Total No. of Questions : 8] **SEAT No. :**

P496 **[Total No. of Pages : 2**

[6004]-401
B.E. (Automobile Engineering)
AUTOMOTIVE TESTING AND CERTIFICATION
(2019 Pattern) (Semester - VII) (416481)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Explain the test procedure of Pass by noise test and noise limits for various vehicle categories. **[9]**

b) Explain in the following. **[9]**

i) Split-mu track

ii) External noise track

iii) Steering pad

OR

Q2) a) Explain the test procedure of Cost Down Test. Why coast down test is performed on the vehicle? **[9]**

b) What is the importance of proving ground vehicle testing? Explain high speed track and gradient track. **[9]**

Q3) a) What is meant by chassis dynamometer? Explain its working and enlist its different types. **[8]**

b) Explain procedure of two wheeler testing on chassis dynamometer for emissions. **[9]**

OR

Q4) a) What is meant by Real Drive Emission (RDE) Testing? How does RDE test work in practice? What are the different equipment's used for RDE Test? **[8]**

b) What is meant by Non-road Transient Cycle (NRTC)? Explain. **[9]**

P.T.O.

Q5) a) Define and differentiate Sound Pressure, Sound Intensity & Sound Power levels and write the relationship between them. **[8]**

b) Write a short note on Vehicle structure noise and methods to reduce it. Explain with examples. **[9]**

OR

Q6) a) What are the different sources of noise and vibration in vehicle? Explain mechanism of noise generation? **[8]**

b) How do you minimize wind noise? Explain with examples. **[9]**

Q7) a) Explain Driver Field Of Vision Test. **[9]**

b) What are the different types of tests performed on rear view mirrors? Explain any one. **[9]**

OR

Q8) a) Explain Demist and Defrost Test. **[9]**

b) Explain Airbag Test. **[9]**

Total No. of Questions : 8]

SEAT No. :

P497

[Total No. of Pages : 3

[6004]-402
B.E. (Automobile Engineering)
MACHINE & VEHICLE DYNAMICS
(2019 Pattern) (Semester - VII) (416482)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of Logarithmic tables, slide rule, electronic pocket calculator is allowed.***
5) ***Assume Suitable data, if necessary.***

Q1) a) Draw and explain the frequency response curves. **[6]**

b) In a vibratory system, a mass of 3 kg is suspended by a spring of stiffness 1200 N/m and it is subjected to harmonic excitation of 20 N. If the viscous damper is provided with the damping coefficient of 75 N-s/m, determine: **[12]**

i) the resonance frequency

ii) the phase angle at resonance

iii) the amplitude at resonance

iv) the frequency corresponding to peak amplitude

v) the damped frequency

OR

Q2) a) Explain **[8]**

i) Transient and steady state vibrations

ii) Magnification Factor

iii) Quality factor of the vibratory system

iv) Bandwidth of the vibratory system

b) A motor car moving with a speed of 100 km/h has a gross mass of 1500 kg. It passes over a rough road which has a sinusoidal surface with an amplitude of 75 mm and a wavelength of 5m. The suspension system has a spring constant of 500 N/mm and damping ratio of 0.5. Determine the displacement amplitude of the car and time lag. **[10]**

P.T.O.

Q3) a) Explain briefly with a neat diagram the various external forces acting on a vehicle. **[9]**

b) Derive the equation of motion for maximum tractive effort that the vehicle can develop for rear wheel drive. **[8]**

OR

Q4) a) Derive the equation for normal reactions acting on axles of a vehicle, when vehicle is on a slope and in rest state. **[6]**

b) A car weighing 21336.75N has a static weight distribution of 50:50 on the front and rear axles. The wheel base is 3m and the height of C.G. above the ground is 0.55 m. The car is accelerating with 3 m/s^2 at a slope of 9º. Neglecting the aerodynamic and drawbar pull resistances, with a neat diagram of car showing all the relevant forces acting on the car, find the magnitude of normal reactions acting on the front and rear wheel axles of the car.

Also, determine the magnitude of normal reaction acting on the front and rear wheel axles of the car, when the vehicle is accelerating on level road. **[11]**

Q5) a) Write a short note on mass factor of power train and its significance.**[7]**

b) With a neat diagram of powertrain, derive the expression for the effective steady state tractive force available from the engine at the ground (tire) after considering all the losses due to inertia of engine and drive train components. **[10]**

OR

Q6) a) A car weighing 1700 kg travelling at a speed of 45 km/hr. The driver puts on the brakes with a steady brake force of 9000 N, when he sees a stop sign. Determine, the: **[12]**

i) Deceleration of the car.
ii) Stopping distance of the car.
iii) Time to stop the car.
iv) Energy dissipated during braking.
v) Brake power dissipated at point of brake application.
vi) Brake power dissipated average at the stop.

Neglect, aerodynamic, rolling and drawbar pull resistances.

b) Explain the terms: **[5]**

i) Constant Deceleration
ii) Brake factor

Q7) a) Derive an expression for steer angle in terms of turning radius and slip angle for two axle vehicle. Explain the same with neat diagram. **[9]**

b) A passenger car has a weight of 20.105 kN and a wheelbase of 2.8 m. The weight distribution on the front axle is 53.5%, and that on the rear axle is 46.5% under static conditions. **[9]**

i) If the cornering stiffness of each of the front tires is 38.92 kN/rad and that of the rear tires is 38.25 kN/rad, determine the steady-state handling behavior of the vehicle.

ii) If the front tires are replaced by a pair of radial-ply tires, each of which has a cornering stiffness of 47.82 kN/rad, and the rear tires remain unchanged, determine the steady-state handling behavior of the vehicle under these circumstance.

OR

Q8) Write short notes on: **[18]**

a) Active suspension system.
b) Constant speed test for vehicle handling.
c) Excitation sources for ride.

Total No. of Questions : 8]

SEAT No. : ____

P498

[Total No. of Pages : 3

[6004] - 403

B.E. (Automobile)

ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

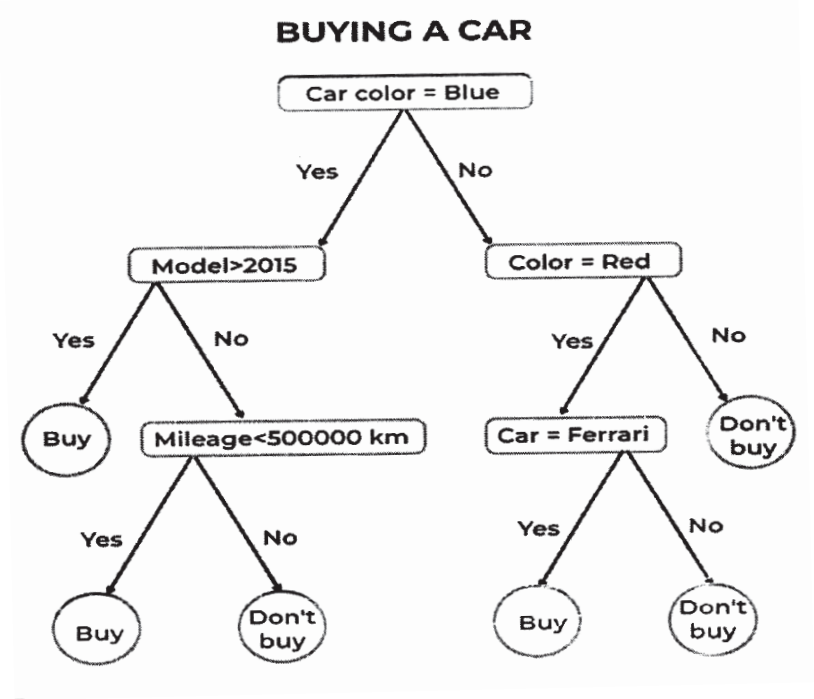
(2019 Pattern) (Semester - VII) (Elective - III) (416484A)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, and Q.7 or Q.8.***
2) ***Neat diagrams must be drawn whenever necessary.***
3) ***Figures to right side indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume suitable data, wherever necessary.***

Q1) a) Explain how does following decision tree algorithm work for buying a car? Also, identify various nodes, attributes and features. **[7]**



b) Explain Support Vector Machine (SVM) terminology. **[5]**

c) Differentiate between logistic regression and linear regression. **[5]**

OR

P.T.O.

Q2) a) Explain with neat sketch Kernel functions of SVM - linear and polynomial. **[7]**

b) State and explain types of Logistic Regression. **[5]**

c) What is the difference between KNN and K means? **[5]**

Q3) a) Observe the following confusion matrix and calculate: **[8]**

Accuracy of classification

Correctly classified samples (Considering all classes and per class)

Incorrectly classified samples (Considering all classes and per class)

True positive, true negative, false positive, false negative.

Predicated class						
A	B	C	D		Actual class	Tyre Condition
17	03	00	00	A		A (Perfectly inflated tyre)
02	18	00	00	B		B (Partially inflated tyre)
00	02	18	00	C		C (Punctured tyre)
00	00	00	20	D		D (Stable)

b) Explain with neat sketch 5-fold cross-validation mode. **[5]**

c) Compare training data Vs. test data Vs. validation data. **[5]**

OR

Q4) a) Enlist steps involved in development of machine learning based regression model. **[8]**

b) Differentiate between regression and classification. **[5]**

c) Explain Cohen's Kappa, F Score, and ROC Curve. **[5]**

Q5) a) State and describe different architectures of deep learning network. **[8]**

b) Difference between machine learning and deep learning. **[5]**

c) List out key constituents of reinforcement learning and write their roles. **[5]**

OR

Q6) a) Explain value-based, policy-based, and model-based reinforcement learning. **[8]**

b) What are different activation functions in CNN? State their significance. **[5]**

c) Explain Markov Decision Process. **[5]**

Q7) a) How AI is used in autonomous vehicles? Explain with suitable example. **[6]**

b) List steps involved in vehicle health diagnostics assisted by machine learning. **[5]**

c) What is predictive maintenance of vehicles? What is role of AI&ML in it? **[6]**

OR

Q8) a) How machine learning is used in autonomous driving? Describe in detail. **[6]**

b) Explain how AI is used in route optimization. **[5]**

c) State significance of digital twins in auto parts design and steps involved in it. **[6]**

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Total No. of Questions : 8]

SEAT No. :

P499

[Total No. of Pages : 2

[6004] - 405

B.E. (Mechanical & Automobile Engineering)

INTERNET OF THINGS

(2019 Pattern) (Semester - VII) (Elective - III) (402044E)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, and Q.7 or Q.8.***
2) ***Neat diagrams must be drawn whenever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of electronic pocket calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Explain UART serial communication interface. **[6]**

b) Describe Arduino Software with respect to Source Code, Compile Code and Upload Machine Code. **[6]**

c) Explain Arduino Constants, Variables and Variables Qualifiers and Scope. **[6]**

OR

Q2) a) Explain any four Arduino's Operators. **[8]**

b) Explain the buzzer interfacing with any board. **[5]**

c) What do you mean by the IoT architecture Outline & Standards? **[5]**

Q3) a) Explain and illustrate mapping of OSI model on TCP/IP. **[6]**

b) What are the popular communication technologies? Explain any three. **[6]**

c) Explain Web Socket APIs. **[5]**

OR

Q4) a) Explain Wi-Fi communication. **[6]**

b) Compare wires versus wireless Communication. **[6]**

c) Explain the advanced features of IoT Platforms. **[5]**

P.T.O.

Q5) a) Describe and illustrate the structure of Hyper Text Transport Protocol (HTTP). **[8]**

b) Explain Proxies as a component of HTTP. **[5]**

c) Explain the five parts of HTTP request. **[5]**

OR

Q6) a) Explain in detail the status codes of HTTP. **[6]**

b) Explain Representational State Transfer (REST) Architectural Constraints. **[6]**

c) Explain the Message Queueing Telemetry (MQTT) packet structure. **[6]**

Q7) a) Explain Brownfield IoT. **[9]**

b) Explain use of IoT in Surveillance applications. **[8]**

OR

Q8) a) Describe the security, privacy and trust issues in IoT- Data-Platforms when used for Smart Cities. **[6]**

b) Write a short note on data aggregation for the IoT in smart cities. **[6]**

c) Explain use of IoT in Health and Lifestyle applications. **[5]**

❄ ❄ ❄

Total No. of Questions : 8]

SEAT No. :

P500

[Total No. of Pages : 4

[6004]-406
B.E. (Automobile Engineering)
FINITE ELEMENTS ANALYSIS
(2019 Pattern) (Semester VII) (416485 - A) (Elective - IV)

Time :2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2 Q.3 or Q.4 Q.5 or Q.6 Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***
5) ***Use of logarithmic tables, slide rule, electronic pocket calculator is allowed.***

Q1) a) In triangular element, shown in fig 1 the nodes 1, 2 and 3 have Cartesian coordinates: (30,40), (140,70), and (80,140) respectively. The displacement in mm at node 1, 2 and 3 are (0. 1, 0.5), (0.6,0.5) and (0.4, 0.3) respectively. The point P within the element has Cartesian coordinates (77, 96). For point P determine the i) natural coordinate ii) shape function iii) displacement) **[12]**

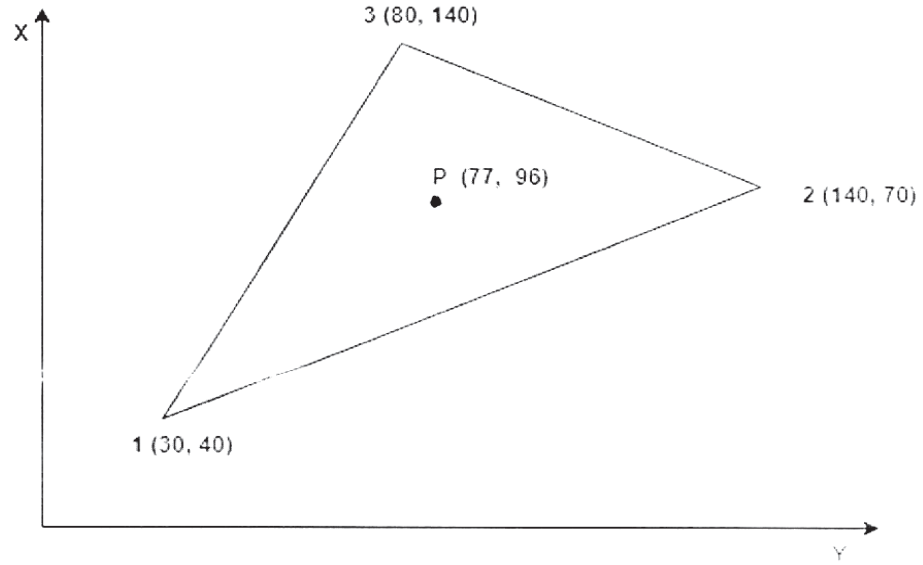

Fig. 1

b) Write the short note on **[6]**

i) Plane stress

ii) Plane stain

OR

P.T.O.

Q2) a) Determine the Cartesian Coordinate of Point P $(\xi = 0.25, \eta = 0.5)$, shown in Fig. 2 **[10]**

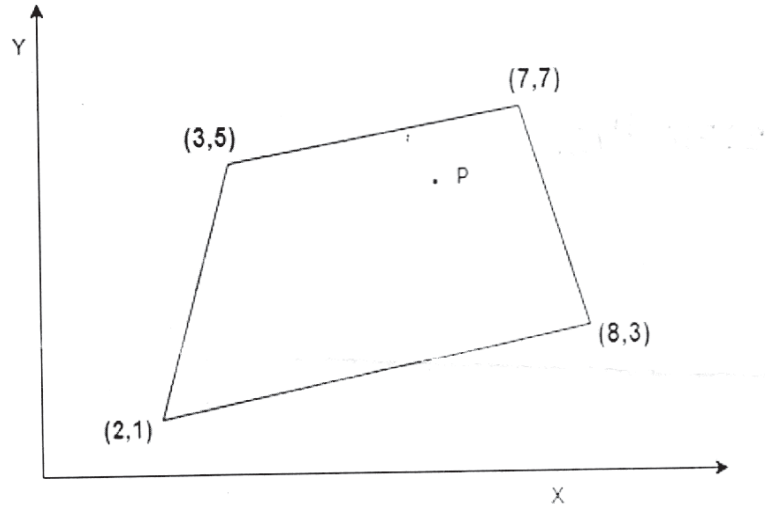

Fig. 2

b) Differentiate the 4 noded quadrilateral element and 8 noded quadrilateral element **[8]**

Q3) a) Briefly explain the concept of P and H formulation in meshing, and how it use for improving the FEA results accuracy. **[9]**

b) Explain the following terminologies in element meshing **[8]**

i) Aspect ratio

ii) Stretch

OR

Q4) a) What is the Convergence test in FEA? **[5]**

b) What is the critical region in FEA model? Which are the different way to improve the FEA results accuracy in critical region? **[4]**

c) Explain the following terminologies in element meshing **[8]**

i) Included anagle

ii) taper

Q5) a) What is the Non-linear analysis? Write down the difference between linear and non-linear analysis. **[10]**

b) What is the material model? Explain any type of material model in non linear analaysis. **[7]**

OR

Q6) a) Explain the following in nonlinear analysis **[10]**

i) geometry nonlinearity

ii) material non linearity

b) Explain the stress measure in non-linear analysis. **[7]**

Q7) a) A brick wall shown in Fig 3 has thickness of 0.6m and thermal conductivity of 0.8W/mºK. The inner surface of wall is at 28ºC and outer surface is exposed to cold air at - 10ºC. The heat transfer coefficient at outer surface is 40 W/mºK. Determine the steady-state temperature distribution within the wall. Considered the two elements. **[12]**

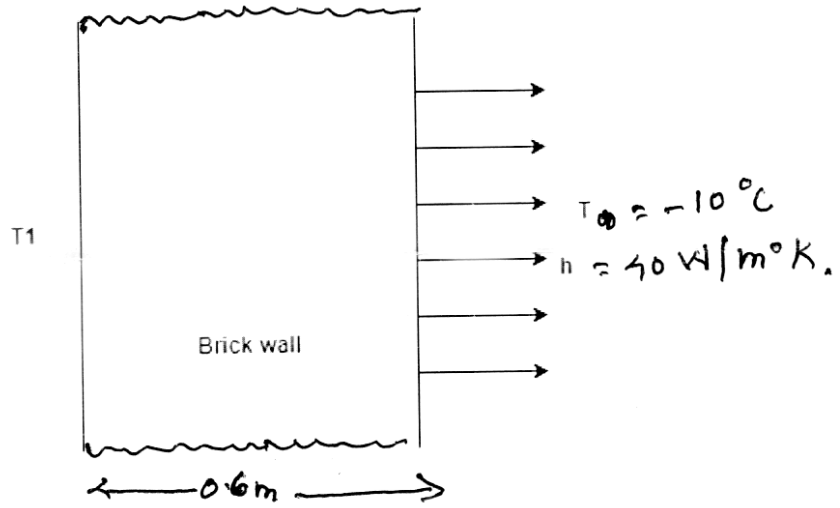

Fig. 3

b) Explain the consistence and lumped mass matrix technique for model analysis. **[6]**

OR

Q8) a) Find the natural frequency of bar using lumped mass matrix method. Use following data E = 2X 10^{11} N/m^2, ρ = 7800kg/m^3 and L = 1m. Considered 1 element only. The bar is shown in Fig.4. **[12]**

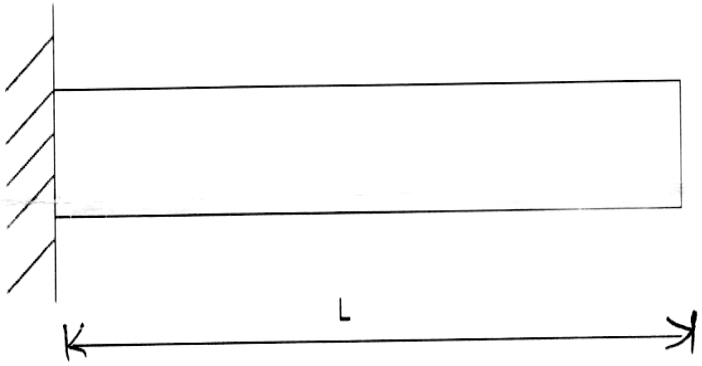

Fig. 4

b) What is the shape function? How it is used in thermal analysis to find the temperature distribution with in the wall? **[6]**

Total No. of Questions : 8]

SEAT No. :

P-501

[Total No. of Pages : 2

[6004]-408

B.E. (Automobile Engineering)

HYBRID AND ELECTRIC VEHICLE

(2019 Pattern) (Semester - VIII) (416489)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Assume suitable data if necessary.***
2) ***Answer FOUR questions from the following (Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, and Q.7 or Q.8).***

Q1) a) Give detailed classification of motors used in 'Electric Vehicle (EV)'. **[8]**

b) Explain Torque-Speed characteristics of Electric Vehicle Motors. Also, show and explain constant torque, constant power and constant speed region in torque-speed curve. **[9]**

OR

Q2) a) In permanent magnet motor drives, explain different magnet arrangements with neat sketches. Also, explain which arrangement is preferred E.V. Motors and why? **[8]**

b) i) In Torque Vs Speed reference plane, explain motoring and generation of an electric motor in four quadrants,

ii) Also, Explain concept of regeneration in electric vehicle.

[9]

Q3) Explain following parameters of Li-Ion batteries in short : **[18]**

a) Battery Capacity

b) State of Charge (SOC)

c) C- Rate

d) State of Health (SOH)

e) EV Battery Life,

f) Depth of Discharge (DOD).

P.T.O.

OR

Q4) a) Why Lithium is preferred in energy storage device of electric vehicle? **[6]**

b) List different Lithium Chemistries used in 'Li-Ion Battery'. **[6]**

c) State different parameters used to compare different types of 'Li-Ion Batteries' **[6]**

Q5) a) What is the need of Battery Management System (BMS)? **[8]**

b) What are the functions of Battery Management System (BMS)? **[9]**

OR

Q6) a) What is a Battery Thermal Management System (BTMS)? **[8]**

b) Why is Battery Thermal Management System important in electric vehicle? **[9]**

Q7) It is decided to design an E-Rickshaw with following specifications :- (1) Gross Vehicle Weight (GVW) = 680kg, (2) Maximum Speed = 45kmph, (3) Acceleration = 0 to 45 kmph in 20 seconds, (4) Grade = 0°, (5) Radius of wheel = 0.2m, (6) Coe. Of Drag = 0.44, (7) Gear Ratio = 9:1, (8) Air Density = 1.225kg/m^3,(9)Front Area = 1.6m^2, (10)Coe. of rolling resistance = 0.013, (11) Coe. of sliding friction = 0.3. Calculate :- (i) Motor Power in kW, (ii) Batteiy Pack Capacity in kwhr, (iii) Energy Efficiency in Watt-hour/km,(iv) Actual Max. Vehicle Speed in kmph, and (v) EV range (in Km) for plane road at constant speed of 30kmph. **[18]**

OR

Q8) It is decided to design an E-Scooter with following specifications:- (1) Gross Vehicle Weight (GVW) = 191kg, (2) Maximum Speed = 80kmph, (3) Acceleration = 0 to 40kmph in 4 seconds, (4) Grade = 0°, (5) Radius of wheel = 0.1524m, (6) Coe. Of Drag = 0.22, (7) Gear Ratio = 7.8:1, (8) Air Density = 1.225kg/m^3,(9)Front Area = 0.875m^2,(10)Coe. of rolling resistance = 0.015, (11) Coe. of sliding friction = 0.3. Calculate :- (i) Motor Power in kW, (ii) Battery Pack Capacity in kwhr, (iii) Energy Efficiency in Watt-hour/km,(iv) Max. Vehicle Speed in kmph, and (v) EV range (in km) for plane road at constant speed of 60 kmph. **[18]**

Total No. of Questions : 8]

SEAT No. : ____

P-502

[Total No. of Pages : 2

[6004]-409
B.E. (Automobile Engineering)
AUTOMOTIVE SYSTEM DESIGN
(2019 Pattern) (Semester - VIII) (416490)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates :

1) ***Answer four questions from the following.***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data, if necessary.***

Q1) a) Why a hollow propeller shaft normally used? **[4]**

b) A three speed gear box gives 3 forward speeds and one reverse with a top gear of unity and bottom and reverse gear ratio of approximately 3.3:1. The centre distance between the shafts is to be 110 mm approximately. Gear teeth of module 3.25 mm. find the number of gear teeth. **[6]**

c) Explain the design procedure of live axles. **[7]**

OR

Q2) a) An engine develops 28 KW at 1500 rpm and its bottom gear ratio is 3.06. If a propeller shaft of 40mm outside diameter is to be used, determine the inside diameter of mild steel tube to be used, assuming a safe shear stress of 55×10^3 KPa for MS. **[8]**

b) Explain the design procedure of propeller shaft with sketch. **[9]**

Q3) In a hydraulic braking system the force on foot pedal is 100N, pedal leverage ratio is 4.4, cross sectional area of master cylinder is 4 cm^4, cross sectional area of front piston 20 cm^4. Cross sectional area of the rear piston is 5 cm^4. Distance moved by effort is 1 cm. Calculate the following. **[18]**

a) Front to rear brake ratio

b) Total force ratio

c) Distance moved by output

d) Cylinder movement ratio

e) Total movement ratio

OR

P.T.O.

Q4) a) A light motor vehicle has a wheel base of 2.64m, the height of its CG above the ground is 0.61m and it is 1.12 m in front of the rear axle. If the car is travelling at 40km/h on a level track, determine the minimum distance in which the car may be stopped, when, **[12]**

i) The rear wheels are braked

ii) The front wheel are braked

iii) All wheels are braked

b) What is the braking efficiency? Explain in detail. **[6]**

Q5) a) A semi elliptic type spring has leaves of 75 mm width and 10 mm thickness, effective length is 900 mm. If the stress is not to exceed 220.725 MPa, when the spring is loaded to 4905 N. Estimate the required number of leaves and the deflection under this condition. If the spring is just flat under load, what is the initial radius? Take E = 196.2 GPa. **[10]**

b) Write a note on air springs. **[7]**

OR

Q6) Discuss on : **[17]**

a) What is nipping in leaf springs?

b) Brake fade and Brake torque.

c) Brake balance and Braking efficiency.

d) Components used in hydraulic brake system

Q7) Design a Tensile Bar for Minimum Cost of the following materials. **[18]**

Assume Factor of Safety of 2.0

Material	Mass density (Kg/m^3)	Yield strength (MPa)	Material cost Rs./N
Steel	3000	16	130
Al alloy	3000	32	50
Magnesium alloy	2100	32	20

Length of the bar is 200 mm and a constant tensile load on bar is of 5000N.

OR

Q8) a) What do you understand by, **[12]**

i) Optimum and adequate design.

ii) Significance of free variable and constrained variable in Johnson's method of optimum design.

iii) Design for natural tolerances.

b) Explain about aspects of Aesthetic Design. **[6]**

▽▽▽▽

Total No. of Questions : 8]

SEAT No. :

P2849

[Total No. of Pages : 3

[6004]-410

B.E. (Automobile Engineering)

ALTERNATIVE FUELS AND EMISSION CONTROL

(2019 Pattern) (Semester-VIII) (Elective-V) (416491A)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume Suitable data if necessary.***

Q1) a) What are the different methods of utilizing vegetable oils in engines, such as biodiesel production, direct vegetable oil (SVO/WVO) combustion, and oil blending? **[9]**

b) What is the process of transesterification of vegetable oils, and how does it enable the production of biodiesel as a viable alternative to conventional diesel fuel? **[9]**

OR

Q2) a) What is the role of nanofluids, additives, and cetane improvers in enhancing the performance of vegetable oils as fuel? Discuss how these technologies and substances can improve combustion characteristics, reduce emissions, and optimize the overall efficiency of vegetable oil-based fuels in internal combustion engines. Provide examples and evidence to support your explanation. **[9]**

b) What are the different methods used for utilizing vegetable oils in engines, including blending, preheating, and emulsification? How do these methods affect the performance, efficiency, and environmental impact of vegetable oil-based fuels? **[9]**

Q3) a) What are the various production methods used for generating biogas, and how do they differ in terms of feedstock, process, and efficiency?**[8]**

b) What modifications are necessary in spark ignition (SI) engines to enable their use with liquefied petroleum gas (LPG) as a fuel source, and how do these modifications impact the engine's performance, emissions, and overall efficiency? **[9]**

OR

P.T.O.

Q4) a) When using compressed natural gas (CNG) in spark ignition (SI) engines, what modifications are necessary to optimize performance, ensure compatibility, and maintain emissions compliance? How do these modifications impact factors such as engine design, fuel delivery systems, ignition timing, and exhaust after- treatment? **[8]**

b) What are the methods and technologies used for the scrubbing of carbon dioxide (Co_2) and hydrogen sulfide (H_2S) in biogas, and how do these processes effectively remove these undesirable components? What are the implications of Co_2 and H_2S scrubbing on the quality and potential applications of biogas as a renewable energy source? **[9]**

Q5) a) What are the major sources of pollution that contribute to environmental degradation and how do they impact air, water, and soil quality? What are some of the key measures and solutions that can be implemented to mitigate and reduce pollution from these sources? **[8]**

b) What is FID (Flame Ionization Detector) and how is it utilized in environmental analysis? Explain the working principle of FID, its advantages, and its applications in detecting and quantifying organic compounds. **[9]**

OR

Q6) a) What are the environmental and human health effects caused by vehicle pollutants, such as carbon monoxide (CO), nitrogen oxides (NOx), particulate matter (PM), and volatile organic compounds (VOCs)? How do these pollutants contribute to air pollution, climate change, and various health issues, and what are the potential strategies to minimize their impact on both the environment and human well being? **[8]**

b) What is NDIR (Non-Dispersive Infrared) technology and how is it used in environmental monitoring and gas detection? What are the key principles behind NDIR technology, its advantages, and its applications in measuring various gases, such as carbon dioxide (Co_2) and volatile organic compounds (VOCs)? **[9]**

Q7) a) What are the effects of design and operating variables, such as engine design, fuel composition, combustion parameters, and exhaust aftertreatment systems, on the formation of emissions in various combustion processes? How do these variables influence the production of pollutants, such as nitrogen oxides (NOx), particulate matter (PM), and volatile organic compounds (VOCs), and what strategies can be employed to optimize these variables for reduced emissions and improved environmental performance? **[9]**

b) What is Selective Catalytic Reduction (SCR) and how does it contribute to the reduction of nitrogen oxide (NOx) emissions in various industries, particularly in diesel engines? Explain the working principle of SCR systems, the role of the catalyst, and the chemical reactions involved in converting NOx into harmless nitrogen and water. Discuss the advantages and challenges associated with implementing SCR technology for effective emission control. **[9]**

OR

Q8) a) What is a catalytic converter and how does it function in reducing harmful emissions from internal combustion engines? Explain the role of catalytic converters in the conversion of pollutants, such as nitrogen oxides (NOx), carbon monoxide (CO), and hydrocarbons (HC), into less harmful substances. Discuss the various types of catalysts used in catalytic converters and their effectiveness in emission control. **[9]**

b) Write a short note on following. **[9]**

i) Secondary Air Injection.

ii) Laser Assisted Combustion.

iii) HCCI.

Total No. of Questions : 8]

SEAT No. : ____

P503

[Total No. of Pages : 2

[6004]-411

B.E. (Automobile Engineering)
RENEWABLE ENERGY
(2019 Pattern) (Semester-VIII) (Elective-V) (416491B)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***

Q1) a) Describe with neat sketch the working of Wind energy Conversion system (WECS) with main components. **[9]**

b) Classify wind-turbines used to extract wind energy. Explain the different types in brief. **[9]**

OR

Q2) a) Elaborate on the concept of wind farm with block/neat diagram. **[9]**

b) What are the advantages and disadvantages of wind energy systems. **[9]**

Q3) a) Describe a liquid dominated geothermal power plant with neat sketch. **[9]**

b) What are different types of Geothermal energy Resources/Explain any two in details. **[8]**

OR

Q4) a) Describe a Hybrid conventional and geothermal power plant with neat sketch. **[9]**

b) What are the main applications of Geothermal Energy? Explain any two in details. **[8]**

Q5) a) Draw the sketches of any three types of biogas plants. **[9]**

b) What is Gasifier? Describe Down-draught Gasifier with neat sketch. **[9]**

OR

P.T.O.

Q6) a) Describe MHD closed cycle system with its advantages and disadvantages. **[9]**

b) Write a note on Fluidized Bed Combustion Boiler (FBCB). **[9]**

Q7) a) Write a note on small hydel power plant. **[9]**

b) What are advantages and limitations of Ocean Energy. **[8]**

OR

Q8) a) Explain the basic principles of ocean thermal energy conversion system (OTEC) and explain closed cycle OTEC System with neat sketch. **[9]**

b) Explain different ocean Energy Resources in brief. **[8]**

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Total No. of Questions : 8]

SEAT No. :

P-504

[Total No. of Pages : 2

[6004]-412

B.E. (Automobile Engineering)

TRANSPORT MANAGEMENT AND AUTOMOBILE INDUSTRY

(2019 Pattern) (Semester - VIII) (416492A) (Elective - VI)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***

Q1) a) What are the provisions regarding construction of motor vehicles as per MVA? **[6]**

b) Why road tax is levied on vehicle. **[6]**

c) Explain one Time tax for Maharashtra State. **[6]**

OR

Q2) a) Define Tax. What are the objectives of Tax? **[6]**

b) Explain the structure and method of Taxation. **[6]**

c) Which vehicles are the exempted from tax payment & why? **[6]**

Q3) a) Explain different types of Traffic Signs? **[6]**

b) Explain the Procedure for accident claim. **[5]**

c) What is third party insurance? **[6]**

OR

Q4) a) What are the Duties of driver in case of accident? **[6]**

b) Explain Hit & Run case. **[6]**

c) Distinguish between Insurance & Assurance. **[5]**

P.T.O.

Q5) a) Explain the functions of good transport organization with the structure. **[9]**

b) Describe briefly the Records keeping importance and fleet management. **[8]**

OR

Q6) a) Describe basic elements of transport system. - **[8]**

b) What is the procedure for transportation of petroleum product? **[9]**

Q7) a) Explain seven quality tools. **[6]**

b) Explain Criteria for International Quality Award. **[6]**

c) Explain Automotive Industry standards. **[6]**

OR

Q8) a) Explain quality circle. **[6]**

b) Explain Six Sigma. **[6]**

c) Discuss Juran Trilogy approach. **[6]**

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Total No. of Questions : 8]

SEAT No. :

P-505

[Total No. of Pages : 2

[6004]-413

B.E. (Automobile Engineering)

AUTOMOTIVE SAFETY

(2019 Pattern) (Semester - VIII) (416492B) (Elective-VI)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2 , Q3 or Q4,Q5 or Q6, Q7 or Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figure to the right side indicate full marks.***

Q1) a) Explain the cadaver testing and crashworthiness. **[9]**

b) Compare the rear testing with side impact testing in a vehicle. **[8]**

OR

Q2) a) Explain the proving-ground testing in a vehicle. **[9]**

b) Describe the in-field testing for a hatchback. **[8]**

Q3) a) Explain the role of occupant packaging in car design. **[10]**

b) Explain the strategies for improving occupant accommodation and comfort in a car. **[8]**

OR

Q4) a) Explain the five steps of occupant package development process for a sedan car. **[9]**

b) Discuss the vehicle seating configuration for a multi utility vechile as per sae norms. **[9]**

Q5) a) Explain Severity Index (SI) and Head Injury Criteria (HIC). **[9]**

b) Describe the side impact and rear impact dummies. **[8]**

OR

P.T.O.

Q6) a) Write a short note on Energy Absorbing systems. **[9]**

b) Design a Bio-RID as per percentile statures. **[8]**

Q7) a) Explain the tyre pressure monitoring system. **[9]**

b) Describe the working of adaptive front lighting system. **[9]**

OR

Q8) a) Explain the working of sensotronic brake control. **[9]**

b) Discuss the working of intelligent airbag sensing system. **[9]**

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Total No. of Questions : 8]

SEAT No. :

P-506

[Total No. of Pages : 3

[6004]-414

B.E. (Automobile Engineering)

PROCESS PLANNING & COST ESTIMATION

(2019 Pattern) (Semester - VIII) (416492C) (Elective-VI)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data, if necessary.***

Q1) a) Explain ladder of cost in detail. **[9]**

b) What are the purposes of cost accounting? **[9]**

OR

Q2) a) Explain cost estimation procedure in detail. **[9]**

b) Explain in detail Parametric Cost Estimation. **[9]**

Q3) a) Explain Selling and Distribution Expenses in detail. **[8]**

b) Explain Administrative Expenses in detail. **[9]**

OR

Q4) a) Explain the methods of Depreciation in detail. **[8]**

b) A certain product is manufactured in batches of 100. The direct material cost is Rs. 50, direct labour cost in Rs. 80 and factory overhead charges are Rs. 65. If the selling expenses are 45 percent of factory cost, what should be selling price of each product so that the profit is 10 percent of the total cost? **[9]**

P.T.O.

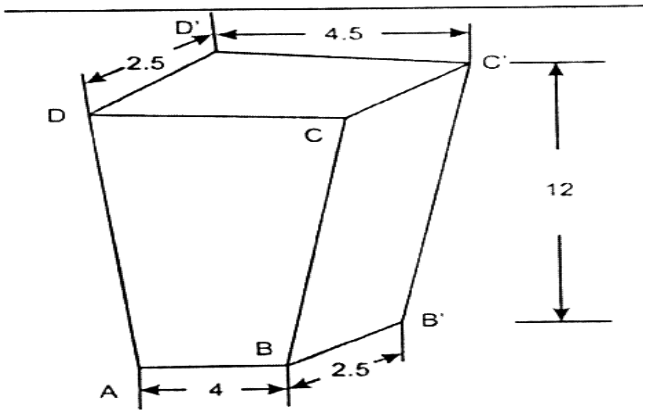
Q5) a) The following particulars of a factory manufacturing three types of components X,Y and Z. Annual overhead expenses=Rs. 90,000. Direct labour cost for the component X= Rs. 10,000. Direct labour cost for the component Y=Rs. 15,000 and direct labour cost for the component Z=Rs. 20,000. Allocate the overheads to each components. **[8]**

b) Explain cost estimation procedure for foundry shop. **[9]**

OR

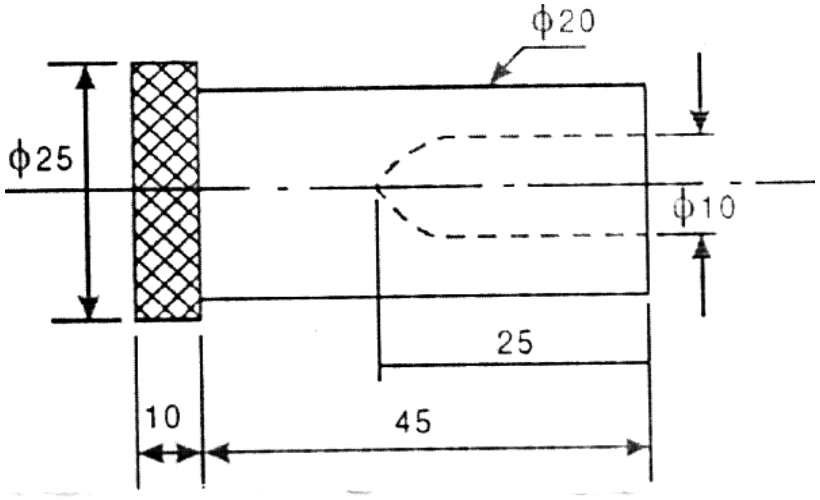
Q6) a) Explain labour cost estimation procedure in detail **[8]**

b) An iron wedge has been made by forging a 3 cm diameter bar stock. The length and breadth of the base being 4.5 cm and 2.5 cm. length 4 cm and height 12 cm. If the density remains unchanged after forging. What length of bar is required to make the wedge? All diamensions are in cms. **[9]**



Q7) a) Explain importance of machining time calculation in detail. **[9]**

b) An ms shaft shows in figure is to be turned from a 25 bar. Speed is 60 m/min. feed is 0.2 mm/rev. calculate the machining time. feed for drilling is 0.08 mm/rev., feed for knurling is 0.3 mm/rev. **[9]**



OR

Q8) a) Explain the important factors for machining time estimation in lathe operation. **[9]**

b) A 300 mm × 50 mm rectangular cast iron piece is to be face milled with a carbide cutter. The cutting speed and feed are 50 m/min and 50 mm/min. If the cutter dia is 80 mm and it has 12 cutting teeth, determine:

i) Cutter r.p.m.

ii) Feed per tooth

iii) Milling time **[9]**

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Total No. of Questions : 8]

SEAT No. :

P507

[Total No. of Pages : 2

[6004]-415
B.E. (Biotechnology)
BIOCHEMICAL ENGINEERING
(2019 Pattern) (Semester -VII) (415461)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Draw a neat sketch and explain top entry and bottom entry impellers. Give advantages and limitations if any. **[9]**

b) Explain in detail role and working of pH controller system. **[9]**

OR

Q2) a) What is headspace? Why headspace is considered while designing a fermenter? What are the factors affecting headspace? **[9]**

b) Draw and explain in detail components of fermenter agitation system. **[9]**

Q3) a) Explain in detail any one method for estimation of oxygen uptake rate. **[9]**

b) Draw and explain role of sparger and baffles in fermenter design. **[8]**

OR

Q4) a) Describe with the help of mass transfer theory how mixing takes place? **[8]**

b) Describe with the help of TCA cycle biosynthetic routes for the production of amino acid. **[9]**

Q5) a) What is pilot plant? Why there is a need to develop a pilot plant before scale up? **[9]**

b) Explain in detail regimen analysis for pilot plant. **[9]**

OR

P.T.O.

Q6) a) Explain terms: **[9]**

i) Compatibility of the equipment.

ii) Process evaluation and validation.

b) Give checklist for GMP considerations. Describe need of cGMP in bioprocess industry. **[9]**

Q7) a) How surface immobilization of enzyme takes place? What are the techniques used for surface immobilization? **[9]**

b) What are types of immobilized cell reactors? Draw sketches and explain in detail. **[8]**

OR

Q8) a) Give one detailed case study of semisynthetic process. **[9]**

b) Write comparison between plant cell reactors and animal cell reactors. Describe one case study where plant or animal cells functions similarly in the bioreactor. **[8]**

Total No. of Questions : 8]

SEAT No. :

P508

[Total No. of Pages : 2

[6004]-416
B.E. (Biotechnology)
BIOINFORMATICS
(2019 Pattern) (Semester - VII) (415462)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Figures to right indicate full marks.***
3) ***Assume suitable data if necessary.***

Q1) a) What is SWISS-PROT? How is it significant? **[9]**

b) Write in detail a sample sequence data file of SWISSPROT. Explain the key features of the file. **[9]**

OR

Q2) a) Write a note on TrEMBL Database. How is that database created and give its significance. **[9]**

b) Write a note on Ramachandran Plot. **[9]**

Q3) a) What is protein structure prediction? What tools or methods used for structure prediction. **[9]**

b) Give an overview of protein structure visualization with a software like RASMOL and its significance. **[8]**

OR

Q4) a) How is the organization of proteins in SCOP and CATH Database? Describe in detail. **[9]**

b) What is molecular docking concept? Give its significance. **[8]**

Q5) a) Describe Alignment concept. How has it changed the way in medical research? **[8]**

b) What is BLAST? Why is it called heuristic method of alignment? **[10]**

OR

P.T.O.

Q6) a) What is a scoring matrix? Give its significance and give examples of scoring matrices. **[10]**

b) What is Global alignment? Give an example. **[8]**

Q7) a) Define Phylogeny. How is a Phylogenetic Tree constructed? Explain with any one way of tree construction. **[8]**

b) What are Homologs, orthologs and paralogs define and explain with a phylogenetic tree diagram. **[9]**

OR

Q8) a) Explain the algorithm and narrate steps to do Multiple Sequence Alignment (MSA). Give an example of application of MSA. **[8]**

b) What are rooted and unrooted trees? Describe Neighbour Joining Tree. **[9]**

Total No. of Questions : 8]

SEAT No. :

P509

[Total No. of Pages : 2

[6004] - 418

B.E. (Biotechnology Engineering)

ENVIRONMENTAL BIOTECHNOLOGY

(2019 Pattern) (Semester - VII) (Elective - III) (415463 B)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of a calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) What are the general processes used in the pulp and paper industry? Explain the problems related to the processes. **[9]**

b) What are the general processes used in the Tannery industry? Explain the problems related to the processes. **[9]**

OR CO3

Q2) Which processes are followed by Dairy Industries to develop products? Write the characteristics of effluents in the Dairy industry. Describe the conventional methods of effluents treatment. **[18]**

CO3

Q3) a) When can combustion be used as a method for air pollution control? Explain the working principle in detail. **[10]**

b) How microorganisms are used in air pollution control? Explain the method and use of equipment in detail. **[7]**

OR CO4

Q4) Describe the working principles and applications of the following equipment: **[17]**

a) Cyclone.

b) Electrostatic Precipitator. CO4

P.T.O.

Q5) How to classify solid waste into a hazardous and non-hazardous categories? Describe in detail the methods used for hazardous medical waste management. **[18]**

OR CO5

Q6) What is the Biotechnology application to hazardous waste management?Explain Biodegradation and Biological detoxification methods in detail. **[18]**

CO5

Q7) Describe In-situ and Ex-situ bioremediation methods in detail. **[17]**

OR CO6

Q8) How to measure Bioremediation in the field? Write a note on Processes and Technologies used in Bioremediation. **[17]**

CO6

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Total No. of Questions : 8]

SEAT No. :

P510

[Total No. of Pages : 2

[6004] - 419
B.E. (Biotechnology)
GENOMICS
(2019 Pattern) (Semester - VII) (Elective - III) (415463 C)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data if necessary.***

Q1) a) What is transcriptomics? Name two applications. **[6]**

b) Write a note on Real Time PCR and its applications **[6]**

c) What are the three mechanisms of miRNA functions? **[6]**

OR

Q2) a) With the help of a chart briefly explain Microarray technology. **[6]**

b) Cancer tissue embedded in paraffin block is given to you. How would you detect over expression of HER 2 in the tissue sample? **[6]**

c) Give names and examples of three miRNA functions. **[6]**

Q3) a) What are the two primary mechanisms of Epigenetics. **[9]**

b) Compare Euchromatin and heterochromatin with respect to structure, function, methylations and diagram. **[8]**

OR

Q4) a) Write a short note on Epigenetics and diseses. **[9]**

b) Write short notes on (4 marks each) **[8]**

i) Histone PTMs.

ii) Bisulphite sequencing.

P.T.O.

Q5) a) What is ADME? **[8]**

b) Give an overview of Pharmacogenomics. **[10]**

OR

Q6) a) Giving example explain the role of drug metabolizing enzymes in drug response. **[10]**

b) What are the technologies used in Pharmacogenomics? **[8]**

Q7) a) What is nutrigenomics? **[8]**

b) What is phenotype plasticity? **[9]**

OR

Q8) a) Write a note on personalized nutrition. **[8]**

b) Design a retrospective study to prove/ disprove the hypothesis "B12 deficiency affects the birth weight of the newborns. (Make a flow chart of study plan). **[9]**

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Total No. of Questions : 8]

SEAT No. :

P511

[Total No. of Pages : 2

[6004]-421
B. E. (Biotechnology)
NANOTECHNOLOGY
(2019 Pattern) (Semester - VII) (Elective - IV)(415464B)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2,Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to right side indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) What are the different application of nanotechnology in the field of : **[12]**

i) Cell therapy

ii) Gene therapy

iii) Cardiac theapy

b) Discuss drug delivery to eye and its advantages in nanotechnology. **[6]**

OR

Q2) a) Discuss in detail applications of nanosurgery. **[6]**

b) Explain in detail physiological approach of drug targeting to brain in nanotechnology field. **[6]**

c) Explain in detail how nanoparticle achieved a key role in detection of infectious dieses. **[6]**

Q3) a) Write a detail note on : **[12]**

i) Polymer based biosensor

ii) Namodevices used in biomedical field

b) Discuss functioning of sensing substrates in nanodevices. **[5]**

OR

Q4) a) Why nanomaterials are used in nanodevices? Explain. **[8]**

b) Which type of nanodevices can be utilized for the improvement of biomedical field? Discuss. **[9]**

P.T.O.

Q5) a) Write IUPAC definition of biosensor? **[6]**

b) Discuss about miniaturization of nanosensors. **[6]**

c) Explain in detail the concept of electron transfer of molecules of biomolecules with reference to biosensor. **[6]**

OR

Q6) a) Discuss indetails about the nanoparticle - Biomaterial hybrid system used for sensing electronic devices. **[9]**

b) What is biochip? Explain its working principles and applications. **[9]**

Q7) a) Discuss in details the micro-electrochemical system (MEMS). **[8]**

b) What are the different characterises of biosensor? Explain any two. **[9]**

OR

Q8) a) Write a detail note on : **[10]**

i) Mass based biosensors

ii) Potentiometric biosensors

b) Write down the various applications of biosensors in food industry and environment field. **[7]**

Total No. of Questions : 8]

SEAT No. : ____

P512

[Total No. of Pages : 2

[6004]-422
B.E. (Biotechnology)
STEM CELL BIOLOGY AND REGENERATIVE MEDICINE
(2019 Pattern) (Semester -VII) (Elective - IV) (415464C)

Time :2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2,Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Figures to right indicate full marks.***
3) ***Assume suitable data, if necessary.***

Q1) a) Describe the process of regeneration of stem cells in planaria. **[6]**

b) Write note on stem cells differentiation and plasticity. **[6]**

c) Explain about tissue regenerative capacity of adult stem cells. **[6]**

OR

Q2) a) Describe the process involved in characterization of somatic stem cells. **[6]**

b) Explain the process of isolation and culturing of stem cells. **[6]**

c) Write note on facultative stem cells. **[6]**

Q3) a) Explain the guidelines for stem cells therapy and clinical trials in India. **[9]**

b) Write note on Embryo Ethics and Egg donation Ethics. **[8]**

OR

Q4) a) Write note on Ethics in Gene editing. **[9]**

b) Describe in detail about the stem cells interventions. **[8]**

Q5) a) Explain about in-vitro cultures of adult stem cells to analyse differentiation and properties. **[8]**

b) Write note on natural and synthetic scaffolds for tissue engineering. **[10]**

OR

P.T.O.

Q6) a) Explain how the scaffold helpful in organ culture. **[10]**

b) What are the computational tools involved to dissect stem cells, describe in detail. **[8]**

Q7) a) As the property of regeneration and differentiation describe the various clinical applications of stem cells. **[8]**

b) Write note on cell replacement therapies from Pluripotent stem cells. **[9]**

OR

Q8) a) Explain about in-vitro transdifferentiation of fibroblast therapy. **[8]**

b) Write short note on disease modeling and drug screening. **[9]**

Total No. of Questions : 8]

SEAT No. :

P-513

[Total No. of Pages : 2

[6004]-423

B.E. (Biotechnology)

BIOPROCESS MODELING AND SIMULATION

(2019 Pattern) (Semester - VII) (415471)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume Suitable data if necessary.***

Q1) a) Why there is a need to build models based on boundary conditions? Explain it with one example. **[9]**

b) Give classification of mathematical modelling based on forms of models. **[9]**

OR

Q2) a) Describe any one model system using partial differential equations. **[9]**

b) Write a short note on modelling of reactors with exothermic reactions. **[9]**

Q3) a) Consider a fed-batch system with a variable volume culture. Where the concentration of biomass at a certain time is given by, **[12]**

$$X^t = X_0 + Y^M_{x/s}(S_0 - S)$$

Considering the reactor variable volume write total continuity equation and component continuity equation with respect to substrate consumption and product formation with microbial cell growth.

b) Write a short note on substrate limited growth in chemostat. **[5]**

OR

Q4) a) Draw a neat sketch of a continuous stirred tank reactor and write model equations considering μ as cell growth rate and D dilution rate inside the fermenter. **[8]**

b) Write a detailed short note on modeling approach of unsteady state reactors. **[9]**

P.T.O.

Q5) a) A tank is used to dissolve a solid into a liquid solvent. The tank is provided with an agitator. This tank acts as a batch system which means no inflow and outflow. The total mass of the system remains constant. Write total and component continuity equations for the system considering an equilibrium condition. **[9]**

b) Write a short note on tower aerobic and anaerobic reactors. **[9]**

OR

Q6) a) Draw a sketch and develop a model for batch bubble column reactor in which reactant A is fed as a gas through a distributor into the bottom of the liquid filled reactor. A chemical reaction occurs between A and B in the liquid phase to form a liquid product C. A must dissolve into the liquid before it can react. Considering the mass transfer taking place inside the reactor. Give certain assumptions. **[12]**

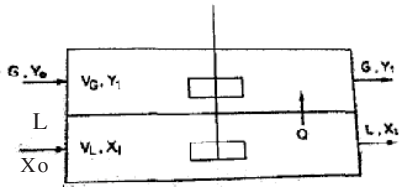
b) What are the different types of sparged bioreactors? Why there is a necessity to replace agitated reactors with sparged ones? **[6]**

Q7) a) Consider a constant volume batch reactor which is used to convert reaction A $\rightarrow$ B A $\rightarrow$ B, via an endothermic reaction. The reaction kinetics are second order with respect to A. Product B is formed at the same rate as that of decomposition of $-\gamma_A = kC_A^2 - \gamma_A = kC_A^2$. Write mass and energy balance equations for a constant volume batch reactor. **[9]**

b) Write a total mass and component balance equations for a simple overhead distillation still considering the vapour-liquid equilibrium.**[8]**

OR

Q8) a) Consider the continuous extraction process which is carried out in a perfectly mixed stage as shown in figure below. **[12]**



Write total balance and component balance equation considering the transfer direction from volume V_L to V_G

b) Write a short note on various softwares used in simulating various bioprocesses with one case study. **[5]**

Total No. of Questions : 8]

SEAT No. : ____

P1444

[Total No. of Pages : 2

[6004]-424

B.E. (Biotechnology)

PLANT ENGINEERING AND PROJECT COSTING

(2019 Pattern) (Semester-VIII) (415472)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitbale data if necessary.***

Q1) a) Sketch and describe any six types of symbols used for the preparation of piping diagram. **[6]**

b) Draw a neat P & ID of batch/biochemical reactor. **[6]**

c) Draw and discuss the concept isometric of piping. **[6]**

OR

Q2) a) Comment on thermal insulation of piping. **[6]**

b) What is the importance of pipe sizing in process piping design? Discuss. **[6]**

c) How wall thickness and pipe schedule is calculated? **[6]**

Q3) a) Give the importance of preventive and predictive maintenance? **[10]**

b) Enlist various treatment process used in biochemical process industry. Explain any one. **[7]**

OR

Q4) a) Write a short note on corrective/breakdown maintenance. **[7]**

b) Write a short note on following process utilities used in process industry: **[10]**

i) Chilling plant

ii) Steam and Oil heating system

P.T.O.

Q5) a) Discuss in detail any one method for the estimation of total capital investment. **[8]**

b) Explain one method in brief for raising finance. **[6]**

c) Explain any one method used for the determination of depreciation? **[4]**

OR

Q6) a) Explain simplified cash flow procedure used in any manufacturing plant. **[8]**

b) Explain the procedure used for comparison after taxes. **[6]**

c) Discuss the different practical factors used in alternative. **[4]**

Q7) a) Differentiate between CPM and PERT technique. **[8]**

b) Explain Return on Investment method which is used for calculating profitability. **[9]**

OR

Q8) a) Write advantages and disadvantages of CPM and PERT. **[8]**

b) What is effect of inflation on profitability analysis? Discuss. **[9]**

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Total No. of Questions : 8]

SEAT No. : ____

P514

[Total No. of Pages : 2

[6004]-426

B.E. (Biotechnology)

MOLECULAR DIAGNOSTICS

(2019 Pattern) (Semester-VIII) (Elective-V) (415473B)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Figures to the right side indicate full marks.***
3) ***Assume suitable data if necessary.***

Q1) a) What is ELISA? Discuss the diagnostic applications ELISA. **[9]**

b) Explain the significance of immunodiagnostics techniques with examples. **[9]**

OR

Q2) a) Discuss the various applications of monoclonal antibodies with examples. **[9]**

b) Define Immunoassays. Write principles and applications of ODD. **[9]**

Q3) a) What are the different methods for detection and identification of Infectious Diseases? **[9]**

b) How microbes were identified using molecular diagnostic tools? **[8]**

OR

Q4) a) Design molecular testing methods for diagnosis of food pathogens. **[9]**

b) Tabulate traditional disease diagnosis methods/tools with its applications in disease diagnostics. **[8]**

Q5) a) Write principle and applications of *In-situ* hybridization techniques in genetic disease/disorder diagnosis. **[10]**

b) Describe methods and applications of Neonatal and Prenatal disease diagnostics. **[8]**

OR

P.T.O.

Q6) a) What is sickle cell anemia? How can sickle cell anemia gene can be detected at DNA level? **[10]**

b) Short note on **[8]**

i) Sex-linked inherited disorders and

ii) Cytogenetics

Q7) a) What is Point of Care Testing (POC) and how it is useful for health care diagnostics. **[8]**

b) How Omics technology used for infectious disease diagnostics explain with examples. **[9]**

OR

Q8) a) Write Short note on **[8]**

i) Lab on CHIP Technology and

ii) NGS Approaches to Studying Virulence

b) Describe importance of enzyme-based biosensors in diagnostics. **[9]**

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Total No. of Questions : 8]

SEAT No. :

P-1417

[Total No. of Pages : 2

[6004]-427

B.E. (Biotechnology)

BIO-THERAPEUTICS TECHNOLOGY

(2019 Pattern) (Semester - VIII) (415473C) (Elective - V)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8.***
2) ***Figures to the right indicate full marks.***
3) ***Assume Suitable data if necessary.***

Q1) a) With the help of diagram describe the process of monoclonal antibody production. **[12]**

b) Give 3 examples of FDA approved MAbs available in market with its therapeutic use. **[6]**

OR

Q2) a) Enlist the steps in which you will study PK of MAbs. **[10]**

b) What is upstream processing and downstream processing? **[8]**

Q3) a) Write a note on clean room design and flow of operations. **[12]**

b) Write a note on CIP. **[5]**

OR

Q4) a) With the help of flow chart show biopharmaceutical manufacturing process **[9]**

b) Discuss the range of assay techniques used to detect impurities in Biotherapeutics **[8]**

P.T.O.

Q5) a) Discuss the advantages of Nasal, transmucosal and transdermal delivery systems. **[8]**

b) Write notes on (Five marks each) **[10]**

i) Pulmonary drug delivery,

ii) Accelerated stability.

OR

Q6) a) Discuss the advantages of 'Advanced drug Delivery Systems". **[12]**

b) Write a note on stability of drugs and stabilizing agents **[6]**

Q7) a) What does CDSCO, DCGI, GMP, CGMP stand for? **[10]**

b) What is a patentability? **[7]**

OR

Q8) a) Give an overview of patenting in Biotechnology **[12]**

b) Write a note on RCT. **[5]**

Total No. of Questions : 8] **SEAT No. :**

P2850 **[Total No. of Pages : 2**

[6004]-428
B.E.(BIOTECHNOLOGY)
MANAGEMENT AND ENTREPRENEURSHIP
(2019 Pattern) (Semester - VIII) (Elective-VI) (415474 A)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Discuss the different leadership styles commonly employed in organizations. **[8]**

b) What are the different techniques used for coordinating activies within an organization? Explain any two techniques. **[8]**

c) What is directing? **[2]**

OR

Q2) a) Write a short note on: **[8]**

i) Leadership styles

ii) Motivation theories

b) Give the importance of communication in term of organization. **[4]**

c) Why is coordination important in the context of organizational management? Discuss. **[6]**

Q3) a) Explain the term entrepreneurship. **[3]**

b) Discuss in detail the different types of entrepreneur. **[10]**

c) Comment on : Identification of a business opportunity. **[4]**

OR

Q4) a) How does an entrepreneur contribute to the economic development in India? Discuss in detail. **[8]**

b) Define the concept of intrapreneurs. **[4]**

c) State the different functions of an entrepreneur. **[5]**

P.T.O.

Q5) a) How the role of small scale industry is important in Economic Development? Discuss. **[9]**

b) Write a detail note on : Government policy towards Small Scale Industry **[9]**

OR

Q6) a) Discuss about the advantages of small scale industry toward economic development in India **[9]**

b) State and explain in brief steps to start Small Scale Industry. **[9]**

Q7) a) Discuss in detail the factors to be considered in the process of project selection. **[8]**

b) What is network analysis and how does it relate to project management? Discuss. **[9]**

OR

Q8) a) Discuss in details about project appraisal. **[6]**

b) Write a short note on : Errors of Project Report **[6]**

c) State and explain any one of the necessities for a project selection. **[5]**

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Total No. of Questions : 8]

SEAT No. : ____

P1445

[Total No. of Pages : 2

[6004]-429

B.E. (Biotechnology Engg.)
IPR, INTELLECTUAL PROPERTY RIGHTS
(2019 Pattern) (Semester-VIII) (Elective-VI) (415474B)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume suitable data if necessary.***

		Course Qutcome (CO)
Q1)	Answer the following. **[18]**	CO3
	a) What is a trademark? What are points, one should consider while adopting a trademark.	
	b) What is the purpose of a trademark? What are the requirements for registering a trademark.	
	OR	
Q2)	Answer the following. **[18]**	CO3
	a) What is protectable matter under trademark law? How do you select and evaluate a trademark?	
	b) Depict a flow chart showing the trademark registration process. Illustrate the benefits of registering a trademark.	
Q3)	Answer the following: **[17]**	CO4
	a) What is a trade secret? How are trade secrets protected? How long can trade secrets protection last? Is there any legislation governing trade secret in India?	
	b) The TRIPS agreements provides protection to trade secrets. Explain.	
	OR	

P.T.O.

Q4) Answer the following: **[17]** CO4

a) What causes a business to lose trade secret protection?

b) What are the six factors which need to be taken into consideration while determining whether information owned or used by a company is a trade secret in terms of the necessary level of security to ensure adequate protection of those trade secrets.

Q5) Answer the following. **[18]** CO5

a) How can be copyright protected? What are the terms of copyright?

b) What is copyright? What is the scope of protection in the copyright Act, 1957?

OR

Q6) Answer the following: **[18]** CO5

a) What are the guidelines regarding registration of a work under the copyright Act? How can Copyright registration for App is done?

b) Explain-Computer software or computer programme can be registered.

Q7) Answer the following: **[17]** CO6

a) Who can apply for the registration of a geographical indication? What is the benefit of registration of geographical indications?

b) Mention the essential contents of GI application.

OR

Q8) Anwser the following: **[17]** CO6

a) Who is a registered proprietor of a geographical indication? List the matters prohibited for registration under Geographical Indication Act?

b) When is a registered geographical indication said to be infringed? Who can initiate an infringement action?

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Total No. of Questions : 8]

SEAT No. : ____

P515

[Total No. of Pages : 2

[6004]-431
B.E. (Chemical Engineering)
PROCESS DYNAMICS AND CONTROL
(2019 Pattern) (Semester - VII) (409341)

Time:2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2,Q.3 or Q.4,Q.5 or Q6,Q.7 or Q.8.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) What is Time integral performance criteria? Explain it in detail. **[9]**

b) Draw root locus of the control system following transfer function $G(S)H(S) = 1/(S(S^2+5S+6))$. **[9]**

OR

Q2) a) Write short note on. **[9]**

i) Tuning of Controllers.

ii) Selection of feedback controller.

b) What is Simple performance Criteria? Explain in detail. **[9]**

Q3) a) Draw Bode plot for pure dead time system. **[8]**

b) Draw Bode plot for pure capacitive process. **[9]**

OR

Q4) a) Draw Nyquist plot for pure dead time system. **[8]**

b) Draw Nyquist plot for pure capacitive process. **[9]**

Q5) a) What is Cascade Control? Explain with neat diagram and example. **[9]**

b) What is feedforward Control? Explain with neat diagram and example. **[8]**

OR

P.T.O.

Q6) a) What is override control? Explain in detail with suitable diagram and example. **[9]**

b) What is Auctioneering control? Explain in detail with suitable diagram and example. **[8]**

Q7) a) What is reconstruction of Continuous signals from their Discrete time values? Explain with neat diagram. **[6]**

b) What is Sampling of continuous signals? Explain. **[6]**

c) Explain role of digital computer in process control as a process interface for data acquisition and control. **[6]**

OR

Q8) Write short note on. **[18]**

a) PLC

b) SCADA

c) DCS

Total No. of Questions : 8]

SEAT No. :

P516

[Total No. of Pages : 2

[6004]-432
B.E. (Chemical)
CHEMICAL REACTION ENGINEERING-II
(2019 Pattern) (Semester - VII) (409342)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Derive the Langmuir adsorption isotherm with suitable assumptions. **[9]**

b) Derive the BET equation for determination of surface area of catalyst. **[9]**

OR

Q2) a) Explain the major steps involved in the preparation of the catalyst. **[9]**

b) Explain the pore volume distribution in porous catalyst. **[9]**

Q3) a) Derive the expression for effectiveness factor of single cylindrical pore of the catalyst. **[9]**

b) Describe significance of the Thiele modulus for strong pore resistance and negligible pore resistance. **[9]**

OR

Q4) a) The observed rate using a cube of 2 cm catalytic pallet 10^{-3} mol/cm^{3}sec. Calculate the value of K (1st order reaction rate constant). The effective diffusivity is 0.01 cm^2/sec and C_{AS} = 1 mol/cm^3 pallet. **[9]**

b) Explain the selectivity for a porous catalyst in parallel and series catalytic reaction. **[9]**

Q5) a) Explain the experimental method for finding rates of fluid-solid catalyzed reactions. **[9]**

b) The following mechanism has been proposed for a catalytic reaction : **[9]**

$A_{(g)} + B_{(g)} \rightarrow C_{(g)}$

i) $A_{(g)} + X == AX$

ii) $AX + B_{(g)} == CX$

iii) $CX == C_{(g)} + X$

Where, X indicates an active site on the catalyst. Derive an expression for the rate of reaction if the surface reaction step is a rate controlling.

OR

P.T.O.

Q6) a) What are the different steps involved in solid catalyzed reaction? Give the suitable example. **[9]**

b) The catalytic reaction A $\rightarrow$ 4R is run at 3.2 atm and 100 C in tubular reactor which contains 0.01 kg of catalyst and uses a feed consisting of partially converted product of 20 lit/hr of pure A and following data was recorded. Determine the rate equation for this reaction. **[9]**

$C_{Ain,}$ mol/lit	0.1	0.08	0.06	0.04
$C_{Aout,}$ mol/hr.kg	0.084	0.070	0.055	0.038

Q7) a) Derive the M-M kinetic equation. **[8]**

b) Explain the fluidized bed reactor in detail. **[8]**

OR

Q8) a) Illustrate the features of M-M kinetic equation. **[8]**

b) Explain the inhibition in the enzyme catalyzed reaction. **[8]**

Total No. of Questions : 8]

SEAT No. : ____

P517

[Total No. of Pages : 2

[6004]-433

B.E. (Chemical)

CHEMICAL ENGINEERING DESIGN

(2019 Pattern) (Semester-VII) (409343)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Figures to the right side indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
5) ***Assume Suitable data if necessary.***

Q1) a) Discuss mechanical design of shell and tube heat exchanger with necessary equations? **[9]**

b) Write procedure for design of calendria type evaporator. **[9]**

OR

Q2) 1800kg/hr of ethylene glycol is to be cooled from 100 ºC to 60 ºC by water available at 15 ºC. The maximum temperature to which water can be heated is 42 ºC. Ethylene glycol is circulated through the tubes while water flows through the annulus of a concentric tube heat exchanger.

Inside tube is of copper while outside tube is of steel.

Inside diameter of copper tube=12.5 mm.

Outside diameter of copper tube=14.5 mm.

Inside diameter of steel tube=22 mm.

Fouling resistance and metal wall resistance can be neglected.

Suggest a suitable design of concentric tube heat exchanger.

The properties of ethylene glycol and water at mean temperature are: **[18]**

Properties	Ethylene glycol	Water
Specific heat, J/Kg K	2650	4180
Viscosity, N-s/m^2	3.2×10^{-3}	0.853×10^{-3}
Density, kg/m^3	1078	995
Thermal conductivity,W/mK	0.261	0.614

P.T.O.

Q3) Explain the following method of calculating plate and column efficiencies. **[17]**

i) AIChE method

ii) Van winkles method

OR

Q4) a) Describe the total plate pressure drop for the plate column in distillation. **[7]**

b) What are the different design methods for binary systems? Explain any one in detail. **[10]**

Q5) a) Give reasons why channeling and bypassing may occur in a packed column. **[9]**

b) What is the effect of size of packing on the performance of packed column? **[9]**

OR

Q6) a) What are liquid distributors, their types & function? **[9]**

b) Explain the use of hold-down plate in packed column. **[9]**

Q7) a) How is appropriate material selection important for piping? Explain with example. **[7]**

b) What are codes and standards and their importance in piping design.**[10]**

OR

Q8) a) Explain the factors which affect orifice size in a pipeline. **[7]**

b) Explain in brief design of a pipeline on the basis of fluid dynamic parameters. **[10]**

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Total No. of Questions : 8]

SEAT No. :

P518

[Total No. of Pages : 2

[6004]-434
B.E. (Chemical)
ENVIRONMENTAL ENGINEERING
(2019 Pattern) (Semester - VII) (Elective - III) (409344A)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q.No.1 or Q.No.2, Q.No.3 or Q.No.4, Q.No.5 or Q.No.6, Q.No.7 or Q.No.8.***
2) ***Neat diagrams must be drawn whenever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) Explain following pollution control equipment with a neat sketch. **[18]**

a) Cyclone Separator

b) Venturi Scrubber

OR

Q2) a) To control the sulphur dioxide emission explain the process of Hydrodesulphurization of coal with a neat sketch, **[12]**

b) A plate type electrostatic precipitator for use in a cement plant for removing dust particles consists of 10 equal channels. The spacing between the plates is 0.15 m and the plates are 2 m high and 2 m long. The unit handles 10000 m^3/h of gas. What is the efficiency of collection? What should be the length of the plates for achieving 99% collection efficiency if other condition is the same? (Given Vpm = 0.10) **[06]**

Q3) a) Explain in detail the effect of following water pollutant **[12]**

i) Radioactive substance

ii) Plant nutrient

iii) Pesticides

b) Write an explanatory note on Biochemical Oxygen Demand (BOD). **[5]**

OR

P.T.O.

Q4) a) Liquid effluent (104 m^3/day) from a food processing unit is to be treated by the activated sludge process at 30 °C from an initial (BOD) 5days of 650 mg/1 to a final (BOD) 5days of 25 mg/1. Bench-scale studies at 20 °C and mixed-liquor biomall concentration of 3000 mg/1 gave BOD removal rate coefficient of 14 $(day)^{-1}$. Estimate the retention time and size of the unit. θ_1(temperature coefficient) = 1.02. **[12]**

b) Write an explanatory note on Biochemical Oxygen Demand (BOD). **[5]**

Q5) a) Explain with a neat sketch Upflow anaerobic sludge blanket reactor (UASB) **[12]**

b) Explain with a neat sketch wet air oxidation process **[6]**

OR

Q6) Explain Principle, construction and working of Trickling filter **[18]**

Q7) What do you mean by disinfection? Enlist the various agents used in disinfection. Explain with a neat sketch Process involved in tertiary waste water treatment. **[17]**

OR

Q8) a) What are the principle sources of solid wastes? Discuss on classification of solid waste. **[9]**

b) Write an explanatory note on nitrification. **[8]**

Total No. of Questions : 8]

SEAT No. :

P519

[Total No. of Pages : 2

[6004]-435
B.E. (Chemical)
MEMBRANE TECHNOLOGY
(2019 Pattern) (Semester - VII) (Elective - III) (409344B) (Theory)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q.No.1 or Q.No.2, Q.No.3 or Q.No.4, Q.No.5 or Q.No.6, Q.No.7 or Q.No.8.***
2) ***Neat diagrams must be drawn whenever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Define per- vaporisation? Explain in details with a suitable example. **[10]**

b) Explain in details about pore flow theory for ultrafiltration membrane. **[7]**

OR

Q2) a) Discuss in details relationship between structure - permeability. **[10]**

b) What is Knudsen diffusion? Explain in details about Knudsen diffusion and surface diffusion through microporous membranes. **[7]**

Q3) a) 'What is concentration polarisation? Discuss in details concentration polarisation in liquid separation processes. **[9]**

b) What is fouling of the membrane? How do we reduce fouling? Give list of chemical used for cleaning. **[8]**

OR

Q4) a) Explain is details with neat sketches osmatic pressure model. **[9]**

b) What is temperature polarisation? Explain in details with suitable examples. **[8]**

Q5) a) What is reverse osmosis? Explain in details with suitable example. **[10]**

b) What is desalination? Explain in details about application reverse osmosis for sea water desalination. **[8]**

OR

P.T.O.

Q6) a) What is molecular cut off of the membrane? Explain in details application of ultrafiltration membrane for cheese production. **[10]**

b) What microfiltration membrane? Explain in details application for drinking water treatment. **[8]**

Q7) a) Define membrane bioreactor? Explain in details with suitable examples. **[10]**

b) Explain in details application of membrane for carbon dioxide separation. **[8]**

OR

Q8) a) Explain in details application membrane for removal and recovery of metal from dilute solutions. **[10]**

b) Explain in details application of membrane for hydrogen separation. **[8]**

Total No. of Questions : 8]

SEAT No. :

P520

[Total No. of Pages : 2

[6004]-436
B.E. (Chemical)
INDUSTRIAL PIPING
(2019 Pattern) (Semester - VII) (Elective - III) (409344C)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q.No.1 or Q.No.2, Q.No.3 or Q.No.4, Q.No.5 or Q.No.6, Q.No.7 or Q.No.8.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn whenever necessary.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain cathode protection and painting techniques for piping systems. **[9]**

b) Explain the piping layout consideration of **[9]**

i) Pipe racks

ii) Pumps

OR

Q2) a) Discuss piping isometrics and bill of material **[9]**

b) Which are the factors considered when the designer is locating equipment in the plot plan? **[9]**

Q3) a) Discuss the complex pipelines in series arrangement with typical examples **[9]**

b) Write a note on pipeline storage capacity **[8]**

OR

Q4) a) Write detailed design procedure for dispersed flow **[9]**

b) Explain the homogenous and heterogeneous flow in slurry pipelines **[8]**

Q5) a) Discuss piping arrangements and factors considered in the piping design of the heat exchanger **[9]**

b) Discuss piping design strategies for cryogenic materials **[8]**

OR

P.T.O.

Q6) a) Describe the various steps for designing utility piping **[9]**

b) Discuss various empirical correlations for the flow of oil, gasoline, and hydrocarbon **[8]**

Q7) a) A pipe of 0.7 m diameter has a length of 6 km and connects two reservoirs A and B. The water level in reservoir A is at an elevation 30 m above the water level in reservoir B. Halfway along the pipeline, there is a branch through which water can be supplied to a third reservoir C. The friction factor of the pipe is 0.024. The quantity of water discharged into reservoir C is 0.15 m^3/s. Considering the acceleration due to gravity as 9.81 m/s^2 and neglecting minor losses, calculate the discharge (m^3/s) into reservoir B.**[9]**

b) Discuss the various service conditions considered for the selection of insulating material **[9]**

OR

Q8) Write a short note on **[3×6=18]**

a) Insulation for piping system

b) Optimum thickness of insulation

c) Critical thickness of insulation

Total No. of Questions : 8]

SEAT No. :

P521

[Total No. of Pages : 2

[6004]-437
B.E. (Chemical)
PETROLEUM REFINING
(2019 Pattern) (Semester - VII) (Elective - III) (409344D)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q.No.1 or Q.No.2, Q.No.3 or Q.No.4, Q.No.5 or Q.No.6, Q.No.7 or Q.No.8.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn whenever necessary.***
4) ***Assume suitable data, if necessary.***

Q1) a) What is the reforming process? Discuss the mechanism and working of the reforming process with a neat schematic diagram. **[9]**

b) Write recent development of FCC along with a neat schematic diagram. **[9]**

OR

Q2) a) Explain the operation and working of the thermal cracking process with a typical diagram. **[9]**

b) What is the mechanism of the hydrocracking process? Describe the hydrocracking process with a neat schematic diagram. **[9]**

Q3) a) Explain the manufacturing of Bitumen with a schematic diagram. **[9]**

b) What are the feedstocks for lubricating oils? Explain the desirable properties of these feedstocks? **[8]**

OR

Q4) a) Describe the solvent extraction process with a typical diagram. **[10]**

b) Explain in detail about various properties of lube oil. **[7]**

Q5) a) Why desulphurization is necessary for the refinery? Discuss the Hydro-desulphurization process with a typical schematic diagram along with reaction and operating parameters. **[12]**

b) Discuss the impact of refinery processes and operations on health, safety and the environment. **[6]**

OR

P.T.O.

Q6) a) Describe hydrogen production using the steam reforming process. **[9]**

b) Describe floating roofed tank arrangements for storage of crude oil. **[9]**

Q7) a) What is the blending operation and explain the line blending operation? **[9]**

b) Explain the effect of additives on the quality of refinery products. **[8]**

OR

Q8) a) What are the recent advances in the transportation techniques used in refineries? **[9]**

b) Discuss various housekeeping techniques used in refinery. **[8]**

Total No. of Questions : 8]

SEAT No. :

P522

[Total No. of Pages : 2

[6004]-438
B.E. (Chemical)
CHEMICAL PROCESS SYNTHESIS
(2019 Pattern) (Semester - VII) (Elective - IV) (409345 (A))

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Figures to the right side indicate full marks.***
3) ***Draw neat figures wherever necessary.***
4) ***Use of logarithmic tables, electronic pocket calculator and steam tables is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) Explain the distillation process for separation of Homogenous mixtures. **[8]**

b) Write notes on following for separation of mixtures. **[8]**

i) Filtration

ii) Flotation

OR

Q2) a) Write notes on following for separation of mixtures: **[8]**

i) Evaporation

ii) Absorption

b) Discuss in detail separation of heterogeneous mixtures. **[8]**

Q3) a) Discuss optimization of a reducible structure. **[8]**

b) What is thermal coupling of the direct and indirect sequence. **[10]**

OR

Q4) a) Explain distillation sequencing using columns with more than two products. **[10]**

b) Explain with sketches the concept of heat integration of sequences of simple distillation column. **[8]**

Q5) a) Discuss overall heat exchanger network and utilities. **[10]**

b) Explain the problem table algorithm in pinch technology. **[8]**

OR

P.T.O.

Q6) a) Explain composites curves with suitable example related to heat recovery. Write down a simple heat recovery problem with one hot stream and one cold stream. **[10]**

b) Explain three forms of cross pinch heat transfer. **[8]**

Q7) a) Explain attenuation of hazardous materials. **[10]**

b) Write note on utility selection. **[8]**

OR

Q8) a) Write in brief on: **[10]**

i) Toxic release from process.

ii) Quantitative measures of inherent safety.

b) Discuss major hazards in process plants. **[8]**

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Total No. of Questions : 8]

SEAT No. :

P523

[Total No. of Pages : 2

[6004]-439

B.E. (Chemical)

INDUSTRIAL MANAGEMENT AND ENTREPRENEURSHIP

(2019 Pattern) (Semester - VII) (Elective - IV) (409345 (B))

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) *Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.*
2) *Figures to the right side indicate full marks.*
3) *Draw neat diagram wherever necessary.*
4) *Assume suitable data if necessary.*

Q1) a) Explain the role of EDII and NIESBUD in Entrepreneurship development. **[9]**

b) Describe the role of central and state government in promoting entrepreneurship development. **[9]**

OR

Q2) a) Describe failed entrepreneurship ventures and turnaround ventures with typical examples. **[9]**

b) Write a note on fiscal and tax concessions available for entrepreneurship development. **[9]**

Q3) a) Discuss the management roles and theories of Henry Mintzberg. **[9]**

b) Write an explanatory note on team role theory by Belbin. **[8]**

OR

Q4) a) Explain verbal and nonverbal communication skills in managerial work **[9]**

b) Explain the hierarchy of needs given by Abraham Maslow. **[8]**

Q5) a) Discuss the concept of adding resources to the model for project development. **[9]**

b) Elaborate on computer-based project management. **[8]**

OR

Q6) a) Discuss the concept of adding resources to the model for project development. **[9]**

b) Elaborate on handling multiple projects with typical examples. **[8]**

P.T.O.

Q7) Write a note on following. **[18]**

a) Business-to-Business marketing.

b) Promotion and Pricing.

c) Product and Brand Management.

OR

Q8) a) Explain in detail the role of information in marketing decisions Support your answer with specific examples. **[9]**

b) Describe the principles, and techniques used in analyzing and interpreting the data for marketing decisions. **[9]**

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Total No. of Questions : 8]

SEAT No. :

P524

[Total No. of Pages : 2

[6004]-440
B.E. (Chemical)
GREEN TECHNOLOGY
(2019 Pattern) (Semester - VII) (Elective - IV) (409345(C))

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of logarithmic tables, electronic pocket calculator and steam tables is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) Explain Integrated Pollution Prevention and its Control in detail. **[8]**

b) The Importance of Measurement in Production of Safer Gasoline. **[8]**

OR

Q2) Write notes on : **[16]**

a) Heterogeneous Catalysts

b) Heterogeneous Catalysis

Q3) Explain with example and applications of renewable resources: Biomass Energy, Fossil Fuels, Energy from Biomass. **[18]**

OR

Q4) a) Discuss the Ionic Liquids as Catalysts in Chemical industry with example. **[9]**

b) Explain Chemicals from renewable feed stocks in detail. **[9]**

Q5) a) Explain the Design for Energy Efficiency in Chemical industry with example. **[9]**

b) Explain applications of Sonochemistry in Green Chemistry. **[9]**

OR

Q6) a) Explain the concept of Designing greener processes for Conventional Reactors. **[9]**

b) Explain the Chemistry Using Microwaves with example in detail. **[9]**

P.T.O.

Q7) a) Explain the Eco-friendly Pesticides, Insecticides. **[9]**

b) Write in brief Radical Process with example. **[9]**

OR

Q8) a) Explain An integrated approach to a greener chemical industry in detail **[9]**

b) Write note on Green Chemical Supply Strategies. **[9]**

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Total No. of Questions : 8]

SEAT No. :

P525

[Total No. of Pages : 2

[6004]-441
B.E. (Chemical)
ADVANCED SEPARATION PROCESSES
(2019 Pattern) (Semester - VII) (Elective - IV) (409345D)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3, or Q.4, Q.5 or Q.6 Q.7, or Q.8.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Explain reactive crystallization process in detail. **[9]**

b) Explain Reactive extraction process in detail. **[9]**

OR

Q2) a) Explain Reactive distillation in detail. **[9]**

b) Explain characteristics of complexing agents used in chemical complexation. **[9]**

Q3) a) Explain basic types of modules used in reverse osmosis. **[9]**

b) Explain pervaporation technique in detail. **[8]**

OR

Q4) a) Explain the principle and working of ultrafiltration. Discuss its applications. **[9]**

b) Explain dialysis and electrodialysis with neat sketches and its applications. **[8]**

Q5) a) Write short note on. **[9]**

i) Temperature swing adsorption.

ii) Pressure swing adsorption.

b) Write down the applications of chromatography in separation of enzymes, proteins and industrial examples in detail. **[9]**

OR

P.T.O.

Q6) a) Explain the detail working of Chromatography. **[9]**

b) Explain the concept and general principles of adsorption. **[9]**

Q7) a) Explain ultracentrifugation in detail. **[9]**

b) Write short note on. **[8]**

i) Zone refining,

ii) Molecular sieves

OR

Q8) a) Write down applications of froath flotation techniques. **[9]**

b) Explain working principles of zone electrophoresis. **[8]**

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Total No. of Questions : 8]

SEAT No. :

P-526

[Total No. of Pages : 2

[6004]-442

B.E. (Chemical)

PROCESS MODELING & SIMULATION

(2019 Pattern) (Semester - VIII) (409349)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) Develop model for batch mixing process. Write assumptions for mixing process. **[18]**

OR

Q2) Develop mathematical model for Cooling tower. Write proper assumptions. **[18]**

Q3) Derive mathematical model for single component vaporizer. **[17]**

OR

Q4) Develop model for batch distillation process. **[17]**

Q5) Consider a non-isothermal CSTR having perfectly mixed cooling jacket. A first order irreversible reaction A $\rightarrow$ B takes place with reaction rate constant k. Write down assumptions and derives modeling equations for the system. **[18]**

OR

Q6) Benzene is nitrated in an isothermal CSTR in three sequential irreversible reactions : **[18]**

$$\text{Benzene} + HNO_3 \rightarrow \text{Nitrobenzene} + H_2O$$

$$\text{Benzene} + HNO_3 \rightarrow \text{Nitrobenzene} + H_2O$$

$$\text{Benzene} + HNO_3 \rightarrow \text{Nitrobenzene} + H_2O$$

P.T.O.

Assuming each reaction is linearly dependent on the concentrations of each reactant; derive a dynamic mathematical model of the system. There are two feed streams, one pure benzene and one concentrated nitric acid (98 wt %). Assume constant densities and complete miscibility.

Q7) A second order reaction A $\rightarrow$ B takes place in a batch reactor where reaction rate constant k = 0.2 (mol/sec/cm^3). Initial concentration C_{AO} = 2 mol/cm^3. Find the outlet concentration at t = 5 sec using Euler's method and check your answer by analytical method. **[17]**

OR

Q8) A reservoir discharging through the gate valve of depth h below water surface. Surface area A for various values of h as given below. If 't' is time in minute, the rate of fall of surface is given by $\frac{dh}{dt} = \frac{-48}{A}\sqrt{h}$

Derive above equation using total continuity equation and estimate the time taken for water level to fall from 14m to 10m. Use trapezoidal rule. **[17]**

h(m)	10	11	12	13	14
A(m^2)	950	1070	1200	1350	1530

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Total No. of Questions :8]

SEAT No. : ____

P2751

[Total No. of Pages : 3

[6004]-443

B.E. (Chemical)

PROCESS ENGINEERING COSTING & PLANT DESIGN

(2019 Pattern) (Semester-VIII) (409350)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use electronic pocket calculator is allowed.***
5) ***Assume suitbale data, if necessary.***

Q1) a) Explain in brief tree diagram showing cash flow for industrial operations. **[8]**

b) A heat exchanger of area 10 m^2 costed Rs. 50,000/- in the year 1985. What is the estimated cost of a 15m^3 exchanger in 1987. Assume that the cost Index in 1985 was 270 and in 1987 it is 320. **[6]**

c) Define fixed capital investment and working capital investment. **[4]**

OR

Q2) a) Describe in brief types of capital cost estimates. **[6]**

b) Explain in brief capitalized costs with the basic equation. **[6]**

c) Define turnover ratio. **[2]**

d) Explain payout period. **[4]**

Q3) a) Explain why are engineers interested in optimization? **[3]**

b) Explain in brief lagrange multiplier method. **[8]**

c) A plant produces refrigerators at the rate of P units per day. the variable costs per refrigerator have been found to be Rs. 4035.33 +0.1$P^{1.2}$. The total daily fixed charges are Rs. 147953.75, and all other expenses are constant at Rs. 619292.13 per day. If the selling price per refrigerator is Rs. 14626.30, determine: **[6]**

P.T.O.

i) The daily profit at a production schedule giving the minimum cost per refrigerator.

ii) The daily profit at a production schedule giving the maximum daily profit.

OR

Q4) a) Explain in brief Break-Even chart with a neat diagram. **[8]**

b) An organic chemical is being produced by a batch operation in which no product is obtained until the batch is finished. Each cycle consists of the operating time necessary to complete the reaction plus a total time of 1.4 h for discharging and charging. The operating time per cycle is equal to $1.5\ P_b^{0.25}\ h$ where Pb is the kilograms of product produced per batch. The operating costs during the operating period are $ 20 per hour (Rs. 1650.4 per hour) and the costs during discharge charge period are $ 15 per hour (Rs. 1237.8 per hour). The annual fixed costs for the equipment avery with the size of the batch as follows:

$C_F = 340\,P_b^{0.8}$ dollars per batch.

Inventory and storage may be neglected. If necessary, the plant can be operated 24 h per day for 300 days per year. the annual production is 1 million kg of product. At this capacity, raw material and miscellaneous costs, other than those already mentioned, amount to $ 2,60,000 per year (Rs. 21455200 per year). Determine the cycle time for conditions of minimum total cost per year. **[9]**

Q5) a) Explain the terms. **[6]**

i) Optimum pipe diameter and

ii) Optimum velocity for an incompressible fluid.

b) Explain in brief contents of a typical techno-economic feasibility report of any project. **[12]**

OR

Q6) a) Explain in brief optimum design & costing for a reactor vessel. **[8]**

b) Explain in brief determination of optimum flow rate of cooling water in condenser. **[10]**

Q7) a) Distinguish between critical path method and program evaluation & review technique. **[8]**

b) Explain in brief how to apply PERT method for a project development. **[9]**

OR

Q8) For the various activities in the project stated event 0 is an initial event, event 1 is preceded by even 0, event 3 is preceded by event 1, event 4 is preceded by event1, event 2 is preceded by event 1, event 3 is preceded by event 2 and 1, event 4 is preceded by events 3 and 1, events 5 is preceded by event 4 find earliest expected time TE. Data **[17]**

Activity	0-1	1-3	1-2	2-3	1-4	3-4	4-5
Duration days	3	16	6	8	10	5	3

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Total No. of Questions : 8]

SEAT No. : ____

P2851

[Total No. of Pages : 2

[6004]-444

B.E. (Chemical)

ENERGY AUDIT & CONSERVATION

(2019 Pattern) (Semester - VIII) (Elective-V) (409351-A)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) What is the significance of knowing energy cost in any manufacturing industry? **[9]**

b) State the difference between Energy Conservation and Energy Audit. **[9]**

OR

Q2) What informations are collected during the detailed audit? Explain with a suitable example, the significance of audit report, for post monitoring of energy conservation project. **[18]**

Q3) What is Forecasting? What are its benefits? Explain Time series quantitative method of Demand Forecasting in detail using proper example. **[17]**

OR

Q4) It is often said that proper forecasting helps in profit making of any industry. Support your views with proper case study. **[17]**

Q5) What is Carbon Footprint? Explain in detail the measures taken to reduce the Carbon Footprint. **[18]**

OR

Q6) a) Distinguish between Renewable and Non-Renewable sources of Energy. **[9]**

b) Explain the benefits of using Renwable sources of energy in Chemical Industry. **[9]**

P.T.O.

Q7) What is Heat Exchange? Write different types of Heat Exchangers used in Chemical Industries. Write the steps involved in Energy performance assessment of Heat Exchanger. **[17]**

OR

Q8) Find out the efficiency of the boiler by direct method with the data given below: **[17]**

Type of Boiler	:	Coal fired
Quantity of steam generated	:	8TPH
Steam pressure (gauge/temp)	:	10 kg/cm^2(g) 180^o C
Quantity of coal consumed	:	1.8TPH
Feed water temperature	:	85^{o}C
GCV of Coal	:	3200 Kcal/kg
Enthalpy of steam at 10 kg/cm^2 pressure	:	665 Kcal/kg
Enthalpy of feed water	:	85 Kcal/kg

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Total No. of Questions : 8]

SEAT No. :

P527

[Total No. of Pages : 2

[6004]-445
B.E. (Chemical)
CHEMICAL PROCESS SAFETY
(2019 Pattern) (Semester - II) (409351(B))

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Explain following terms briefly : **[9]**

i) Flammability limits.

ii) Fire point.

iii) Detonation.

iv) Deflagration.

v) Mechanical Explosion.

b) Describe Technology and process selection. **[9]**

OR

Q2) a) Define and explain minimum oxygen concentration (MOC) and inerting. **[9]**

b) Describe ignition and auto-ignition temperature. **[9]**

Q3) a) Explain pressure versus time curves for Runway reactions. **[9]**

b) List and explain miscellaneous design aspects for Preventing Fires and Explosions. **[8]**

OR

Q4) a) Explain relief systems, its risks and management. **[9]**

b) What bonding and grounding procedures must be followed to transfer a drum of flammable solvent into a storage tank? **[8]**

P.T.O.

Q5) a) Explain event tress and fault tress in the context of process safety. **[9]**

b) Describe in short about the review of probability theory for risk assessment. **[9]**

OR

Q6) a) Discuss in detail about the concept of risk assessment. **[9]**

b) Explain event tree analysis for reactor with high temperature alarm and temperature controller. **[9]**

Q7) a) Describe in detail Safety Vs Production. **[9]**

b) Write short notes on : **[8]**

i) Technology and process selection.

ii) Prevention of hazard human element.

iii) Role of a Computer in safety.

OR

Q8) a) Explain the various safety devices for relieving pressure. **[9]**

b) Discuss in detail prevention of hazard human element. **[8]**

Total No. of Questions : 8]

SEAT No. :

P528

[Total No. of Pages : 2

[6004]-447

B.E. (Chemical Engineering)

ADVANCED MATERIALS

(2019 Pattern) (Semester - VIII) (Elective - V) (409351(D))

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) What are advanced ceramic materials? Explain in details with suitable examples. **[10]**

b) Explain in details about grain boundary engineering of ceramic materials. **[7]**

OR

Q2) a) Give types of ceramic materials? Discuss in details application of ceramic materials with suitable examples. **[10]**

b) Describe in details advance powder synthetic techniques for ceramic materials. **[7]**

Q3) a) Describe in details reinforcing mechanisms for composite materials. **[9]**

b) Define polymerisation. Explain in details types of polymerisation with suitable examples. **[8]**

OR

Q4) a) Discuss in details factors influencing the properties of composite materials. **[9]**

b) Short notes on polymer composite. **[8]**

i) Mechanical behaviour.

ii) Laminates.

P.T.O.

Q5) a) What is metal composite materials? Explain its types of reinforcement. **[10]**

b) Explain in details mechanical behaviour and properties enhancement of metal composite materials. **[8]**

OR

Q6) a) Describe in details about fabrication processes of metal composites. **[10]**

b) Short notes on **[8]**

i) Reinforce ceramics.

ii) Crack propagation and mechanical behaviour.

Q7) a) Describe in details about role of nanoparticles in of carbon composites. **[10]**

b) Explain in details any one application of carbon composites. **[8]**

OR

Q8) a) What is nanomaterial? Explain in details methods of synthesis of nanomaterials. **[10]**

b) Explain in short properties and characterisation of nanomaterial. **[8]**

Total No. of Questions : 8]

SEAT No. :

P-529

[Total No. of Pages : 2

[6004]-448

B.E. (Chemical)

CATALYSIS

(2019 Pattern) (Semester - VIII) (409352A) (Elective-VI)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Slove Q1 or Q2, Q3 or Q4,Q5 or Q6, Q7 or Q8.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam table is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) Write short notes on the following. **[16]**

a) Diffusion effects in the catalyst.

b) Langmuir Hinshelwood approach.

OR

Q2) Explain the mechanism of adsorption and its isotherms in detail. **[16]**

Q3) a) Explain the BET method in detail. **[9]**

b) Explain the deactivation of the catalysis. **[9]**

OR

Q4) a) Explain major steps involved in catalyst preparation and formation. **[9]**

b) Explain the mechanism of solid-catalyzed reaction in detail. **[9]**

Q5) Write short notes on the following. **[18]**

a) Templeted molecular sieves.

b) Modification of zeolites.

OR

P.T.O.

Q6) a) Explain the zeolites structure based on the sodalite cage. **[9]**

b) Explain the catalyst cracking in detail. **[9]**

Q7) a) Derive the M-M kinetics of the enzyme catalyzed reaction. **[9]**

b) Give the kinetics of competitive inhibition. **[9]**

OR

Q8) a) Explain mechanism of participation of enzymes in few reaction. **[9]**

b) Write short note on lipases and microbes as catalyst. **[9]**

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Total No. of Questions : 8]

SEAT No. :

P2852

[Total No. of Pages : 2

[6004]-449
B.E. (Chemical)
NANOTECHNOLOGY
(2019 Pattern) (Semester - VIII) (Elective - VI) (409352 (B))

Time :2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain scanning tunneling microscope (STM) in brief. **[7]**

b) Explain the principle of working of SPM-AFM method. **[10]**

OR

Q2) a) Explain Principal and operation of X-ray diffraction. **[7]**

b) Explain Construction and working of Scanning electron microscope (SEM) with schematic diagram. **[10]**

Q3) a) Write short note on Extrinsic semiconductors and intrinsic semiconductors. **[7]**

b) Write down short note on Quantum cryptography. **[10]**

OR

Q4) a) What is Quantum dot, Quantum well? Explain in detail? **[7]**

b) Explain Heisenberg uncertainty principle and its application. **[10]**

Q5) a) Discuss in detail about Self-assembly and catalysis. **[8]**

b) Discuss the various nanostructured materials for Photocatalysis along with their properties. **[10]**

OR

P.T.O.

Q6) a) Enlist and explain colloidal properites of nanoparticles. **[8]**

b) Explain in detail contact angle and colloidal stability. **[10]**

Q7) a) Explain health and environmental Impacts of nanotechnology. **[8]**

b) Discuss Nano-biotechnology and explain how nanostructure mediated drug delivery helps for treatment of various diseases? **[10]**

OR

Q8) a) Describe the use of nanomaterials in surface coating with suitable example. **[8]**

b) Write briefly on commercial process of nanotechnology and its application in chemical engineering. **[10]**

Total No. of Questions : 8]

SEAT No. :

P2853

[Total No. of Pages : 2

[6004]-450
B.E. (Chemical)
FUEL CELL TECHNOLOGY
(2019 Pattern) (Semester - VIII) (Elective- VI) (409352C)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***All Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Figures to the right side indicate full marks.***
3) ***Neat diagram must be drawn wherever necessary***
4) ***Assume suitable data, if necessary.***

Q1) a) At equilibrium how electric potentials are related to the chemical potentials of fuel and oxidizer stream in a fuel cell ? Describe its importance in the design of a fuel cell. **[10]**

b) Discuss various hydrocarbon - based fuel cells with typical examples. **[8]**

OR

Q2) a) Discuss various hydrocarbon - based fuel cells with typical examples. **[9]**

b) Describe H_2production from renewable sources and its storage techniques. **[9]**

Q3) a) Describe in detail the osmotic drag coefficient, back diffusion flux and fuel crossover for PEMFC. **[9]**

b) Describe various anodic catalyst materials used in the construction of a Proton Exchange Membrane Fuel Cell and their possible functions in its working. **[8]**

OR

Q4) a) Write a detailed note on steam reforming needed in a hydrogen fuel cell **[9]**

b) Write a detailed note on the internal reforming needed in a bydrogen fuel cell. **[8]**

Q5) a) Describe the treatment of electrolyte interface for SOFC with a typical schematic diagram. **[9]**

b) Describe with the help of a diagram oxidation reaction on the TPB of an anode made of Ni - YSZ. **[8]**

OR

P.T.O.

Q6) a) Describe the modeling current transport & potential field in SOFC. **[9]**

b) Describe the concept of an Ohmic over potential for SOFC. **[8]**

Q7) a) Discuss the configuration of fuel cell systems with fuel processors. **[12]**

b) Describe microbial and enzymatic fuel cells with their advantages and limitations. **[6]**

OR

Q8) Write a note on **[3×6=18]**

a) Recent development in harnessing hydrogen.

b) Fuel cell Networking.

c) Fuel cell System.

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Total No. of Questions : 8]

SEAT No. :

P2854

[Total No. of Pages : 1

[6004]-451
B.E. (Chemical)
PETROCHEMICAL ENGINEERING
(2019 Pattern) (Semester - VIII)(Elective VI) (409352D)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) List down different separation and purification techniques utilized in petrochemical industry. Explain any 3 in detail. **[18]**

OR

Q2) With a neat and labeled diagram, explain the production of low molecular weight olefins by hydrocarbon cracking. **[18]**

Q3) With a neat and labeled diagram,explain the production of Glycol. **[17]**

OR

Q4) With a neat and labeled diagram,explain the production of Ketones. **[17]**

Q5) With a neat and labeled diagram,explain in detail the production of Nylon 6. **[18]**

OR

Q6) What are the different types of the Polymers? Explain in detail the production of polymers through bulk polymerization. Give exmples of polymers produced by the process. **[18]**

Q7) Write in detail about the Integration of refinery and petrochemical plants with power generation. Also explain the process with neat and labelled diagram. **[17]**

OR

Q8) Describe in detail the different safety considerations applied in Petrochemical Industry. **[17]**

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Total No. of Questions : 8]

SEAT No. : ____

P530

[Total No. of Pages : 2

[6004]-452

B.E.(Civil Engg)

FOUNDATION ENGINEERING

(2019 Pattern) (Semester - VII) (401001)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Solve Q.1 or Q.2,Q.3 or Q.4,Q.5 or Q.6 and Q.7 or Q.8.***

2) ***Figures to the right indicate full marks.***

Q1) a) Explain spring analogy with respect with respect to consolidation process. **[5]**

b) Explain with sketches how contact pressure changes according to type of soil and type of footing. **[6]**

c) A soil stratum is 10 m thick with pervious stratum on top and bottom. Determine the time required for 50% consolidation. Use following data (i) coefficient of permeability of soil = 10^{-9} m/s.(ii) Coefficient of compression = 0.003 m^2/kN. (iii) void ratio =2. =**[6]**

OR

Q2) a) A rectangular footing 2 m × 3 m carries a column load of 600 kN at a depth of 1 m. The footing rests on c - φ soil strata, 6 m thick having Poisson's ratio of 0.25 and Young's modulus of elasticity as 20000 kN/m^2 . Calculate the immediate elastic settlement of the footing. Take influence factor = 1.06. **[5]**

b) Explain square root of time fitting method to determine coefficient of consolidation. **[6]**

c) Define (i) normally consolidated soil (ii) pre consolidated soil (iii) degree of consolidation. **[6]**

Q3) a) Give classification of piles based on function. **[5]**

b) What is negative skin friction? How will you calculate the negative skin friction for a single pile? **[6]**

c) Calculate the efficiency of 15 piles arranged in three rows and 5 columns by Feld's rule. Take pile diameter = 300 mm and spacing of pile (both ways) = 0.8 m. **[6]**

OR

P.T.O.

Q4) a) What is the principle used in dynamic methods to calculate pile capacity? Write Engineering News Formula with meaning of each term. **[5]**

b) Explain the static pile load test in detail. **[6]**

c) A 3 × 3 pile group with pile diameter and pile length of 300 mm and 10 m respectively is embedded in soft clay with cohesion of 70 kN/m^2. The spacing between the piles (both ways) is 90 cm and adhesion factor is 0.6. Calculate the capacity of the pile group. Take factor of safety = 2.5. Neglect end bearing. **[6]**

Q5) a) Discuss the design principles involved in design of raft foundation by flexible (elastic) method. **[6]**

b) Write a note on (i) Floating raft (ii) types of shallow foundation. **[6]**

c) When following types of footings are used (i) Combined rectangular (in plan) footing (ii) Trapezoidal (in plan) footing (iii) Strap footing. **[6]**

OR

Q6) a) Enlist the uses of caissons and write a note on caisson disease. **[6]**

b) Explain the components of Pneumatic Caissons with a neat sketch. **[6]**

c) Draw a sketch of well foundation and give names to all parts. **[6]**

Q7) a) Explain any two types of cofferdams. **[6]**

b) Explain the procedure of swelling pressure test with a neat sketch. **[6]**

c) Discuss stone column technique with a neat sketch. **[6]**

OR

Q8) a) Write a note on 'construction of diaphragm wall'. **[6]**

b) Draw a vertical section of underreamed pile with two bulbs. Name various parts. **[6]**

c) Discuss vibro flotation technique with a neat sketch. **[6]**

Total No. of Questions : 8]

SEAT No. :

P531

[Total No. of Pages : 2

[6004]-453
B.E. (Civil Engineering)
TRANSPORTATION ENGINEERING
(2019 Pattern) (Semester - VII) (401002)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat sketches must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***
5) ***Use of electronic pocket calculator is allowed.***

Q1) a) Explain with neat sketch of cross section of road pavement in embankment showing different elements and write their functions. **[6]**

b) What is purpose of providing camber? Explain with sketches different shapes of cross slopes of road pavement? **[6]**

c) Calculate minimum sight distance required to aviod head-on collision of two cars approaching from opposite direction at 100 and 80 kmph. Assume a reaction time of 2.5 seconds, coefficient of friction of 0.7 and a break efficiency of 50 percent, in either case. **[6]**

OR

Q2) a) Explain PIEV theory of stopping sight distance. **[6]**

b) What is ruling gradient, what are the limiting values of IRC recommendations of ruling gradient? When limiting gradient is used? **[6]**

c) Desing speed of a highway is 100 kmph. There is a horizontal curve of radius 300 m on a certain locality. Calculate superelevation needed to maintain this speed. If maximum superelevation of 0.07 is not to be exceeded, calculate the maximum allowable speed on this curve as it is not possible to increase the radius. Safe limit of transverse coefficient of friction is 0.15. **[6]**

Q3) a) Enlist desirable properties of road aggregate and explain any one in details. **[6]**

b) Explain the terms Cutback, Emulsions, flash and fire point. **[6]**

c) Enlist different tests on bitumen and explain any one in details. **[6]**

OR

P.T.O.

Q4) a) Explain how Impact Test on aggregates is done in the laboratory. How are the results of the test interpreted? **[6]**

b) Explain the requirement of bitumen mixes. **[6]**

c) State and explain desirable properties of the sub grade soil? **[6]**

Q5) a) State comparison between rigid pavement and flexible pavement. **[6]**

b) Why joints are necessary in concrete pavements? State the various types of joints. Explain any one in brief. **[6]**

c) Explain in brief the CBR test and its importance in design of Flexible pavement. **[5]**

OR

Q6) a) Write short note on surface drainage system of highway. **[6]**

b) Describe briefly the various factors influences the pavement design. **[6]**

c) State the Westergaards stress equations for wheel loads at all the three regions of cement concrete pavement with meanings of notations used. **[5]**

Q7) a) What is permanent way? Describe components permanent way with neat sketch. **[6]**

b) Find out maximum scour depth for a straight stream flow condition for a bridge sight if design discharge is 600 m^3 per second and mean diameter of soil bed particle is 0.6 mm. (Use constant for maximum scour depth R = 1.27). **[6]**

c) What is role and necessity of railway in development of country? **[5]**

OR

Q8) a) Draw a neat labeled sketch showing all the components of bridges and state purpose of each component. **[6]**

b) A bridge has linear waterway of 100 m constructed across a river whose natural waterway is 120 m. Calculate a height of afflux under the bridge if discharge during flood is 1200 m^3 per second and average floor depth is 3 m. Use Molesworth's formula. **[6]**

c) What are different types of gauges? Explain their suitability. **[5]**

Total No. of Questions : 8]

SEAT No. :

P532

[Total No. of Pages : 2

[6004]-454

B.E. (Civil)

COASTAL ENGINEERING

(2019 Pattern) (Semester - VII) (Elective - III) (401003A)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q.No.1 or Q.No.2, Q.No.3 or Q.No.4, Q.No.5 or Q.No.6, Q.No.7 or Q.No.8.***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data, if necessary.***
4) ***Neat diagrams must be drawn wherever necessary.***

Q1) a) Define tide. What are the basic characteristics of tides? Explain the process of generation of tides? What affects tides in addition to Sun and Moon? **[9]**

b) Classify the tides in detail based on the position of Earth, Sun, and the Moon and based on the frequency of occurrence. Draw the neat diagrams wherever necessary. **[9]**

OR

Q2) a) Define tidal currents in shallow sea? What are the spring and neap currents? What are the forces which affects the tidal currents in hallow sea? What are the storm surges? **[9]**

b) Elaborate in detail dynamic theory of tides- types. **[9]**

Q3) a) Enlist the various factors which affect on the long shore sediment transport (littoral drift)? What are the characteristics of littoral drift materials? How particle fall velocity influences the littoral drift process? **[8]**

b) Compare the enlisted factors determining Littoral Wave Climate and explain their interdependency at the time of long shore sediment transport. **[9]**

i) Offshore Wave Climate

ii) Effect of Bottom Topography

iii) Nearshore Wave Climate

OR

P.T.O.

Q4) a) Differentiate between the offshore and nearshore sediment transport. What is sediment budget? Give expression to determine the sediment budget for longshore sediment transport. Explain the effect of different wave conditions on sediment transport. **[8]**

b) Draw a schematic profile representing the effect of littoral drift on shoreline and explain various effects of littoral drifts on the shoreline. What remedial measures should be provided to reduce the loss which occurs due to the littoral drift. **[9]**

Q5) a) Characterize the various types of coastal structures based on coastal protection, shore protection, mixed coastal and shore protection, draw schematic or line diagrams representing the any 4 structures and write 2 applications of each. **[9]**

b) What is the concept breakwater? How it useful for shore protection? Explain following types of breakwaters in depth. **[9]**

i) Reef breakwaters

ii) Detached breakwaters

iii) Floating breakwaters

OR

Q6) a) Draw the representative diagrams of sea walls, sea dikes, revetments, bulkheads and explain each of them in depth along with their functions**[9]**

b) Draw the figures and explain Artificial Beach Nourishment and beach dewatering (or beach drain) as shore protection measures. **[9]**

Q7) a) What is a coastal zones? Draw a schematic diagram of coastal zone representing beach profile, surf zone, off shore zone and explain each term in detail. **[8]**

b) Write short note about the estuaries, wet lands and lagoons, coastal dunes. **[9]**

OR

Q8) a) What are the causes of pollution in coastal zone? Discuss the various issues for disposal of waste/dredged spoils in the coastal zones. **[8]**

b) How the oil spills and contaminants causes the pollution in sea water? What are the primary reasons of oil pills? What are remedial measures to reduce the pollution caused by the oil spills? **[9]**

Total No. of Questions : 8]

SEAT No. :

P533

[Total No. of Pages : 2

[6004]-455
B.E. (Civil)
ADVANCED DESIGN OF CONCRETE STRUCTURES
(2019 Pattern) (Semester - VII) (Elective - III) (401003B)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q.No.1 or Q.No.2, Q.No.3 or Q.No.4, Q.No.5 or Q.No.6, Q.No.7 or Q.No.8.***
2) ***Figures to the right indicate full marks.***
3) ***IS 456, IS 3370, IS 1893 and IS 13920 are allowed in the examination.***
4) ***The designs should comply with the latest codal provisions.***
5) ***If ncessary, assume suitable data and indicate clearly.***
6) ***Use of electronic pocket calculator is allowed.***

Q1) a) Explain with neat sketches, the deformation of L shaped retaining wall and show the position of the main reinforcement to be provided in all elements **[5]**

b) Propose suitable dimensions and perform the stability analysis for T-shaped retaining wall provided to retain a horizontal leveled backfill of height 3.5 m having unit weight respectively equal to 18 kN/m^3. Angle of repose = 30°, Coefficient of friction between concrete and soil = 0.55, SBC of soil = 180 kN/m^2, depth of foundation = 1.0 m.**[12]**

OR

Q2) A L-shaped retaining wall of height 4.8 m is to be provided to retain a backfill with two different layers. The upper layer of 2.5 m height is having unit weight equal to 17 kN/m^3 with angle of repose = 28°. The lower layer has unit weight of 18 kN/m^3 and angle of repose equal to 30°. Coefficient of friction between concrete and soil = 0.55, SBC of soil = 160 kN/m^2, depth of foundation = 1.0 m. Carry the stability analysis and design the stem sketching the details of reinforcement in the stem. **[17]**

Q3) a) Explain the approximate analysis and design of circular water tank with rigid base, with proper sketches. **[4]**

b) Design the wall of a square water tank open at top of size 4.0 m × 4.0 m × 3.0 m. Use Fe 500 grade of steel and M30 grade of concrete. Provide detailing of reinforcement. **[14]**

OR

Q4) Design a rectangular water tank open at top resting on ground having a size of 5.5 m ×4.0 m × 2.8 m high. Use M 30 and Fe 500 grade material. Sketch details of reinforcement for the wall. **[18]**

P.T.O.

Q5) Design a ductile solid shear wall with boundary elements, for a residential building, located in seismic zones IV. Use M25 grade concrete and Fe500 grade of steel. Consider the height of shear wall as 15 m & length of shear wall as 4 m. The RC shear wall is subjected to the following loadings. Shear Force = 500 kN, axial force =8200 kN, axial force on boundary element = 1500 kN and moment = 5,500 kNm. **[18]**

OR

Q6) a) Discuss different types of shear wall and explain the lateral load resistance mechanism for the shear wall. **[4]**

b) Design a ductile RC shear wall subjected to Shear Force = 450 kN, axial force = 9200 kN, and moment = 5,000 kNm. Consider the height of the shear wall as 12 m and length as 5 m. Draw the ductile detailing of the shear wall. **[14]**

Q7) a) Determine the seismic forces at each floor level for the commercial RCC structure. The building is a three storey structure having total height 9m with three frames placed c/c distance of 7 m forming two bay of size 7 m each. Storey height of 3 m is provided. The building is located in seismic zone III. The soil investigation revealed a well graded gravel. The special moment resisting RC frames are in-filled with brick-masonry. The lumped weight due to dead loads may be taken as 12 kN/m^2. The floors are to cater a live load of 4 kN/m^2 on floors and 1.5 kN/m^2 on the roof. **[12]**

b) Explain the approximate method of analysis for gravity loads for a multistory frame. **[5]**

OR

Q8) a) A continuous three span beam ABCD have equal span of 6 m. The design data for the beam is as follows. The moments due to vertical loads are

Support moments M_A (–) = 78.07 kNm; M_B (–) = 127.92 kNm; **[12]**
Mid span moments: M_{AB} (+) = 74.41 kNm and M_{BC} (+) = 61.45 kNm.
Earthquake moments is 210 kNm.
Design the beam ABCD for combined effect of lateral and gravity loads for flexure only. Draw the ductile detailing of the reinforcement.

b) Explain the seismic coefficient method of analysis to find the lateral forces on a multistory frame. **[5]**

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Total No. of Questions : 8]

SEAT No. :

P534

[Total No. of Pages : 2

[6004]-456

B.E. (Civil)

INTEGRATED WATER RESOURCES PLANNING AND MANAGEMENT

(2019 Pattern) (Semester - VII) (Elective - III) (401003C)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q.No.1 or Q.No.2, Q.No.3 or Q.No.4, Q.No.5 or Q.No.6, Q.No.7 or Q.No.8.***
2) ***Neat diagrams must be drawn whenever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Justify importance assessment of river water quality and write a brief note on prevention and control of surface water pollution. **[10]**

b) Explain polluters pay principle. **[8]**

OR

Q2) a) What is Environmental Impact Assessment (EIA) and what are its objectives, state methodology to carryout EIA. **[10]**

b) State any four CPCB regulations regarding water pollution control. **[8]**

Q3) a) State and explain principles of planning and financing water of water resources projects. **[10]**

b) Explain how water is economic good. **[7]**

OR

Q4) a) Explain framework for planning a sustainable water future. **[10]**

b) Explain in brief economics and decision making in IWRPM. **[7]**

Q5) a) What are water crises, explain its global and national perspective. **[10]**

b) State and explain rural local governing body water laws. **[8]**

OR

P.T.O.

Q6) a) State and explain UN laws on non-navigable uses of international water courses. **[10]**

b) State any four municipal corporation laws regarding water supply and drainage. **[8]**

Q7) a) Explain in detail role of dam in flood control and power generation and its importance in IWRPM. **[10]**

b) Explain importance of management of flood plains. **[7]**

OR

Q8) a) Explain in detail Use of QGIS in IWRPM. **[10]**

b) Explain application of soft computing in flood control. **[7]**

Total No. of Questions : 8]

SEAT No. :

P535

[Total No. of Pages : 2

[6004]-457
B.E. (Civil Engineering)
FINITE ELEMENT METHOD
(2019 Pattern) (Semester - VII) (Elective - III) (401003D)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q.No.1 or Q.No.2, Q.No.3 or Q.No.4, Q.No.5 or Q.No.6, Q.No.7 or Q.No.8.***
2) ***Neat diagrams must be drawn whenever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***
5) ***Use of electronic pocket calculator is allowed.***

Q1) a) Enlist the various types elements used in finite element analysis with their applications. **[6]**

b) Write short note on shape functions and enlist the various methods for deriving the shape function. **[6]**

c) Derive the shape functions of 2 noded bar element using natural co-ordinate system (ξ). **[8]**

OR

Q2) a) Derive the shape functions of 2 noded bar element using polynomials. **[6]**

b) Write displacement polynomial for CST and LST elements. **[6]**

c) Derive the shape functions for 4 noded rectangular element by using Lagrangian formula. **[8]**

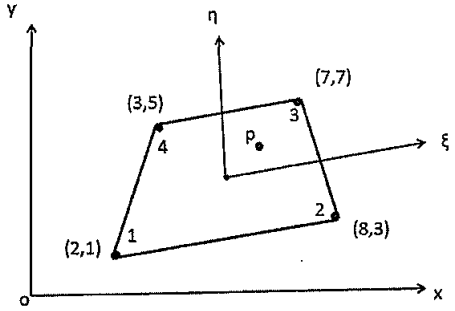
Q3) a) Obtain the Jacobian Matrix for the 4 noded isoparametric rectangular element using (ξ, η) co-ordinate system. **[10]**

b) State and explain the three basic law on which isoparametric concept is developed. **[6]**

OR

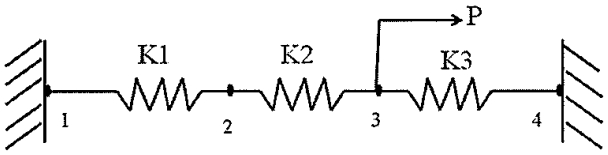
Q4) a) Determine the shape functions of 8 noded hexahedron element using Lagrangian polynomial. **[10]**

b) Determine the cartesian co-ordinates of point p(ξ=0.5 ,η=0.6) shown in figure. **[6]**



P.T.O.

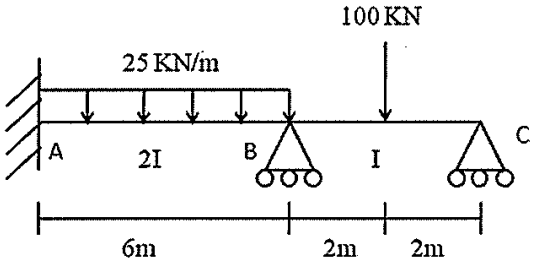
Q5) a) Find out the deformation at each node. Where, K1 = 100 N/mm, K2 = 300 N/mm, K3= 300 N/mm and P =500 N. **[10]**



b) State and Explain the equation for half bandwidth of overall stiffness matrix. **[6]**

OR

Q6) a) Analyse the continuous beam as shown in figure using finite element method. Take E constant. **[10]**

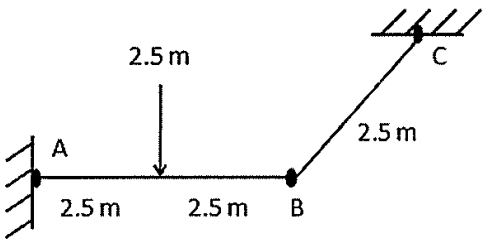


b) Write a short note on node and explain the effective node numbering scheme. **[6]**

Q7) Explain the local co-ordinate system and global co-ordinate system and derive the stiffness matrix and transformation matrix of 2 noded frame element.**[18]**

OR

Q8) Find out the unknown joint displacement at joint B of grid structure shown in figure. EI = 2×10^5 KN.m^2 and GJ = 1.2×10^5 KN.m **[18]**



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Total No. of Questions: 8]

SEAT No. : ____

P536

[Total No. of Pages : 4

[6004]-458
B.E. (Civil Engineering)
DATA ANALYTICS
(2019 Pattern) (Semester-VII) (Elective-III) (401003 E)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Attempt Q.No. 1 or Q.No. 2, Q.No. 3 or Q.No. 4, Q. No. 5 or QNo. .6 and Q.No. 7 or Q.No. 8.***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data, if necessary.***
4) ***Neat diagrams must be drawn wherever necessary.***

Q1) a) Enlist and discuss the Non-Probability Sampling Methods and Probability sampling methods **[6]**

b) Calculate the Sperman's rank coefficient of correlation from the following data **[6]**

Marks by X	50	66	34	21	15	79	42
Marks by Y	31	64	53	41	17	73	29

c) Calculate the Karl Pearson's coefficient of correlation for the following data. **[6]**

Expenditure on food (%)		Family Income (₹)			
	20000-30000	30000-40000	40000-50000	50000-60000	60000-70000
10-15	-	-	-	3	7
15-20	-	4	9	4	3
20-25	7	6	12	5	-
25-30	3	10	19	8	-

OR

P.T.O.

Q2) a) Explain Sampling Distribution of the Mean and the Central Limit theorem. **[6]**

b) Psychological tests of intelligence and of engineering ability were applied to 10 students. Here is a record of ungrouped data showing intelligence ratio (I.R.) and engineering ratio (E.R.). Calculate the coefficient of correlation. **[6]**

Student	A	B	C	D	E	F	G	H	I	J
IR	105	104	102	101	100	105	98	96	93	95
ER	101	103	100	98	95	96	104	98	97	94

c) Calculate Karl Pearson's coefficient of correlation between age and playing habits from the data given below. Also calculate probable error and comment on the value **[6]**

Age	20	21	22	23	24	25
Number of students	500	400	300	240	200	180
Regular players	400	300	180	96	60	24

Q3) a) Explain following methods of Hypothesis testing: **[5]**

i) Z test

ii) Chi Square Test

b) Weights in kg of 10 students are given as 38, 40, 45, 53, 47, 43, 55, 48,52, 49. Can we say that the variance of the distribution of weights of all students from which the above sample of 10 students was drawn is equal to 20 kg^2. $(v = 9 \;\; x^2_{0.05} = 16.92)$ **[6]**

c) The specimen of copper wires drawn form a large lot have the following breaking strength (in kg- weight). Test (using Student's t-statistic) whether the mean breaking strength of the lot may be taken to be 578 kg-weight (Test at 5 per cent level of significance). 578, 572, 570, 568, 572, 578, 570, 572, 596, 544. (As the observed value of t is - 1.488 for degrees of freedom=9) **[6]**

OR

Q4) a) Explain: **[5]**

i) Essentials of Hypothesis

ii) Level of confidence and its signifance

b) In an anti-corona compain in a certain area vaccine was administered to 1624 persons out of total population of 6496. The number of corona cases is shown below: **[6]**

Discuss the usefulness of vaccine in checking corona. (for v =1, $x^2_{0.05}$=3.84)

Treatment	Corona	No corona	Total
Vaccine	40	1584	1624
No Vaccine	440	4432	4872
Total	480	6016	6496

c) In a sample of 8 observations the sum of squared deviations of item from the mean was 84.4. In another sample of 10 observations the value was found to be 102.6. Test whether the difference is significant at 5% level. (F=3.29 at 5% level of significance v_1=7 and v_2 = 9, F = 3.07 at 5% level of significance v_1=8 and v_2=10) **[6]**

Q5) a) Explain the significance of: **[6]**

i) Data analytics life cycle

ii) Data cleaning

iii) Data transformation

b) From the following data, obtain the two regression equations **[6]**

X	6	2	10	4	8
Y	9	11	5	8	7

c) A manufacturer of flooring tiles has the following data on the cost per unit in ₹ on the cost per unit of a certain made tiles and the number of units made in each order, obtain the two regression equations and correlation coefficient. **[6]**

Order number	1	2	3	4	5	6
X	1	3	5	7	10	12
Y	58	52	46	40	37	22

OR

Q6) a) Explain with suitable examples: **[6]**

i) Data Comparing

ii) Data Reporting

iii) Data Analysis

b) Given the following data obtain the yield when the rainfall is 75 cm. The coefficient of correlation between yield and rainfall is 0.8 **[6]**

	Rainfall (cm)	Yield per acre
mean	67.5	90
S.D.	7.5	15

c) The following data, based on 450 students, are given for marks in Statistics and Economics at a certain examination **[6]**

Mean marks in statistics:40

Mean marks in Economics:48

Standard Deviation of marks in statistics:12

The variance of marks in Economics: 256.

The sum of products of deviation of marks from their respective mean is 42075 . Give the equations of two lines of regression.

Q7) a) Explain in detail Regression and Regression Analysis in Machine learning **[5]**

b) Explain with an example logistics regression **[6]**

c) Discuss the technique of Support vector machines **[6]**

OR

Q8) a) Define and explain types of machine learning: Supervised, unsupervised, reinforced learning **[5]**

b) Discuss the Applications of Machine Learning in Civil Engineering **[6]**

c) Explain in detail K means clustering with a suitable application **[6]**

Total No. of Questions: 8]

SEAT No. :

P537

[Total No. of Pages :4

[6004]-459
B.E. (Civil)
OPERATIONS RESEARCH
(2019 Pattern) (Semester-VII) (Elective-III) (401003-F)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Figures to the righte side indicate full marks.***
3) ***Use of Calculator is allowed.***
4) ***Assume suitable data if necessary.***

Q1) a) Explain the following in the context of assignment problem **[6]**

i) The Hungarian Method

ii) Infesible assignment

b) Unit cost of transporting precast blocks from four factories to three sites is given along with availability at each factory and the requirement on each site. Obtain optimal solution to minimize cost of transportation using VAM method. **[12]**

	1	2	3	4	supply
A	2	7	4	6	5
B	3	3	7	2	8
C	5	4	1	3	7
D	1	6	2	5	14
Demand	7	9	18	6	

OR

Q2) a) Six different jobs J1,J2, J3, J4 J5 and J6 are to be worked on a machine tool with setting times as given in the following matrix. It is necessary that a job once undertaken will not be handled again till all other jobs are finished. Decide the sequence of jobs which gives minimum elapsed time. **[12]**

P.T.O.

		Next jobs					
		J1	J2	J3	J4	J5	J6
	J1	-	17	20	22	6	8
	J2	21	-	18	23	17	16
	J3	23	22	-	19	22	19
Jobs	J4	27	19	21	-	20	21
Before	J5	16	18	17	23	-	17
	J6	18	16	20	24	19	-

b) What are the applications of transportation problem in Construction industry? **[6]**

Q3) a) In Simplex problem, explain the two phase method and its applications **[8]**

b) What are the advantages of Linear programming problems? **[4]**

c) Define the following terms and indicate their significance of decision making with linear programming and simplex method: **[6]**

i) Key cloumn

ii) Key row

OR

Q4) a) Solve using Simplex method **[8]**

Maximize $Z=2x_1-4x_2+5x_3-6x_4$

Subject to

$$x_1 + 4x_2 - 2x_3 + 8x_4 \le 2$$
$$-x_1 + 2x_2 + 3x_3 + 4x_4 \le 1$$
$$x_1, x_2, x_3, x_4 \ge 0$$

b) Under which circumstances, Big M method is used? **[4]**

c) Explain the significance of surplus and slack variables. **[6]**

Q5) a) Optimize $Z = -x_1^2 - x_2^2 + 4x_1 + 9x_2$ **[10]**

Subject to

$$4x_1 + 3x_2 = 15$$
$$3x_1 + 5x_2 = 14$$
$$x_1, x_2 \geq 0$$

Use Lagrangian Multiplier technique.

b) Give the steps involved in steepest ascent/descent method. **[7]**

OR

Q6) a) Explain the following **[7]**

i) Hessian matrix

ii) Gradient vector

b) A company sells two types of items, A and B. On item A, three is no discount and is sold at a fixed of price of Rs. 250 per unit. The sales revenue for item B is given as $(40–0.40x_2)x_2$ where x_2 is the number of units sold. The marketing department has only 1,500 hours available for selling these items in the next year. Further the company estimates the sales time function as sales time $= x_1 + 0.3x_1^2 + 3x_2 + 0.5x_2^2$. The company can procure a maximum of 6,000 units of the two products combined. Formulate the mathematical model of the problem to maximize the revenue. **[10]**

Q7) a) Solve the following 3 X 5 game using dominance property **[8]**

		Opponent 2				
		1	2	3	4	5
Opponent 1	A	6	15	30	21	16
	B	3	3	6	6	4
	C	12	12	24	35	3

Give optimum strategy for both the opponents and find value of games

b) In an investment project, Seven salesmen are to be appointed for three areas to maximize the sales. the sale in each zone w.r.t the number of salesman is as given under. Find the optimum allocation. **[9]**

N. of salesmen	0	1	2	3	4	5	6	7
Zone 1	2	4	7	12	16	19	21	22
Zone 2	3	6	10	17	22	25	27	27
Zone 3	2	3	6	10	15	19	22	23

OR

Q8) a) Why is replacement of items required? what is the strategy used for replacement of any machine? What are the types of costs to be considered for calculating the replacement year? **[9]**

b) Write the applications of following OR techniqus in the filed of Civil Engineering. **[8]**

i) Non linear Programming

ii) Dynamic programming

Total No. of Questions : 8]

SEAT No. :

P538

[Total No. of Pages : 2

[6004]-460
B.E. (Civil)
AIR POLLUTION AND CONTROL
(2019 Pattern) (Semester - VII) (Elective - IV) (401004 (A))

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Figures to the right side indicate full marks.***
3) ***Draw neat figures wherever necessary.***
4) ***Assume suitable data if necessary.***
5) ***Use of scientific calculators is allowed.***

Q1) a) Explain the purpose of ambient air and stack gas sampling. **[6]**

b) Convert 100 $\mu g/m^3$ of SO_2 in ppm. Assume temperature 25°C and pressure at 103.193 kPa. **[6]**

c) List the devices and methods used for air pollutant sampling. **[6]**

OR

Q2) a) Explain with a neat sketch location of sampling ports and traverse points in case of stack sampling. **[6]**

b) Convert 140 $\mu g/m^3$ of SO_2 in ppm. Assume temperature 25°C and pressure at 103.193 kPa. **[6]**

c) Explain with a neat sketch working of high volume sampler. **[6]**

Q3) a) Define emission factor and relate its significance in preparation of emission inventory. **[6]**

b) Describe the steps involved in preparation of gridded emission inventory. **[6]**

c) Compare the physical, statistical and deterministic air quality models. **[5]**

OR

Q4) a) Enumerate and discuss the basic components and importance of air quality modelling. **[6]**

b) State the basic equation of emission estimation and describe its terminologies. **[6]**

c) Explain activity data in emission estimation with examples. **[5]**

P.T.O.

Q5) a) Describe the control of air pollution at source by process modification, change of raw material and equipment modification. **[6]**

b) Determine the migration velocity for an existing ESP having collection plate area of 110 m^2, gas flow rate 2.5 m^3/s and collection efficiency 99.5%. **[6]**

c) Explain the measures to be taken to control gaseous air pollutants. **[6]**

OR

Q6) a) State and explain the carbon sequestration. **[6]**

b) Find the collecting plate area and number of plates to be used in a horizontal flow single stage Electrostatic precipitator handling an average gas flow of 2.5 m^3/s from a pulverized coal fired boiler. Consider the plate of 4 m wide and 5.2 m high. The required collection efficiency of ESP is 98%. Take the drift velocity as 12 cm/s. **[6]**

c) Describe the factors responsible for selection of particulate control equipment. **[6]**

Q7) a) Relate improved ventilation to indoor air quality. **[5]**

b) Describe the use of plants for control of indoor air pollution. **[6]**

c) Discuss the causes and mitigation technologies for indoor air pollution. **[6]**

OR

Q8) a) Explain sick building syndrome and its solution. **[5]**

b) Explain the radon removal technique. **[6]**

c) Enumerate the odorous materials with respect to following industries. **[6]**

i) Petroleum

ii) Pharmaceutical

iii) Paper and Pulp

✡ ✡ ✡

Total No. of Questions : 8] **SEAT No. :**

P539 **[Total No. of Pages : 2**

[6004]-461
BE (Civil)
ADVANCED DESIGN OF STEEL STRUCTURES
(2019 Pattern) (Semester - VII) (Elective IV) (401004 B)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q8.***
2) ***Neat sketches must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***
5) ***Use of electronic pocket calculator and relevant IS code are allowed.***
6) ***Use of cell phone is prohibited in the examination hall.***

Q1) a) Define flat - width ratio and effective design width for cold formed light gauge section. **[6]**

b) Alight gauge steel rectangular box section 180 mm x 90 x 2.0 mm is used for a column. The effective length of a column is 2.8 m. Determine safe load carrying capacity of the section assuming basic diesign stress σ_b = 125 N/mm^2 Adopt the properties of box section from IS : 811 - 1961. **[12]**

OR

Q2) a) Differentiate cold formed light gauge and hot rolled steel section . **[6]**

b) Asimply supported beam of span 4.0 m carrying uniformly distributed load 20 kN/m over entire span. If the beam is laterally supported throughout the span. Design cross section of beam using two channels without bent lips. **[12]**

Q3) a) Explain in brief disadvantage of tubular section. **[5]**

b) A tubular column consists of IS: 1161 grade st. 35 steel with effective length 4.5 m. The outside diameter of tube is 219.1 mm. The weight of 1 meter length of tube is 310 N. Determine the safe load carrying capacity of the column. **[12]**

OR

P.T.O.

Q4) a) State the advantage and disadvantage of tubular section. **[5]**

b) Design a tubular column of length 4.0 M and subjected to an axil load of 450 kN. The one end of column is hinged and other end is fixed. **[12]**

Q5) a) Explain in brief application of castellated beam. **[5]**

b) A simply supported beam carrieslive load 4 kN/m and dead load 4 kN/m over a span of 16 m. Design a castellated beam and check for shear, assuming the compression flange is restrained. **[12]**

OR

Q6) a) Explain in brief mode of failure of castellated beam. **[5]**

b) A simply supported beam carrieslive load 6 kN/m and dead load 4 kN/m over a span of 12 m. Find maximum shear & moment and desing castellation. **[12]**

Q7) a) State and explain the mechanisms for a gable frame with sketches. **[6]**

b) Find shape factor and plastic moment for the I - section assuming yield stress, σ_y = 250 N/mm^2 with following dimension.

Flange : 100 mm wide and 10 mm thick.

Web: 200 mm deep and 10 mm thick. **[12]**

OR

Q8) Design a portal frame loaded and supported as shown in Fig.8. **[18]**

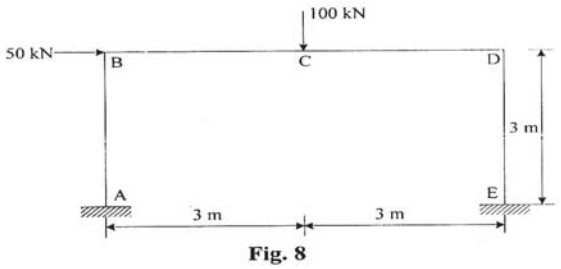

Fig. 8

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Total No. of Questions : 8] **SEAT No. :**

P540 **[Total No. of Pages : 4**

[6004]-462
B.E. (Civil)
STATISTICAL ANALYSIS AND COMPUTATIONAL METHODS
(2019 Pattern) (Semester - VII) (Elective IV) (401004 C)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q8 ,Q9 or Q10.***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data, if necessary.***
4) ***Use of electronic pocket calculator is allowed in the examination.***
5) ***Use of cell phone is prohibited in the examination hall.***

Q1) a) Write a short note on Data sampling, its types, methods of sampling and ideal sample size selection with relevant examples **[5]**

b) Write a short note on different types of samples with suitable examples on each. **[6]**

c) Explain with an example student T test. **[6]**

OR

Q2) a) Write a short note on sampling Distribution of the Mean and the Central Limit. **[5]**

b) Write a short note on process of sampling and explain what is the meaning of " Null Hypothesis". **[6]**

c) Explain with an example Chi Square test. **[6]**

Q3) a) Explain in detail assumptions of Chi Square test of Hypothesis. **[6]**

b) The figures given below are (a) the theoretical frequencies of a distribution and (b) the frequencies of a normal distribution having the same mean, standard deviation and the total frequency as in (a). **[6]**

i) 1,5,20,28,42,22,15,5,2.

ii) 1,6,18,25,40,25,18,6,1.

Apply the χ^2 test of goodness of fit.

P.T.O.

c) In order to start new S.T. bus to a certain remote village it is required to get the average fare of ì 400 daily. Reports on number of passengers for 21 days revealed that the average daily collection of fare from the passengers was ì 390 with standard deviation of ì 40. Do these data support the demand of people for starting new bus to the village?

[Use 5% l.o.s] **[6]**

OR

Q4) a) Explain in detail assumptions of Z test of Hypothesis. **[6]**

b) The demand for a particular spare part in a factory was found to vary from day - to -day. In a sample study the following information was obtained. **[6]**

Days	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
No.of Parts Demanded	1124	1125	1110	1120	1126	1115

Test the hypothesis that the number of parts demanded does not depend on the day of the week. Apply Chi Square Test.

c) Suppose that sweets are sold in packages of fixed weight of the contents. The producer of the packages is interested in testing that average weight of contents in packages in 1 kg. Hence a random sample of 12 packages is drawn and their contents found (in kg) as follows: **[6]**

1.05, 1.01, 1.04, 0.98, 0.96, 1.01, 0.97, 0.99, 0.98, 0.95, 0.97, 0.95.

Using the above data what should he conclude about the average weight of contents in the packets? Apply Student T Test.

Q5) a) Explain Correlation and its significance to civil engineering with examples. **[6]**

b) Find the lines of regression for the following data. **[6]**

X	10	14	19	26	30	34	39
Y	12	16	18	26	29	35	38

and estimate y for x = 14.5 and x for y = 29.5.

c) Determine regression line for price, given the supply, hence estimate price when supply is 180 units, from the following information: X = supply, Y =Price, n= 7, Σ (x - 150) =119 ,Σ (y- 160)=84, Σ (x-150)2=2835, Σ (y-160)2=2387, Σ (x-150) Σ (y-160)=525. Also, find correlation coefficient between price and supply. **[6]**

OR

Q6) a) Explain Regression analysis and its significance to civil engineering with examples. **[6]**

b) Obtain regression lines for the following data: **[6]**

x	2	3	5	7	9	10	12	15
y	2	5	8	10	12	14	15	16

Find estimate of (i) Y when X = 6 and (ii) X when Y= 20.

c) If the two lines of regression are $9x + y - \lambda = 0$ and $4x + y = \mu$ and the means of x and y are 2 and –3 respectively, find the values of λ, μ and the coefficient of correlation between x and y. **[6]**

Q7) a) Explain one and two sided analysis of variance. **[5]**

b) Fit a straight line of the form y = mx + c to the following data, by using the method of least squares. **[6]**

x	0	1	2	3	4	5	6	7
y	–5	–3	–1	1	3	5	7	9

c) Following date refers to the load lifted and corresponding force applied in a pulley system. If the load lifted and effort required are related by equation effort =a* (load lifted) b, where a and b are constants. Evaluate a and b by linear curve fitting. **[6]**

Load lifted in kN	10	15.0	20.0	25.0	30.0
Effort applied in kN	0.750	0.935	1.100	1.200	1.300

OR

Q8) a) Explain K-S test for goodness of fit. **[5]**

b) Given the table of points: Use least square method to fit a straight line to the data and find the value of y (22) **[6]**

x	0	2	4	6	8	12	20
y	10	12	18	22	20	30	30

c) Fit a curve $y = ax^b$ using the following data: **[6]**

x	2000	3000	4000	5000	6000
y	15	15.5	16	17	18

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Total No. of Questions : 8]

SEAT No. :

P541

[Total No. of Pages : 2

[6004]-463
B.E. (Civil)
AIRPORT AND BRIDGE ENGINEERING
(2019 Pattern) (Semester - VII) (Elective - IV) (401004 (D))

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Figures to the right side indicate full marks.***
3) ***Draw neat diagrams wherever necessary.***
4) ***Assume suitable data if necessary.***
5) ***Use of electronic pocket calculators is allowed.***

Q1) a) What is airport drainage? What are the functions and basic requirements of airport drainage? **[6]**

b) Write note on. **[6]**

i) Augmented reality

ii) Virtual Reality

c) Explain CBR method of flexible pavement design. **[6]**

OR

Q2) a) What is BIM (Building Information Modeling)? Explain in detail. **[6]**

b) Define Airport Capacity. State the various factors affecting airport operating capacity. **[6]**

c) Name the various methods used for designing flexible airport pavement and discuss in brief any one method. **[6]**

Q3) a) Describe the following terms :- **[6]**

i) Apron marking

ii) Landing Direction Indicator

iii) Threshold marking

b) Discuss in brief the ICAO system of approach lighting . **[6]**

c) What is heliport? State the various helicopter characteristics. **[6]**

OR

P.T.O.

Q4) a) Explain marking of heliport with neat sketch. **[6]**

b) What is VTOL and STOL? What are the advantages of STOL? **[6]**

c) Why lighting and marking of airport is required? Enlist parameters considered for heliport planning. **[6]**

Q5) a) What are the various methods commonly used in estimation of the flood discharge at a bridge site. **[6]**

b) What do you mean by economical span? Derive the equation for economical span, stating clearly the assumptions made in the derivation. **[5]**

c) Calculate flood discharge from a catchment of 65 square kilometer when the rainfall during a storm was 15 cm in two hours. The time of concentration is 20 hours and the run off coefficient is 0.35 **[6]**

OR

Q6) a) Define following terms related to bridge. **[6]**

i) Effective span

ii) Freeboard

iii) Afflux

b) Sketch any two types of abutments and piers used in the construction of bridges. **[5]**

c) Describe in brief IRC class A and Class B Loading used for the design of bridges. **[6]**

Q7) a) Describe with neat sketch. **[6]**

i) Bascule bridge

ii) Suspension bridge

b) Differentiate between temporary and permanent bridges with example. **[5]**

c) Define culvert. Describe box culvert with neat sketch. **[6]**

OR

Q8) a) State the purpose of providing bearing in bridges. Enlist different types of bearing. **[5]**

b) Discuss any three types of movable bridges. **[6]**

c) Write short note on rigid frame bridges and cable stayed bridges. **[6]**

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Total No. of Questions : 8] **SEAT No. :**

P542 **[Total No. of Pages : 4**

[6004]-464
B.E. (Civil)
DESIGN OF PRESTRESSED CONCRETE STRUCTURES
(2019 Pattern) (Semester - VII) (Elective - IV) (401004 E)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q8 ,Q9 or Q10***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to right indicate full marks.***
4) ***Use of electronic pocket calculator is allowed.***

Q1) a) A post - tensioned prestressed beam of rectagular section 250 mm wide is to be designed for an imposed load of 12kN/m, uniformly distributed on a span of 12m. The stress in the concrete must not exceed 17 N/mm^2 in compression or 1.4N/mm^2 in tension at any time and the loss of prestress may be assumed to be 15% Calcutate.

i) The minimum possible depth of the beam

ii) For the section provided the minimum prestressing force and the corresponding eccentricity. **[9]**

b) A prestressed concrete beam 250 mm wide & 375mm deep is subjected to two symmetrical cables each with a prestressing force of 800 kN/. An anchor plate 150mm × 275 mm is provided for each cable. Calculate the reinforcement required to resist bursting forces in the transmission zone. Assume a jacking force equal to 960 kN for each cable. **[8]**

OR

Q2) a) A pre - tensioned T- section has a flange which is 300 mm wide and 200 mm deep. The rib is 150 mm wide and 350 mm deep. The effective depth of the cross section is 500 mm. If f_{ck} = 50 N/mm^2, f_{pu} = 1600N/mm^2, and the area of prestressing steel Aps =200 mm^2,Calculate the ultimate flexural strength of the section using IS1343 code provisions. **[8]**

P.T.O.

b) A prestressed concrete beam of rectangular section 150 mm wide by 300 mm deep is to be designed to support an ultimate shear force of 130kN. The uniform prestress across the section is 5 N/mm^2. The characteristic cube strngth of the concrete is 40N/mm^2 and steel is Fe415 with bar dia.8 mm. Design suitable spacing for the stirrups conforming to IS1343 recommendations for uncracked section. Assume cover to the reinf. as 50mm. **[9]**

Q3) a) A slab spanning 10m is to be designed as a one way prestressed concrete slab with parallel post tensioned cables carrying an effective force of 620kN. The deck slab is required to support a udl of 25kN/m^2. The permissible stresses in concrete should not exceed 15N/mm^2 in compression and no tension is permitted at any stage. Design the spacing of the cables and their position at mid span section. Assume loss ratio 0.8. **[8]**

b) Design a post tension two way slab of effective span 6m ×7m with continutity on all side, subjected to superimposed load 4 kN/m^2. Take F.F. load = 1.5 *kN/m*^{2} Use cable S_3 or S_4, f_{ck}= 45 N/mm^2, f_y of S_3 or S_4 = 1900 N/mm^2. Design the spacing of cable in both direction. Dont't apply checks. **[10]**

OR

Q4) a) A slab spanning 8m is to be designed as a one way prestressed concrete slab with parallel post tensioned cables carrying an effective force of 620 kN. The deck slab is required to support a udl of 25kN/m^2. The permissible stresses in concrete should not exceed 15 N/mm^2 in compression and no tension is permitted at any stage. Design the spacing of the cables and their position at mid span section. Assume loss ratio 0.8. **[8]**

b) Design a post tension two way slab of effective span 5m × 6m with continuity on all sides, subjected to superimposed load 4 kN/m^2. Take F.F. load = 1.5 kN/m^2. Use cable S_3 or S_4, f_{ck}= 45 N/mm^2, f_y of S_3 or S_4= 1900 N/mm^2. Design the spacing of cable in both directions. Don't apply checks. **[10]**

Q5) Desingn a post tensioned flat slab for the following data **[18]**

Centre to centre distance between columns = 7m in both directions

column size - 800 mm square

Floor is to be used for a shopping mall.

Live load -5 kN/m^2

Floor finish - 1kN/m^2

Materials - M35, multistrand cables

Slab with drop

OR

Q6) Design a post tensioned flat slab for the following data **[18]**

Centre to centre distance between columns = 8m in both directions

Column size - 800 mm diameter

Floor is to be used for an pharmaceutical company

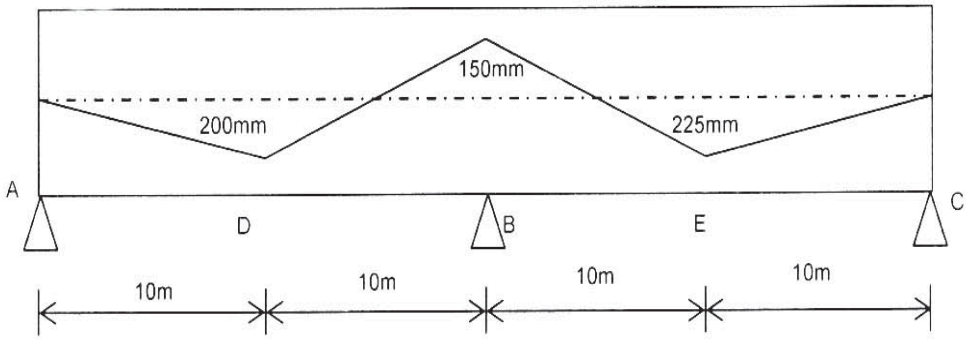
Live load -4 kN/m^2

Floor finish - 1kN/m^2

Materials - M40, multistrand cables

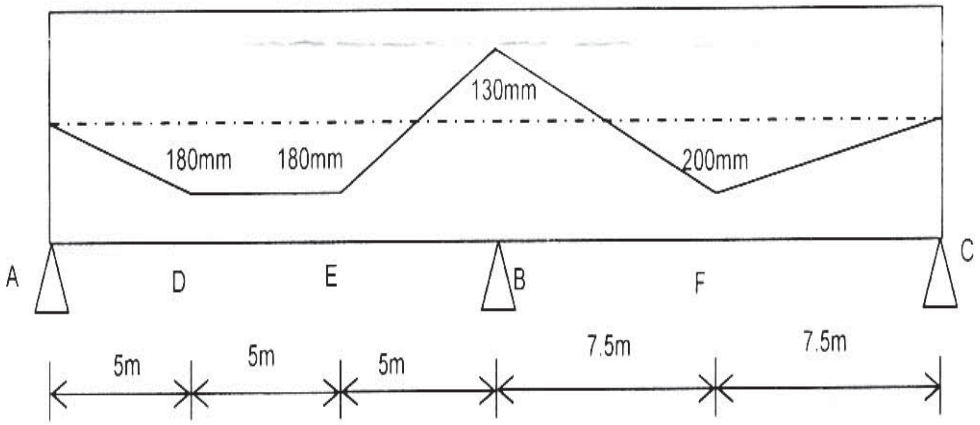
Slab with drop

Q7) Fig. shows a two span continuous beam. corresponding to the cable profile provided locate the pressure line due to prestress alone. The prestressing f[illegible] **[17]**



OR

Q8) Fig. shows a two span continuous beam. Corresponding to the cable profile provided locate the pressure line due to prestress alone. The prestressing force is 1100kN. **[17]**



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Total No. of Questions : 10]

SEAT No. :

P543

[Total No. of Pages : 2

[6004]-465
B.E. (Civil)
FORMWORK AND PLUMBING ENGINEERING
(2019 Pattern) (Semester - VII) (Elective - IV) (401004(f))

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Figures to the right side indicate full marks.***
3) ***Draw neat figures wherever necessary.***
4) ***Assume suitable data if necessary.***

Q1) Explain formwork issues in multistory building construction. **[10]**

OR

Q2) Explain formwork design for Precast concrete with their issues. **[10]**

Q3) Explain details Causes of Formwork Failure. **[10]**

OR

Q4) Explain term involved in flying formwork, table formwork, tunnel formwork and slip fromwork. **[10]**

Q5) a) Explain norms for water quality as per CPCB and also explain plumbing for public health engineering. **[8]**

b) Explain Write a note on Green Plumbing Code Supplement lndia (GPCS-l). **[8]**

OR

Q6) a) Describe the role of Plumbing consultant while executing plumbing work in the building industry. **[8]**

b) Explain local laws laid down by municipal corporation for plumbing regarding rain water harvesting. **[8]**

Q7) a) Explain on workmanship and minimum standards in plumbing. **[8]**

b) Explain how hot water is distributed considering safety, and energy conservation. **[8]**

OR

P.T.O.

Q8) a) Explain velocity, pressure, temperature limitations in plumbing and Explain its importance in plumbing design. **[8]**

b) Explain backflow is prevented in water supply and its importance in plumbing. **[8]**

Q9) a) Explain horizontal wet vent and vertical wet vent with neat sketch. **[8]**

b) Comment on "plumbing system needs to breathe". State maximum value of pneumatic pressure difference in Pascal's so that the seal is protected, state vent terminals as per code. **[10]**

OR

Q10)a) Explain grease trap works with neat sketch also its maintenance? **[8]**

b) Explain the trap requirements as per uniform plumbing code for design of trap. **[10]**

i) Trap seal and trap seal protection &

ii) Trap setting and protection.

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Total No. of Questions : 8] **SEAT No. :**

P1446 **[Total No. of Pages : 3**

[6004]-466

B.E. (Civil Engineering) (Semester - VIII)

DAMS AND HYDRAULICS STRUCTURES

(401011) (2019 Pattern)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat sketches/diagrams must be drawn wherever necessary***
3) ***Figures to the right indicate full marks for the sub-questions.***
4) ***Assume suitable data if necessary and state them in your answer clearly.***
5) ***Use non-programmable pocket size electronic calculator is allowed.***

Q1) a) What is an emergency spillway? state its purpose. **[5]**

b) What is a spillway gate? Briefly explain anyone types of gates. **[5]**

c) Discuss the various types of energy dissipator used below spillway in relation to the position of tail water depth and jump height curve at least two with sketch. **[7]**

OR

Q2) a) Enlist main components of spillway & explain any one. **[5]**

b) Enlist type of energy dissipator & explain in details bucket type energy dissipater. **[5]**

c) Design an ogee spillway for concrete gravity dam, for the following data. **[7]**

i) Average river bed level = 160 m

ii) Slope of D/S = 0.75 H : IV, u/s face is vertical

iii) Spillway crest RL = 265 m

iv) Design discharge = 5750 m^3/s

v) Spillway length is 6 spans with a clear length of 7 m each.

Pier thickness = 2m.

P.T.O.

Q3) a) Write a note on measures adopted for safe drainage of seepage water in earthen dam. **[5]**

b) Explain the function of hearting and rock toe in earthen dam. **[5]**

c) Determine the factor of safety of downstream slope of (homogeneous section) an earth dam drawn to a scale of 1:650, for the following data:**[8]**

Area of N-rectangle =20 cm^2

Area of T-rectangle = 10 cm^2

Area of U-rectangle = 5 cm^2

Length of slip circle arc = 20 cm

Angle of internal friction = 26^0

Cohesion c = 24 kg/m^2

Specific weight of soil = 18 kN/m^3

OR

Q4) a) Briefly explain various causes of modes of failure of earthen dams. Draw relevant sketches. **[5]**

b) Describe the method of plotting phreatic line for an earth dam with horizontal filter at the downstream. **[5]**

c) With the help of appropriate sketches explain Swedish slip circle method of stability analysis of an earth dam. **[8]**

Q5) a) Write short note on **[5]**

i) Canal falls

ii) Canal outlets

b) Describe the types of canals on the basis of their purpose. **[5]**

c) Briefly explain kennedy's theory. What are the drawbacks of Kenned's theory. **[7]**

OR

Q6) a) Write short note on **[5]**

i) Canal escapes

ii) Canal regulators

b) Explain types of canal according to function. **[5]**

c) Design a regime channel of trapezoidal section for carrying water at the rate 12 cumecs having side slopes 1 H : 2 V, if Lacey's slit factor is 0.90. **[7]**

Q7) a) Explain bilgh's theory of seepage with neat sketch. **[5]**

b) What do you understand by cross drainage work? Write the factors for selection of CD works. **[5]**

c) Explain in brief **[8]**

i) Aqueduct

ii) Super passage

iii) Level crossing

iv) Inlet and outlet

OR

Q8) a) Explain Khosla's theory of independent of seepage variable. **[5]**

b) Explain the importance of exit gradient. **[5]**

c) Draw a labelled sketch of diversion headworks Also enumerate the function of each component. **[8]**

Total No. of Questions : 8]

SEAT No. : ____

P1418

[Total No. of Pages : 4

[6004]-467

B.E. (Civil)

QUANTITY SURVEYING CONTRACTS AND TENDERS

(2019 Pattern) (Semester - VIII) (401012)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of electronic pocket calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Fig 1 (a) and (b) shows plan and section of residential building, Determine the quantities of following item. **[8]**

i) Excavation in foundation

ii) UCR masonry in CM (1 :6) in foundation

iii) Damp proof course

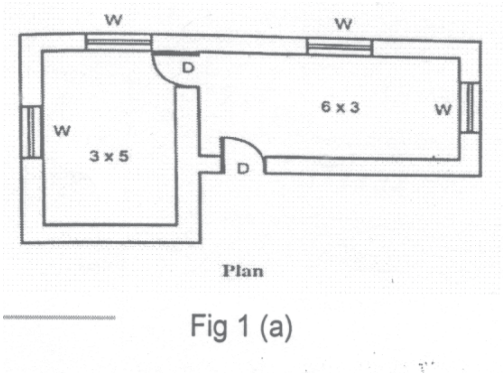


Fig 1 (a)

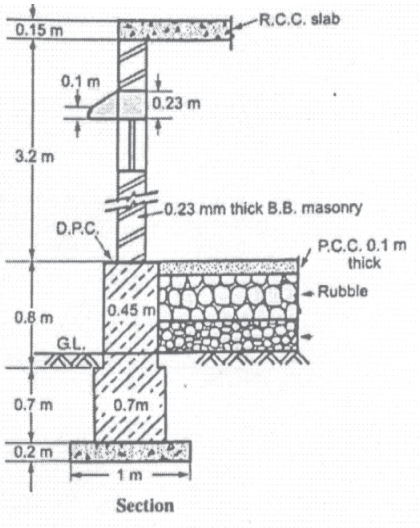


fig 1 (b)

P.T.O.

b) Determine quantity to steel reinforcement in slab for both room from fig no 2 in 8 mm ó bar provided @ 120mm c/c along short and long span with alternate bar bent up at support. Determine the quantity of reinforcement. **[9]**

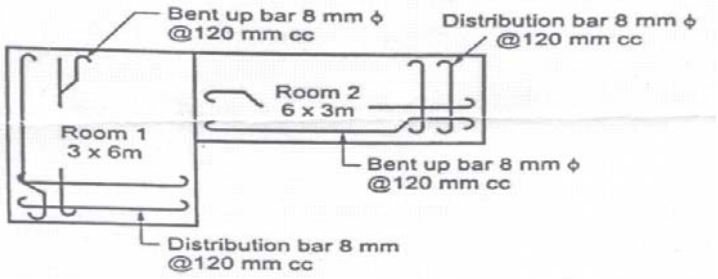


Fig no 2

OR

Q2) a) Explain in detail concept of long wall short wall and Centre line method with the help of example. **[8]**

b) The plan and elevation for the column footing for an R.C.C. framed structure is shown in Fig.3 (a) and (b). work out the quantities for the following item of works. **[9]**

i) Earth 1 work excavation for foundation

ii) C.C.(1:2:4) for column footing.

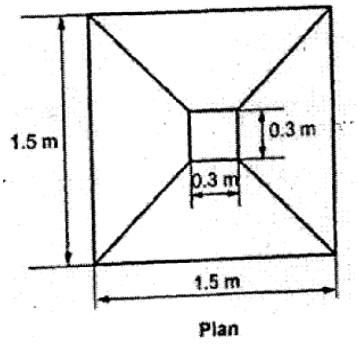


Fig 3 (a)

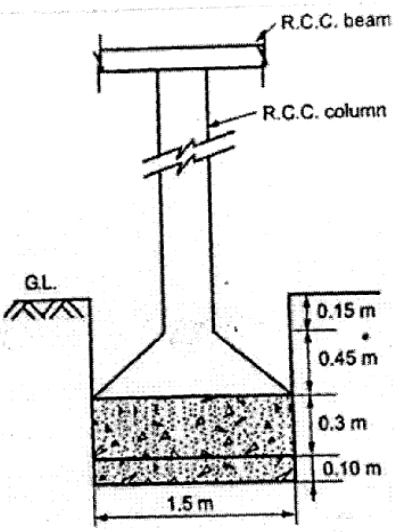


fig 3 (b)

Q3) a) Calculate for an embankment by mean area method, workout the quantities of earthwork for an embankment 100 m long and l0 m wide at a top. Side slope is 2:1 and depth of each 20 m and are 0.6, 1.2, 1.4, 1.6, 1.5m. **[8]**

b) Prepare an estimate of a pipe culvert for following item as shown in Fig. 4 (a) and Fig. 4(b) **[9]**

i) Excavation

ii) Earth filling

iii) Rubble soling

iv) P.CC. (1:4:8) for foundation and below pipes

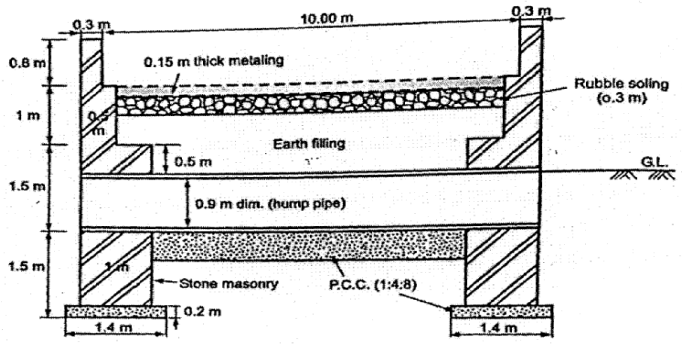


Fig 4(a)

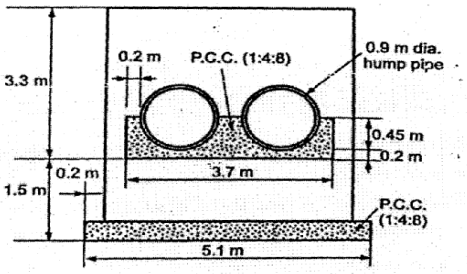


Fig 4(b)

OR

Q4) a) Calculate the quantities of earthwork for 200 m length for a portion of road in an uniform ground, the height of banks at two ends being 1.0m and 1.60m. The formation width is 10 m and side slope 2:1 (H:V). Assume that there is no transverse slope. **[9]**

b) Explain different methods to workout quantity of earthwork for Road,canal, Railway embankment, dam. **[8]**

Q5) a) Briefly explain **[9]**

i) General or brief specification

ii) Detailed specification

b) Using the standard format, conduct the rate analysis for the following item of work. Brickwork in a cement mortar 1:6. (take brick size as 19cm×9cm×9cm) **[9]**

OR

Q6) a) Conduct the rate analysis for the following item of work. **[9]**

Cement concrete 1:2:4 for RCC Roof slab

b) Write a detailed specification for BBM in CM 1:6 for superstructure. **[9]**

Q7) a) Define valuation. Explain any one method of depreciation. **[6]**

b) A building is constructed at a cost of 5 lakhs. The life of building may be assumed to be 80 years and the scrap value of building to be 10% of building cost. Determine the depreciation in 40^{th} year. Use straight line method, constant percentage method and sinking fund method assuming 8% compound interest. **[6]**

c) Differentiate between price, cost and value. **[6]**

OR

Q8) a) Explain the concept of free hold and lease hold property. What are the reasons under which the property is leased and what are the liabilities of leaser and lease? **[6]**

b) Explain with example: **[6]**

i) Obsolesce

ii) Years Purchase

iii) Earned Value

c) What is Depreciation? List different methods of calculating depreciation explain anyone. **[6]**

Total No. of Questions : 8]

SEAT No. :

P2855

[Total No. of Pages : 4

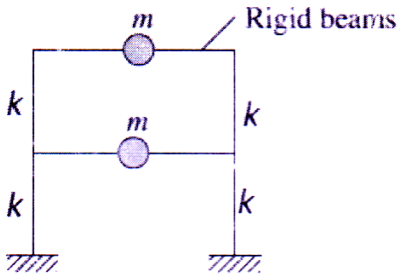
[6004]-468
B.E. (Civil)
EARTHQUAKE ENGINEERING
(2019 Pattern) (Semester-VIII) (401013A) (Elective V)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, and Q.7 or Q.8.***
2) ***Figures to the right indicate full marks.***
3) ***Neat sketches must be drawn wherever necessary.***
4) ***Use of IS 1893 Part-I and non programmable calculator is allowed.***
5) ***Your answers will be valued as a whole.***
6) ***If necessary assume suitable data and indicate clearly.***

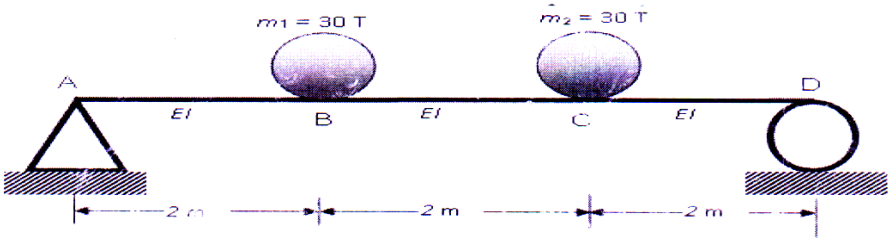
Q1) a) Obtain natural frequencies and mode shapes for the following two storey shear frame having equal lateral stiffness, *k* and lumped mass, *m*. Represent the mode shapes graphically. **[10]**



b) State and prove the orthogonality principle of modes of multi-degree freedom (MDOF) system. **[8]**

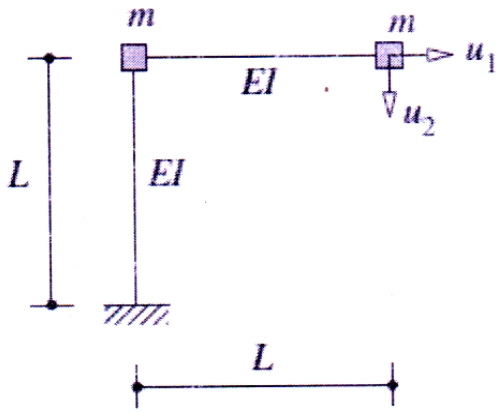
OR

Q2) a) Calculate natural frequencies and mode shapes for following simply supported beam with lumped mass lumped at one third span. Take EI=10000 kNm^2 Represent the mode shapes graphically. **[10]**



P.T.O.

b) Formulate the free vibration equations for following inverted L-shaped frame. **[8]**



Q3) a) A four storey office building on hard strata located in Delhi consists of special steel moment resisting frame (SMRF) without infill as a lateral load resisting system. Inter-storey height is 3.50 m. Seismic weights are 5000 kN and 4000kN on floors and roof level, respectively. **[12]**

Workout:

i) Approximate fundamental time period, T_a of building

ii) Base shear, V_b

Using equivalent static method of seismic analysis evaluate:

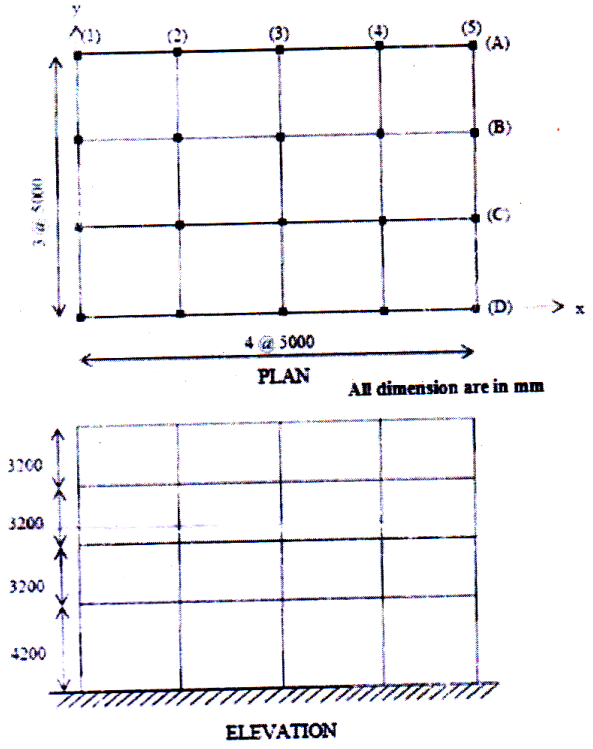
i) Lateral forces at each floor level, Q_i

ii) Storey shears, V_i

b) Explain the role of response reduction factor (R) in calculation of design base shear (V_b). **[5]**

OR

Q4) Consider a four-storey reinforced concrete school building shown in figure below. The building is located in Mumbai (seismic zone IV). The soil conditions are medium stiff and the entire building is supported on a raft foundation. The R.C. frames are infilled with brick-masonry. The lumped weight due to dead loads is 12 kN/m^2 on floors and 10 kN/m^2 on the roof. The floors are to cater for a live load of 4 kN/m^2 on floors and 2.0 kN/m^2 on the roof. **[17]**



Workout:

i) Approximate fundamental time period, T_a of building

ii) Base shear, V_b

Using equivalent static method of seismic analysis evaluate:

i) Lateral forces at each floor level, Q_i

ii) Storey shears, V_i

Q5) The dynamic properties (natural periods, and mode shapes) of three-storey reinforced concrete school building with special moment resisting frame as obtained from free vibration analysis in the X-direction are reported in following table. The floor to floor height is 4.0 m. The building is located in seismic zone IV. The soil conditions are medium stiff and the entire building is supported on a raft foundation. Assume damping as 5% of critical damping. **[17]**

Floor, i	Seismic Weight, w_i (kN)	Mode, k		
		1	2	3
		T_1=0.54 sec	T_2=0.19 sec	T_3=0.13 sec
		Mode shapes (ϕ_{ik})		
1	490.50	1.00	1.00	1.00
2	490.50	1.80	0.45	–1.25
3	490.50	2.25	–0.80	0.56

Using dynamic analysis evaluate

i) Model mass M_k;

ii) Mode participation factor P_k;

iii) Design lateral force at each floor in each mode Q_{ik};

iv) Storey shear force in each mode, V_{ik}

v) Using SRSS rule for modal combination obtain the base shear

OR

Q6) a) A two-storey office building is modeled as 2-DOF system with rigid floors. The building is located in seismic zone IV. The Soil is soft and response reduction factor, R=3. Use following dynamic properties of building obtained from eigen value analysis. **[9]**

Floor, i	Seismic Weight, w_i (kN)	Mode, k	
		1	2
		T_1=0.45 sec	T_2=0.20 sec
		Mode shapes (ϕ_{ik})	
1	500	1.00	1.00
2	250	2.00	–1.00

Using SRSS rule for modal combination obtain the base shear

b) Write short note on following: **[8]**

i) Dynamic method of seismic analysis

ii) Modal combination rules

Q7) a) State advantages and limitations of any three lateral load resisting system. (LLRS) **[12]**

b) Explain soft storey and weak storey **[6]**

OR

Q8) a) Define ductility of lateral load resisting system and explain significance of ductile detailing in earthquake resistance design of structure. **[9]**

b) Draw neat sketch representing ductile detailing for **[9]**

i) Beam-column joint and

ii) Column-footing joint

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Total No. of Questions : 8]

SEAT No. :

P-1419

[Total No. of Pages : 3

[6004]-469

B.E. (Civil)

STRUCTURAL DESIGN OF BRIDGES

(2019 Pattern) (Semester - VIII) (401013B) (Elective - V)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***IS 1343, IRC 6, IRC 112, Bridge rules and steel table are permitted in the examination.***

Q1) Design the intermediate prestressed post-tensioned concrete girder shown in Fig.1. **[18]**

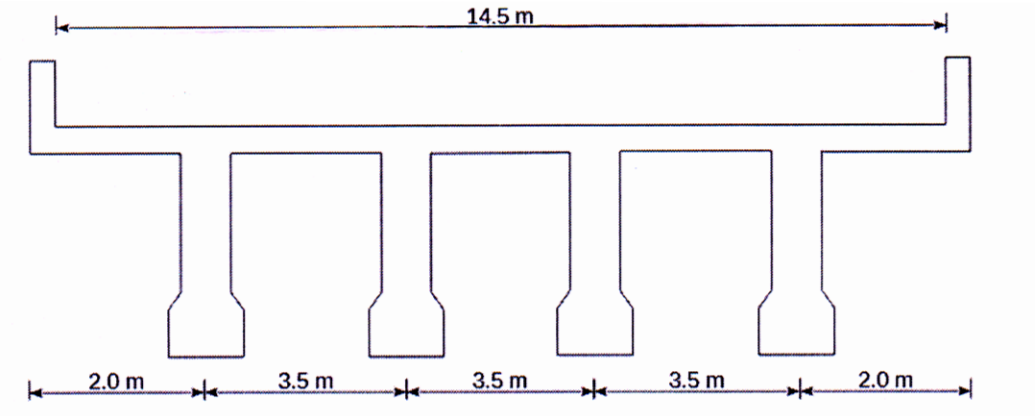

Fig.1

The live load on the deck slab is IRC Class A loading. The following material properties shall be considered for the design.

a) M-40 grade concrete for the deck slab and M-60 grade for the girders;

b) Ultimate tensile of the steel used in the girders is 1500 MPa;

c) Compressive strength of concrete at transfer is 38 MPa;

d) The loss in the prestress may be taken as 15%. Any additional data required may be suitably considered.

OR

P.T.O.

Q2) For the problem data given in Q.l, design the intermediate prestressed post-tensioned concrete girder, if the live load on the deck slab is IRC Class A tracked vehicle. **[18]**

Q3) A railway welded plate girder bridge is to be designed for the given data : **[17]**

a) Span = 32.0 m;
b) Total load for bending moment = 3972.72 kN;
c) Total load for shear force = 4345.71 kN;
d) CDA = 0.681;
e) Yield stress of steel 250 N/mm^2
f) Design the cross section and the end stiffeners. Assume suitably if additional data is required.

OR

Q4) For the data given in Q.3, design the cross section and the intermediate transverse stiffeners. **[17]**

Q5) Figure 2 shows the schematic of a single line BG railway bridge. The details for bridge are as follows. **[18]**

a) Spacing of stingers = 1.9 m;
b) Weight of sleeper per meter on each girder = 0.5 kN/m;
c) Weight of rail per meter = 0.45 kN/m;
d) EUDL for bending moment = 4379 kN;
e) EUDL for shear force = 4823 kN;
f) Impact factor CDA = 0.29;
g) Intensity of wind load = 1.5 kN/m^2
h) Racking force = 5.88 kN/m. Design the stringers and the bracings for the stringers.

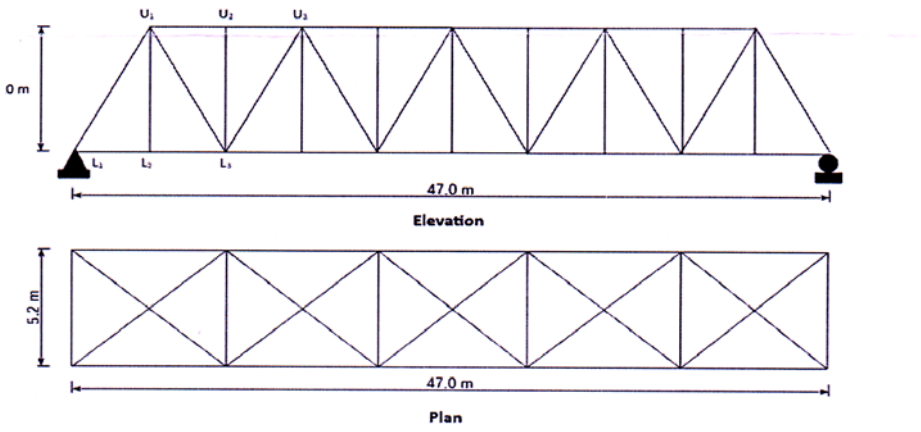

Fig.2

OR

Q6) For the problem given in Q.6, design the members L_1-U_1, L_1-L_2, U_1-L_1, and U_2-L_2. **[18]**

Q7) Design a steel rocker bearing for the following data. **[17]**

a) Load from the truss girder = 4205 kN;
b) Allowable pressure on bearing block = 3.25 MPa;
c) Permissible bending stress = 175 MPa;
d) Permissible bearing stress = 95 MPa;
e) Allowable shear stress = 85 MPa.

OR

Q8) Design an elastomeric bearing for a railway bridge with the given data.**[17]**

a) Dead load reaction from the girder = 1850 kN;

b) Live load reaction = 875 kN;

c) Longitudinal frictional force = 60 kN;

d) Grade of concrete used for bed block = M-50. Any additional data required may be suitably considered.

Total No. of Questions : 8]

SEAT No. :

P-1420

[Total No. of Pages : 3

[6004]-470

B.E. (Civil)

IRRIGATION AND DRAINAGE

(2019 Pattern) (Semester - VIII) (401013C) (Elective - V)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8.***
2) ***Answer to the all questions should be written in single answer-book.***
3) ***Figures to the right indicate full marks.***
4) ***Neat diagrams must be drawn wherever necessary.***
5) ***Assume suitable data if necessary.***

Q1) a) Draw a neat sketch of centrifugal pump and explain any three component parts. **[6]**

b) Draw a layout of drip irrigation system. Explain three component parts of drip irrigation system. **[6]**

c) Explain following component parts of lift irrigation: **[6]**

i) Intake structure

ii) Rising main

OR

Q2) a) Explain why priming is essential in centrifugal pump. **[6]**

b) Explain the procedure for design of main line in drip irrigation system. **[6]**

c) Discuss two empirical equations used to estimate head loss in drip irrigation. **[6]**

Q3) a) Draw a labelled sketch showing components of a sprinkler irrigation system and explain any four component parts in brief. **[8]**

b) Explain how to calculate water spread area using Cavazza formula. **[3]**

c) Determine the system capacity for a sprinkler irrigation system to irrigate 20 ha of maize crop. Design moisture use rate is 5 mm per day. Moisture replaced in soil at each irrigation is 7 cm. Irrigation efficiency is 70 %. Irrigation period is 10 days in 12 day interval. The system is to be operated for 18 hours per day. **[6]**

OR

P.T.O.

Q4) a) Determine the required capacity of a sprinkler system to apply water at the rate of 1.25 cm/hr. Two 186 m long sprinkler lines are required. Sixteen sprinklers are spaced at 12 m intervals on each line. The spacing between lines is 18 m. **[6]**

b) A lateral has 14 sprinklers spaced 16 m apart. The laterals are spaced 20 m on the main line. Determine the amount of fertilizer to be applied at each setting when recommended fertilizer dose is 90 kg/ha. **[6]**

c) Explain with neat sketch Fertilizer Applicator in sprinkler irrigation system. **[5]**

Q5) a) Define the following terms : **[6]**

i) Sodic soil

ii) Alkaline soil

iii) Cation exchange capacity (CEC)

iv) Exchangeable sodium percentage (ESP)

v) Leaching requirement

vi) Sodium adsorption ratio (SAR)

b) A quantity of 100 ml of gypsum solution, having 32 meq/l concentration as calcium, on reacting with 5 gm of an alkali soil showed 29.5 meq/l of Ca+Mg concentration in the filtrate. Estimate the gypsum requirement in meq/100 gm soil. **[6]**

c) Explain in brief - water stress coefficient. **[5]**

OR

Q6) a) Explain in brief - salinity stress coefficient. **[5]**

b) Calculate osmotic potential in the soil at 28% water content if electrical conductivity of saturated paste extract is equal to 1.3 dS/m, and saturated water content is 50%. **[6]**

c) Explain different engineering practices for salinity management. **[6]**

Q7) a) Draw a neat sketch of pipe envelope and also explain functions of pipe envelope. **[6]**

b) Determine the required drain spacing for the basic design criteria q = 8 mm/d, H= 0.6 m, pipe with outer diameter = 0.2 m and wet entry perimeter (u) = 0.3 m. K_1 = 2.1 m/day, K_2 = 1.1 m/day. W = 1m, D = 3 m. Refer Fig. 7 (b). Use Hooghoudt's formula. Take only two trials. **[9]**

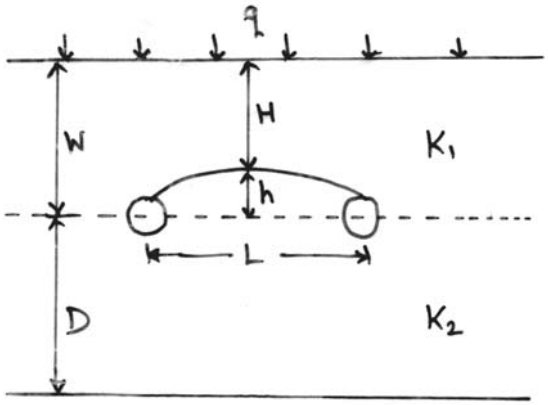

Fig. 7 (b)

c) Write Glover-Dumm formula with meanings of all symbols. **[3]**

OR

Q8) a) Surface drainage should be planned for a new agricultural farm to drain out irrigation tail-water and seasonal rainfall runoff. The maximum rainfall intensity at the site in 20years record is 37 mm/h. The tertiary drain would have to carry runoff from 3.8 ha land. The secondary drain would have to carry thrice of tertiary, and the main drain to carry discharge of five secondary drains (of similar flow). Determine the design discharge capacity of the (i) tertiary, (ii) secondary, and (iii) main drain. **[9]**

b) Explain different types of surface drainage system layouts. **[6]**

c) What are the selection criteria for drain pipe? **[3]**

Total No. of Questions : 8]

SEAT No. : ____

P2856

[Total No. of Pages : 3

[6004]-471

B.E. (Civil)

DESIGN OF PRECAST AND COMPOSITE STRUCTURES

(2019 Pattern) (Semester-VIII) (Elective-V) (401013 D)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Assume suitable data if necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Mere reproduction from code as answer will not be given full credit.***

Q1) a) Describe the different types of slabs used in precast concrete construction, focusing on roof and floor slabs. Discuss their advantages, limitations, and applications. **[7]**

b) Design a hollow core slab for a given span and loading condition. Consider the following details: **[10]**

Span (L): 6.5 meters

Loading condition: Dead load (DL)=2.5 kN/m^2, Live load (LL)=4.0

kN/m^2 Concrete grade : M25

Steel reinforcement grade : Fe415 Include calculations for determining the necessary reinforcement, prestressing requirements, and any additional design considerations.

OR

Q2) a) Explain the construction and design principles for precast concrete columns. Discuss the key provisions of IS: 15916 and their applications in design of column. **[7]**

b) Design a precast concrete column based on the given design requirements, considering the relevant provisions of IS: 15916 for the given data. **[10]**

Axial load (N) : 500 kN

Height (H) : 5 meters

Concrete grade : M30

Steel reinforcement grade : Fe415

P.T.O.

Q3) a) Discuss the behavior and design considerations for simply supported composite beams with solid steel subjected various types of loading. Explain its importance. **[7]**

b) Analyze and design a simply supported composite beam under given loading condition, taking into account the interaction between the steel and concrete components. **[10]**

Dead load (DL) : 30 kN/m

Live load (LL) : 20 kN/m

Span (L) : 7.5 meters.

OR

Q4) a) Explain the advantages and challenges associated with steel-concrete composite construction. Also The measures taken to enhance their performance. **[7]**

b) Design a composite solid steel beam using steel-concrete composite construction. **[10]**

Floor area : 2000 square meters

Live load (LL) : 4.0 kN/m^2

Q5) a) Describe the different types of shear connectors used in composite construction and their advantages and limitations. Descuss the factors. influencing the selection of shear connectors for specific applications.**[8]**

b) Design the shear connection between a composite concrete slab and a steel beam. **[10]**

Concrete slab thickness (t_c) : 150 mm

Steel beam flange thickness (t_bf) : 20 mm

Steel beam web depth (d_b) : 300 mm

Live load (LL) : 15 kN/m

Shear connector type : Shear studs

OR

Q6) a) Discuss the behavior and performance of shear connectors. Explain the measures taken to ensure the integrity and ductility of the shear connection in composite structures. **[8]**

b) Explain steps for designing a shear connection between a concrete slab and a solid steel beam. **[10]**

Q7) a) Determine the IS : 11384 code provisions and its applications in the design of composite columns. **[8]**

b) Analyze and design a composite column. Consider the following design parameters: **[10]**

Axial load (N): 800 kN

Moment (M) : 150 kNm

Concrete grade : M30

Steel reinforcement grade : Fe415

OR

Q8) a) Discuss the behavior and performance of composite columns and explain the mechanisms of load transfer and the factors influencing the strength and stability of composite columns. **[8]**

b) Design a composite column subjected to combined axial load and bending moments for a specific structural application. **[10]**

Axial load (N) : 150 kN

Bending moment (Mx) : 150 kNm

Bending moment (My) : 100 kNm

Concrete grade : M30

Steel reinforcement grade : Fe415

Total No. of Questions : 8]

SEAT No. :

P544

[Total No. of Pages : 2

[6004]-472
B.E. (Civil)
HYDROPOWER ENGINEERING
(2019 Pattern) (Semester - VIII) (Elective - V) (401013(E))

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Explain Sedimentation of Reservoirs and Sedimentation yield in rivers. **[8]**

b) What is Installed capacity or Plant capacity of a hydropower plant? Explain different methods of fixing installed capacity of a hydropower plant in detail. **[9]**

OR

Q2) a) Explain different types of Head acting on turbine in detail. **[8]**

b) Write notes on : **[9]**

i) Mass Curve.

ii) Hydropower Potential.

Q3) a) Explain types of underground power stations with sketch. **[9]**

b) What is instrumentation in power house? How instrumentation and control is achieved in case of powerhouse? **[8]**

OR

Q4) a) Write notes on : **[8]**

i) Generators.

ii) Transformers for the power house.

b) What is intake structure? Explain different types of intake structures for water conducting system of Power Plant. **[9]**

P.T.O.

Q5) a) What is draft tube? What are the functions of draft tube? Explain with figure draft tube theory. **[9]**

b) A pelton wheel is to be designed for the following specifications : **[9]**

Shaft Power = 11,772 KW Head = 380 meters

Speed = 750 r.p.m. Overall efficiency = 86%

and jet diameter is not to exceed one-sixth of the wheel diameter.

Determine :

i) The wheel diameter.

ii) The number of jet required.

iii) Diameter of the jet.

Take coefficient of velocity = 0.985 & speed ratio = 0.45.

OR

Q6) a) Explain the concept of Water Hammer. How it is controlled? Derive the formula for rise of pressure head due water hammer for gradual closure of the valve. **[9]**

b) What is surge tank? Give the functions of Surge tanks. Explain different types of surge tank with the line sketches. **[9]**

Q7) a) What are the factors governing the pricing of electricity? **[9]**

b) Explain economic considerations of hydroelectric power plant. **[9]**

OR

Q8) a) Explain the concept of carbon credit. Give its significance. **[9]**

b) What are the provisions related to licensing in case of hydroelectric power generation as per electricity act 2003? **[9]**

Total No. of Questions : 8]

SEAT No. : ____

P2857

[Total No. of Pages : 2

[6004]-473

B.E. (Civil)

STRUCTURAL AUDIT AND RETROFITTING OF STRUCTURES

(2019 Pattern) (Semester-VIII) (Elective-V) (401013 f)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat sketches must be drawn wherever neccessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume Suitable data if necessary.***
5) ***Use of electronic pocket calculator allowed.***
6) ***Use of cell phone is prohibited in the examination hall.***

Q1) a) Explain in details importance SHM along with short and long-term monitoring. **[9]**

b) What is remote and wireless SHM Techniques, explain any one in detail. **[9]**

OR

Q2) a) Explain in details Local and Global techniques for SHM. Also explain active and passive monitoring. **[9]**

b) Explain instrumentation, data acquistion and data processing in SHM. **[9]**

Q3) a) State the different methods of retrofitting and explain any two in details. **[8]**

b) Explain process for retrofitting of histroical structures in details with suitable example. **[9]**

OR

Q4) a) Explain suitability of various retrofitting techniques for RC structures, steel structures and masonary structures. **[8]**

b) Explain base isolation technique in retrofitting wiht suitable example. **[9]**

Q5) a) State and explain advantage and disadvantage of FRP as retrofitting material. **[9]**

b) Describe the different types of FRP and explain any two in detail. **[9]**

OR

P.T.O.

Q6) a) Explain the machanical property of FRP material for retrofitting of structures. **[9]**

b) Explain the procedure for Retrofitting of RC columns using FRP for axial confinements as per provisions of ACI 440. **[9]**

Q7) a) Describe the procedure for Retrofitting of RC Beams using FRP for flexural strengthening as per provisions of ACI 440. **[8]**

b) Explain in details retrofitting of structures using Fiber Reinforced polymers **[9]**

OR

Q8) a) Describe the procedure for Retrofitting of RC Beams using FRP for shear strengthening as per provisions of ACI440. **[8]**

b) Explain in details retrofitting of damaged structure using FRP. **[9]**

❖ ❖ ❖

Total No. of Questions : 10]

SEAT No. : ____

P1447

[Total No. of Pages : 2

[6004]-474

B.E. (Civil)

TQM AND MIS

(2019 Pattern) (Semester-VIII) (Elective-VI) (401014 A)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or 10.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams Should be drawn wherever necessary.***
4) ***Assume suitable data if necessary.***

Q1) a) Explain in details various barriers affecting on the implementation of TQM in construction sector? **[5]**

b) Explain the contribution of any two QM Gurus highlight their views regarding quality. **[5]**

OR

Q2) a) Workman ship is important parameter of quality work' explain in details. **[5]**

b) Explain in details DMAIC & DMADV. **[5]**

Q3) a) Explain in details on six sigma in construction with respect to its advantages and limitations. **[5]**

b) What are the contents of quality manual? Describe its structure. **[5]**

OR

Q4) a) Explain in details principle of ISO 9001 and explain any two? **[5]**

b) Explain in details six sigma? Explain their certification levels. **[5]**

Q5) a) Explain in details benchmarking is important role in TQM? **[6]**

b) Describe the main features and process of quality circle. **[6]**

c) Explain the flow of cost of quality. How it will be effect any construction project? **[4]**

OR

P.T.O.

Q6) a) Explain with example CONQAS. **[6]**

b) Explain in details CIDC-CQRA certification. **[6]**

c) Explain zero defects with suitable example. **[4]**

Q7) a) Explain with example 5S techniques. **[6]**

b) Explain in details four elements of Zero defects explain with a suitable example. **[6]**

c) Explain the role of awards in TQM. **[4]**

OR

Q8) Explain in details'.

a) FEMA. **[6]**

b) Rajiv Gandhi National quality Award **[6]**

c) Malcolm Baldrige National Quality Awards **[4]**

Q9) a) Explain in details DSS with example and write their advantages. **[6]**

b) Explain in details operation support system. **[6]**

c) Explain in details MIS? With its objectives. **[6]**

OR

Q10)a) Explain in details support system? Explain various components of DSS. **[9]**

b) Explain in details between data and information. **[9]**

Total No. of Questions : 8]

SEAT No. : ____

P1448

[Total No. of Pages : 3

[6004]-475

B.E. (Civil Engineering)

ADVANCED TRANSPORTATION ENGINEERING

(2019 Pattern) (Semester-VIII) (Elective-VI) (401014 B)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Figures to the right indicate full marks.***
3) ***Use of electronics pocket calculator is allowed.***
4) ***Assume suitable data if necessary.***
5) ***Neat diagrams must be drawn wherever necessary.***

Q1) a) Explain the Role & Responsibility of Non-Motorized Transportation (NMT) system **[6]**

b) Explain active & transport diversity of NMT. **[6]**

c) Give your suggestions on how NMT is treated in your own country. **[6]**

OR

Q2) a) Write a short note on pedestrian level of service. **[6]**

b) Explain the data collection techniques used in NMT. **[6]**

c) What are the approaches to enhance NMT in India? **[6]**

Q3) a) The average normal flow of traffic on cross roads A & B during design period are 400 & 250 PCU per hour. The saturation flow values on these roads are estimated as 1250 & 1000 PCU per hour respectively. The All-Red time required for pedestrian crossing is 12 Sec. design two phase traffic signal with pedestrian crossing by Webster's method. **[10]**

b) List the various traffic engineering studies. Mention the objective and importance of each study. **[7]**

OR

P.T.O.

Q4) a) Write a short note on On-street and Off-street parking. **[9]**

b) Explain the steps used for signal design as per IRC guidelines. **[8]**

Q5) a) Explain in brief the various steps of design of flexible pavement as per IRC guidelines. **[8]**

b) State comparison between Rigid pavement & Flexible pavement. **[5]**

c) Briefly explain the graphical method of determination of ESWL. **[5]**

OR

Q6) a) The traffic studies and axle load distribution studies carried out during the project preparation indicated that there are **[12]**

i) 5600 commercial vehicles per day with rear axle loads in the range of 2500 to 3500 kg and growth rate of 6.5% p.a. and

ii) 1900 heavy commercial vehicles with rear axle loads in the range 11,000 to 13,000 kg and growth rate of 4.5%. The road pavement is expected to be constructed in period of 3.0 years after this study and the flexible pavement structure is to be designed for a life of 15 years. Determine value of CSA for design.

b) Enumerate the various approaches of flexible pavement design. Explain the basis of design in each approach. **[6]**

Q7) a) Explain various joints in rigid pavements & its design as per IRC guidelines. **[9]**

b) Explain function of Dowel bars in concrete pavements with neat sketch. **[8]**

OR

Q8) a) The following data is given for a cement concrete pavement. **[10]**

Spacing of transverse joint=10m

Width of pavement=7m

Wheel load=4000 kg

Contact pressure = 5.0kg/cm^2

Coefficient of expansion of cement concrete=8.0×10^{-6} per ºC

Modulus of elasticity of concrete =3.0×10^5 kg/cm^2

Poisson's ratio =0.15

Modulus of subgrade reaction =4.0 kg/cm^3

Maximum difference of temperature between top and bottom of CC pavement=20ºC. Assume Cx=1.04 and Cy=0.25

Calculate frictional stress, warping stress at edge, interior and corner region of the CC pavement 25 cm thick.

b) What are the different types of overlays that may be considered for strengthening existing flexible pavements? Mention their relative advantages. **[7]**

Total No. of Questions : 8]

SEAT No. :

P2858

[Total No. of Pages : 2

[6004]-476
B.E. (Civil)
GEO-SYNTHETIC ENGINEERING
(2019 Pattern) (Semester - VIII) (401014C) (Theory) (Elective-VI)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary and mention it clearly.***
5) ***Use of non-programmable calculator is allowed.***

Q1) a) Describe the mechanism of filtration and drainage function. **[9]**

b) What are the essential properties of soil to be determined for the successful use of a geotextile in a filtration application? **[9]**

OR

Q2) a) Explain the design steps for erosion control. **[9]**

b) How are geo-grids applied in controlling wind and rain water erosion? **[9]**

Q3) a) What are the various factors that are considered while designing of pavements by Geo-composites? **[8]**

b) Explain in detail the role of Geo-synthetics in airfield pavement design. **[9]**

OR

Q4) a) Describe the Giroud and Noiray method of pavement design. **[8]**

b) What are the advantages of use of Geo-synthetics in pavement design? **[9]**

Q5) a) What are the advantages of reinforced earth? **[8]**

b) State and explain various facing elements in reinforced earth wall. Which one is most economical? **[9]**

OR

P.T.O.

Q6) a) How geo-grids are placed while reinforcing soil? Illustrate with the help of a neat sketch. Compare performance of geo-grids over steel as reinforcements. **[8]**

b) Write a note on: **[9]**

i) Gabion wall

ii) Geo-grid reinforced soil wall

Q7) a) Describe as how the bearing capacity of soil below a footing can be increased by using Geo-grids. **[6]**

b) Discuss the mechanism of geo-cell reinforced sand overlying soft clay. **[6]**

c) Write a note on ground instrumentation and monitoring in ground improvement. **[6]**

OR

Q8) a) Write a note on consolidation technique in ground improvement. **[6]**

b) Explain the role of geo-synthetic material in soil stabilization. **[6]**

c) Describe the design of encased stone column with neat sketch. **[6]**

Total No. of Questions : 8]

SEAT No. : ____

P1449

[Total No. of Pages : 2

[6004]-477

B.E. (Civil)

STRUCTURAL DESIGN OF FOUNDATIONS

(2019 Pattern) (Semester-VIII) (Elective-VI) (401014D

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of electronic pocket calculator is allowed.***

Q1) a) Explain the IS code provision for the design and construction of Pile foundation. **[10]**

b) Explain in detail method of estimation of load carrying capacity of pile for **[7]**

i) Cohesionless soil

ii) Cohesive soil

OR

Q2) a) Explain the load carrying capacity of piles by static formulae. **[10]**

b) Discuss in detail pile caps and negative skin friction. **[7]**

Q3) a) Explain the assumptions made in Banerjee and Gangopadhyay's Analysis and explain anyone method of analysis. **[9]**

b) Define the Cassions foundation and explain its types. **[9]**

OR

Q4) a) Discuss the various measures for rectification of Tilts and Shifts. **[9]**

b) Explain floating caisson with neat sketch. **[9]**

P.T.O.

Q5) a) Explain different types of machine foundation with the help of neat sketch. **[9]**

b) Determine the natural frequency of a machine foundation having a base area 2m×2m and a mass of 15kg, including the mass of the machine. Taking Cu=4×10^4 kN/m^3. **[8]**

OR

Q6) a) Explain the various methods to determine spring stiffness (k) in vibration analysis of a machine foundation. **[9]**

b) The exciting force of a machine is 100kN. Determine the transmitted force if the natural frequency of the machine foundation is 3.0 Hz. Take D=0.40 and the operating frequency as 5 Hz. **[8]**

Q7) a) Discuss the different types of sheet pile walls. **[8]**

b) Discuss counterfort retaining wall. Also state the difference between the counterfort retaining wall and cantilever retaining wall. **[10]**

OR

Q8) a) Explain gravity retaining wall and its proportioning with the help of neat sketch. **[8]**

b) Explain the various safety factors in cantilever retaining wall. **[10]**

Total No. of Questions :8]

SEAT No. :

P1421

[Total No. of Pages : 2

[6004]-478

B.E. (Civil)

GREEN STRUCTURES AND SMART CITIES

(2019 Pattern) (Semester-VIII) (Elective-VI) (401014 E)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Figures to the right indicate full marks.***
3) ***Draw neat diagram wherever necessary.***

Q1) a) How does BIPV technology affect the aesthetics and overall appearance of a building? **[6]**

b) How does BIPV technology impact the energy efficiency and overall performance of a building? **[6]**

c) What are some of the challenges associated with the widespread adoption of BIPV technology? **[6]**

OR

Q2) a) What is the Energy Conservation Building Code (ECBC-2017) and what are its objectives? **[6]**

b) What are the key requirements and standards set by ECBC-2017 for new and existing buildings? **[6]**

c) What are the benefits of complying with ECBC-2017 for building owners and occupants? **[6]**

Q3) a) What is a smart city and what are its main characteristics? **[6]**

b) What is city planning and what are the key objectives of city planning? **[6]**

c) What are some of the emerging trends and developments in city planning and smart city technology, and how will they impact the way we live and work? **[5]**

OR

P.T.O.

Q4) a) What are the advantages of smart city components over conventional components, in terms of efficiency, sustainability, and cost-effectiveness? **[6]**

b) How do smart city components improve the quality of life for residents, and what are some of the benefits of these improvements? **[6]**

c) What are the key stakeholders involved in the development and implementation of smart city components, and what role do they play?**[5]**

Q5) a) What do you understand about "Conventional Cities"? **[6]**

b) In what way solar energy is used for benefitting the users of an area? **[6]**

c) Write a note on: PV application and solar thermal energy. **[6]**

OR

Q6) a) Differentiate between singular and hybrid solar cells. **[6]**

b) Write a note on smart city planning and development. **[6]**

c) What is the "100" smart cities initiative and how does it aim to transform urban India? **[6]**

Q7) a) What is the Swachh Bharat mission and how does it aim to improve cleanliness and sanitation in India? **[6]**

b) How has the Swachh Bharat mission contributed to the overall development of smart cities in India? **[6]**

c) Explain the role of technology in improving cleanliness and sanitation under the Swachh Bharat mission and smart cities program. **[5]**

OR

Q8) a) Explain the role of technology in the development of smart city projects in Pune, Maharashtra, and how they have benefited the citizens .**[6]**

b) What are the future prospects for the governance of smart city projects in India? **[6]**

c) What is artificial intelligence (AI) and how is it being used in smart city development? **[5]**

Total No. of Questions : 8]

SEAT No. : ____

P1450

[Total No. of Pages : 3

[6004]-479

B.E. (Civil Engineering)

RURAL WATER SUPPLY AND SANITATION

(2019 Pattern) (Semester-VIII) (Elective-VI) (401014 F)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Figures to the right indicate full marks.***
3) ***Draw neat figures wherever necessary.***
4) ***Assume necessary data if required.***
5) ***Use of scientific calculators is allowed.***

Q1) Attempt the following questions.

a) Can you discuss the role of government policies and initiatives in promoting sustainable and accessible water supply in rural areas? **[6]**

b) How can cost-benefit analysis and financial models help in decision-making and securing funding for retrofitting projects? **[5]**

c) How does the location, type, and size of the intake structure impact the efficiency and reliability of the water supply system? **[6]**

OR

Q2) Attempt the following questions.

a) What are the different types of groundwater-based schemes implemented in rural areas, and what factors determine their feasibility? **[6]**

b) How do these systems address the challenges of water scarcity. contamination, and accessibility? **[5]**

c) Explain the significance of a membrane bioreactor (MBR) in the context of water treatment. **[6]**

P.T.O.

Q3) Answer the following questions.

a) How can interdisciplinary collaboration enhance community participation and empowerment in rural water supply initiatives? **[6]**

b) How do factors such as pump size, materials of construction and operational costs play a role in the selection of the most suitable pump for a specific application. **[5]**

c) Explain the concept of frictional head loss in a piping system and how it affects the hydraulic grade line (HGL). **[6]**

OR

Q4) Answer the following questions.

a) What is the significance of selecting an appropriate rising main and its appurtenances to control water hammer in a water supply system? **[5]**

b) Explain how interdisciplinary approaches can contribute to developing innovative and context-specific solutions for rural water supply challenges.**[6]**

c) What are the key features and capabilities of JALTANTRA software that distinguish it from other similar tools? **[6]**

Q5) Answer the following questions.

a) Explore the importance of level sensors in water storage facilities. **[6]**

b) Write a note on use of instrumentation and robotics in water supply systems **[6]**

c) Discuss the following.

i) SCADA (Supervisory Control and Data Acquisition **[3]**

ii) Trend analysis **[3]**

OR

Q6) Answer the following questions.

a) Describe the functioning and applications of flow meters in water supply schemes. Also enlist the different types of flow meters. **[6]**

b) Explain in detail what do you understand by GPS? Give the applications of GPS in water supply engineering. **[6]**

c) Discuss the potential future applications and advancements in pH sensor technology for water quality monitoring. **[6]**

Q7) Answer the following questions.

a) What are the different operations and maintenance issues related to water supply systems? Explain the role played by villagers in handling these issues. **[9]**

b) Explain the necessity of record drawings in relation to rural water supply systems with specific reference to 'As-built drawings.' **[9]**

OR

Q8) Answer the following questions.

a) Explain the process of periodical maintenance of pumping machinery, used in water supply systems along with necessary documentation required. **[9]**

b) Give a brief note on leakage detection techniques and its necessity in water supply systems. **[9]**

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Total No. of Questions : 8]

SEAT No. :

P3147

[Total No. of Pages : 3

[6004]-480A

B.E. (Computer Engineering)

DESIGN ANALYSIS OF ALGORITHMS

(2019 Pattern) (Semester - VII) (410241)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Consider the following instance of the knapsack problem. Find the optimal solution by using dynamic programming approach. **[10]**

Item	Weight	Profit
1	2	$12
2	1	$10
3	3	$20
4	2	$15

Capacity of the knapsack = 5.

b) What is job scheduling algorithm? How job scheduling algorithm can be solved using Greedy algorithmic approach? Explain your answer with respect to Principle, control abstraction, time analysis of control abstraction, of greedy approach for the following instance of knapsack problem. **[8]**

Each job is associated with a deadline and profit.

Job	J_1	J_2	J_3	J_4	J_5
Deadline	2	1	3	2	1
Profit	60	100	20	40	20

OR

Q2) a) What is greedy approach? Explain Job scheduling algorithm using Greedy approach for following examples. Give the sequence of job scheduling. **[8]**

P.T.O.

Input: Four jobs with following deadlines and profits

Job1D	deadline	Profit
a	4	20
b	1	10
c	1	40
d	1	30

Input: Five Jobs with following deadlines and profits

Job1D	Deadline	Profit
a	2	100
b	1	19
c	2	27
d	1	25
e	3	15

b) What is optimal binary search tree? How dynamic programming approach is used to build OBST for following tale. **[10]**

	1	2	3	4
Keys→	10	20	30	40
Frequency→	4	2	6	3

Q3) a) Explain with suitable example Backtracking: Principle, control abstraction, time analysis of control abstraction. **[8]**

b) Compare between greedy method and dynamic programming with respect to. **[9]**

i) Feasibility.

ii) Optimality.

iii) Recursion.

iv) Memorization.

v) Time complexity.

OR

Q4) a) What is sum of subset problem? Solve sum of subset problem for following instance using backtracking approach. **[8]**

Input : set [] = {2, 3, 5, 6, 8, 10}, sum = 10

b) What is Branch and Bound method? Write control abstraction for Least cost search? **[9]**

Q5) a) What is amortized analysis? Explain aggregate and potential function methods used for amortized analysis with respect to stack operations? **[9]**

b) What is potential function method, of amortized analysis? To illustrate potential method, find amortized cost of PUSH, POP and MULTIPOP stack operations. **[9]**

OR

Q6) a) Write short notes on the following. **[10]**

i) Aggregate analysis.

ii) Accounting Analysis.

iii) Potential function method.

iv) Tractable and Non-tractable problems.

b) Write short notes on with suitable example of each. **[8]**

i) Randomized algorithm.

ii) Approximation algorithm.

Q7) a) Write and explain pseudo code for multi-threaded merge sort algorithm. How parallel merging gives a significant parallelism advantage over merge Sort? **[9]**

b) i) Explain an algorithm for Distributed Minimum Spanning Tree. **[8]**

ii) Write and explain Rabin-Karp algorithm for string matching.

OR

Q8) a) Write short notes on the following. **[10]**

i) Multithreaded matrix multiplication.

ii) Multithreaded merge sort.

iii) Distributed breadth first search.

iv) The Rabin-Karp algorithm.

b) With respect to Multithreaded Algorithms explain Analyzing multithreaded algorithms, Parallel loops, Race conditions. **[7]**

✡ ✡ ✡

Total No. of Questions : 8]

SEAT No. :

P546

[Total No. of Pages : 2

[6004]-481
B.E. (Computer Engineering)
MACHINE LEARNING
(2019 Pattern) (Semester - VII) (410242)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain the following terms with suitable examples. **[6]**

i) Bias

ii) Variance

iii) Under fitting and Over fitting

b) Differentiate between Lasso Regression and Ridge Regression. **[6]**

c) Explain gradient descent algorithm with example. **[6]**

OR

Q2) a) What do you mean by regression? Explain with suitable example. **[6]**

b) Write a short note on : **[6]**

i) MAE

ii) RMSE

iii) R^2

c) What is gradient descent? Compare batch gradient and stochastic gradient descent. **[6]**

Q3) a) Explain with example the variant of SVM, the support vector regression. **[5]**

b) What do you mean by ensemble learning?Differentiate between bagging & boosting. **[6]**

c) What are different variants of multi-class classification? Explain them with suitable example. **[6]**

OR

P.T.O.

Q4) a) Calculate macro average precision, macro average recall and macro average F-score for the following given confusion matrix of multi-class classification. **[6]**

Predictions →

Actual values ↓	A	B	C	D
A	100	80	10	10
B	0	9	0	1
C	0	1	8	1
D	0	1	0	9

b) Write a short note on : **[6]**

i) Random forest.

ii) Adaboost.

c) Discuss K-nearest neighbour algorithm with suitable example. **[5]**

Q5) a) With reference to Clustering explain the issue of "Optimization of Clusters". **[6]**

b) Compare Hierarchical clustering and K-means clustering. **[6]**

c) Explain how a cluster is formed in the density based clustering algorithm. **[6]**

OR

Q6) a) How would you choose the number of clusters when designing a K-Medoid clustering algorithm? **[6]**

b) Write a short note on out lier analysis with respect to clustering. **[6]**

c) Differentiate between K-means and Spectral clustering. **[6]**

Q7) a) What are building blocks of neural network, elaborate? **[5]**

b) Describe characteristics of back propagation algorithm. **[6]**

c) Write a short note on Recurrent neural n/w & convolutional neural n/w. **[6]**

OR

Q8) a) Explain artificial neural n/w based on perception concept with diagram. **[6]**

b) Describe multi-layer neural n/w. Explain why back propagation algorithm is required. **[6]**

c) Discuss any two activation functions with example. **[5]**

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B.E. (Computer Engineering)

BLOCKCHAIN TECHNOLOGY

(2019 Pattern) (Semester-VII) (410243)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Figures to the right side indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume Suitable data if necessary.***

Q1) a) Explain in details **[8]**

i) Bitcoin

ii) Hyperledger

b) Explain types of Blockchain in details? **[6]**

c) Explain in details any one algorithm. **[4]**

OR

Q2) a) List different consensus algorithms used in Blockchain Technology. Explain any two algorithms in detail. **[8]**

b) Write a note on Corda and R3. **[6]**

c) Explain Byzantine General problem. **[4]**

Q3) a) Write a note on Bitcoin. **[6]**

b) Describe Token in details with example? **[6]**

c) Define types of crypto currencies. **[5]**

OR

Q4) a) Different between Coinbase and Binance. **[6]**

b) Explain in details crypto wallets. **[6]**

c) Write a note on Coinbase. **[5]**

P.T.O.

Q5) a) Discuss what is Ethereum. **[8]**

b) Explain In Details Whisper? **[6]**

c) Define the purpose and types of Smart Contracts. **[4]**

OR

Q6) a) Write a note on Ethereum Virtual Machine. **[8]**

b) Write a note on Swarm. **[6]**

c) What is a smart contract? Explain with an example. **[4]**

Q7) a) Explain use of Blockchain in retail. **[6]**

b) List and explain benefits of using Blockchain in Government sector. **[6]**

c) List and explain any two Blockchain applications. **[5]**

OR

Q8) a) Discuss use of Blockchain in Healthcare. **[6]**

b) List and explain any two applications of Blockchain in retail. **[6]**

c) Explain how Blockchain can be used in Financial services. **[5]**

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Total No. of Questions : 8]

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B.E. (Computer Engineering)

PERVASIVE COMPUTING

(2019 Pattern) (Semester - VII) (Elective - III) (410244(A))

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicates full marks.***

Q1) a) What is Context aware computing? Discuss types of Contexts with example? **[6]**

b) Explain Context aware applications and steps to develop them. **[6]**

c) Discuss the privacy and ethical issues of location determination. **[6]**

OR

Q2) a) Discuss the motivation for ICT environment awareness for mobile users. Discuss designs to support context aware content adaptation for the access devices and its local network link. **[6]**

b) Compare and contrast different methods of location determination with respect to accuracy, indoor and outdoor use and local versus global location determination. **[6]**

c) Discuss core capabilities for context aware applications. **[6]**

Q3) a) How uncertainty can be handled in planning? **[5]**

b) What is first order logic? Explain difference between First order logic and propositional logic. **[6]**

c) What are different reactive Information System models? **[6]**

OR

P.T.O.

Q4) a) Give the key characteristics of a cooperative system. Discuss two basic designs to support cooperation based upon perfect coordination and explicit communication? **[5]**

b) Discuss how the use of norms can act as design for a perfect coordination model? **[6]**

c) What is meant by interaction multiplicity? Discuss the types of multiplicity when multiple dumb peers interact, when cooperative intelligent peers interact and when competitive intelligent peers interact? **[6]**

Q5) a) Explain the process of interaction design. **[6]**

b) What is interaction design? Comment on importance of interaction design. **[6]**

c) Compare and contrast interaction design with User experience (UX) design. **[6]**

OR

Q6) a) Why is it important to study human-computer interaction for ubiquitous computing? Comment. **[6]**

b) Discuss advantages and disadvantages of Human Computer Interface with some suitable examples. **[6]**

c) What is difference between explicit HCI and Implicit HCI. Justify your answer with respect to any suitable activity like preparation of meal. **[6]**

Q7) a) Explain Security model in pervasive computing. **[5]**

b) What are the Privacy and trust issues in Pervasive computing? **[6]**

c) How the authentication and authorization is carried out in Pervasive environment? **[6]**

OR

Q8) a) Describe role of ethics in Pervasive computing security? **[5]**

b) What are the Legal responsibilities in Pervasive computing security? **[6]**

c) Comment on digital divide and sustainable development. **[6]**

Total No. of Questions : 8]

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B.E. (Computer Engineering)

MULTIMEDIA TECHNIQUES

(2019 Pattern) (Semester - VII) (Elective - III) (410244B)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of Calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) How would you identify the limitations of CRT? Draw and explain a typical electronic signal for one scan line of NTSC composite video. **[5]**

b) Based on color coding and lines per frame rate identify the similarities between the PAL Video and SECAM Video Explain in a brief NTSC Video. **[6]**

c) What are three different interfaces for analog video signal transmission? Explain anyone in detail. **[6]**

OR

Q2) a) How would you differentiate between conventional TV and HDTV. **[5]**

b) Explain the Ultra High Definition TV. **[6]**

c) Explain the advantages of digital representation for video. **[6]**

Q3) a) How would you demonstrate coding tree for HELLO using Shannon-Fano algorithm. **[5]**

b) Using the information you have learned about Dictionary-Based Coding, construct LZW Compression for String ABABBABCABABBA. **[6]**

c) Identify the advantages and disadvantages of Arithmetic Coding as compared to Huffman Coding? **[6]**

OR

P.T.O.

Q4) a) What are three most commonly used numerical distortion measures in image compression? Explain in detail. **[5]**

b) Explain any two types of wavelet transforms. **[6]**

c) What is JPEG Standard? Draw and explain block diagram for JPEG encoder. **[6]**

Q5) a) Explain functional requirements for augmented reality ecosystem. **[6]**

b) Enlist types of head-mounted displays? Explain Mobile VR with suitable example. **[6]**

c) Enlist the input devices that are popularly used in immersive experience systems. Explain any input device in detail. **[6]**

OR

Q6) a) Compose Applications, Challenges & Future Potential of AR display. **[6]**

b) Compose challenges and common misperceptions about AR, VR and MR practices. **[6]**

c) Explain at least two future applications of Immersive Technologies. **[6]**

Q7) a) What can be possible challenges to implementing AR Technology? Explain how AR can be used for the employee training. **[6]**

b) Judge the importance of immersive experiences for designing academic applications which serve communication between educators, researchers, and students. **[6]**

c) Draw and explain each layer from the architecture of the Internet of Things (IoT). **[6]**

OR

Q8) a) Decide the major functions of AI- Based Software? Explain how AI achieves incredible accuracy. **[6]**

b) What changes would you make in the medical field using Big Data and AI technology. **[6]**

c) What alternative services would you suggest using M-IoT for road safety system. **[6]**

Total No. of Questions : 8]

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B.E. (Computer Engineering)

CYBER SECURITY AND DIGITAL FORENSICS

(2019 Pattern) (Semester - VII) (Elective - III) (410244C)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of Calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) Explain in brief computer forensic services. Write the applications of digital forensics in military. **[8]**

b) What is the significance of data recovery and backup? Explain various data recovery solutions. **[9]**

OR

Q2) a) What are the various business oriented digital forensic techniques? **[8]**

b) How does computer forensics help in law enforcement? **[9]**

Q3) a) Discuss the various legal aspects of collecting and storing digital evidence. **[9]**

b) What are different computer evidence processing steps? **[9]**

OR

Q4) a) What is chain custody? How we can control the contamination of digital evidence? **[9]**

b) What are various methods of collecting digital evidence ?Enlist the various digital collection steps. **[9]**

Q5) a) Explain different approaches for validating forensic data. **[9]**

b) Explain the approaches for seizing digital evidence at the crime scene. **[8]**

OR

P.T.O.

Q6) a) Explain the process of identifying digital evidence in computer forensics. **[9]**

b) Explain Network forensics and order of volatility for computer system. **[8]**

Q7) a) State the features of any five computer forensic software tools. **[9]**

b) Write short notes on **[9]**

i) Task performed by digital forensic tool

ii) Tools for email forensics

iii) Techniques for email forensic investigation

OR

Q8) a) State the features of any five computer forensic hardware tools. **[9]**

b) Write short notes on **[9]**

i) Role of client and server in email

ii) Investigating Email crimes and investigations

iii) NIST standards for forensic technologies

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B.E. (Computer Engineering)

OBJECT ORIENTED MODELING AND DESIGN

(2019 Pattern) (Semester - VII) (Elective - III) (410244D)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Neat diagrams must be drawn wherever necessary.***
5) ***Assume suitable data if necessary.***

Q1) a) What are Composite states? Explain Categories of Composite states **[6]**

b) Explain Following terms with respect to use case **[6]**

i) Use Case

ii) Actor

iii) System Boundary

c) Draw Use case Diagram for ATM Machine **[6]**

OR

Q2) a) What do you mean by activity? Consider ATM scenario, Identify' and explain at least five activities involved in ATM system scenario **[6]**

b) What is Sequence diagram? Discuss components of sequence diagram **[6]**

c) Draw Sequence diagram for ATM Machine (Complete view) **[6]**

Q3) a) Define Reuse Plan. Explain in brief following term with respect to reuse plan **[6]**

i) Library

ii) Framework

iii) Pattern

b) Explain data storage management in software modelling. **[6]**

c) What do you mean by Batch Transformation and Continuous transformation? **[5]**

OR

P.T.O.

Q4) a) Explain in detail components of a component diagram **[6]**

b) Explain Following with respect to deployment diagram **[6]**

i) Node

ii) Association

iii) Dependency

c) Draw Deployment diagram for ATM System **[5]**

Q5) a) Give detailed guidelines for finding and defining classes involved in software system scenario **[6]**

b) List and Explain different types of dependencies in package **[6]**

c) Discuss how you identify, Use cases and actors with respect to use case diagrams? **[6]**

OR

Q6) a) Discuss different architectural styles **[6]**

b) What are different categories of external control? Explain in Brief **[6]**

c) Explain in brief Global Resource handling **[6]**

Q7) a) What is Design Pattern? Explain different types of design Patterns **[6]**

b) State and explain entities involved in design pattern **[6]**

c) Explain Strategy Design patterns **[5]**

OR

Q8) a) Explain Observer design pattern **[6]**

b) Explain elements of a design pattern **[6]**

c) Explain State design Pattern **[5]**

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B.E. (Computer Engineering)
DIGITAL SIGNAL PROCESSING
(2019 Pattern) (Semester - VII) (Elective - III) (410244E)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Your answer will be valued as a whole.***
5) ***Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables in allowed.***
6) ***Assume suitable data, if necessary.***

Q1) a) State and prove the convolution property of Z transform. **[4]**

b) Compute Z transform of following including ROC **[6]**

$x(n) = (1/2)^n \{u(n) - u(n - 10)\}$

c) Find the Z transform of the discrete time signal, **[8]**

$X(n)=a^n \cos(\omega_0 n)\, u(n)$

OR

Q2) a) Show the relation between Fourier iransform & Z-transform. **[4]**

b) Find Z transform of: **[6]**

i) $x(n) = n^2\, u(n)$

ii) $x(n) = 2^n\, u(n-2)$

c) Determine IZT of following functions. **[8]**

i) $$X(z)=\frac{z^2}{(z-1)(z-0.2)} \text{ROC} \mid z \mid >1$$

ii) $$X(z)=\frac{z^{-1}}{(1-3z^{-1})} \text{ROC} \mid z \mid < 3$$

P.T.O.

Q3) a) Determine the unit step response of the system described by difference equation **[8]**

$y(n)= 0.9\, y(n-1) - 0.81\, y(n-2) + x(n)$

Under the following initial conditions:

i) $y(-1)=y(-2)=0$

ii) $y(-1)=y(-2)=1$

b) Determine the transfer function and impulse response of the LTI system given by the difference equation. **[9]**

$$y(n)+\frac{3}{4}y(n-1)+\frac{1}{8}y(n-2)=x(n)+x(n-1)$$

OR

Q4) a) Compute DFT of the sequence **[8]**

$x(n)$ = { 1, 2, 2, 2, 1, 0, 0, 0} using DIF_FFT algorithm. Sketch its magnitude spectrum.

b) For the following system, obtain the system function H(z) and plot its poles and zeros against the unit circle. **[9]**

$y(n) = ay(n-1) + x(n)$

Q5) a) Compare IIR & FIR filters on following points. **[9]**

i) Filter governing mathematical equation

ii) Memory requirement

iii) Stability

iv) Recursiveness

v) Phase response

vi) Processing time

b) Explain Linear Filtering using overlap add method and Find the output (n) of a filter whose impulse response is $h(n)$ = {1, 1, 1} and input signal $x(n)$ = {3,-1, 0, 1,3,2,0, 1,2, 1} using overlap add method **[9]**

OR

Q6) a) Explain windowing technique of FIR filter design in detail. Also explain Gibb's phenomena and how it can be reduced. State different types of windows used with their window function. **[9]**

b) Design a FIR digital filter to approximate an ideal LPF with passband gain of unity, cut off frequency 850 Hz and working at sampling frequency of 5000 Hz. The length of impulse response should be 5. Use a rectangular and hamming window. **[9]**

Q7) a) Obtain direct form I and Direct form II realization of a LTI system described difference equation as given below: **[8]**

$3y(n)–2y(n – 1)+ y(n – 2) = 4x(n)–3 (n – 1)+2x(n – 2)$

b) Write the feattires of ADSP-21xx.processor. Also compare it with a conventional processor. **[9]**

OR

Q8) Write a short notes on following (any two)

a) SHARC DSP processor. **[8]**

b) Gibbs phenomenon **[8]**

c) Finite word length effect in IIR filter Design **[9]**

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B.E. (Computer Engineering)
INFORMATION RETRIEVAL
(2019 Pattern) (Semester - VII) (Elective - IV) (410245 (A))

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Figures to the right side indicate full marks.***
3) ***Neat diagram must be drawn wherever necessary.***
4) ***Assume suitable data if necessary.***

Q1) a) Enlist the General-Purpose Data Compression techniques and explain with suitable examples. **[9]**

b) Write a short note on. **[9]**

i) Nonparametric Gap Compression.

ii) Parametric Gap Compression.

iii) Context-Aware Compression Methods.

OR

Q2) a) Write a short note on. **[9]**

i) Modeling and Coding.

ii) Huffman Coding.

iii) Arithmetic Coding.

b) Describe Dynamic Inverted Indices like Incremental Index Updates, Contiguous Inverted Lists and Noncontiguous Inverted. **[9]**

Q3) a) Explain Categorization and Filtering with any two detailed Examples. **[9]**

b) Explain the Information-Theoretic Model in detail. **[8]**

OR

Q4) a) Explain probabilistic Classifiers & Generalized Linear Models. **[9]**

b) Describe Language Models and Smoothing. **[8]**

Q5) a) Explain MeasuringEffectiveness like Traditional effectiveness measure and the text retrieval conference (TREC) with suitable examples. **[9]**

b) Write a short note on: **[9]**

i) Nontraditional effectiveness measures.

ii) Measuring efficiency.

OR

P.T.O.

Q6) a) Explain Query Scheduling and Caching with suitable examples. **[9]**

b) Write a short note on: **[9]**

i) Using statistics in evaluation.

ii) Minimizing adjudication Effort.

Q7) a) Describe Parallel Query Processing with suitable examples. **[8]**

b) Write a short note on: **[9]**

i) The structure of the web.

ii) Quires and Users.

iii) Static ranking.

OR

Q8) a) Describe Map Reduce with suitable examples. **[9]**

b) Write a short note on: **[8]**

i) Evaluation web search.

ii) Web Crawlers.

iii) Web crawler libraries.

iv) Dynamic ranking.

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B.E. (Computer Engineering)

GPU PROGRAMMING AND ARCHITECTURE

(2019 Pattern) (Semester - VII) (410245 B) (Elective - IV)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Figures to the right side indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable data if necessary.***

Q1) a) Describe CUDA error handling APIs and explain how they can be used for error checking. **[9]**

b) Describe parallel programming issues. **[9]**

OR

Q2) a) Explain defensive programming and assertions technique. **[9]**

b) What are tools and techniques that you should employ for finding and solving CUDA errors? **[9]**

Q3) a) What are various OpenCL components? **[9]**

b) What is pipe memory object ? **[8]**

OR

Q4) a) Explain OpenCL architecture. **[8]**

b) Explain kernel programming model. **[9]**

Q5) a) Explain MPI communication on GPU. **[9]**

b) In brief discuss CSR format for sparse matrix. **[9]**

OR

Q6) a) Explain convolution parallel algorithm. **[9]**

b) 'What is task parallelism and data parallelism. **[9]**

Q7) a) Explain how OpenCL can be used for Heterogeneous Computing? **[9]**

b) Enlist and explain few OpenCL applications. **[8]**

OR

Q8) a) Write short note on - Efficient Neural Network Training/Inferencing. **[9]**

b) Explain OpenCL application design process. **[8]**

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[6004]-490
B.E. (Computer Engineering)
MOBILE COMPUTING
(2019 Pattern) (Semester - VII) (410245 (C)) (Elective - IV)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Figures to the right side indicate full marks.***
3) ***Neat diagram must be drawn wherever it is necessary.***
4) ***Assume suitable data if necessary.***

Q1) a) Explain GSM architecture in detail. **[6]**

b) Explain the Um interface of GSM. **[6]**

c) Write a short note on SIM. **[6]**

OR

Q2) a) Explain different architectures of WLAN. **[6]**

b) Explain the Virtual Home Environment (VHE). **[6]**

c) Explain the UMTS core network in detail. **[6]**

Q3) a) Explain GSM Location Management . **[6]**

b) Write a short note on VLR identification Algorithm O-II. **[6]**

c) With a neat diagram explain: **[6]**

i) Intacell handover

ii) Inter cell handover.

OR

Q4) a) Explain the Handoff process in detail. **[6]**

b) What is HLR failure restoration? Explain in detail. **[6]**

c) Write a short note on MAP protocol Machine. **[6]**

Q5) a) How to achieve the IP packet delivery to and from.mobile node? Explain. **[7]**

b) Explain registration process of Mobile node. **[5]**

c) Write short note on micro mobility. **[5]**

OR

P.T.O.

Q6) a) Explain generic routing encapsulation. **[5]**

b) List and explain the applications of MANET. **[5]**

c) How to achieve the optimization in mobile IP? Why? **[7]**

Q7) a) Explain SAE architecture in detail. **[6]**

b) Explain the Role of 5G in IoT. **[5]**

c) Write short note on Long Term Evolution (LTE) in 4G. **[6]**

OR

Q8) a) Explain various network nodes present in E-UTRAN architecture. **[5]**

b) What is HSPA? Explain in detail. **[5]**

c) Explain 3G and 4G technologies for GSM and CDMA. **[7]**

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B.E. (Computer)

SOFTWARE TESTING AND QUALITY ASSURANCE

(2019 Pattern) (Semester - VII) (Elective - IV) (410245D)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q.No.1 or Q.No.2, Q.No.3 or Q.No.4, Q.No.5 or Q.No.6, Q.No.7 or Q.No.8.***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data, if necessary.***
4) ***Neat diagrams must be drawn wherever necessary.***

Q1) a) Differentiate between black box and white box testing. **[6]**

b) What do you mean by unit and integration testing what are the approaches used in integration testing? **[6]**

c) Illustrate Non - functional testing? Explain performance testing with example? **[6]**

OR

Q2) a) Write a brief outline Experienced based techniques. **[6]**

b) Can you explain statment coveragetesting & branch coverage testing? **[6]**

c) How would you explain system testing & acceptance testing. **[6]**

Q3) a) What is impact of defect in different phase of software development? **[6]**

b) Can you explain quality plan in details? **[6]**

c) Explain why ISO - 9001 standard and it's importants in software testing. **[5]**

OR

Q4) a) With respect to quality management system explain important aspects of quality management. **[6]**

b) What do you understand regarding quality control & Explain two methods of quality control. **[6]**

c) Why do you need to measure customer satisfaction? **[5]**

P.T.O.

Q5)	a)	What is automation testing in software testing? Explain in brief?	**[6]**
	b)	Illustrate Selenium's IQE explain in details.	**[6]**
	c)	How would you explain selenium's web driver explain.	**[6]**

OR

Q6)	a)	Identify different benefits of Automation testing.	**[6]**
	b)	Explain different automated testing process.	**[6]**
	c)	How would you explain R.P.A.	**[6]**

Q7)	a)	Explain the six sigma characteristics in details.	**[6]**
	b)	Compare the Ishikawa's flowchart and Histogram tools.	**[6]**
	c)	What parameter required for achieving good software quality.	**[5]**

OR

Q8)	a)	Can you explain how to maintain SQA.	**[6]**
	b)	Illustrate different task goal and metric in SQA.	**[6]**
	c)	What do you think about deffect removal effectiveness explain it.	**[5]**

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[6004]-492
B.E. (Computer)
COMPILERS
(2019 Pattern) (Semester - VII) (Elective - IV) (410245E)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q.No.1 or Q.No.2, Q.No.3 or Q.No.4, Q.No.5 or Q.No.6, Q.No.7 or Q.No.8.***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data, if necessary.***
4) ***Neat diagrams must be drawn wherever necessary.***

Q1) a) Write short notes on **[10]**

i) Semantic analyzer

ii) Syntax Trees

iii) Translation Schemes

iv) Type System

v) Type Expression

b) What is three address code? Construct the parse tree for following expression and generate three address code A = b + c + d. **[8]**

OR

Q2) a) Generate annotated parse tree for expression - a*b–c/e+f. **[7]**

b) Explain bottom - up evaluation of L-attributed grammar. **[6]**

c) Explain the term with example S - attributed grammar. **[5]**

Q3) a) Discuss storage organization & allocation strategies. **[9]**

b) What is activation record? Explain each field in detail. **[8]**

OR

Q4) a) What are 2 approaches of implementing dynamic scope? **[6]**

b) Differentiate between Static, Stack & heap allocation. **[6]**

c) Explain the dangling pointers. **[5]**

P.T.O.

Q5) a) What is DAG? Explain the role of DAG in code Generation phase. **[10]**

b) Explain the tree labeling algorithm with suitable example. **[8]**

OR

Q6) a) Explain with example. **[7]**

i) Basic Blocks

ii) Peephole optimization

b) Explain dynamic programming algorithm for code generation **[6]**

c) List the Issues in code generation. **[5]**

Q7) a) Define what is common sub-expression. Dissuss the Algorithm for Elimination of common sub expression. **[9]**

b) Write short notes on - **[8]**

i) Reaching definition.

ii) Live variables

OR

Q8) a) Discuss in brief optimizing transformations. **[6]**

b) What is Iterative data flow analysis? Explain with example. **[6]**

c) What is code motion technique. Explain in detail. **[5]**

Total No. of Questions : 8]

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[6004]-493

B.E. (Computer Engineering)

High Performance Computing

(2019 Pattern) (Semester - VIII) (410250)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***

Q1) a) Explain with diagram One-to-all broadcast on an eight-node ring with recursive doubling technique. Node 0 is the source of the broadcast. Also Explain all to one reduction with node 0 as destination. **[7]**

b) Explain in detail Blocking and Non-Blocking Communication Using MPI. **[6]**

c) Write a short note on prefix-sum operation. **[4]**

OR

Q2) a) What is all to all broadcast communication operation? Explain all to all broadcast on an eight node ring with step wise diagrams. (Show first two steps and last communication step). **[7]**

b) Explain scatter and gather communication operation with diagram. **[6]**

c) Explain circular shift operation? **[4]**

Q3) a) Explain parallel Matrix —Matrix multiplication algorithm with example? **[7]**

b) Explain different performance Metrics for Parallel Systems. **[6]**

c) Explain Minimum Execution Time and Minimum Cost Optimal Execution Time. **[4]**

OR

P.T.O.

Q4) a) What is granularity? What are effects of granularity on performance of parallel systems? **[7]**

b) Explain various sources of overhead in parallel systems? **[6]**

c) Explain "Scaling Down (downsizing)" a parallel system with example. **[4]**

Q5) a) What is CUDA? Explain different programming languages support in CUDA. Discuss any three applications of CUDA. **[8]**

b) Describe processing flow of CUDA-C program with diagram. **[6]**

c) Explain the following terms in CUDA: device, host, device code, Kernel. **[4]**

OR

Q6) a) Explain CUDA memory model. Discuss thread hierarchy. **[8]**

b) What is block dimension and grid dimension in CUDA? Write a CUDA kernel for addition of two vectors and explain how it will calculate addition using threads. **[6]**

c) What is a Kernel in CUDA? What is kernel launch? Explain arguments that can be specified in a Kernel launch. **[4]**

Q7) a) Explain odd-even transportation in bubble sort using parallel formulation. Give one stepwise example solution using odd-even transportation. **[8]**

b) Explain Parallel Depth First Search algorithm in detail? **[6]**

c) What is Kubernets? Explain its features and applications. **[4]**

OR

Q8) a) Write short notes on : **[8]**

i) Parallel Merge sort

ii) GPU applications

b) What are the issues in sorting on parallel computers? Explain with appropriate example? **[6]**

c) Explain parallel BFS algorithm in brief. **[4]**

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Total No. of Questions : 8]

SEAT No. :

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[6004]-494

B.E. (Computer Engineering)

DEEP LEARNING

(2019 Pattern) (Semester - VIII) (410251)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates :

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7or Q.8***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn whenever necessary.***
4) ***Make suitable assumption whenever necessary.***

Q1) a) Explain Pooling Layer with its need and different types. **[6]**

b) Draw and explain CNN (Convolution Neural Network) architecture in detail. **[6]**

c) Explain ReLU Layer in detail. What are the advantages of ReLU over Sigmoid? **[6]**

OR

Q2) a) Explain all the features of pooling layer. **[6]**

b) Explain Dropout Layer in Convolutional Neural Network. **[6]**

c) Explain working of Convolution Layer with its features. **[6]**

Q3) a) What is RNN? What is need of RNN? Explain in brief about working of RNN (Recurrent Neural Network). **[6]**

b) How LSTM and Bidirectional LSTM works. **[6]**

c) Explain Unfolding computational graphs with example. **[5]**

OR

P.T.O.

Q4) a) What are types of RNN (Recurrent Neural Network)? How to train RNN explain in brief. **[6]**

b) Explain Encoder-Decoder Sequence to Sequence architecture with its application. **[6]**

c) Differentiate between Recurrent and Recursive Neural Network. **[5]**

Q5) a) Explain Boltzmann machine in details. **[6]**

b) Explain GAN (Generative Adversarial Network) architecture with an example. **[6]**

c) Do GANs (Generative Adversarial Network) find real or fake images? If yes explain it in detail. **[6]**

OR

Q6) a) Differentiate generative and discriminative models in GAN (Generative Adversarial Network). **[6]**

b) What are applications of GAN (Generative Adversarial Network)? Explain any four in detail. **[6]**

c) Write Short Note on Deep generative model and Deep Belief Networks. **[6]**

Q7) a) Explain Markov Decision Process with Markov property. **[6]**

b) Explain in detail Dynamic programming algorithms for reinforcement learning. **[6]**

c) Explain Simple reinforcement learning for Tic-Tac-Toe. **[5]**

OR

Q8) a) Write Short Note on Q Learning and Deep Q-Networks. **[6]**

b) What are the challenges of reinforcement learning? Explain any four in detail. **[6]**

c) What is deep reinforcement learning? Explain in detail. **[5]**

Total No. of Questions : 8]

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[6004]-495

B.E. (Computer Engg.)

NATURAL LANGUAGE PROCESSING

(2019 Pattern) (Semester - VIII) (Elective - V) (410252(A))

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Describe the process of building a simple Markov model for predicting the next word in a sentence with the help of example. **[6]**

b) Suppose you have a text corpus of 10,000 words, and you want to build a bigram model from this corpus. The vocabulary size of the corpus is 5,000. After counting the bigrams in the corpus, you found that the bigram "the cat" appears 50 times, while the unigram "the" appears 1000 times and the unigram "cat" appears 100 times. Using the add-k smoothing method with k=0.5, what is the probability of the sentence "the cat sat on the mat"? **[8]**

c) Write a short note on Latent Semantic Analysis (LSA). **[4]**

OR

Q2) a) What are generative models of language, and how do they differ from discriminative models? **[4]**

b) Given a document-term matrix with the following counts : **[6]**

	Document 1	Document 2	Document 3
Term 1	10	5	0
Term 2	2	0	8
Term 3	1	3	6

Calculate the TF-IDF score of "Term 1" in "Document 1".

c) Describe the Latent Dirichlet Allocation (LDA) algorithm and how it is used for topic modeling? **[8]**

P.T.O.

Q3) a) Describe the concept of Information Retrieval system in Natural Language Processing. **[4]**

b) What is Named Entity Recognition (NER)? Describe the various metrics used for evaluation. **[8]**

c) What is Cross-Lingual Information Retrieval and how is it used in Natural Language Processing? Provide an example. **[6]**

OR

Q4) a) Explain the concept of the Vector Space Model and describe how it is used in Information Retrieval. **[6]**

b) Describe entity extraction and relation extraction with the help of examples. **[8]**

c) What is Coreference Resolution? Give examples. **[4]**

Q5) a) Write a note on : WordNet. **[10]**

b) List the tools available for the development of NLP applications? Write features NLTK and TextBlob? **[7]**

OR

Q6) a) Describe in detail the Lesk algorithm and Walker's algorithm for word sense disambiguation. **[10]**

b) Which types of tasks are performed by the Gensim library? Give an example. **[7]**

Q7) a) Write a note on : Sentiment Analysis. **[10]**

b) Explain Statistical Machine Translation (SMT) with suitable diagrams and example. **[7]**

OR

Q8) a) Describe various Machine Translation Approaches. **[10]**

b) Explain Natural Language Generation with reference architecture. **[7]**

Total No. of Questions : 8]

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[6004]-496
B.E. (Computer Engg.)
IMAGE PROCESSING
(2019 Pattern) (Semester - VIII) (Elective - V) (410252(B))

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume suitable data, if necessary.***

Q1) a) What is Image Segmentation? Discuss any two application of image segmentation. **[6]**

b) Explain Otsu's algorithm in detail. **[6]**

c) Discuss various steps involved in Canny Edge detection algorithms? **[6]**

OR

Q2) a) Explain fundamental approaches in Image Segmentation. **[6]**

b) Explain Region Splitting and Merging algorithm? **[6]**

c) Discuss various steps involved in K-means Clustering for segmentation. **[6]**

Q3) a) Describe Image Compression Model? **[6]**

b) Explain Run-Length encoding with example? **[6]**

c) Write short note on Object Recognition. **[6]**

OR

Q4) a) Explain any three Image Compression Measures? **[6]**

b) Explain Huffman encoding with example? **[6]**

c) Write short note on Tensor in Computer vision? **[6]**

P.T.O.

Q5) a) Explain Image Degradation Model. **[6]**

b) Explain Wiener Filtering algorithm for Image Reconstruction. **[6]**

c) Compare Image Enhancement and Image Restoration. **[5]**

OR

Q6) a) Explain any three noise models. **[6]**

b) Explain Lucy-Richardson Filtering algorithm for Image Reconstruction. **[6]**

c) Explain Inverse Filtering. **[5]**

Q7) a) Explain process of Remote sensing with diagram. **[6]**

b) Explain Magnetic Resonance Imaging in Medical Imaging. **[6]**

c) Explain in detail the Computer Tomography. **[5]**

OR

Q8) a) What is Photogrammerty and explain its types? **[6]**

b) Explain Multispectral and Hyperspectral Imaging in Remote Sensing. **[6]**

c) "Role of Image Processing in Medical Imaging", Justify. **[5]**

Total No. of Questions : 8]

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[6004]-497

B.E. (Computer Engg.)

SOFTWARE DEFINED NETWORKS

(2019 Pattern) (Semester - VIII) (Elective - V) (410252(C))

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) *Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right indicate full marks.*
4) *Assume suitable data, if necessary.*

Q1) a) Define data center? What are the types of data center? **[6]**

b) Write a short note on Traffic Engineering. **[6]**

c) Explain the SDN strategies to centralize Management in the data center. **[6]**

OR

Q2) a) Which are the 4 tiers of data centers? **[6]**

b) Write a short note on VxLAN. **[6]**

c) Explain the data center architecture component. **[6]**

Q3) a) What are Current Languages and Tools used in SDN programming? **[6]**

b) Explain the Composition of SDNs? **[6]**

c) What is Mininet? Explain basic commands of mininet. **[5]**

OR

Q4) a) Explain Northbound Application Programming Interface. **[6]**

b) Explain in detail Network Functions Virtualization (NFV). **[6]**

c) Enlist the applications of Software Defined Networks. **[5]**

Q5) a) Explain Southbound Application Interface. **[6]**

b) Differentiate between NFV and SDN. **[6]**

c) Explain the Challenges for Network Functions Virtualization? **[6]**

OR

P.T.O.

Q6) a) Explain NFV management and Network Orchestration. **[6]**

b) Compare between NFV and NV. **[6]**

c) Discuss any one NFV deployment case study. **[6]**

Q7) a) Write a short note on Data Center Orchestration. **[6]**

b) Enlist the salient features of Floodlight Controller. **[6]**

c) Explain in detail Bandwidth calendaring. **[5]**

OR

Q8) a) Explain in detail Juniper SDN. (Diagram). **[6]**

b) Write a short note on Open Daylight Controller. **[6]**

c) Explain in detail IETF SDN Framework. **[5]**

Total No. of Questions : 8]

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[6004]-498

B.E. (Computer Engg.)

ADVANCE DIGITAL SIGNAL PROCESSING

(2019 Pattern) (Semester - VIII) (Elective - V) (410252(D))

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) *Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8.*
2) *Figures to the right indicate full marks.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Assume suitable data, if necessary.*

Q1) a) What is multi rate signal processing? Explain any two applications of multi rate signal processing. **[7]**

b) Describe the decimation process with a factor of 'D'. Obtain necessary expression, sketch frequency response. Also discuss aliasing effect. **[10]**

OR

Q2) a) Describe sampling rate conversion of band pass signals linear prediction. **[7]**

b) Draw and explain Lattice-ladder structure for ARMA filters. **[10]**

Q3) a) Write a short note on KL transform. **[6]**

b) Compare DCT and Wavelet transform. **[6]**

c) Briefly explain STFT and applications. **[6]**

OR

Q4) a) Explain in detail Harr Transform. **[6]**

b) Elaborate on DCT and KL transform. **[6]**

c) Discuss applications of DCT and WT. **[6]**

Q5) a) Explain Adaptive transform coding of speech signals. **[7]**

b) Write a short note on Harmonic Coding. **[10]**

OR

P.T.O.

Q6) a) Discuss harmonic coding and its application in speech processing. **[7]**

b) What is speaker verification? Why is it important? Justify with appropriate applications. How is it different from speaker identification? **[10]**

Q7) a) Describe the use of low pass, highpass and bandpassfilters for image smoothing and edge detection. **[10]**

b) What are the different types of optimum linear filter? Describe in brief. **[8]**

OR

Q8) a) What is image enhancement? Why is it needed? Enlist and explain the image enhancement techniques. **[10]**

b) Enlist the different types of optimum linear filter. Discuss the applications of Wiener and Median filters in brief. **[8]**

Total No. of Questions : 8]

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[6004]-499

B.E. (Computer Engineering)

PATTERN RECOGNITION

(2019 Pattern) (Semester - VIII) (410253A) (Elective-VI)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2 , Q3 or Q4,Q5 or Q6, Q7 or Q8.***
2) ***Figures to the right indicate full marks.***

Q1) a) Explain in detail Tree Classifiers-Decision Trees? **[6]**

b) Explain in detail the stochastic Method: Boltzmann learning. **[6]**

c) What is stochastic grammar & application. **[5]**

OR

Q2) a) Explain in detail Random Forest. **[6]**

b) Explain in detail the Elements of formal grammar. **[6]**

c) Explain in detail string generation as Pattern description? **[5]**

Q3) a) Explain Hierarchical clustering & give its types. **[6]**

b) Explain ward's method in detail. **[6]**

c) What is partition clustering. **[5]**

OR

Q4) a) Explain in detail K-Mean Algorithm. **[6]**

b) What is clustering algorithms based on the Minimum spanning Tree Algorithm? **[6]**

c) Explain the agglomerative clustering algorithm. **[5]**

P.T.O.

Q5) a) Explain the Edit distance. **[6]**

b) Explain measures based on correlations. **[6]**

c) Explain Bellman's optimality principle and dynamic programming. **[6]**

OR

Q6) a) Explain Dynamic time warping. **[6]**

b) Explain Measures based on the optimal path-searching technique. **[6]**

c) What are deformable template models? **[6]**

Q7) a) Explain IRIS Scanner & give its application. **[6]**

b) Explain Fuzzy pattern classifiers. **[6]**

c) What is facial recognition & Explain any 3 applications. **[6]**

OR

Q8) a) Explain pattern recognition application in detail. **[6]**

b) Explain pattern classification using a Genetic Algorithm. **[6]**

c) What is the application of pattern recognition techniques in object recognition. **[6]**

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Total No. of Questions : 8] **SEAT No. :**

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[6004]-500

B.E. (Computer Engineering)

SOFT COMPUTING (Elective-VI)

(2019 Pattern) (Semester - VIII) (410253 (B))

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q1 or Q2 , Q3 or Q4,Q5 or Q6, Q7 or Q8.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Assume suitable data if necessary.***

Q1) a) Difference between Hill Climbing And Simulated Annealing. **[6]**

b) Explain the benefits of particle swarm optimization? **[6]**

c) What are the steps of evolutionary programming? **[6]**

OR

Q2) a) What is the difference between single and multi-objectve optimization? **[6]**

b) Elaborate Scope of Evolutionary Computing. **[6]**

c) What is artificial hummingbrid algorithm? **[6]**

Q3) a) “Fuzzy system has limitation”-Comment on the statement. **[6]**

b) Explain different Arithmetic operations performed on fuzzy stes with example. **[5]**

c) Draw system Architecture and explain Operation of FLC System. **[6]**

OR

P.T.O.

Q4) a) What is defuzzification? Why it is needed? Explain various defuzzification methods with suitable example. **[6]**

b) State application of FLC System. **[5]**

c) Explain different types of membership functions used in fuzzy sets. **[6]**

Q5) a) Explain in detail various genetic operators involved in genetic Algorithms. **[6]**

b) Describe Genetic Algorithm with conventional Artificial Intelligence. **[5]**

c) What are the advantages and disadvantages of Genetic Algorithm. **[6]**

OR

Q6) a) Explain cross over and its type with example. **[6]**

b) Discuss the following term in genetic algorithm. **[5]**

i) Individual

ii) Gene

iii) Fitness

iv) Population

v) Data structure

c) Discuss Bucket Brigade algorithm. **[6]**

Q7) a) Explain latest applications of soft computing. **[9]**

b) What are the characteristics of neuro-fuzzy hybrid systems? **[9]**

OR

Q8) a) Write a short note on: **[9]**

i) Sequential Hybrid systems

ii) Auxiliary Hybrid systems

iii) Embed hybrid systems.

b) Explain in detail any one real life application where a hybrid system can be implemented for Automation. **[9]**

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Total No. of Questions :8]

SEAT No. : ____

P1422

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[6004]-501

B.E. (Computer Engineering)
BUSINESS INTELLIGENCE
(2019 Pattern) (Semester-VIII) (Elective-VI) (410253 C)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Explain in detail drill up & drill down. **[6]**

b) Explain multidimensional data model with example. **[6]**

c) What is data grouping and sorting? Write example of each. **[5]**

OR

Q2) a) Explain different types of reports in detail? **[6]**

b) Explain relational data Model with example. **[6]**

c) Write short note on filtering reports. **[5]**

Q3) a) Explain data exploration in detail with example. **[7]**

b) Explain data transformation in detail with example. **[5]**

c) Explain data validation, incompleteness, noise, inconsistency of quality of input data. **[5]**

OR

Q4) a) Explain data reduction in detial with example. **[7]**

b) Difference between univariate, Bivariate, Multivariate analysis. **[5]**

c) Write a short note on data discretization. **[5]**

Q5) a) What is the association rule mining? Explain the terms support, confidence, lift. **[5]**

b) What is the difference between hierarchical clustering and partitioning method? **[5]**

P.T.O.

c) Consider the following dataset and we will find frequent item sets and generate association rules for them using apriori algorithm, consider minimum support count is 2 & minimum confidence is 60% **[8]**

TlD	Items
T1	11,12,15
T2	12,14
T3	12,13
T4	11, 12, 14
T5	11, 13,
T6	12, 13
T7	11, 13
T8	11, 12, 13, 15
T9	11, 12, 13

OR

Q6) a) Explain Bayes theorem in detail. **[5]**

b) Different between classification and clustering. **[5]**

c) Explain logistic regression with example. **[8]**

Q7) a) Explain BI application in CRM. **[6]**

b) Explain roles of Analytical tools in BI. **[6]**

c) Define business intelligence. List and explain any 03 tools for Business intelligence. **[6]**

OR

Q8) a) Explain applications of BI in telecommunication and banking. **[6]**

b) Explain BI application in Logistics and production. **[6]**

c) Explain Role of BI in finance and marketing. **[6]**

Total No. of Questions : 8]

SEAT No. :

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[6004]-502

B.E. (Computer Engineering)

QUANTUM COMPUTING

(2019 Pattern) (Semester - VIII) (410253D) (Elective - VI)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right indicate full marks.***
3) ***Use of calculator is allowed.***
4) ***Assume Suitable data if necessary.***

Q1) a) Enlist and explain any three universal quantum gates, which are used for the constructions of quantum computation. **[6]**

b) What is principle of deferred measurement, draw and explain Controlled-U operation and its equivalent in terms of circuit elements. **[6]**

c) Explain how unitary matrix U can be decomposed into a product of two-level unitary matrices. Assume that the U acts on a d-dimensional Hilbert space. **[6]**

$$U = \begin{bmatrix} a & d & g \\ b & e & h \\ c & f & j \end{bmatrix}$$

OR

Q2) a) Explain how a single qubit and CNOT gates together can be used to implement an arbitrary two-level unitary operation on the state space of n qubits. **[6]**

b) What is a universal quantum gate set? How does the choice of universal quantum gate set affect the efficiency and accuracy of quantum algorithms? **[6]**

c) Explain how to evaluate efficiency of approximating quantum circuits using a discrete set of gates. **[6]**

P.T.O.

Q3) a) Define the following terms with their mathematical representation in the context of the simulation of quantum systems : **[6]**

i) Schrödinger's equation

ii) Poisson's equation

iii) Diffusion equation

b) What is the circuit diagram for the QFT, and how does it operate on a set of qubits? **[6]**

c) Is it possible to construct a quantum circuit using a universal set of quantum gates? Justify your answer. **[5]**

OR

Q4) a) What are the three simple examples of Quantum error correcting codes? Explain anyone in detail. **[6]**

b) Write short notes on **[6]**

i) Key elements of the quantum circuit model of computation.

ii) Exponential complexity growth of quantum systems.

c) Define discrete fourier transform and explain what is fourier coefficients. **[5]**

Q5) a) Write an algorithm for Quantum phase estimation and explain why is phase estimation interesting? **[6]**

b) Explain the limitations of Kitaev's phase estimation algorithm in order finding application. **[6]**

c) In the context of general applications of the quantum Fourier transform, explain the following terms : **[6]**

i) The hidden subgroup problem

ii) Discrete logarithms

OR

Q6) a) Explain why order-finding is believed to be a hard problem on a classical computer? **[6]**

b) Explain how hidden subgroup problem can be solved using efficient quantum Fourier transform algorithm. **[6]**

c) Explain the shift-invariance property of the Fourier transform. Assume that, in the context of group theory, G is a group and H is a subgroup of G. **[6]**

Q7) a) Quantum information theory has led to advances in the field of machine learning. In this context, explain the following terms : **[6]**

i) Adiabatic Quantum Computing

ii) Quantum Parallelism

b) Draw and explain a feedforward quantum neural network with mixed quantum and classical components. **[6]**

c) Define the QKD protocol. Explain the role of the QKD protocol in securing quantum key distribution. **[5]**

OR

Q8) a) What are quantum-like learning methods? Explain how the potential energy of the Hamiltonian is used in dynamic quantum clustering. **[6]**

b) What are the application domains for quantum machine learning? Explain any one application with the help of a special-purpose quantum device. **[6]**

c) Define Private key cryptography? Explain the encoding and decoding process in private key crypto-system. **[5]**

Total No. of Questions : 8]

SEAT No. :

P567

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[6004]-503

B.E.(Electrical Engineering)

POWER SYSTEM OPERATION AND CONTROL

(2019 Pattern) (Semester - VII) (403141)

Time : 2.30 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2,Q.3 or Q.4,Q.5 or Q.6 and Q.7 or Q.8.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagram must be drawn wherever neccesary.***
4) ***Assume suitable data, if necessary.***
5) ***Use of a non-programmable calculator is allowed.***

Q1) a) Explain the necessity of maintaining frequency constant. **[4]**

b) Explain the droop characteristics of the speed governor system. **[6]**

c) Explain the working of proportional plus integral load frequency control of an isolated power system along with its frequency response curve. **[8]**

OR

Q2) a) Draw the complete block diagram of single area load frequency control. **[4]**

b) Explain the necessity of automatic generation control (AGC). Also, explain the concept of area control error (ACE) of a single area and two area case. **[6]**

c) With the neat block diagram, explain two area of load frequency control. **[8]**

Q3) a) Define the terms related to the constraints of the Unit Commitment: **[4]**

i) Crew Constraints

ii) Minimum uptime

iii) Minimum downtime

iv) Spinning reserve

P.T.O.

b) State the various methods for the unit commitment. Hence, explain the 'priority list method' for unit commitment. **[5]**

c) Explain with the mathematical formulation, the Lagrange Multiplier method of economic load dispatch with transmission loss and no constraints of generation limit while meeting the load. **[8]**

OR

Q4) a) What is the need for a unit commitment study in the power system? Explain. **[4]**

b) Write a short note on: **[5]**

i) Heat rate curve of a thermal generating unit.

ii) Cost curve of a thermal generating unit.

c) Using the priority list method prepare a unit commitment table using three generating units, for load values such as 400MW, 900MW, and 1100MW.The incremental fuel cost of three units and other details are as follows: **[8]**

$$(IC)_1 = (0.003P_1 + 8)*10^3 \text{ Kcal/MWhr}$$

$$(IC)_2 = (0.002P_2 + 8.5)*10^3 \text{ Kcal/MWhr}$$

$$(IC)_3 = (0.004P_3 + 9)*10^3 \text{ Kcal/MWhr}$$

Maximum and minimum generation limits are,

$50<P_1<500$ MW;$40<P_2<400$ MW;$20<P_3<200$ MW

The fuel cost is $(CP)_1$ = 1.1 Rs / Kcal, $(CP)_2$ = 1.05Rs / kcal, $(CP)_3$ = 1.25Rs / kcal.

Q5) a) What is the need for interconnection of the power system? **[4]**

b) Explain in detail: Interchange evaluation with unit commitment. **[4]**

c) With an example explain the economic interchange between interconncted utilities. **[10]**

OR

Q6) a) What do you mean by power pool? What is the role of the power pool in energy control? **[6]**

b) Write a short note on: Capacity Interchange, diversity interchange. **[6]**

c) Explain: **[6]**

i) Energy Banking.

ii) Emergency Power Interchange.

Q7) a) State the procedure to draw the QV curve. Hence, draw the QV curve with appropriate labeling showing stable-unstable regions. **[4]**

b) What are the effects of voltage instability on the power system? Explain in detail. **[6]**

c) Derive the expression of the power-voltage relationship for drawing the PV curve in detail and hence draw the PV curve with appropriate labeling showing stable-unstable region. **[7]**

OR

Q8) a) What is the use of the PV curve in voltage stability analysis? State the drawbacks associated with the PV curve method. **[4]**

b) Write a short note on load characteristics in the voltage stability. **[6]**

c) What is the concept of voltage collapse in the power system? What are the causes of voltage collapse? **[7]**

Total No. of Questions : 8]

SEAT No. : ____

P568

[Total No. of Pages : 2

[6004]-504
B.E. (Electrical)
ADVANCED CONTROL SYSTEM
(2019 Pattern) (Semester - VII) (403142)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8.***
2) ***Figures to the right indicate full marks.***

Q1) a) $\frac{Y(s)}{U(s)} = \frac{S+1}{S^2+1.3S+0.4}$ Given system represent in **[10]**

i) Controllable canonical form.

ii) Observable canonical form.

b) For a given system $A = \begin{bmatrix} 0 & 1 \\ -3 & 4 \end{bmatrix}$, $x(0) = [1 \quad 0]^T$.

Obtain STM & find its solution. **[8]**

OR

Q2) a) Explain and derive the Cayley Hamilton theorem of STM. **[8]**

b) Derive the transfer function from the state variable model and Evaluate the transfer function $\frac{Y(s)}{U(s)}$ from the state variable model of a discrete time system with usual notation. **[10]**

$$X = \begin{bmatrix} 1.8 & 1 \\ 0 & 2.5 \end{bmatrix} x + \begin{bmatrix} 1 \\ 0.5 \end{bmatrix} u$$

$$Y = \begin{bmatrix} 1 & 0 \end{bmatrix} x$$

P.T.O.

Q3) a) Given $\dot{X}=\begin{bmatrix}0.1 & 0.1 & 0\\ 0.3 & -0.1 & -0.2\\ 0 & 0 & -0.3\end{bmatrix}x+\begin{bmatrix}1\\ 1\\ 0\end{bmatrix}u$ & $Y=\begin{bmatrix}1 & 0 & 1\end{bmatrix}x$.

Determine controllability & Observability of the system. **[8]**

b) Derive and explain Ackermann's formula for Pole placement design. **[9]**

OR

Q4) a) What is principle of duality? Explain the effect of pole-zero cancellation on controllability & Observability. **[8]**

b) For a given system $A=\begin{bmatrix}0 & 15\\ 1 & 0\end{bmatrix}$, $B=\begin{bmatrix}0\\ 1\end{bmatrix}$, $C=\begin{bmatrix}0 & 2\end{bmatrix}$.

Determine observing gain matrix Ke such that S_1, $S_2 = -2 \pm j3$ are eigen values of observer gain matrix. **[9]**

Q5) a) Explain in detail basic building blocks of discrete time control system. **[8]**

b) Explain the sampling & reconstruction process, State the sampling theorem and Give its importance. **[9]**

OR

Q6) a) Show how mapping of left half of S-plane is done into the Z plane with stable and unstable Region. **[8]**

b) Determine stability of system using Jury's Test whose characteristic polynomial is $2z^4 + 8z^3 + 12z^2 + 5z + 1 = 0$. **[9]**

Q7) a) Define adaptive control. Explain the need of adaptive control. What is adaption mechanism? **[6]**

b) Explain Gain scheduling adaptive control strategy with proper block diagram. **[6]**

c) Draw block diagram of Model Reference Adaptive Control scheme and explain it. **[6]**

OR

Q8) a) Describe a self-tuning regulator with suitable block-diagram. **[6]**

b) List out the properties of sliding mode control. **[6]**

c) Explain the terms, variable structure control, sliding mode control, sliding phase, reaching phase and chattering with suitable diagram. **[6]**

Total No. of Questions : 8]

SEAT No. :

P569

[Total No. of Pages : 2

[6004]-505
B.E. (Electrical)
PLC AND SCADA
(2019 Pattern) (Semester - VII) (Elective - III) (403143(A))

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagram must be drawn wherever it is necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Explain rules of ladder diagram. **[8]**

b) Construct a ladder diagram for Bottle filling plant. **[9]**

OR

Q2) a) Draw ladder diagram for following functional table I1, I2-Inputs C1, C2-Outputs. **[8]**

I1	I2	C1	C2
0	0	1	0
0	1	0	1
1	0	0	1
1	1	1	0

b) Construct a ladder diagram for any one of the following industrial applications. **[9]**

i) ON/OFF Temperature Control.

ii) Elevator Control.

Q3) a) Draw and Explain AC Motor starter. **[9]**

b) Discuss various methods of PID tuning. Select one of them and explain. **[9]**

OR

Q4) a) Explain with necessary diagram overload protection of AC Motor. **[9]**

b) List various speed control method of DC motor. Explain any one method in brief. **[9]**

Q5) a) Define SCADA. State applications of SCADA. Write desirable properties of SCADA. **[8]**

b) Explain how SCADA system is used in Petroleum Refining Process. **[9]**

OR

P.T.O.

Q6) a) Explain how SCADA system is used in Automatic Substation Control. **[9]**

b) Explain generations of SCADA Architectures. **[8]**

Q7) a) What are seven layers of OSI model explain each with function and associated protocol. **[9]**

b) Write note on CIP Protocol. **[9]**

OR

Q8) a) Make list of SCADA protocols and Explain Device Net in detail. **[9]**

b) Explain DCS architecture in detail. **[9]**

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Total No. of Questions : 8]

SEAT No. :

P570

[Total No. of Pages : 2

[6004]-506
B.E. (Electrical)
POWER QUALITY MANAGEMENT
(2019 Pattern) (Semester - VII) (Elecetive - III) (403143B)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagram must be drawn wherever it is necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) State importance of voltage sag hence explain economic impact of voltage sag. **[6]**

b) Explain CBEMA and ITIC curve in reference to power quality. **[6]**

c) Explain various causes and consequences of voltage sag. **[6]**

OR

Q2) a) Define Sag hence state occurrence of 7 types of voltage sag. **[9]**

b) Explain with neat diagram area of vulnerability and critical distance. Also explain procedure to determine area of vulnerability. **[9]**

Q3) a) Discuss in brief what are harmonics, what are causes of production of harmonics, and how nonlinear waveform can be analysed using Fourier transform. **[7]**

b) Explain harmonics generation and effects observed in. **[10]**

i) Fluorescent tube light with magnetic ballast.

ii) Fluorescent tube light with electronic ballast.

Draw current waveforms and harmonic spectrum in above cases and specify respective THD levels.

OR

Q4) a) Explain following terms in context to non-sinusoidal supply conditions.**[9]**

i) Total demand distortion.

ii) Total harmonic distortion.

iii) Triplen Harmonics.

b) Describe generation of harmonics due to AC drives. Draw necessary current waveform and harmonic spectrum. State why Rabbit ear' nature is produced. **[8]**

P.T.O.

Q5) a) Discuss what are passive filter hence explain various shunt passive filters used for harmonic reduction. **[9]**

b) What computer tools are used for effective power quality analysis? Explain. **[8]**

OR

Q6) a) Write a short note on IEEE 519 standard for harmonic distortion. **[8]**

b) In context to harmonic attenuation explain. **[9]**

i) Effect of system response.

ii) Series and parallel resonance.

Q7) a) State various requirements of power quality analyser hence explain the various techniques for data collection and analysis related to power quality problems. **[10]**

b) List various power quality monitoring instruments and briefly explain their use. **[8]**

OR

Q8) a) Write note on test location in PQ monitoring. **[9]**

b) Explain power quality indices and standards for assessment of disturbances and waveform distortion. **[9]**

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Total No. of Questions : 8]

SEAT No. :

P571

[Total No. of Pages : 2

[6004]-507
B.E. (Electrical)
HIGH VOLTAGE ENGINEERING
(2019 Pattern) (Semester - VII) (Elective - III) (403143C)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Figures to the right indicates full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable data, if necessary.***

Q1) a) What is insulation coordination? Explain statistical method of insulation coordination with appropriate graphs. **[8]**

b) Explain main causes of overvoltage due to switching surges. Discuss various methods to overcome problems of switching surges in power system. **[9]**

OR

Q2) a) Explain clearly the process of "Cloud to earth" and "Return" lightning stroke. State the characteristics of such stroke and their effect when they strike EHV AC installations or lines. **[8]**

b) State the different charge formation theories in clouds. Compare Wilsons Theory with Reynolds and Mason's theory of charge formation. **[9]**

Q3) a) What is Tesla coil? How damped high frequency oscillations are obtain from Tesla coil. **[9]**

b) What is the principle of operation of a resonant transformer? List advantages over the cascade connected transformer. **[9]**

OR

Q4) a) Explain a Trigatron method of tripping and control for multistage impulse generator. **[9]**

b) Explain with suitable diagram Impulse Current Generator. Also give the function of different parts of an impulse current generator. **[9]**

Q5) a) What is partial discharge? Explain one method of measurement of partial discharge. **[9]**

b) With suitable figure explain the working of generating voltmeter. Also state its advantages. **[8]**

OR

P.T.O.

Q6) a) Give the basic circuit for measuring the peak voltage of. **[9]**

i) ac voltage and

ii) impulse voltage. What is the difference in measurement technique in the above two cases?

b) Draw a vertical arrangement of sphere gap used for peak value of the voltage. Clearly show insulator support, sphere shank, operating gear and motor for changing gap distance, HV connection and sparking point. Discuss various factors that affect the sparkover voltage of a sphere gap. **[8]**

Q7) a) Explain the following terms as referred to high voltage testing: **[9]**

i) Withstand voltage.

ii) Flashover voltage.

iii) 50% flashover voltage.

iv) Wet and dry power frequency tests.

b) Why is grounding very important in an HV laboratory? Describe a typical grounding system used. **[9]**

OR

Q8) a) What are the different power frequency tests done on insulators? Mention the procedure for testing. **[9]**

b) Classify the different High voltage laboratories and give salient features of each of them. **[9]**

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Total No. of Questions : 4]

SEAT No. :

P572

[Total No. of Pages : 1

[6004]-508
B.E. (Electrical)
ROBOTICS &AUTOMATION
(2019 Pattern) (Semester - VII) (Elective - III) (403143D)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Neat diagram must be drawn wherever it is necessary.***
3) ***The figures to the right indicate full marks.***

Q1) Solve any two.

a) Explain Denavit - Hartenbery (D-H) representation of kinematic chain. **[9]**

b) Write short on SCARA Robot. **[9]**

c) Explain rules for establishing link co-ordinate frames. **[9]**

Q2) Solve any two.

a) Write on existance and uniqueness properties of Inverse solution. What is mean by Inverse Kinematics. **[9]**

b) Explain basic parameters of photoelectric sensors need to be considered during the selection of it. **[9]**

c) What are position sensors. Explain it with different types and applications. **[9]**

Q3) Solve any two.

a) Explain the concept of manipulator Jacobian, Jacobian inverse and singularities. **[9]**

b) Explain Joint position control (JPC) with the help of neat sketch. **[9]**

c) Explain modelling of D.C. motor with load and relevant equations. **[9]**

Q4) Solve any two.

a) Explain working of robot in spray paing application. **[8]**

b) Explain how robots can be used in defence and surveillance industry. **[8]**

c) How SCARA robots can be used in material handling, picking and packaging. **[8]**

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Total No. of Questions : 8]

SEAT No. :

P573

[Total No. of Pages : 2

[6004]-509
B.E. (Electrical)
ALTERNATE ENERGY SYSTEM
(2019 Pattern) (Semester - VII) (Elective - IV) (403144A)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q.No.1 or Q.No.2, Q.No.3 or Q.No.4, Q.No.5 or Q.No.6, Q.No.7 or Q.No.8.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn whenever necessary.***
4) ***Assume suitable data, if necessary.***

Q1) a) Define **[8]**

i) Tip Speed Ratio

ii) Pitch angle

iii) Cut - in speed

iv) Cut - out speed

b) List the various control mechanisms used for wind turbine. Explain any two in detail. State the expression for power contained in wind with nomenclature. **[10]**

OR

Q2) a) List the various components of wind electric system. Describe each component in brief. **[8]**

b) State the types of wind turbines with respect to axis of rotation of rotor. Find the diameter of a wind turbine to generate 10kW at wind speed of a m/s and a rotor speed of 120 rpm. Assume power coefficient = 0.4, efficiency of electrical transmission = 0.95, efficiency of mechanical transmission = 0.9, Air density (at standard atm pressure & temp) = 1.225kg/m^3. **[10]**

Q3) a) What are the biomass resources? Explain biomass based power generation with neat block diagram. **[9]**

b) Explain any one gasifier with suitable diagram. **[8]**

OR

P.T.O.

Q4) a) What are various types of biomass conversion processes? Explain any one of detail. **[9]**

b) Discuss the method of power generation from liquid waste land fill gas. **[8]**

Q5) a) Explain the principle of working of a battery. Describe Lead - acid battery. **[9]**

b) A 120 Ah, 12V battery with a rest voltage of 12.5V is charged (at its current state of charge) at a C/4 rate (a charge rate in amps of one fourth the over all battery capacity in amp - hours) during which time the applied voltage to the battery is 13V. **[9]**

i) Estimate the internal resistance of battery.

ii) Estimate the power and energy lost during charging.

OR

Q6) a) What is a fuel cell? State its various types. What are the advantages and disadvantaages of a fuel cell? **[9]**

b) List the various methods of hydrogen storage. Explain briefly. **[9]**

Q7) a) Define and explain with examples. **[8]**

i) Simple payback period.

ii) Net present value.

iii) Return on Investment.

iv) Time value of money.

b) A cogeneration system installation is expected to reduce the company's annual energy bill by Rs.20 Lacs. If the capital cost of new cogeneration installation is Rs. 90 Lacs and annual operating & maintenances cost is Rs. 5 Lacs. **[9]**

i) What will be the expected payback period for the project?

ii) What will be Initial Rate of Return / Return on Investment (ROI)?

OR

Q8) a) Compare net Present value and internal rate of return. **[8]**

b) Draw Grid connected wind generator. What are the necessary parameters required to be checked before integration with grid. **[9]**

Total No. of Questions : 8]

SEAT No. :

P574

[Total No. of Pages : 2

[6004]-510

B.E. (Electrical)

ELECTRICAL AND HYBRID VEHICLE

(2019 Pattern) (Semester - VII) (Elective - IV) (403144B)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Ques. 1 or Ques. 2, Ques. 3 or Ques. 4, Ques. 5 or Ques. 6 and Ques. 7 or Ques. 8.***
2) ***Draw neat diagrams whenever necessary.***
3) ***Assume suitable data, if neccessary.***

Q1) a) Draw and explain various BEV configurations. **[7]**

b) Describe any one energy management strategies for EV's. **[6]**

c) Explain different methods of Battery Swapping System. **[5]**

OR

Q2) a) Which are the various sensors used for battery pack and EV motor? **[6]**

b) Describe electric truck with suitable example. **[5]**

c) Explain working of Fuel cell vehicle with mertis and demerits. **[7]**

Q3) a) Explain Vehicle dynamics importance and its consideration for EV performance. **[9]**

b) Explain in detail Power Flow control in HEV. **[8]**

OR

Q4) a) What is energy hybridization and explain operation of a hybrid energy system? **[9]**

b) Draw parallel HEV configuration and explain its different operating modes. **[8]**

Q5) a) Write a short note on CAN vehicle network. **[5]**

b) Mention important considerations for battery pack design. **[6]**

c) Draw and explain Induction motor control for an EV application. **[7]**

OR

P.T.O.

Q6) a) Which are various factors to be consider for the sizing of Power converter design? Derive the equation for buck converter. **[7]**

b) How to select size of HEV motor? Which are the factors considered for the same? **[6]**

c) State the criteria for battery selection in HEV. **[5]**

Q7) a) Explain the various standards for charging infrastructure? **[6]**

b) What is star labelling schemes for Li-ion packs? **[6]**

c) List Li-ion recycling policy and standards used in EV in India. **[5]**

OR

Q8) a) Explain EV tariff rate considerations declare by government for EV charging. **[6]**

b) Describe the FAME-II policy for EV in brief. **[6]**

c) Mention any one EV start-up in detail as per Indian norms. **[5]**

Total No. of Questions : 8]

SEAT No. :

P575

[Total No. of Pages : 2

[6004]-511
B.E. (Electrical)
SPECIAL PURPOSE MACHINES
(2019 Pattern) (Semester - VII) (Elective - IV) (403144 (C))

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data, if necessary.***
5) ***Use of non-programmable calculator is allowed.***

Q1) a) Obtain abc-αβ transformation to get αβ-dq transformation. State clearly the assumptions made. **[9]**

b) Explain field oriented control concept for PMSM. **[9]**

OR

Q2) a) Explain with block diagram control scheme for unity power factor operation of PMSM. **[9]**

b) Explain significance of various transformations used in machine modeling. **[9]**

Q3) a) Explain-Principle of operation and construction of Switch Reluctance motor. **[9]**

b) Draw and explain torque-speed characteristics of reluctance motor. **[8]**

OR

Q4) a) State differences between axial and radial air gap synchronous reluctance motors. **[9]**

b) Discuss selection of number of poles and pole arc in switched reluctance machine. **[8]**

Q5) a) Explain construction of different types of stepper motors. **[9]**

b) Explain concept of lead angle. How this is used in control of stepper motor? Also explain figure of merit of stepper motor. **[9]**

OR

Q6) a) Explain various applications of stepper motors. **[9]**

b) Explain with suitable diagram control of stepping motor by using micro stepping method. **[9]**

P.T.O.

Q7) a) Explain process of torque production in linear induction motor. **[9]**

b) Explain various important characteristics of linear induction machine. **[8]**

OR

Q8) a) Explain different types of linear induction motors with their construction. **[9]**

b) State detail classification of Linear induction motors. With suitable diagram explain any two types. **[8]**

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Total No. of Questions : 7]

SEAT No. :

P-576

[Total No. of Pages : 2

[6004]-512
B.E. (Electrical)
Elective-II (D): HVDC and FACTS
(2019 Pattern) (Semester-VII) (403144D)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates :

1) ***Attempt all questions***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of logarithmic tables slide rule. Mollier charts, eclectronic pocket calculator and steam tables is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Explain the Principle of operation, Control and Power transfer characteristics of VSC. **[9]**

b) How dc link voltage control is achieved in VSC based HVDC system? **[8]**

OR

Q2) a) Explain HVDC Light system. Also state applications of VSC based HVDC system. **[9]**

b) Discuss the structure of VSC link. Also explain how voltage control is achieved in VSC based system. **[8]**

Q3) **Solve any Two:** **[18]**

a) Describe construction and operation of AC Controllers.

b) Define FACTS Controllers. Also state benefits of FACTS Controllers.

c) Discuss the static Power converter structures.

d) Discuss the constructional feature with suitable diagram of back to back converters and also explain its operation.

P. T. O

Q4) a) Draw a practical structure of TCSC and Explain Principle of operation and different operating modes of TCSC. **[10]**

b) Explain TCR plus TSC operation and along with its V-I Characteristics.**[8]**

OR

Q5) a) With neat sketches explain construction and operation of SSSC. **[10]**

b) Discuss the applications of SVS. **[8]**

Q6) a) By using relevant diagrams explain different operating modes of UPFC controllers. **[9]**

b) With detailed diagram explain operation of UPFC. **[8]**

OR

Q7) a) What is the function of series controller of UPFC? With control of the same explain operation of the same. **[9]**

b) What are the constraints on the operation of UPFC? **[8]**

Total No. of Questions : 8]

SEAT No. :

P1423

[Total No. of Pages : 2

[6004]-513
B.E. (Electrical Engineering)
SWITCHGEAR & PROTECTION
(2019 Pattern) (Semester-VIII) (403148)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherevr necessary.***
4) ***Assume suitable additional data, if necessary.***
5) ***Use of non-programmable calculator is allowed.***

Q1) a) What is auto reclosing of circuit breaker? Discuss multi shot auto reclosing. **[4]**

b) Mention the advantages and disadvantages of GIS as compared to conventional air insulated substation. **[6]**

c) With neat diagram explain the construction & working of Puffer type SF6 circuit breaker. **[8]**

OR

Q2) a) A 3 phase VCB is rated as 1500 A, 2000 MVA, 33 kV, 3 seconds. Determine **[4]**

i) Symmetrical breaking current

ii) Rated making current

iii) Short time current

iv) Rated normal current

b) What is difference between field testing and laboratory testing? Explain the relative merits of each. **[6]**

c) With neat diagrm explain the construction & working of Vacuum circuit breaker. **[8]**

Q3) a) Draw block diagram of static relay. Explain its working. State merits and demerits of static relay. **[10]**

b) Draw and explain block diagram of PMU. **[7]**

OR

P.T.O.

Q4) a) Draw a block diagam of numerical relay. Explain its woking. State its advantages over conventioinal and static relays. **[10]**

b) State Sampling theorem. What is Aliasing? Explain it with neat diagram.**[7]**

Q5) a) Restricted earth fault protection of 3 phase alternator gives 100% stator winding protection-Justify the statement stating True/False. **[4]**

b) Discuss various abnormal operating conditions & causes of failures in 3 phase induction motor. **[6]**

c) Suggest suitable protection scheme to protect power transformer against the magnetic inrush current phenomenon. With neat diagram explain the protection scheme in this case. **[8]**

OR

Q6) a) Discuss abnormal condition-Over speeding in case of 3 phase alternator. Suggest protection scheme in this case. **[4]**

b) List out different types of faults in alternator. Suggest suitable protection scheme to protect alternator against these faults. **[6]**

c) A three phase 33kV/3.3kV, star/delta connected transformer is protected by percentage differential protection. The CTs on LT side have ratio of 400/5. Determine he CT ratio on HT side. Draw the protection scheme. **[8]**

Q7) a) With suitable diagrams explain the effect of **[10]**

i) arc resistance

ii) power swing on the operation of distance relay.

b) Draw the schematic of PLCC. State advantages of PLCC. **[7]**

OR

Q8) a) Draw block diagram of numerical impedance relay. Explain its working. Draw its algorithm. **[10]**

b) With neat diagram explain three stepped distance protection scheme for transmission line. **[7]**

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Total No. of Questions : 8]

SEAT No. :

P-1407

[Total No. of Pages : 3

[6004]-514A

B.E. (Electrical)

ADVANCED ELECTRIC DRIVES & CONTROL

(2019 Pattern) (Semester - VIII) (403149)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7or Q.8***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) With necessary mathematical expressions explain ac dynamic braking of three phase induction motor using two lead connection. Also draw necessary torque speed characteristics. **[9]**

b) A 400V wye connected 3 phase, 6 pole, 50 Hz induction motor has following parameters referred to the stator Rs = Rr' = 1 Ohm, Xs = Xr' = 2 Ohm is under go plugging operation from its full load speed of 950 rpm. The stator to rotor turns ratio is 2.3. Calculate the initial braking current and torque as a ratio of their full load values. What resistance must be inserted in rotor circuit to reduce the maximum braking to 1.5 times full load current? **[9]**

OR

Q2) a) Discuss VSI fed induction Motor Drive. Also give different circuit topologies of VSI fed Drives. **[9]**

b) A3°φ , 4l5V, 50Hz, 4 pole, l460 RPM, star connected induction motor has the following parameters. R_1= 0.65Ω; R_2 = 0.35Ω; X_1= 0.95Ω, X_2 = 1.43Ω, X_m = 28Ω. Motor speed is controlled by varying stator

P.T.O.

Voltage and frequency keeping the V/f ratio constant at the rated condition. Determine the maximum Torque and speed at which it occurs for stator frequencies. **[9]**

i) 50Hz

ii) 35Hz

iii) l0Hz.

Q3) a) Describe the construction and operation of BLDC Motor. **[8]**

b) With neat diagram explain close loop control of BLDC motor. Also describe characteristics of BLDC Motor. **[9]**

OR

Q4) a) Describe with necessary diagram sensored vector control of BLDC motor. What advantages of vector control? **[9]**

b) Explain control scheme of BLDC motor used in EV applications. **[8]**

Q5) a) Explain different topologies of rotor constructions used in PMSM. Also state the applications of each. **[9]**

b) Explain direct vector control of PMSM motor with necessary diagrams. **[8]**

OR

Q6) a) Describe the construction of synchronous reluctance motor. Also judge the suitability of this motor for EV applications. **[9]**

b) Compare BLDC motor with PMSM motor. **[8]**

Q7) a) How motors are classified on the basis of duty and enclosure type. How these will help selecting motors? **[9]**

b) Explain various requirements and choice of drive for EV applications. Also explain basic operations of drive. **[9]**

OR

Q8) a) Explain requirements of motor drive requirements for traction applications. Explain with neat sketch any one scheme. **[9]**

b) With schematic diagram explain drives required in sugar industries. Will modern power converters be useful in sugar industry? Explain. **[9]**

Total No. of Questions : 8]

SEAT No. :

P578

[Total No. of Pages : 2

[6004]-517
B.E. (Electrical)
RESTRUCTURING & DEREGULATION
(2019 Pattern) (Semester - VIII) (Elective - V) (403150(B))

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) What are the different types of regulation? Explain methods of regulation in detail. **[9]**

b) Explain the Electricity Act 2010. **[8]**

OR

Q2) a) Explain Consumer tariff structures. What are the different consumer categories. **[9]**

b) What is the role of regulatory commission? Explain principles of Tariff setting in detail. **[8]**

Q3) a) Explain models based on energy trading. What are different structural models? Explain any one in detail. **[9]**

b) Explain DAM and TAM in detail. **[9]**

OR

Q4) a) What are the different trades in energy? Explain multilateral trades in details. **[9]**

b) Write short note on : **[9]**

i) Trading of Renewable energy credits.

ii) Carbon credits.

P.T.O.

Q5) a) What is HHI Index? Explain Entropy coefficient in details. **[9]**

b) Explain the Rules that govern electricity markets. **[8]**

OR

Q6) a) What are the various electricity markets? Explain any one in detail. **[9]**

b) Write a short note on : **[8]**

i) MCP.

ii) Market efficiency.

Q7) a) What are the different Transmission pricing methods? Explain any two in detail. **[9]**

b) Write a short note on : **[9]**

i) TTC.

ii) TRM.

iii) FTR.

OR

Q8) a) What is Locational marginal pricing? Explain congestion management methods in detail. **[9]**

b) Write a short note on : **[9]**

i) Physical transmission rights,

ii) Open access.

Total No. of Questions : 8]

SEAT No. :

P579

[Total No. of Pages : 2

[6004]-518

B.E.(Electrical Engineering)

SMART GRID

(2019 Pattern) (Semester-VIII) (403150 C) (Elective-V)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Each questions carry 18 or 17 marks.***
2) ***Solve questions Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8.***
3) ***Figures to the right side indictae full marks.***
4) ***Assume the suitbale data, if necessary.***
5) ***Neat diagram must be down wherever necessary.***

Q1) a) Explain how automatic meter reading can make the system smarter. **[9]**

b) List different smart appliances and describe an integration of smart Appliances into grid for Home and building automation. **[9]**

OR

Q2) a) Write a note on, "Real time Pricing", Outage Management system (OMS)**[9]**

b) What is geographic information system (GIS)? Explain the components of GIS. **[9]**

Q3) a) Explain concept of micro grid, and its need and applications. **[9]**

b) Write a note on 'protection & control of micro grid'. **[8]**

OR

Q4) a) State and explain the issues of interconnecting the micro grid with the utility grid. **[9]**

b) Compare micro grid and smart Grid. **[8]**

P.T.O.

Q5) a) Describe the concept, power quality conditioners related to smart grid. **[9]**

b) Explain the power quality audit and its importance in smart grid. **[9]**

OR

Q6) a) Explain EMC and its importance in smart grid. **[9]**

b) Describe the power quality issues of grid connected renewable energy sources. **[9]**

Q7) a) Why cyber security is of prime importance in Smart grid & how it can be achieved. **[9]**

b) Explain the role HAN and NAN in Smart Grid. **[8]**

OR

Q8) a) Explain cloud computing and concept of Broadband over powerline. **[9]**

b) Write a note on 'Web based power quality monitoring'. **[8]**

● ● ●

Total No. of Questions : 8]

SEAT No. :

P-580

[Total No. of Pages : 2

[6004]-520

B.E. (Electrical Engineering)

EHV AC TRANSMISSION

(2019 Pattern) (Semester - VIII) (403151A) (Elective - VI)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer all questions.***
2) ***Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Assume Suitable data if necessary.***
6) ***Use of calculator is allowed.***

Q1) a) Explain Electrostatic Field of a point charge and its properties. **[9]**

b) Explain Field of line charges and their properties & charge potential relations for multi-conductor lines. **[9]**

OR

Q2) a) Explain design of cylindrical cage for corona gradients. **[9]**

b) Explain Electric shock and threshold currents **[9]**

Q3) a) Evaluate the horizontal, vertical and total value of electrostatic field components near the single circuit transmission line, which are energized by three phase voltages. **[9]**

b) Derive expression for electrostatic induction on un energized circuit of double circuit line. **[8]**

OR

Q4) a) Derive the expression for magnetic field calculation of horizontal configuration of Single circuit of three phase lines. **[9]**

b) Discuss effect of high electrostatic field on : **[8]**

i) Humans

ii) Animals

iii) Plants

P.T.O.

Q5) a) Explain the corona formation and methods to reduce the corona effects. **[8]**

b) Draw a charge-voltage diagram and derive an expression $Pc = 1/2\ KC\ (Vm^2 - Vo^2)$ for corona loss. **[9]**

OR

Q6) a) With the help of simple block diagram. explain the audible noise measuring circuit in EHV AC lines. **[8]**

b) State and explain at least 4 formulae for power loss due to corona. **[9]**

Q7) a) Write note on various properties of XLPE used in EHV cables. **[9]**

b) Name the materials used for insulation in E.H.V cables; and state the properties of SF6 gas as an insulating in cables. **[9]**

OR

Q8) a) State and Explain at least four factors to be considered in the design of EHV lines based upon the steady state limits. Also state their limiting value. **[9]**

b) Define tan δ loss factor and derive an expression for insulation resistance of a cable. **[9]**

Total No. of Questions : 8]

SEAT No. :

P-581

[Total No. of Pages : 2

[6004]-521

B.E. (Electrical Engineering)

ILLUMINATION ENGINEERING

(2019 Pattern) (Semester - VIII) (403151B) (Elective-VI)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) a) Discuss the factors to be considered in indoor illumination scheme. **[6]**

b) Define and explain the following terms in accordance with illumination : **[6]**

i) Coefficient of utilization

ii) Beam angle and field angle

iii) Polar diagram

c) What different components of flux are considered in zonal cavity method? **[6]**

OR

Q2) a) What are the cavities to be considered in Indoor lighting design? Define and explain each of them. Also draw a cross section of a room showing these cavities. **[6]**

b) What are the various factors on which un-recoverable losses depend? State and explain the factors. **[6]**

c) State the uses of polar diagrams. **[6]**

Q3) a) State and explain the advantages of good illumination schemes. **[7]**

b) Explain the procedure for design of illumination for residential purpose. **[10]**

P.T.O.

OR

Q4) a) A room of size 15 x 6 m is to be illuminated by 20 lamps of 200 watts each. The MSCP (Mean Spherical candle power) of each lamp is 250. Take depreciation factor as 1.2 and utilization factor as 0.6. Find the average illumination produced on the floor. **[7]**

b) Elaborate and explain the steps involved in design of illumination scheme for educational institute. **[10]**

Q5) a) What are the key factors in designing an outdoor illumination scheme? Explain each in brief. **[10]**

b) With respect to road / street lighting explain the following terms : **[8]**

i) Contrast

ii) Glare

iii) Visual Performance

iv) Field of vision

OR

Q6) a) What are the different pole arrangements in street lighting? What are the factors affecting the selection of pole arrangement? **[10]**

b) What are the objectives of road lighting? State them. **[8]**

Q7) a) What are intelligent LED lighting systems and how do they work? **[5]**

b) Compare intelligent lighting for domestic and commercial use. **[5]**

c) Explain in brief about optical Fiber and its construction. **[7]**

OR

Q8) a) Explain natural light conduiting system (any two) **[5]**

b) State the advantages and disadvantages of OLED. **[5]**

c) Write a short note on LASERS. **[7]**

Total No. of Questions : 8]

SEAT No. :

P2859

[Total No. of Pages : 2

[6004]-523
B.E. (Electrical)
ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING
(2019 Pattern) (Semester - VIII) (Open Elective) (403151 D)
(Elective - VI)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary .***

Q1) a) Why is it important to build a knowledge base? What is knowledge base and examples? **[4]**

b) What is a theorem of first-order logic? **[6]**

c) What is a partial-order plan? Which planning is also known as partial order planning? What is total order and partial order planning? **[8]**

OR

Q2) a) What is reasoning under uncertainty? What are the 3 techniques in uncertainty reasoning? **[4]**

b) What is Bayesian networks and give with examples? What are the different types of Bayesian networks? **[6]**

c) What is uncertainty in probabilistic reasoning? What is probabilistic reasoning over time? **[8]**

Q3) a) Which example of application uses machine learning? What is a real life application of machine learning with example? **[4]**

b) What is supervised learning vs unsupervised learning? What is an example of supervised learning a class? **[6]**

c) What does approximately refer to in Probably Approximately Correct learning? What is Probably Approximately Correct learn ability in machine learning? **[7]**

OR

P.T.O.

Q4) a) What is an example of a multiclass classification? What is locally linear embedding? **[4]**

b) What is model selection and generalization in machine learning? **[6]**

c) What is principle component analysis explain with an example? **[7]**

Q5) a) What is linear regression model explain with example? **[4]**

b) What is least square multiple regression model? **[6]**

c) What is the difference between ridge and lasso regression? What is the least angle regression? **[8]**

OR

Q6) a) What is a partial least square analysis? What is the difference between subset selection and shrinkage methods? **[4]**

b) What is shrinkage in multiple regressions? **[6]**

c) What is logistic regression and its example? Which method gives the best fit for logistic regression model? **[8]**

Q7) a) What is an example of association rule in supermarket? What is the Apriori algorithm? **[4]**

b) How is unsupervised learning different from supervised learning? What is an example of supervised unsupervised learning? **[6]**

c) What is a cluster analysis example? What is the use of proximity matrix? **[7]**

OR

Q8) a) What is the k-means algorithm for clustering? **[4]**

b) What is the difference between soft K-means and Gaussian mixture model? **[6]**

c) What are the 5 elements of reinforcement learning? What is Temporal Difference Learning? **[7]**

Total No. of Questions : 8]

SEAT No. :

P582

[Total No. of Pages : 2

[6004] - 524

B.E. (Electronics)

VLSI DESIGN

(2019 Pattern) (Semester - VII) (404201)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2,Q.3 or Q.4,Q.5 or Q.6 and Q.7 or Q.8.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) Explain working of 6T SRAM cell in detail. Why it is not preferred though it is faster? **[9]**

b) Compare SRAM and DRAM. **[8]**

OR

Q2) a) Explain working of DRAM (any two schematic) in detail.
Why it is preferred though it is slower? **[9]**

b) Which different refresh circuits are available for memories?Explain in detail. **[8]**

Q3) a) Explain switch box routing with its advantages. **[9]**

b) What are the challenges of floor planning? Explain interconnect routing techniques. **[9]**

OR

Q4) a) What is clock skew and clock jitter? Explain clock distribution techniques. **[9]**

b) Write short note on signal integrity issues. **[9]**

P.T.O.

Q5) a) Explain fast carry chains and cascade chains in FPGA with neat diagram. **[9]**

b) What do you mean by Shannon's decomposition?

Implement logic gates like AND, XOR and NOT using 2:1 MUX. **[9]**

OR

Q6) a) Compare CPLD with FPGA. **[9]**

b) Explain need of PLD technologies? Explain limitations of CPLD? **[9]**

Q7) a) Explain IEEE 1149. 1 architecture in detail. **[9]**

b) What is need of boundary scan? Explain boundary scan methodology in detail. **[8]**

OR

Q8) a) Draw stick diagram and layout of 2 input NAND gate. **[8]**

b) What is Scaling? Explain the effect of any one type of scaling on various parameters like channel length, width power dissipation, capacitances. **[9]**

Total No. of Questions : 8]

SEAT No. :

P583

[Total No. of Pages : 2

[6004]-525
B.E. (Electronics)
ADVANCED POWER ELECTRONICS
(2019 Pattern) (Semester - VII) (404202)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer questions Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain operation of microprocessor based control of DC drive. **[8]**

b) Explain torque speed characteristics of DC motors. **[9]**

OR

Q2) a) Differentiate Converter fed and Chopper fed DC drives. **[5]**

b) The speed of a separately excited motor is controlled by 1Φ semiconverter. The field current which is also controlled by a semiconverter is set to its maximum possible value. The ac supply voltage to the armature and field converters is one phase 230 V, 50 Hz, Ra = 0.25Ω, Rf = 150 Ω, motor voltage constant Kv = 0.7032 V/A-rad/s. Load torque T_L = 50 N-m at 1000 rpm. Armature and field current can be assumes to be continuous and ripple free. Determine **[12]**

i) The field current.

ii) Delay angle of the converter in the armature circuit α_a.

iii) Input Power factor PF of the armature circuit converter.

Q3) a) Explain torque speed characteristics of induction motors. **[9]**

b) Explain working of variable frequency VSI drives. **[8]**

OR

Q4) a) Explain stator voltage control, stator voltage and frequency control, method for controlling speed of induction motor. **[9]**

b) Explain braking of induction motors. **[8]**

P.T.O.

Q5) a) Explain working of switched reluctance motor drive with neat circuit diagram of power converter configuration and waveforms. **[9]**

b) Explain working of servomotor drive with neat circuit diagram and waveform. **[9]**

OR

Q6) a) What are drive requirements for step motor? Explain unipolar voltage drives for variable reluctance motors (chopper drive) with neat circuit diagram and waveform. **[9]**

b) Explain working of synchronous reluctance motor drive. **[9]**

Q7) a) Explain working of solar power systems. **[9]**

b) Explain types of wind generator control of wind turbines. **[9]**

OR

Q8) a) Explain working of various wind energy systems. **[9]**

b) Explain selection criteria for solar panel, inverter, battery and charge controller in solar system. **[9]**

Total No. of Questions : 8]

SEAT No. :

P-584

[Total No. of Pages : 2

[6004]-526

B.E. (Electronics Engineering)

ELECTRONICS SYSTEM DESIGN

(2019 Pattern) (Semester - VII) (404203)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates :

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Figures to the right side indicate full marks.***
3) ***Assume suitable data, if necessary.***

Q1) a) What are different factors to be considered in selection of Microcontroller? & explain it in details. **[6]**

b) What is need of backlight in LCD? Interface any microcontroller with LCD. **[6]**

c) Explain CAN, 12C with their applications & Limitations. **[6]**

OR

Q2) a) Explain interfacing of tempture sensor with microcontroller. **[6]**

b) Compare architectures of any three Microcontrollers. **[6]**

c) Compare SPI & CAN bus. **[6]**

Q3) a) Elaborate & explain step by step stages of software development in electronic product. **[9]**

b) What are features of simulators, what is the role of documentation in product design & development? **[8]**

OR

Q4) a) What are different factors affecting on the choice between assembly & high level language? **[9]**

b) Write short note on Compiler, Emulator, Simulator and Assembler. **[8]**

P.T.O.

Q5) a) What are the different PCB design issues of analog & mixed signal circuits? Explain in detail. **[9]**

b) What are testing standards for EMI/EMC? Explain it. **[8]**

OR

Q6) a) Explain the mechanism of generation & prevention methods for following phenomenon in high speed PCB design. **[9]**

i) Crosstalk

ii) Reflection.

b) What are compliance for EMI/EMC? **[8]**

Q7) a) What is need of environmental testing? Explain different types of en environmental testing? **[6]**

b) Explain the importance with example of DC analysis? **[6]**

c) Explain transient analysis with importance. **[6]**

OR

Q8) a) Compare Logic analyzer & spectrum analyzer? **[6]**

b) Explain DSO with the help of neat diagram. **[6]**

c) Explain various analysis used in finding fault in circuit. **[6]**

Total No. of Questions : 8]

SEAT No. :

P585

[Total No. of Pages : 2

[6004]-527
B.E. (Electrical/E & TC)
SPEECH PROCESSING
(2019 Pattern) (Semester - VII) (Elective - III) (404184 (A))

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Figures to the right side indicate full marks.***
3) ***Assume suitable data if necessary.***

Q1) a) Explain the method of finding LPC coefficients using autocorrelation method. **[6]**

b) Compare mel scale & back scale. **[4]**

c) Explain in detail estimation of ferment & pitch parameters using cepstrum. **[8]**

OR

Q2) a) Explain levinson-Durbin recursive algorithm for calculation of predictor coefficients. **[9]**

b) What is MFCC? Explain the method to calculate MFCC using block diagram. **[9]**

Q3) a) With the help of block diagram, explain homomorphic speech processing. **[8]**

b) What is APCM? Compare APCM with compounded PCM. Explain how commanded PCM will improve the SNR of the signal? **[9]**

OR

Q4) a) Explain sub-band coding of speech signal. **[8]**

b) Explain linear prediction Based vocoders. **[9]**

Q5) a) Explain speech synthesis and compare speaker identification & speaker verification. **[9]**

b) Draw a block diagram & explain the operation of text-to-speech (TTS) converter. **[9]**

OR

P.T.O.

Q6) a) What is prosody in speech production? What is the importance of prosody in speech? **[9]**

b) What is concatenative synthesis? State and explain sub types of concatenactive synthesis. **[9]**

Q7) a) Explain following performance parameters. **[8]**

i) True positives

ii) True negatives.

iii) False positive.

iv) False negative.

b) Explain Recument neural network, state its advantages & disadvantages.**[9]**

OR

Q8) a) Explain following performance parameters. **[8]**

i) Sensitivity.

ii) Specificity.

iii) Area under curve.

iv) Receiver operating characteristics.

b) Explain TTS synthesis using support vector machine. **[9]**

✡ ✡ ✡

Total No. of Questions : 8]

SEAT No. :

P586

[Total No. of Pages : 2

[6004]-528
B.E. (Electronics Engineering)
INTERNET OF THINGS
(2019 Pattern) (Semester - VII) (Elective - III) (404204 (A))

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Figures to the right side indicate full marks.***
3) ***Assume suitable data if necessary.***

Q1) a) Draw architecture of WSN and explain challenges of WSN. **[6]**

b) What is full from of SaaS? Define SaaS. What are merits and demerits of Saas. **[6]**

c) Explain with neat diagram how WSN can be used in Smart Home application. **[8]**

OR

Q2) a) What is Big Data? Explain different data types in Big data. **[6]**

b) What are different types of cloud? With the help of neat diagram explain each type in detail. **[6]**

c) Explain with neat diagram how WSN can be used in Intelligent transportation system. **[8]**

Q3) a) Explain Ultrasonic Sensor with neat diagram. Draw interfacing of Ultrasonic Sensor with Arduino Board. Write the program for distance measurement. **[8]**

b) Explain the principle of LDR sensor. Draw the interfacing diagram of LDR sensor with Arduino Board. Also write the program for same. Any one application where LDR sensor can be used. **[8]**

OR

Q4) a) List and elaborate features of Raspberry Pi. Why Raspberry Pi is more successful than other? What is SoC available for Raspberry Pi? **[8]**

b) What is Raspberry pi? Draw the interfacing diagram of LED with Raspberry Pi. Also write the program for blinking of LED with delay of 10 second. **[8]**

P.T.O.

Q5) a) Define Big Data. What are the characteristics of Big data? Explain any two types of Big Data. **[8]**

b) Explain the following terms: **[8]**

i) Statistical Models.

ii) Contingence and Correlation.

OR

Q6) a) What is Hadoop? Why is Hadoop used for big data analysis? Explain different features of Hadoop. **[8]**

b) Draw basic architecture of Big Data and explain the function of each block. **[8]**

Q7) a) Write short note on Trends in Wearable Technology. **[6]**

b) With the help of diagram explain IoT based Greenhouse Monitoring. **[6]**

c) Write short note on Smart Health care monitoring. **[6]**

OR

Q8) a) Write short note on IoT for Industrial Automation. **[6]**

b) With the help of diagram explain IoT based Smart Car Parking. **[6]**

c) Draw and explain IoT based Smart Home Automation. **[6]**

✡ ✡ ✡

Total No. of Questions : 8]

SEAT No. :

P587

[Total No. of Pages : 2

[6004]-530
B.E. (Electronics)
TESTING AND VERIFICATION FOR SOC DESIGN
(2019 Pattern) (Semester - VII) (Elective - III) (404204 (C))

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of Calculator is allowed.***
5) ***Assume suitable data if necessary.***

SECTION-I

Q1) a) Explain in detail about simulation for design verification with suitable diagram. **[8]**

b) What is simulation for test evaluation? Explain how fault simulator is useful to simulate the circuit response in the presence of faults. **[9]**

OR

Q2) a) Explain what action an event-driven true-value simulator will take when it Evaluates a zero-delay gate. **[8]**

b) List the different the different modeling levels of simulator. Explain each level in detail. **[9]**

Q3) a) Explain the difference between structural and functional test. **[8]**

b) What are the benefits of combinational ATPG algorithm? Explain redundancy identification algorithm in detail with example. **[9]**

OR

Q4) a) Explain in detail the CONTEST algorithm. **[8]**

b) What is simulation-Based sequential Circuit ATPG? Explain the GENETIC algorithm. **[9]**

Q5) a) What is main idea behind scan design? Explain the scan design rule.**[10]**

b) Explain the Ad-hoc DFT method thataim at improving the testability of stuck-at faults. **[8]**

P.T.O.

Q6) a) Why physical design of scan chain requires timing verification? What are several problem that should be checked while scan test. **[8]**

b) Explain variation of scan in detail. **[9]**

Q7) a) What is memory BIST? Explain counter test technique for RAM BIST. **[10]**

b) Explain Boundary Scan Description Language. **[8]**

OR

Q8) a) How does boundary scan work? Explain major modes of operation that boundary scan provide. **[10]**

b) Explain automated circular BIST approach with suitable diagram. **[8]**

✡ ✡ ✡

Total No. of Questions : 8]

SEAT No. :

P588

[Total No. of Pages : 2

[6004]-531
B.E. (Electrical /E & TC)
JAVA SCRIPT
(2019 Pattern) (Semester - VII) (Elective - III) (404184(C))

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of Calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) What is function? Explain with example how to pass and return parameters and arguments from called function to the calling function. **[6]**

b) What are Common properties and methods of object in JavaScript? **[6]**

c) Write a Java Script program to pass the function by reference, perform addition of two objects inside the function and display the result in calling function. **[6]**

OR

Q2) a) What is Anonymous Functions in JavaScript? Explain its use with an example. **[6]**

b) Write a JavaScript program that will append an object to an array and will check if an object is an array datatypse. **[6]**

c) Explain data types in JavaScript? Differentiate between primitive and non primitive. **[6]**

Q3) a) What is Regular Expression in JavaScript and explain the need of regular expressions. **[6]**

b) Explain look ahead and look behind concepts in JavaScript. **[6]**

c) Write a program to study string related built-in methods in JavaScript. **[5]**

OR

Q4) a) Explain string methods for Regular Expression in JavaScript. **[6]**

b) Explain Character Classes in JavaScript. **[6]**

c) What are the limitations of Regular Expression. **[5]**

P.T.O.

Q5) a) Define JavaScript object model and explain four distinct object models used in JavaScript. **[6]**

b) Explain event and event handler with an example. **[6]**

c) Write a JavaScript program to create a Home page of any website and change background color using. **[6]**

On mouse over event (mouse over)

On focus event (focus).

OR

Q6) a) Describe Document properties and methods with their HTML relationship. **[6]**

b) Differentiate between HTML and DHTML. **[6]**

c) Explain DOM and CSS Elements with example. **[6]**

Q7) a) Explain Various methods to control windows and list out window features. **[6]**

b) Explain the form handling and the terms form fields, validations, Dynamic forms, Form usability with an example. **[5]**

c) Design and implement a simple calculator using java script for operations like addition, multiplication, subtraction, division, square of a number. **[6]**

OR

Q8) a) List and explain various popular windows events? **[6]**

b) What is frame and explain the HTML tags to create frames and how to change the properties of the frame. **[5]**

c) Create a student information form to accept information like Name, Address, City, State, Gender, Mobile Number, and email id. Perform validations for. **[6]**

i) Correct Names.

ii) Mobile Names.

iii) Email I.D.'s

✡ ✡ ✡

Total No. of Questions : 8]

SEAT No. :

P-589

[Total No. Of Pages : 2

[6004]-532

B.E.(Electronics Engineering)

MOBILE COMMUNICATION

(2019 Pattern) (404205A) (Semester-VII) (Elective - IV)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) What is mean by Equalizers? Classify the equalizers. **[6]**

b) With neat diagram explain the operation of RAKE receiver. **[6]**

c) Explain with neat diagram DPSK transmitter & receiver **[8]**

OR

Q2) a) Explain in details lattice equalization technique. **[6]**

b) Differentiate between equalizer and diversity techniques. **[6]**

c) What is mean by diversity technique? Explain any two space diversity methods. **[8]**

Q3) a) What are the different logical channel in GSM & explain each channel. **[8]**

b) Draw and explain GSM Architecture in details **[8]**

OR

Q4) a) Explain in details call processing of Mobile originated call in AMPS **[8]**

b) Explain in details AMPS radio interface with diagram. **[8]**

P. T. O

Q5) a) Explain the concept packet data transport process flow. Explain with diagram mobile IP. **[8]**

b) Draw & explain GSM Time Hierarchy. **[8]**

OR

Q6) a) Explain different radio network components use in CDMA 2000. **[8]**

b) Write short note on EVDV. **[8]**

Q7) a) Draw and explain X.25 protocol in details. **[6]**

b) Explain in details with diagram Circuit Switching method. **[6]**

c) Explain with diagram cellular packet-switched architecture. **[6]**

OR

Q8) a) Compare wireless network & fixed telephone network. **[6]**

b) Explain with figure packet switching method. **[6]**

c) With neat diagram explain network architecture for UMTS. **[6]**

Total No. of Questions : 8]

SEAT No. :

P-590

[Total No. Of Pages : 2

[6004]-533
B.E.(Electronics)
EMBEDDED SYSTEMS
(2019 Pattern) (Semester-VII) (404205B) (Elective - IV)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates :

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Figures to the right indicate full marks.***

Q1) a) Elaborate Semaphore, Mutex and Mutual exclusion with suitable examples. **[8]**

b) Explain Priority inversion problems. **[9]**

OR

Q2) a) Explain Architecture of Kernel. **[8]**

b) Elaborate Pre-emptive and non-preemptive Schedulers. **[9]**

Q3) a) Differentiate between OS and RTOS. **[9]**

b) Differentiate different types of Real Time Operating Systems: Features, advantages, disadvantages. **[9]**

OR

Q4) a) Explain Embedded Linux, overview, advantages and disadvantages. **[9]**

b) Differentiate QNX Neutrino, Vx Works, Micro C/OS. **[9]**

P. T. O

Q5) a) Explain Design and Co-design issues in the development Process of Embedded system. **[8]**

b) Write a short note on Scopes and Logic Analyzer. **[9]**

OR

Q6) a) Elaborate Design cycle in the Development Phase of Embedded System. **[8]**

b) Explain use of Emulator and In Circuit Emulator (ICE) in Embedded System. **[9]**

Q7) a) Explain Case study of Coding steps for Adaptive Cruise Control System in a car **[9]**

b) Elaborate Case study of Coding steps for an Automatic Chocolate Vending Machine. **[9]**

OR

Q8) a) Explain a case study of Coding steps for Smart Card. **[9]**

b) Elaborate Case study of Coding steps for transmission of stream on a TCP/IP Network using RTOS. **[9]**

Total No. of Questions : 8]

SEAT No. :

P-3161

[Total No. Of Pages : 2

[6004]-535A
B.E.(Electronics (E & TC)
LOW POWER CMOS (Elective - IV)
(404185D) (2019 Pattern) (Semester-VII)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Explain how the sizing of the transistor can be done using RC delay approximation. **[5]**

b) List and explain low-power design tools. **[5]**

c) Explain low-power special latches and flip-flops. **[8]**

OR

Q2) a) Explain various low-power design techniques. **[5]**

b) Explain how transistor sizing affects leakage power reduction. **[5]**

c) Describe low-power digital cell library with respect to

i) Cell Sizes and Spacing

ii) Varieties of Boolean Functions **[8]**

Q3) a) Write an algorithm to compute signal probabilities at the internal nodes of a logic circuit. **[5]**

b) Write steps that are used in high-level techniques to estimate power. **[5]**

c) Explain different sources of power dissipation in digital CMOS circuits. **[8]**

P. T. O

OR

Q4) a) What is domino logic? Write a note on power dissipation in domino CMOS. **[5]**

b) Explain the automatic test generation-based approach. **[5]**

c) Explain

i) Average power estimation in combinational circuits

ii) Average power estimation in sequential circuits. **[8]**

Q5) a) Explain different sources of software power dissipation **[5]**

b) State architectural considerations for low-power software **[5]**

c) Explain

i) Gate level power estimation.

ii) Architecture-level power estimation **[7]**

OR

Q6) a) State instruction set design techniques and their relationship to low-power design. **[5]**

b) State memory system considerations for low-power software. **[5]**

c) Explain

i) Bus Switching Activity

ii) Instruction Level Power Analysis **[7]**

Q7) a) What is adiabatic switching? How is power dissipation minimized using adiabatic switching? **[5]**

b) Explain the rate capacity effects and recovery effects of the commonly used rechargeble batteries. **[5]**

c) Realize a two-input OR/NOR gate using positive feedback adiabatic logic (PFAL) circuit. Explain its operation. **[7]**

OR

Q8) a) Explain how dynamic power dissipation is minimized using adiabatic switching. **[5]**

b) How does a battery-aware task scheduler combine dynamic voltage scaling and reverse body biasing to extend the life of a sensor node? **[5]**

c) Design an adiabatic half-adder circuit and compare its transistor count with that of a static CMOS realization. **[7]**

Total No. of Questions : 8]

SEAT No. :

P-592

[Total No. Of Pages : 2

[6004]-536
B.E.(E&TC/Electronics)
SMART ANTENNAS (Elective - IV)
(404185E) (2019 Pattern) (Semester-VII)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates :

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Differentiate between switched beam and adaptive antenna approach. **[6]**

b) What is the concept of a smart antenna? What are the different smart antenna configurations? **[6]**

c) Explain the beam steering and degree of freedom for smart antennas. **[6]**

OR

Q2) a) Explain the architecture of a smart antenna system with suitable digram. **[6]**

b) What are the different types of smart antennas? Explain it with their advantages and disadvantages. **[6]**

c) What is the mutual coupling effect in a smart antenna array? How to achieve maximum directivity considering mutual coupling effect? **[6]**

Q3) a) What are the different spectral estimation methods? Compare all methods based on their performance. **[7]**

b) Explain in detail Maximum likelihood method for DOA estimation. **[5]**

c) What is ESPRIT algorithm for DOA estimation? **[5]**

P. T. O

OR

Q4) a) What is a MUSIC algorithm? Compare root music and cyclic music algorithm for DOA estimation. **[7]**

b) Explain in detail the linear prediction method for spectral estimation. **[5]**

c) What are the advantages and disadvantages of the Eigen structure method for spectral estimation? **[5]**

Q5) a) Explain the concept of Classical Beam former and Statistically Optimum Beam-forming Weight Vector. **[6]**

b) Explain how to design a beamformer to achieve maximum SNR. **[6]**

c) Elaborate Direct Matrix Inversion (DMI) beamforming method. **[6]**

OR

Q6) a) Explain the design of beamformer for Multiple Sidelobe Canceler and Maximum SINR. **[6]**

b) What is Linearly Constrained Minimum Variance (LCMV) beamforming method? Explain it in detail. **[6]**

c) How to achieve Minimum Mean Square Error (MMSE) using beamforming algorithms? **[6]**

Q7) a) What is the principle of MIMO systems? Explain with various types. **[6]**

b) Explain the design of Hybrid antenna array for mm wave considering Channel modeling and capacity characterization. **[6]**

c) What is the concept of Massive MIMO? Explain it with suitable examples. **[5]**

OR

Q8) a) What are the different types of MIMO systems? Explain each type in brief. **[6]**

b) Explain state-of -the-art for development of mm-Wave hybrid arrays and discuss important issues for the same. **[6]**

c) Compare SISO, SIMO, MISO, MIMO systems with respect to data throughput, link range, bandwidth and transmit power. **[5]**

Total No. of Questions : 8]

SEAT No. : ____

P1451

[Total No. of Pages : 2

[6004]-537
B.E. (Electronics)
PROCESS INSTRUMENTATION
(2019 Pattern) (Semester - VIII) (404210)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Neat diagrams must be drawn whenever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***
5) ***Use of non-programmable scientific calculator is allowed.***

Q1) a) In the Ziegler-Nichols method, the critical gain was found to be 4.2, and the critical period was 2.21 min. Find the standard settings for the following mode: **[9]**

i) Proportional control

ii) PI control

iii) PID control

b) State the equation and explain OP-AMP realization of P+I+D control mode with neat circuit diagram. **[8]**

OR

Q2) a) In an application of Ziegler-Nichols Method, a process begins oscillation with a 30% proportional band in an 11.5 min period. Find the nominal three-mode controller settings. **[9]**

b) Explain the concept of relay based tuning in detail. State the advantages of relay based tuning over other tuning methods. **[8]**

Q3) a) Explain with neat diagram feed-forward control scheme for a steam heated heat exchanger. **[9]**

b) Explain cascade control system with the help of suitable example. **[8]**

OR

P.T.O.

Q4) a) Explain Air to Fuel ratio control scheme for boiler furnace in detail. Draw a neat P & ID for the same. **[9]**

b) Explain selective control scheme to protect process equipment. State advantages of selective control scheme. **[8]**

Q5) a) What is Adaptive Control? Why do we need adaptive control? Explain Programmed or Scheduled Adaptive Control System. **[9]**

b) Explain Model Reference Adaptive Control with the help of a neat block diagram. **[9]**

OR

Q6) a) Explain the concept of self-tuning regulator with the help of a neat block diagram. **[9]**

b) Explain Internal Model Control (IMC) for a First Order Plus Dead Time (FOPDT) process. **[9]**

Q7) a) Explain the following aspects of control for safety - **[9]**

i) Basic process control system (BPCS)

ii) Alarms

iii) Safety Interlock System (SIS)

iv) Safety relief valves

v) Containment

b) Explain steps involved in defining the problem in process control design. **[9]**

OR

Q8) a) Explain the hierarchy of control structure. **[9]**

b) Explain how plant performance is monitored in a typical process industry. **[9]**

Total No. of Questions : 8]

SEAT No. :

P593

[Total No. of Pages : 2

[6004]-538
B.E. (Electronics)
BIOMEDICAL ELECTRONICS
(2019 Pattern) (Semester - VIII) (Elective - V) (404211(A))

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Draw and explain 10-20 electrode system for EEG recording. **[6]**

b) Draw and explain block diagram of EEG machine. **[6]**

c) Draw and explain block diagram of EMG Machine. **[6]**

OR

Q2) a) Draw and explain 10-20 electrode system for EEG recording. **[6]**

b) List various EEG waves with their frequency & applications? **[6]**

c) What are the different components of central nervous system? Explain in detail. **[6]**

Q3) a) Describe operation of DC defibrillator with circuit diagram and wave form. **[9]**

b) Explain in detail life saving device Ventilator. **[8]**

OR

Q4) a) Write down objective of central monitoring system & its advantages. **[9]**

b) Explain Systolic & Diastolic Blood pressure? **[8]**

Q5) a) Name different methods for blood cell counting. Explain coulter counters in detail. **[9]**

b) Describe the working of Flame Photometer. **[8]**

OR

P.T.O.

Q6) a) Draw the Block diagram of colorimeter & Explain it with applications. **[9]**

b) Discuss various issue of noise pollution around Hospital. **[8]**

Q7) a) Write a working principle of MRI. How does an MRI scanner work? **[6]**

b) Explain CT scanner working principle and scanning system. **[6]**

c) Explain Telemetry System for Biomedical application in detail. **[6]**

OR

Q8) a) Explain operation of X-ray machine with help of neat block diagram. **[6]**

b) Explain merits & demerits of MRI system. **[6]**

c) What is the need of Telemetry System? Explain with example. **[6]**

Total No. of Questions : 8]

SEAT No. :

P594

[Total No. of Pages : 2

[6004]-539

B.E. (Electronics)

ARTIFICIAL INTELLIGENCE AND NEURAL NETWORK

(2019 Pattern) (Semester - VIII) (Elective - V) (404211(B))

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume suitable data, if necessary.***
4) ***Use of non-programmable scientific calculator is allowed.***

Q1) a) Explain Parameters affecting Deep Learning. **[6]**

b) Explain Training of Neural Network. **[6]**

c) Explain methods to avoid Overfitting and under fitting. **[6]**

OR

Q2) a) Draw and explain Architecture of Back Propagation Networks. **[6]**

b) With help of neat diagram describe Multilayer neural network. **[6]**

c) Explain Batch Normalization and Weight normalization. **[6]**

Q3) a) Explain Convolutional Neural Network in detail. **[6]**

b) Explain application of Convolutional Neural Network in detail. **[6]**

c) Describe fully connected layer and softmax classification. **[6]**

OR

Q4) a) Write short note on Threshold Function and Hyperbolic Tangent Function. **[6]**

b) Explain components of Convolutional Neural Network. **[6]**

c) Describe Convolution layer and pooling layer of CNN. **[6]**

Q5) a) Explain Application, Advantages and disadvantages of Recurrent Neural Network. **[9]**

b) Explain Forward propagation and back propagation in Recurrent Neural Network. **[8]**

OR

P.T.O.

Q6) a) Describe different Recurrent neural network architecture. **[9]**

b) With the help of diagram explain Recurrent neural network. **[8]**

Q7) a) Explain Natural Language processing using deep learning. **[9]**

b) Describe Image classification using deep learning. **[8]**

OR

Q8) a) Explain Speech recognition using deep learning. **[9]**

b) Describe Handwritten Digit Recognition using CNN. **[8]**

Total No. of Questions : 8]

SEAT No. :

P595

[Total No. of Pages : 2

[6004]-540
B.E. (Electronics/E&T.C.)
ANDROID DEVELOPMENT
(2019 Pattern) (Semester - VIII) (Elective - V) (404191(C))

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of a calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Explain Android building block. **[5]**

b) What is Intent? Explain its types with an example. **[6]**

c) What is an Activity? Draw lifecycle of it and explain. **[6]**

OR

Q2) a) Explain UI components. **[5]**

b) Explain the structure of Android project. **[6]**

c) What is Dalvik Virtual Machine? Compare with JVM. **[6]**

Q3) a) Write a note on fragment. **[5]**

b) Which are the different components of screen? Explain each. **[6]**

c) What is the use of Intent in activities? **[6]**

OR

Q4) a) Explain Toast. **[5]**

b) Explain lifecycle of fragment. **[6]**

c) How to call built in application using Intent? **[6]**

Q5) a) What is View? Explain any two views. **[6]**

b) What is use of Toggle Button, Radio Button and Radio Group Views? **[6]**

c) What is Fade In / Fade Out Animation? Explain it. **[6]**

OR

P.T.O.

Q6) a) Explain Auto Complete Text View and Picker views. **[6]**

b) How to add audio and video in android project? **[6]**

c) Explain 2D and 3D Graphics. **[6]**

Q7) a) Write difference between Internal storage and External storage. **[6]**

b) Write a note on SQLite Databases. **[6]**

c) How to create, open and close database? **[6]**

OR

Q8) a) Explain JSON Web Service. **[6]**

b) How to access phone services like Call, SMS, MMS in Android application? **[6]**

c) Write a note on Bluetooth/Wi-Fi Connectivity. **[6]**

Total No. of Questions : 8]

SEAT No. :

P596

[Total No. of Pages : 2

[6004]-541
B.E. (Electronics)
AUDIO VIDEO ENGINEERING
(2019 Pattern) (Semester - VIII) (Elective - V) (404211(C))

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of logarithmic tables, slide rule, Electronic pocket calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Write a short note on Video Intercom systems and video projectors. **[8]**

b) Draw and explain block diagram of smart TV. **[9]**

OR

Q2) a) Discuss in brief Wi-Fi TV with diagram. **[8]**

b) Explain the working of IP TV with its architecture. **[9]**

Q3) a) Explain with block diagram of digital TV receiver. **[6]**

b) Write a short note on video streaming. **[6]**

c) Compare EDTV, SDTV, HDTV. **[6]**

OR

Q4) a) Draw and explain block diagram of Direct To Home (DTH). **[6]**

b) Write a short note on CAS (Conditional Access System). **[6]**

c) What is MAC signal? What are various types of MAC? Draw D2 MAC signal. **[6]**

Q5) a) Draw and explain the cordless microphone system. **[8]**

b) Draw and explain the block diagram of PA system. **[9]**

OR

P.T.O.

Q6) a) What are requirements for good auditorium? Give salient features of acoustic design for an auditorium. **[8]**

b) Discuss in any two types of microphone. **[9]**

Q7) a) Compare CD, DVD and Blue Ray DVD. **[6]**

b) Explain in detail Dolby/Multichannel 5.1 sound system and also state its advantage. **[6]**

c) Write a short note on Mp3 Player. **[6]**

OR

Q8) a) State the important specification of a Blue Ray DVD? Draw and explain working of Blue Ray DVD Player. **[9]**

b) Explain the variable area method of recording of sound on films. **[9]**

Total No. of Questions : 8]

SEAT No. : ____

P2860

[Total No. of Pages : 2

[6004]-543

B.E. (Electronics Engineering)

RENEWABLE ENERGY SYSTEM AND DSM

(2019 Pattern) (Semester - VIII) (Elective-VI) (404212 A)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Figures to the right side indicate full marks.***
3) ***Assume suitable data, if necessary.***

Q1) a) Draw and explain characteristics of Power vs Speed and TSR. Explain Maximum power operation of wind power system. **[6]**

b) List the various types of Wind Energy Conversion System (WECS). Explain Hybrid WECS System in detail. **[6]**

c) Compare fixed speed and variable speed wind power system. **[6]**

OR

Q2) a) Explain the principle of wind energy conversion system. State the basic Components of WECS and their role in WECS. **[6]**

b) Explain following mechanical controls used in Wind Energy Conversion System (WECS) **[6]**

i) Pitch Control

ii) Yaw Control

c) Enlist the different type of wind generators. Explain working of any one in detail. **[6]**

Q3) a) Explain Municipal Solid Waste Management in Detail. **[8]**

b) With suitable sketch explain an anaerobic digestion method of producing biogas from resources. **[9]**

OR

Q4) a) Explain the operation of Biofuel Production with the help of suitable schematic diagram. fermentation process. **[9]**

b) What are the biomass conversion technologies? Explain any one in detail. **[8]**

P.T.O.

Q5) a) Write three important components of a tidal power plant. Briefly explain the Kaplan type turbine with working range of water head. **[9]**

b) Discuss the various ways of geothermal power generation. **[8]**

OR

Q6) a) Describe the closed cycle Ocean Thermal Energy Conversion system (OTEC) and mention its advantages and limitations. **[9]**

b) Write short notes on: **[8]**
   i) Tidal energy
   ii) Wave energy

Q7) a) What is DSM? Explain various components of DSM and their role. **[6]**

b) Explain Technology options for DSM in **[6]**
   i) Lightning
   ii) Space cooling (Ceiling Fan, AC system)
   iii) Refrigeration and Water cooling

c) Explain architecture for DR implementation, Energy management system. **[6]**

OR

Q8) a) Explain various load shape curves with suitable graphical representation. **[6]**

b) What is Demand Response? Classify various DR options. **[6]**

c) What is the role of communication infrastructure? Explain MDMS, DRAS (Server & client) **[6]**

Total No. of Questions : 8]

SEAT No. :

P-1424

[Total No. of Pages : 2

[6004]-544

B.E. (Electronics Engineering)

WIRELESS SENSOR NETWORK

(2019 Pattern) (Semester - VIII) (404212B) (Elective - VI)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8.***
2) ***Figures to the right indicate full marks.***
3) ***Assume Suitable data if necessary.***

Q1) a) Explain in detail protocol stack of WSNs along with its diagram. **[6]**

b) Write short note on wireless HART protocol. **[6]**

c) Explain IEEE 802.15.4 protocol standard along with its architecture. **[8]**

OR

Q2) a) Explain in detail BLE protocol standard along with its architecture. **[6]**

b) Write short note on 6LoWPAN protocol. **[6]**

c) Along with architecture explain Zigbee protocol in detail. **[8]**

Q3) a) What is localization in wireless sensor networks? Explain localization precision and localization accuracy. **[8]**

b) What is routing in wireless sensor networks? Explain full-network broadcast routing protocol with flow diagram. **[8]**

OR

P.T.O.

Q4) a) Draw and explain multi-hop wireless sensor network architecture. State the advantages and disadvantages of multi-hop wireless sensor networks. **[8]**

b) Explain range-based localization and range free localization in wireless sensor networks. **[8]**

Q5) a) Explain random clustering and geographic clustering technique in WSN along with diagram. **[8]**

b) Explain physical layer, data link layer, network layer and transport layer attacks in WSN. **[8]**

OR

Q6) a) Explain the following terms : **[8]**

i) In-Network Processing

ii) Data Aggregation

b) Explain the different constraints regarding security issues in wireless sensor networks. **[8]**

Q7) a) What is meant by deployment of wireless sensor networks? Explain typical life cycle of wireless sensor network application. **[6]**

b) Explain node problems and global problems in deployments of wireless sensor networks. **[6]**

c) Explain the bottom - up implementation process of deployment of WSN. **[6]**

OR

Q8) a) Explain early WSN deployments in brief. Explain the requirement analysis in WSN. **[6]**

b) Explain link/path problems and topology problems in deployments of wireless sensor networks. **[6]**

c) Explain the top-down design process of deployment of WSN. **[6]**

Total No. of Questions : 8]

SEAT No. :

P-597

[Total No. of Pages : 2

[6004]-545

B.E. (E & TC/Electronics)

REMOTE SENSING

(2019 Pattern) (Semester - VIII) (404192C) (Elective - VI)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume any missing data if necessary.***

Q1) a) What is Data Formats and Data Products explain them with their Characteristics? **[8]**

b) Explain Supervised and Unsupervised classification? Compare Supervised and Unsupervised_classification. **[9]**

OR

Q2) a) Explain Basic Principles of Visual Interpretation. Enlist the equipment's used for it. Explain any one in detail. **[9]**

b) Which are Remote Sensing Data Sources? What is USGS and its use? **[8]**

Q3) a) What is Microwave Remote Sensing? Compare Passive and active Microwave Remote Sensing. **[8]**

b) What is Radar Principle? Derive the Radar range equation. **[9]**

OR

Q4) a) What is Side-Looking Airborne Radar Imaging? Explain Ground Range Resolution with figure. **[8]**

b) Explain the Principle of LiDar bathymetry. Explain the types of LiDAR with their applications. **[9]**

P.T.O.

Q5) a) Explain GPS Architecture. Also explain Space Segment, Control (Ground) Segment and User Segment in detail. **[9]**

b) What is Satellite based augmentation system? Explain different types of satellite based augmentation system. **[9]**

OR

Q6) a) Illustrate Global Navigation Satellite System. Explain any two GNSS applications in detail. **[9]**

b) Explain in detail the factors that affect GPS performance. Also draw the figure for the same. **[9]**

Q7) a) Enlist applications of Remote Sensing. Explain geological mapping in detail. **[9]**

b) What is watershed and stream network, Explain three steps for water flow management? **[9]**

OR

Q8) a) Draw and explain Flowchart showing Landslide Hazard Modeling using GIS. **[9]**

b) How the Coastal mapping and tsunami simulation is done by using LiDar bathymetry and multi-beam echo sounding. **[9]**

Total No. of Questions : 8]

SEAT No. :

P2861

[Total No. of Pages : 2

[6004]-546
B.E. (Electronics/E & TC)
DIGITAL MARKETING
(2019 Pattern) (Semester - VIII) (Elective-VI) (404192 D)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume suitable data if necessary and mention it clearly.***

Q1) a) Explain different types of Search engine marketing tools used by business organization. **[9]**

b) List the benefits of keyword planner along with its functions. **[8]**

OR

Q2) a) Discuss the types of remarketing Ad used in Digital Marketing. **[9]**

b) Explain the methods of mobile advertising frequently used by users for marketing. **[8]**

Q3) a) List out the benefits of social media marketing, Also, explain in detail types of Facebook marketing? **[9]**

b) Discuss on Youtube ads and Youtube analytics in detail. **[8]**

OR

Q4) a) Detail the concept for B2B and B2C perspective. **[9]**

b) List out the steps required for YouTube Account Setup while creating a business account with a personal account and explain about YouTube Monetization. **[8]**

Q5) a) Write short notes on WebForms and lead generation. **[9]**

b) Explain concept of LinkedIn advertising and explain briefly LinkedIn message pitching. **[9]**

OR

P.T.O.

Q6) a) List the various steps involved in planning email campaign. **[9]**

b) Discuss the steps involved in web forms lead importing. **[9]**

Q7) a) Discuss concept of Affiliate marketing in detail. **[9]**

b) List the advantages and disadvantages of OTT platforms. **[9]**

OR

Q8) a) Elaborate on visual search and Chatbots. **[9]**

b) Explain automated and smart bidding in detail. **[9]**

Total No. of Questions : 8]

SEAT No. : ____

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[Total No. of Pages : 2

[6004]- 547
B.E. (E & T.C.)
RADIATION AND MICROWAVE THEORY
(2019 Pattern) (Semester - VII) (404181)

Time :2 ½Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q1 or Q2,Q3,or Q4,Q5 or Q6,Q7 or Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right carries full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain E plane Tee and Magic Tee with the help of construction diagram. **[6]**

b) With neat schematic diagram explain the operation of Isolator. Also State S-matrix for it. **[6]**

c) Draw and explain two-hole directional coupler with neat diagram. **[6]**

OR

Q2) a) State and explain properties of S matrix. **[6]**

b) Explain the working principle of Gyrator. **[6]**

c) An Isolator has an insertion loss of 0.5db and an isolation of 30dB. Determine the scatting matrix of the isolator if the isolated ports are perfectly Matched to the junction. **[6]**

Q3) a) Explain the construction of Single Cavity klystron Tube. **[6]**

b) Explain the Cavity Magnetron with Hull cut off condition in detail. **[6]**

c) What are the limitation of conventional tubes at microwave frequencies? **[6]**

OR

Q4) a) Explain the phase focusing effect in cavity magnetron. **[6]**

b) Explain construction, operation of Two Cavity Klystron. **[6]**

c) Distinguish between TWTA and Klystron Tube. **[6]**

P.T.O.

Q5) a) Explain construction and working of PIN diode. State applications of pin diode. **[6]**

b) Write a short note on IMPATT diode. **[6]**

c) Write the comparison between PN junction diode and Schottky diode. **[5]**

OR

Q6) a) Explain the working principle of Varactor diode. **[6]**

b) Explain construction and working of Schottky barrier diode. **[6]**

c) Explain Gunn effect using two valley theory. **[5]**

Q7) a) Explain the phase shift measurement using double minimum method at microwave frequency. **[6]**

b) State different methods for measurement of power. Explain Bolometric technique to measure power. **[6]**

c) Write short note on effect of Microwave radiation on human. **[5]**

OR

Q8) a) Write a note on measurement of quality factor. **[6]**

b) Explain microwave measurement techniques to measure S-parameters. **[6]**

c) List industrial and medical applications of microwave communication. **[5]**

Total No. of Questions : 8]

SEAT No. :

P599

[Total No. of Pages : 2

[6004]-548
B.E. (Electronics & Telecommunication Engg.)
VLSI DESIGN & TECHNOLOGY
(2019 Pattern) (Semester - VII) (404182)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right indicate full marks.***
3) ***Use of electronic pocket calculator is allowed.***
4) ***Assume suitable data, if necessary.***

Q1) a) Compare CPLD and FPGA on the basis of features, specifications and applications. **[6]**

b) Explain in brief classification of PLDs. **[6]**

c) Explain various stages of Synthesis in FPGA with suitable diagram. **[6]**

OR

Q2) a) Draw and explain the architecture of FPGA. Explain CLB in detail. **[10]**

b) Explain Clock Management Techniques in FPGA. **[8]**

Q3) a) Design CMOS logic for Y = AB + CD. Calculate W/L ratio for NMOS and PMOS area needed on chip. Find the total area. **[9]**

b) Discuss need for transmission gate. Draw 4 : 1 Mux using TG. **[8]**

OR

Q4) a) Draw CMOS logic for 2 input NAND gate. Explain its working and draw its stick diagram. **[9]**

b) Explain the working of CMOS inverter with the help of Voltage Transfer curve. **[8]**

Q5) a) Draw and explain ASIC design flow. **[6]**

b) Discuss Lambda rules with diagram? (Any 6 rules) **[6]**

c) What is stick diagram? Draw Stick diagram of CMOS Inverter. **[6]**

OR

P.T.O.

Q6) Write short note on : **[18]**

a) Antenna Effect.

b) Crosstalk.

c) Electro migration.

Q7) a) Explain need of Design for Testability. **[8]**

b) Explain Stack at Fault models in brief. **[9]**

OR

Q8) a) Write short note on Built in Self-Test. **[8]**

b) Write short note on Boundary Scan Method for testing. **[9]**

Total No. of Questions : 8]

SEAT No. :

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[Total No. of Pages : 2

[6004]-549

B.E. (E & TC)

CLOUD COMPUTING

(2019 Pattern) (Semester - VII) (404183)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Draw and explain architecture of virtualization technique. **[6]**

b) Explain in brief virtual clusters and resource management **[6]**

c) Write short notes on: **[6]**

i) CPU virtualization.

ii) Memory virtualization.

OR

Q2) a) Describe the concept of network virtualization with the help of suitable diagram. **[6]**

b) Draw and explain any two types of hardware virtualization. **[6]**

c) Differentiate between cloud computing and virtualization. **[6]**

Q3) a) Draw and explain the cloud CIA security model. **[6]**

b) Describe the types of firewall and its benefits. **[6]**

c) Explain the various security issues for cloud service providers. **[5]**

OR

Q4) a) Explain cloud computing security architecture with neat diagram. **[6]**

b) Draw and explain fundamental components of SOA and enlists it's characteristics. **[6]**

c) Discuss Host Security and Data Security in detail. **[5]**

P.T.O.

Q5) a) Explain the microsoft Azure cloud services. **[6]**

b) Explain Google App Engine application life cycle. **[6]**

c) Explain the cost models in cloud computing. **[6]**

OR

Q6) a) Enlist types of cloud platforms and describe any two. **[6]**

b) Define Amazon EBS snapshot. Write the steps create EBS snapshot. **[6]**

c) Explain the features of Google App Engine. **[6]**

Q7) a) Describe any three enabling technologies for loT. **[6]**

b) Differentiate between distributed computing and cloud computing. **[6]**

c) Write short note on Online social and Professional Networking. **[5]**

OR

Q8) a) Explain any three innovative applications of loT. **[6]**

b) Enlist and explain types of Distributed Systems. **[6]**

c) Discuss the advantages and disadvantages of distributed systems. **[5]**

Total No. of Questions : 8]

SEAT No. : ____

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[Total No. of Pages : 2

[6004] - 550

B.E. (Electronics and Telecommunication)

PLC, SCADA AND AUTOMATION

(2019 Pattern) (Semester - VII) (Elective - III) (404184 (B))

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, and Q.7 or Q8.***
2) ***Neat diagrams must be drawn whenever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) What is the function of Timer in PLC? Draw ladder diagram using Timer function. **[4]**

b) Draw the ladder diagram of following sequence. **[7]**

i) If the push button PB1 is pressed the red lights turns ON.

ii) If Push button PB2 is pressed the green light is ON.

iii) If both the push buttons [PB1 and PB2] are pressed at once, neither light turns ON.

c) Explain the following terms in detail with respect to PLC. **[7]**

i) Input Scan Time.

ii) Output Scan Time.

OR

Q2) a) What is the function of Counter in PLC? Draw ladder diagram using Counter function. **[4]**

b) Prepare the ladder diagram of the control problem The global objective is to heat a liquid to a specified temperature and keep it there with stirring for 30min. The hardware has following characteristics. **[7]**

1) START push button is NO, STOP is NC

2) NO and NC contacts are available for the limit switches

The event sequence is

i) Fill the tank

ii) Heat and stir the liquid for 30min

P.T.O.

iii) Empty the tank

iv) Repeat from Step I

With suitable assumptions sketch the system diagram and construct ladder diagram for the same.

c) Explain Concept of P, PI, PD, PID control actions with respect to PLC. **[7]**

Q3) a) Define the term SCADA and list the components of SCADA system. **[4]**

b) Explain Block Diagram of SCADA? **[7]**

c) Explain an application of SCADA system in Industrial Automation. **[7]**

OR

Q4) a) Write functions of RTU and MTU in SCADA? **[4]**

b) Draw & Explain the architecture of SCADA. **[7]**

c) What are characteristics of Process make them potential candidate for SCADA? **[7]**

Q5) a) Explain the need of DCS. **[4]**

b) Explain various Functional Levels of DCS? **[7]**

c) Explain the application of DCS in water treatment plant. **[7]**

OR

Q6) a) Explain the basic concept of DCS. **[4]**

b) Compare PLC, DCS and SCADA. **[7]**

c) Explain the DCS architecture. **[7]**

Q7) a) What Concept of NC Machine? **[2]**

b) Explain PROFIBUS protocol in detail. **[7]**

c) Explain Foundation Field Bus with Suitable Diagram? **[7]**

OR

Q8) a) What is Concept of Industry 4.0? **[2]**

b) Explain MODBUS protocol in detail? **[7]**

c) Explain DEVICENET protocol for Industrial Automation? **[7]**

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Total No. of Questions : 8]

SEAT No. :

P602

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[6004]-551

B.E. (Electronics & Telecommunication Engineering)

EMBEDDED SYSTEM & RTOS

(2019 Pattern) (Semester - VII) (Elective - III) (404184(D))

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Black figures to the right indicate full marks.***
4) ***Assume suitbale data if necessary.***

Q1) a) State the features of µCOS-II Real Time Operating System (RTOS). **[4]**

b) What is intertask communication in RTOS? Explain the use of semaphore for event signaling using following functions: OSSemPost() and OSSemPend(). **[8]**

c) Explain with state diagram the states of a task in RTOS. **[6]**

OR

Q2) a) Explain the following μ_c/OS-II functions. **[4]**

i) OSInit()

ii) OSStart()

b) What are different task management functions? Explain following functions with reference to µCOS-II. **[8]**

i) OSTaskCreate ()

ii) OSTaskDel ()

iii) OSTaskChangePrio()

c) Define clock tick in RTOS. Explain with functions any two time management services in µCOS-II **[6]**

Q3) a) Differentiate between BIOS and Boot-loader. **[4]**

b) Explain cross-development environment for Embedded Linux with reference to Host and target board. **[8]**

c) Explain the various binary utilities in tool chain. **[5]**

OR

Q4) a) Explain the storage considerations in Embedded Linux. **[6]**

b) Explain typical set up for embedded Linux application development. **[7]**

c) Explain in detail the role of GNU debugger. **[4]**

P.T.O.

Q5) a) What is Linux kernel configuration? Explain the steps in Linux kernel configuration. **[6]**

b) Explain the file structure used in Embedded Linux. **[6]**

c) Explain with diagram the architecture of Linux kernel. **[6]**

OR

Q6) a) With diagram, explain the functional blocks of Universal Boot-loader. **[6]**

b) What are the various boot-loader challenges? Discuss in terms of DRAM., image complexity and flash vs RAM. **[6]**

c) Which are different types of device driver? Explain the loadable kernel modules. **[6]**

Q7) a) Explain structure of Arduino program? Write a program to blink a LED connected to any port of Arduino board. **[5]**

b) Explain the development platform of Arduino with reference to IDE, Board details and application. **[6]**

c) Explain the embedded software development process and tool chain. **[6]**

OR

Q8) a) Explain the development platform of Raspberry Pi with reference to IDE, Board details and application. **[6]**

b) List the popular IDEs. Also state the features that an Integrated. Development Environment (IDE) should have to build the project. **[6]**

c) How the testing and debugging is done using Simulator, Emulator, Logic analyzer and JTAG tools? **[5]**

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Total No. of Questions : 8]

SEAT No. :

P603

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[6004]-552
B.E. (Electronics & Telecommunication)
MODERNIZED IOT
(2019 Pattern) (Semester - VII) (Elective - III) (404184E)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***

Q1) a) What is HART. Explain Basic Working of HART Protocol. **[6]**

b) Give the difference between IPv4 and IPv6. **[6]**

c) What is MQTT? Describe components and methods in MQTT. **[6]**

OR

Q2) a) Explain IPv6 packet format in detail. **[6]**

b) Explain CoAP messaging format. **[6]**

c) Explain Architecture of Zigbee. **[6]**

Q3) a) Write a short note on Contiki OS and COOJA simulator. **[6]**

b) Explain the process of IoT deployment w.r.t. Raspberry Pi. **[5]**

c) Explain data flow methodology for data transfer from sensor to Cloud. **[6]**

OR

Q4) a) Explain Bluetooth Protocol in Detail. **[6]**

b) Explain USB communication Protocol in detail. **[6]**

c) Explain AMQP in details. **[5]**

Q5) a) Give the difference between IoT and IIoT. **[6]**

b) Discuss IoT for Oil and Gas Industry. **[6]**

c) Enlist challenges faced by industry related IoT Applications. **[6]**

OR

Q6) a) Explain any one application of IIoT. **[6]**

b) Explain IIAF Framework. **[6]**

c) Explain eHealth IoT applications. **[6]**

P.T.O.

Q7) a) Explain Smart grib application w.r.t IoT. **[5]**

b) Explain home automation system with neat diagram. **[6]**

c) Explain case study on air pollution control system. **[6]**

OR

Q8) a) Write a short note on smart cities. **[5]**

b) Design Smart Parking system for a shopping mall. **[6]**

c) Explain case study on forest fire detection system w.r.t. IoT. **[6]**

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Total No. of Questions : 8]

SEAT No. :

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[Total No. Of Pages : 2

[6004]-553
B.E. (E & TC)
DATA MINING
(2019 Pattern) (Semester-VII) (404185A) (Elective - IV)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates :

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Give points of differences between Apriori and FP growth algorithm. **[9]**

b) Write the different steps in decision tree induction algorithm. **[9]**

OR

Q2) a) What are the different methods used to evaluate and compare accuracy of different classification algorithms? **[9]**

b) Explain different data visualization techniques. **[9]**

Q3) a) Detail different attribute selection measures. **[9]**

b) Give the steps involved in CART algorithm. **[9]**

OR

Q4) a) Describe in detail Bayesian classification method. **[9]**

b) Write short notes on Support Vector Machines. **[9]**

P. T. O

Q5) a) Discuss the different types of outliers that occur in a dataset. **[9]**

b) With the help of suitable example, explain k-medoids algorithm. **[8]**

OR

Q6) a) Detail BDSCAN clustering algorithm with an example. **[9]**

b) Differentiate between classification and clustering. **[8]**

Q7) a) Write in detail on mining stream data. **[9]**

b) Discuss the steps involved in HITS algorithm. **[8]**

OR

Q8) a) Define web mining and give details on web content mining. **[9]**

b) Write short notes on web usage mining. **[8]**

Total No. of Questions : 8]

SEAT No. :

P-605

[Total No. Of Pages : 2

[6004]-554
B.E.(E&TC)
ELECTRONIC PRODUCT DEVELOPMENT (Elective - IV)
(404185B) (2019 Pattern) (Semester-VII)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates :

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right indicate full marks.***
3) ***Use of logarithmic tables slide rule, mollier charts, electronic pocket calculator and steam tables is allowed.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain the following terminologies: **[8]**

i) Risk Abatement and Failure Preventions

ii) Software Bugs and Testing

iii) Good programming practice

b) Explain software design with any case study and design example. **[9]**

OR

Q2) a) Describe traditional software lifecycle with reference to Waterfall Model. **[8]**

b) Illustrate prototyping model and spiral model for software development **[9]**

Q3) a) Explain assembly and materials required with factors affecting on costing of PCB. **[9]**

b) Explain configurations of routing topologies in PCB layout designing **[9]**

OR

Q4) a) Interpret the role of proper component placement in PCB **[9]**

b) How can we improve reliability over failure in PCBs? **[9]**

P. T. O

Q5) a) What are the different steps in the debugging? Differentiate debugging from troubleshooting. **[9]**

b) Explain the following terms with example: **[9]**

i) Prototyping and Testing

ii) Integration

iii) Validation and Verification

iv) Manufacturing

OR

Q6) a) Define debugging process and explain steps of debugging. **[9]**

b) State the important parameters to be considered while selecting passive, active and switching components. **[9]**

Q7) a) Explain the need of documentation? **[8]**

b) Explain with example what do you mean by preparation, presentation and preservation of documents. **[9]**

OR

Q8) a) Describe the need and types of documentation. **[8]**

b) What are the different methods of preservation of documents? Explain. **[9]**

Total No. of Questions : 8]

SEAT No. :

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[6004]-555

B.E. (E & TC)

DEEP LEARNING

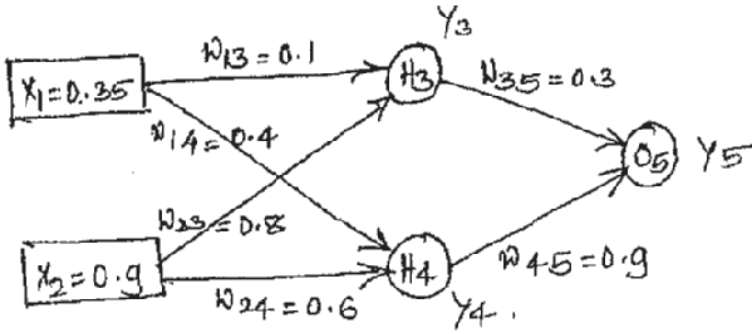
(2019 Pattern) (Semester - VII) (404185C) (Elective - IV)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve any four questions from Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Assume that the neurons have a sigmoid activation function perform the forward pass and backward pass on the network. Assume that the actual output Y is 0.5 and learning rate is 1. Perform another forward pass. **[7]**



b) Describe the following activation functions :

i) Sigmoid,

ii) Threshold,

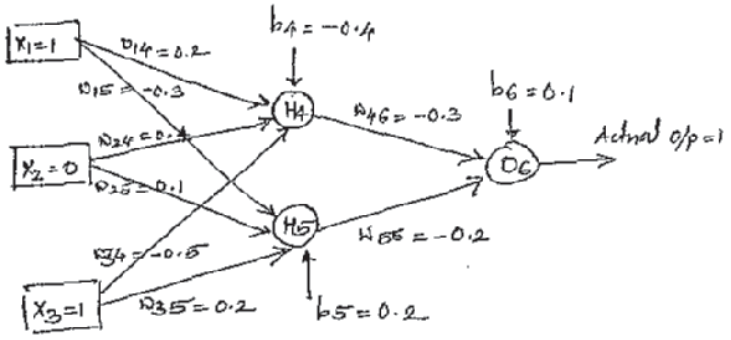
iii) ReLU

'Vanishing Gradient' occur in Sigmoid Function and 'Dying ReLU' occur in ReLu - Justify **[10]**

OR

P.T.O.

Q2) a) Assume that the neurons have a sigmoid activation function perform the forward pass and backward pass on the network. Assume that the actual output Y is 1 and learning rate is 0.9. Perform another forward pass. **[7]**



b) Explain the concept of Overfitting and Underfitting in deep learning. How to reduce Overfitting using Dropout and Regularization? **[10]**

Q3) a) With the help of architectures show that Speed and Accuracy of VGG is greater than AlexNet. **[10]**

b) Show that CNN works same as human brain for image recognition through various steps. **[8]**

OR

Q4) a) With the help of architecture explain each block of DenseNet in detail. Enlist advantages and disadvantages. **[10]**

b) What is weight initialization? Describe the various weight initialization techniques. **[8]**

Q5) a) Explain the working of RNN with suitable diagram. Illustrate the Vanishing Gradient problem occurs in simple RNN. **[10]**

b) How Name Entity Recognition Problem is fixed using Bidirectional RNN? Explain with the help of suitable diagram. **[7]**

OR

Q6) a) How short term memory problem avoided in LSTM? Explain with the help of suitable diagram. **[10]**

b) What is the difference between LSTM and GRU? Explain the working of GRU with suitable diagram. **[7]**

Q7) a) What is NLP? Enlist the advantages and disadvantages of NLP. **[6]**

b) What is sentiment analysis? Describe the various use cases of sentiment analysis. **[6]**

c) How NLP works in text pre-processing. **[6]**

OR

Q8) a) Differentiate between classical image processing and deep learning image processing. **[6]**

b) How deep learning works for image classification? **[6]**

c) How deep learning works for Audio Wavenet. **[6]**

Total No. of Questions : 8]

SEAT No. :

P-607

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[6004]-556

B.E. (E & TC)

Fiber Optic Communication

(2019 Pattern) (Semester - VIII) (404190)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) A photodiode has a quantum efficiency of 65% when photons of energy 1.5×10^{-19} J are incident upon it. **[6]**

i) at what wavelength is the photodiode operating?

ii) Calculate the incident optical power required to obtain a photocurrent of 2.5 μA.

b) Define the quantum efficiency and the responsivity of a photodetector. Give the mathematical equations for the same. **[6]**

c) Compare PIN diode with APD (any 3 points). **[6]**

OR

Q2) a) An InGaAs PIN photodiode has the following parameters at a wave length of 1300 nm: $I_D = 4$ nA, $\eta = 0.90$, $R_L = 1000\Omega$, and the surface leakage current is negligible. The incident optical power is 300 nW (–35 dBm) and the receiver bandwidth is 20 MHz. Find the following noise terms of the receiver. **[6]**

i) The mean-square dark current

ii) The mean-square thermal noise current

b) What is a photodetector? Discuss various requirements of a photodetector to be used in optical communication. **[6]**

c) With the help of diagram explain working of p - n photodiode. Draw its output characteristics. **[6]**

P.T.O.

Q3) a) A 1550-nm single-mode digital fiber optic link needs to operate at 622 Mb/s over 80 km without amplifiers. A single-mode InGaAsP laser launches an average optical power of 13 dBm into the fiber. The fiber has a loss of 0.35 dB/km and there is a splice with a loss of 0.1 dB every kilometer. The coupling loss at the receiver is 0.5 dB and the receiver uses an InGaAs APD with a sensitivity of –39 dBm. Excess-noise penalties are predicted to be 1.5 dB. Setup an optical power budget for this link and find the system margin. **[6]**

b) Draw and explain simplex point to point optical link. **[6]**

c) Illustrate the working of optical amplifier. Enlist the semiconductor materials used for active medium in DFAs. **[6]**

OR

Q4) a) Sketch and explain implementation of a typical WDM network. Enlist some of the active WDM components. **[6]**

b) A digital optical fiber system uses an RZ pulse format. An optical fiber link is required to operate over a distance of 10 km without repeaters. The fiber available exhibits a rise time due to intramodal dispersion of 0.2 ns/km. in addition the APD detector has a rise time of 1 ns. Estimate the maximum rise time allowable for the system, if the source has a rise time of 4 ns in order for the link to be successfully operated at a transmission rate of 40 Mbps. **[6]**

c) Describe Optical power-loss model. Draw a neat diagram for the same. **[6]**

Q5) a) With the help of diagram explain various elements used in optical networks. Explain the modularity and scalability features of an optical network. **[6]**

b) What are the corresponding levels and bit rates for SDH and SONET? Draw and explain STS-1 frame structure. **[6]**

c) i) Calculate how many 64-kb/s voice channels can be carried by an STS-3, STS-48, and STS-192 system.

ii) How many 20-Mb/s digitized video channels can be transported over STS-3 systems? **[5]**

OR

Q6) a) Draw and explain general structure of a passive optical network (PON). **[5]**

b) Compare EPON, APON and GPON (any 3 points). **[6]**

c) Explain the following w.r.t. SONET. **[6]**

i) Structure

ii) Operation

iii) Advantages

Q7) a) Enlist widely used optical system test instruments and explain their functions. **[6]**

b) Draw Schematic experimental setup for determining fiber attenuation by the cutback technique. Explain the same. **[6]**

c) Draw representative trace of backscattered and reflected optical power as displayed on an OTDR screen and explain the meanings of various trace features. **[5]**

OR

Q8) a) Illustrate Operational principle of an OTDR using an optical circulator. Draw the corresponding diagram. **[6]**

b) Explain Eye diagram test. Define fundamental measurement parameter. **[6]**

c) Consider the case when the power at the photodetector prior to inserting the filter is $P_1 = 0.51$ mW and the power level with the optical filter in the link is $P_2 = 0.43$ mW. What is the insertion loss of the device? **[5]**

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Total No. of Questions : 10]

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P608

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[6004]-557

B.E. (Electronics & Telecommunication)
BIOMEDICAL SIGNAL PROCESSING
(2019 Pattern) (Semester - VIII) (Elective - V) (404191(A))

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Explain in brief, Somatosensory-Evoked Potentials. **[5]**

b) Write short note on Sleep Disorders. **[5]**

OR

Q2) a) Explain diseases of Central Nervous System and EEG. **[5]**

b) Write on defects in Muscle Cell Membrane. **[5]**

Q3) a) Draw and explain structure of brain. **[5]**

b) Explain Electrooculogram. **[5]**

OR

Q4) a) What is Signal of Muscles? Write significance of EMG. **[5]**

b) Explain Pathological Motor Units. **[5]**

Q5) a) What is a function of Electromyography? Enlist the types of EMG? Explain the procedure to perform EMG? **[8]**

b) Explain various EEG waveforms with their frequency and significance. **[8]**

OR

Q6) a) Explain Respiratory Signals in detail. **[8]**

b) Explain Blood Pressure and Blood Flow. **[8]**

Q7) a) Write short note on, Feature Extraction EEG. **[8]**

b) Explain Time, Frequency and Wavelet-Domain Analysis of EMG. **[10]**

OR

P.T.O.

Q8) a) What are the objectives of biomedical signal analysis? What difficulties face during biomedical signal analysis? **[10]**

b) Explain Magneto encephalogram in detail. **[8]**

Q9) a) Write a note on direct and indirect blood pressure measurement. **[8]**

b) Explain Steepest descent algorithm. **[8]**

OR

Q10)a) Differentiate Digital filters : IIR and FIR filters. **[8]**

b) Explain LMS adaptive algorithm in detail. **[8]**

Total No. of Questions : 8]

SEAT No. :

P609

[Total No. of Pages : 2

[6004]-558

B.E. (Electronics & Telecommunication)
INDUSTRIAL DRIVES & AUTOMATION
(2019 Pattern) (Semester - VIII) (Elective - V) (404191(B))

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8.***
2) ***Neat diagrams and wave forms must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of non programmable calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Explain the Chopper Control of Separately excited DC Motor for motoring control and regenerative braking. Draw the speed torque curves for the same. **[9]**

b) Explain with neat diagram hysteresis controller operation. **[8]**

OR

Q2) a) Draw the closed loop speed scheme for control below and above base speed of the Separately excited DC Motor. **[9]**

b) What is the necessity of anti wind up circuit and explain anti winder circuit with P-I speed controller. **[8]**

Q3) a) Draw the torque-slip characteristics of three phase induction motor. Indicate stable and unstable regions in it, also indicate positions of starting torque, break down torque and full load torque on the characteristics. **[9]**

b) Explain super synchronous speed operation in induction motor. How it is achieved? **[9]**

OR

Q4) a) Explain rotor resistance control for speed control of induction motor. Draw the speed torque curves indicating the effect of variation in resistance. State its drawback. **[9]**

b) What do you mean by slip power recovery scheme? Explain any one scheme for the same. **[9]**

P.T.O.

Q5) a) Explain with neat block diagram vector controlled permanent magnet synchronous motor drive. **[9]**

b) Explain the following control strategies for the permanent magnet synchronous motor drive system. **[8]**

i) Constant torque-angle control.

ii) Unity power factor control.

OR

Q6) a) Explain variable frequency control of multiple synchronous motors. **[9]**

b) Explain self controlled Synchronous motor drive employing load commutated thyristor inverter. **[8]**

Q7) a) Draw and explain stepper motor dynamic characteristics (Torque vs stepping rate characteristics). **[9]**

b) Explain unipolar drive circuit for stepper motor with neat diagram. **[9]**

OR

Q8) a) Explain construction and working of variable Reluctance (VR) stepping motor. **[9]**

b) What is limitation of stepper motor in open loop mode? Explain with neat diagram closed loop control of stepping motor. **[9]**

Total No. of Questions : 8]

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P2862

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[6004]-559

B.E. (E & TC)

EMBEDDED SYSTEM DESIGN

(2019 Pattern) (Semester-VIII) (404191-D) (Elective-V)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer any one Questions out of Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever neccessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume Suitable data; if necessary.***
5) ***Use of scientific calculator is allowed.***

Q1) a) Describe the classification of API. **[9]**

b) Illustrate configuration of GPIO. **[8]**

OR

Q2) a) Interpret in detail GPIO port functions and their relationship to HAL. **[9]**

b) Elaborate USB Modules in the STM 32F4 Microcontroller. **[8]**

Q3) a) Describe cross development compilation in detail. **[9]**

b) Explain the various binary utilities in tool chian **[9]**

OR

Q4) a) What is FreeRTOS? How FreeRTOS is configured using STM 32CubeMX? **[9]**

b) Describe ChibiOS and Contiki OS. **[9]**

Q5) a) Elaborate how to Install Touch GFX for Graphical User Interface (GUI). **[9]**

b) Design an embedded system for Image transfer between PC and STM32F4. **[8]**

OR

Q6) a) Summarize how to Interface of SPI based graphical LCD with STM32F4. **[9]**

b) Design an embedded system for Transferring the Digital Signal Between the PC and STM32F4 Microcontroller. **[8]**

P.T.O.

Q7) a) What are the different Android App development tools? **[9]**

b) Describe Loading and interfacing methods in Embedded Android. **[9]**

OR

Q8) a) Articulate requirments of android. **[9]**

b) Illustrate device hardware methods and their interfaces. **[9]**

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Total No. of Questions : 10]

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[6004]-560

B.E. (Electronics & Tele Communication)

MOBILE COMPUTING (End Sem.)

(2019 Pattern) (Semester - VIII) (404191E) (Elective - V)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Compare proactive routing protocols with reactive routing protocols. **[8]**

b) How does Ad Hoc On-Demand Distance Vector Routing (AODV) route the data? What are its advantages and disadvantages? **[8]**

OR

Q2) a) Explain with suitable data flow diagram, client initialization via DHCP. **[8]**

b) What is hybrid routing? Explain zone routing protocol (ZRP) with suitable diagram. **[8]**

Q3) a) Describe IP packet delivery between two mobile nodes in a mobile IP network. Why reverse tunneling is required? **[8]**

b) Explain the modifications of Indirect TCP. What are its advantages and disadvantages? **[8]**

OR

Q4) a) Why and when encapsulation is needed? List different methods of encapsulation and explain any one of them. **[8]**

b) Explain transaction-oriented TCP with suitable diagram. What are its advantages and disadvantages? **[8]**

P.T.O.

Q5) a) Explain Rayleigh distribution. How mean and variance of Rayleigh distribution is calculated? **[7]**

b) Compare wideband and narrowband channels. List any two channel models used in each channel. **[7]**

OR

Q6) a) Describe multipath propagation with neat diagram. What is ISI in multipath fading channels? **[7]**

b) What is non-coherent detection? Explain with neat diagram, non-coherent detection of FSK. **[7]**

Q7) a) What is M-commerce? List out benefits of M-commerce. Briefly explain any three applications of M-commerce. **[7]**

b) Explain mobile operating system. What are needs of a mobile OS? List different types of OS. **[7]**

OR

Q8) a) Draw B2B model and explain any one B2B application. **[7]**

b) Write a short note on mobile computing and its three basic components. **[7]**

Q9) What is a mobile payment system? Explain payment process using credit card. List advantages and disadvantages of M-commerce. **[10]**

OR

Q10) Explain snooping TCP with proper diagram. List out its advantages and disadvantages. **[10]**

Total No. of Questions : 8]

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[6004]-561

B.E. (E & TC)

SYSTEM ON CHIP

(2019 Pattern) (Semester - VIII) (404192A) (Elective - VI)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Draw neat diagram.***
2) ***Assume Suitable data.***

Q1) a) Explain different modeling styles in verilog. **[6]**

b) Explain task & function. **[5]**

c) Write verilog code for full adder. **[7]**

OR

Q2) a) Write verilog code for half adder. **[4]**

b) Write verilog code of 4 bit counter. **[8]**

c) Explain blocking and non block statements. **[6]**

Q3) a) Explain floor planning. **[9]**

b) Explain partitioning. **[8]**

OR

Q4) a) Explain placement. **[9]**

b) Explain Routing. **[8]**

Q5) a) Expalin : **[9]**

i) Scalar processor

ii) Superscalar processor

iii) VLIW processor.

b) Explain vector processor. **[5]**

c) Explain soft processors. **[4]**

OR

P.T.O.

Q6) a) Explain 3 branch management technique. **[9]**

b) Explain buffers in pipeline. **[9]**

Q7) a) Explain 2 cache. **[8]**

b) Explain policies of cache. **[5]**

c) Explain types of cache. **[4]**

OR

Q8) a) Explain interconnect Architecture of SOC. **[6]**

b) Explain advanced Microcontroller Bus Architecture. **[6]**

c) Write full form : **[5]**

i) AHB

ii) DMA

iii) APB

iv) AHB

v) ARM

Total No. of Questions : 8]

SEAT No. : ____

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[6004]-562
B.E. (E & TC)
NANO ELECTRONICS
(2019 Pattern) (Semester - VIII) (Elective - VI) (404192 B)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to right indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Explain Metal nano particles? Classified Nano particles. Properties. **[8]**

b) Explain Properties of CNT & give its Applications. **[8]**

OR

Q2) a) What is Cluster? Explain Carbon nano tubes. **[8]**

b) Explain Nano material & Its Types. **[8]**

Q3) a) Explain Photolithography process in detail. **[9]**

b) Explain Electron Beam Lithography with neat Diagram. **[9]**

OR

Q4) a) Explain Nano electronics for communication. **[9]**

b) Explain Atomic Lithography with neat Diagram. **[9]**

Q5) a) What are molecular switch? Explain Ph switch. **[9]**

b) Explain MEMS. **[9]**

OR

P.T.O.

Q6) a) Explain NEMS. **[9]**

b) Explain types of Super molecular Switches. **[9]**

Q7) a) What are Nano sensor? Explain Optical Sensor. **[9]**

b) Which are types of Nano Sensor? Explain Nano biosensor. **[9]**

OR

Q8) a) What is Energy Capture? Explain Solar Cell. **[9]**

b) Explain Transformation. **[9]**

Total No. of Questions : 8]

SEAT No. :

P-611

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[6004]-563

B.E. (IT)

INFORMATION AND STORAGE RETRIEVAL

(2019 Pattern) (Semester - VII) (414441)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Why are the performance evaluation measures needed in IR system? Explain trade-off between Recall and Precision. **[6]**

b) What are alternative measures used to evaluate system performance in IR. **[6]**

c) Explain in detail the term NDCG. Explain with a suitable example. **[6]**

OR

Q2) a) What are User oriented measures used in performance evaluation of IR system. **[6]**

b) Explain MRR and F-Score measures used in performance evaluation of IR systems. **[6]**

c) Define and explain Interface support for search process related to visualization in information system. **[6]**

Q3) a) What is distributed IR? Explain it with the help of Source Selection? **[8]**

b) What is Query processing? How is it processed in distributed IR? **[9]**

OR

Q4) a) What is multimedia IR? Explain the architecture of multimedia IR in detail. **[9]**

b) Explain Collection partitioning with respect to Distributed IR. **[8]**

P.T.O.

Q5) a) Explain search engine mechanism with a neat diagram. **[6]**

b) What is page ranking? Explain role of page ranking in web searching. **[6]**

c) Write a note on request module and beautiful soup library. **[6]**

OR

Q6) a) Explain difference between centralized and distributed architecture of search engine. **[6]**

b) Define and explain the following terms with respect to web searching. **[6]**

i) Crawling

ii) Web directories

c) Explain Web Scrapping with a suitable example. **[6]**

Q7) a) Differentiate Collaborative filtering and Content Filtering. **[8]**

b) Define Recommender system? Explain Collaborative Filtering in brief. **[9]**

OR

Q8) a) Explain Text-Centric and Data-Centric XML retrieval. **[8]**

b) Explain in detail Content Based Recommendation of Documents. **[9]**

Total No. of Questions : 8] **SEAT No. :**

P612 **[Total No. of Pages : 2**

[6004]-564
B.E. (Information Technology)
SOFTWARE PROJECT MANAGEMENT
(2019 Pattern) (Semester - VII) (414442)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Explain various Project Scheduling Techniques. Explain the difference between CPM and PERT. **[9]**

b) What is Project Risk Management? What are the RM Processes? **[9]**

OR

Q2) a) Describe IT Project Risk Identification Framework. Explain the types of risk with examples. **[9]**

b) How do Network Diagrams help in Project Planning? Define Predecessor, Successor, and Parallel Activities. Give a real-world example of each.**[9]**

Q3) a) Draw and explain the flowchart for change control function in SCM.**[8]**

b) What is project control? Explain the different types of control mechanism in details. **[9]**

OR

Q4) a) Write short notes on Team Structure and Virtual Team in a Software Project. **[8]**

b) Describe the plan monitor control cycle used in the project. **[9]**

Q5) a) What is Leadership? Explain Different approaches of Leadership. **[9]**

b) Explain briefly the FOUR (4) types of teams in an organization. **[9]**

OR

P.T.O.

Q6) a) Explain Oldham-Hackman job characteristic model. **[9]**

b) What are the objectives of managing people and organizing teams? **[9]**

Q7) a) Feature of Azure DevOps Project Management. **[5]**

b) Explain the Agile Project Management in Azure DevOps and TFS. **[6]**

c) Which methodologies are supported by Azure DevOps server to implement Agile project practices? **[6]**

OR

Q8) a) Discuss three primary ways of enabling visibility in Azure DevOps. **[5]**

b) Describe in brief application lifecycle management. **[6]**

c) Explain the Customizing the Process Template in Azure DevOps. **[6]**

Total No. of Questions : 8]

SEAT No. :

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[6004]-565

B.E.(InformationTechnology)

DEEP LEARNING

(2019 Pattern) (Semester - VII) (414443)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates :

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Differentiate between Recurrent Neural Network and Recursive Neural Network with appropriate diagram. **[9]**

b) Explain the general layout of a Long Short-Term Memory Network (LSTM) with suitable diagram. **[9]**

OR

Q2) a) Explain how sequence to sequence model works. **[9]**

b) Describe Recursive Neural Network and types of Recursive Neural Network. Explain its advantages. **[9]**

Q3) a) Explain the architecture of sparse autoencoder with suitable diagram. What are advantages of sparse encoder over usual autoencoder? **[9]**

b) State applications of autoencoder. Explain any two applications in detail. **[8]**

OR

Q4) a) Explain the structure of regularized autoencoders. What is the purpose of sparsity constraint in sparse autoencoder? **[9]**

b) Explain architecture of autoencoder with neat diagram. Explain the hyperparameters that must be set before training of autoencoders. **[8]**

P.T.O.

Q5) a) When will you transfer learning? Explain with example. **[9]**

b) Explain architecture of DenseNet. **[9]**

OR

Q6) a) Why is the network called Greedy Layer Wise Pretraining Network? **[9]**

b) Write Short note on i) Representation Learning ii) Distributed Representation. **[9]**

Q7) a) Explain CNN based and RNN based framework for natural language processing. **[9]**

b) Describe deep learning based recommender systems with suitable diagram. **[8]**

OR

Q8) a) Illustrate the social network analysis using deep learning and enlist the applications of social network analysis. **[9]**

b) What are the application areas of image classification? Explain CNN for image Classification. **[8]**

Total No. of Questions : 8] **[Total No. of Pages :1**

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[6004]-566
B.E. (Information Technology Engineering)
MOBILE COMPUTING
(2019 Pattern) (Semester-VII) (Elective-III) (414444 A)

[Time: 2.30 Hours] **[Max. Marks: 70]**

Instructions:
- ***(1)*** *Answer the questions-* ***Q(1) or Q(2), Q(3) or Q(4), Q(5) or Q(6), Q(7) or Q(8).***
- ***(2)*** *Figures to the right indicate full marks.*
- ***(3)*** *Neat diagrams must be drawn wherever necessary.*
- ***(4)*** *Use of Electronic calculator is allowed*
- ***(5)*** *Assume suitable data, if necessary.*

Que. 1 a) Comment on Second Generation Wireless Cellular Networks(2G) with standards. 9
b) Explain Fifth Generation Wireless Networks (5G) with advanced features. 9

OR

Que. 2 a) Write a note on Third Generation Wireless Networks (3G). 9
b) Explain Fourth Generation Wireless Networks (4G). 9

Que. 3 a) Describe Mobile IP with Entities, Terminology & IP packet delivery. 8
b) Explain Reactive Routing Protocols DSR and Hybrid routing protocol ZRP. 9

OR

Que. 4 a) Whats is Tunnelling and Encapsulation and Reverse Tunnelling in Mobile IP? 8
b) Describe IPv6 DHCP in detail. 9

Que. 5 a) Explain Slow start, Fast retransmit/fast recovery in regard with TCP. 9
b) Explain Wireless application protocol in detail. 9

OR

Que. 6 a) Write a note on Wireless Markup Language. 9
b) Explain World Wide Web with system architecure in detail. 9

Que. 7 a) Write a note on Software Development Kit - Ios. 9
b) Comment on M Commerce with it's Structure. 8

OR

Que. 8 a) Explain Mobile Device Operating Systems with Special Constrains & Requirements. 9
b) Explain Mobile Payment System with security issues involved in it. 8

Total No. of Questions : 8]

SEAT No. : ____

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[6004] - 567

B.E. (Information Technology)

HIGH PERFORMANCE COMPUTING

(2019 Pattern) (Semester - VII) (Elective - III) (414444(B))

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Explain Circular shift operation on mesh and hypercube network. **[9]**

b) Write a short note on All-to-one reduction with a suitable example. **[9]**

OR

Q2) a) Compare the one to all broadcast operation for Ring, Mesh & Hypercube topologies. **[6]**

b) Explain the Broadcast and Reduction example for a multiplying matrix with a vector. **[6]**

c) Explain term of all-to-all broadcast on mesh & Hypercube topologies. **[6]**

Q3) a) What is the minimum execution time and minimum cost-optimal execution time? Explain in detail. **[8]**

b) Explain in detail the scalability of a parallel system. **[9]**

OR

Q4) a) Explain sources of overhead in parallel programs. **[8]**

b) Interpret the effect of Granularity on the Performance of parallel execution. **[9]**

P.T.O.

Q5) a) What is multinode computing? Explain in detail. **[9]**

b) Explain the OpenMP Programming Model in detail. **[9]**

OR

Q6) a) Explain CUDA programming model groups threads. **[9]**

b) Write a short note on: Managing GPU memory. **[9]**

Q7) a) Explain parallel Depth First Search for solving 8 puzzle problem. **[8]**

b) Explain parallelism in the Best First Search algorithm. Give an appropriate example. **[9]**

OR

Q8) a) Explain odd-even transportation on bubble sort using a parallel formulation. **[8]**

b) Explain the Sparse graph algorithm. **[9]**

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Total No. of Questions : 8]

SEAT No. :

P616

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[6004] - 568

B.E. (Information Technology)

MULTIMEDIA TECHNOLOGY

(2019 Pattern) (Semester - VII) (Elective - III) (414444C)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) What is the sound wave? What are the uses of audio in computer applications? Explain with suitable example. **[8]**

b) List the various audio formats supported by the internet. Explain PCM and AAC audio file formats. **[9]**

OR

Q2) a) What is the purpose of video editing? Explain various stages of video editing considering sample application. **[8]**

b) Draw and explain video broadcast standards. **[9]**

Q3) a) What is meant by key framing and tweening? Explain their importance with suitable example. **[8]**

b) Which are the main types of animation? Explain following animation file formats. ***.flic, .fla, .swf, & .gif.*** **[9]**

OR

Q4) a) List and explain any eight basic principles of animation. **[8]**

b) Explain onion skinning, masking, and morphing in the context of animation. **[9]**

P.T.O.

Q5) a) Discuss the techniques used for selection and manipulation of objects in virtual environments. **[9]**

b) What is the use of VR the field of education? Explain virtual field trip application in detail. **[9]**

OR

Q6) a) What is the use of VR devices? Explain how Hand Gloves, Head mounted tracking system, VR chair is used while creating VR application? **[9]**

b) Explain in detail about the five classic components of a virtual reality system. **[9]**

Q7) a) What is image processing? Explain features of multimedia image processing software. **[9]**

b) Define and explain in brief with respect to multimedia gaming. **[9]**

i) Mobile Gaming.

ii) Cloud Gaming.

iii) On-Demand Gaming.

OR

Q8) a) What is video processing? Explain features of multimedia video processing software. **[9]**

b) Define and explain in brief following terms with respect to multimedia computer gaming. **[9]**

i) Facial Recognition.

ii) Gesture Control.

iii) Augmented Reality.

❄ ❄ ❄

Total No. of Questions : 8]

SEAT No. :

P-617

[Total No. of Pages : 2

[6004]-569

B.E. (Information Technology)
SMART COMPUTING
(2019 Pattern) (Semester - VII) (414444D) (Elective - III)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates :

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) List and Explain advantages of Ubiquitous Computing. **[6]**

b) List and Explain core properties Ubiquitous Computing. **[6]**

c) Explain the three main types of environment context. **[6]**

OR

Q2) a) Describe Smart DEl Model with neat diagram. **[8]**

b) List and explain different types of Smart Environment Devices Interaction. **[10]**

Q3) a) Describe different smart devices characteristics? **[8]**

b) Draw a neat diagram of service provision life cycle and explain in details. **[9]**

OR

Q4) a) Describe any one Distributed Service Invocation Data Model? **[6]**

b) Write short note on “Virtual Machine”? **[5]**

c) Discuss mobility support provided by OS for Mobile Computers and Communicator Devices? **[6]**

P.T.O.

Q5) a) Explain various characteristics of sensors and explain components of Sensor Networks. **[9]**

b) Discuss Micro- Electro-Mechanical Systems (MEMS) in detail? **[9]**

OR

Q6) a) Describe different smart devices form factors? **[8]**

b) Write a short note on : **[10]**

i) Nanocomputing.

ii) Real Time system.

Q7) a) Enlist different characteristics of Internet of Things (IoT)? **[8]**

b) Describe any one application of related with Smart Home with neat diagram? **[9]**

OR

Q8) a) Write short note on Smart Agricultural System. **[8]**

b) Explain Physical design of IoT and IoT enabling technologies. **[9]**

Total No. of Questions : 8]

SEAT No. :

P-618

[Total No. Of Pages : 2

[6004]-570
B.E.(IT)
BIOINFORMATICS
(414445A) (2019 Pattern) (Elective-IV) (Semester-VII)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates :

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Neat labelled diagrams must be drawn wherever necessary.***
3) ***Assume suitable data, if necessary.***

Q1) a) State the difference between PAM and BLOSUM. **[8]**

b) Define Sequence Visualization? Discuss the concept of Structure Visualization and rendering tools? **[9]**

OR

Q2) a) Discuss and state the difference between global and local alignments methods? **[8]**

b) Why do you need multiple sequence alignments? Can they be done globally? **[6]**

c) What is the role of microarray in bioinformatics? **[3]**

Q3) a) Explain in brief different Clustering, and classification algorithms. used in Bioinformatics. **[9]**

b) BLAST and FASTA are two widely used tools for sequence alignment. What are the similarities and differences in their approaches? **[9]**

OR

Q4) a) Define and discuss Biological algorithm vs. Computer algorithms, **[6]**

P. T. O

b) Explain FASTA in detail with neat diagrams **[6]**

c) Define and write short notes: Hidden Markov Models, Dynamic Programming. **[6]**

Q5) a) Explain the methods of protein structure prediction and determination
i) Experimental ii) An-initio **[8]**

b) What are the component of modeling and simulation system? Explain in detail with neat diagram. **[9]**

OR

Q6) a) Explain with example Hierarchical organization on protein structure. **[8]**

b) What is Drug and Drug discovery process? Explain Application of Bioinformatics in Drug Discovery Process. **[9]**

Q7) a) Discuss various applications of Genetic Engineering in real world. **[9]**

b) Discuss the principles and applications of bioremediation in environmental biotechnology, Provide examples of pollutants that can be treated using this approach **[9]**

OR

Q8) a) What are the recent trends in bioinformatics world **[9]**

b) Explain the role of nanotechnology in environmental remediation. Discuss how nanomaterials can be used to address pollution challenges. **[9]**

Total No. of Questions : 8]

SEAT No. :

P-619

[Total No. Of Pages : 2

[6004]-571
B.E.(Information Technology)
Introduction TO DevOps
(414445B) (2019 Pattern) (Semester-VII) (Elective - IV)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates :

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) What is Test Driven Development? Explain in brief. **[5]**

b) What are benefits of Continuous Integration (CI) and Continuous Delivery (CD)? **[5]**

c) Explain the stages for building Continuous Integration and Continuous Delivery pipelines. **[8]**

OR

Q2) a) Explain Blue Green Deployment? **[5]**

b) Explain Canary deployment? **[5]**

c) How to create build reports? Explain the process of putting a build in shared location and releasing it. **[8]**

Q3) a) Write a short note on Automated Acceptance Test Best Practices. **[5]**

b) What is continuous deployment? **[4]**

c) Draw & explain basic deployment pipeline cycle. **[8]**

OR

P. T. O

Q4) a) Explain Integration Testing in detail. **[5]**

b) Write a short note on commit stage of deployment pipeline. **[4]**

c) Explain different types of testing strategy **[8]**

Q5) a) What is Behaviour-Driven Monitoring? **[4]**

b) What is a Monitoring System? What are key requirements of monitoring system? **[6]**

c) Write a note on: White-Box and Black-Box Monitoring **[8]**

OR

Q6) a) What are common tools used by site reliability engineering (SRE)? **[4]**

b) What is site reliability engineering (SRE)? Explain its role and responsibilities. **[6]**

c) Explain the importance of monitoring system? List and explain factors involved in monitoring system. **[8]**

Q7) a) What are the benefits of using version control? **[6]**

b) What is Docker? What are main components of a Docker architecture? **[6]**

c) Write a note on Jenkins and its role in Continuous Integration. **[5]**

OR

Q8) a) Write a note on Selenium and its role in Continuous testing. **[6]**

b) What is version control system? Explain its types. **[6]**

c) What is serverless orchestration in Kubernetes? **[5]**

Total No. of Questions : 8]

SEAT No. :

P-620

[Total No. of Pages : 2

[6004]-572
B.E.(Information Technology)
COMPUTER VISION (Elective IV)
(414445C) (2019 Pattern) (Semester-VII)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates :

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain the following terms. **[9]**

i) Feature Detectors ii) Feature Descriptors iii) Feature Matching

b) Explain the role of finding Points, Patches and Edges detection along with feature detection in Computer Vision. **[9]**

OR

Q2) a) What is feature? State different feature extraction techniques. Explain any three in detail. **[9]**

b) What is meant by edge linking? Why is it necessary? Explain with an example. **[9]**

Q3) a) Explain Hough Transform for line detection in detail with pros and cons. **[8]**

b) How the RANSAC is useful for straight line detection? How it is different from Hough Transform? **[9]**

OR

P. T. O

Q4) a) Describe edge-liking using Hough Transform. State difference between an edge and boundary using suitable example. **[8]**

b) Write a short note on: **[9]**

i) Locating human iris in an image

ii) Possibilities for saving computation

iii) Generalized Hough Transform

Q5) a) Explain how active range finding is applied in digital heritage. **[9]**

b) Explain the variety of methods used in 3-D vision. **[9]**

OR

Q6) a) Explain hierarchical motion estimation and Fourier based alignment. **[9]**

b) Explain with comparison parametric, layered and spline-based motion. **[9]**

Q7) a) Explain face detection in detail. **[8]**

b) Explain how the views of multiple cameras are combined. **[9]**

OR

Q8) a) How background and foreground are separated in an image? **[8]**

b) Write a note on: **[9]**

i) License plate location

ii) Human gait analysis

iii) Intelligent photo editing.

Total No. of Questions : 8]

SEAT No. :

P-621

[Total No. Of Pages : 2

[6004]-573
B.E.(Information Technology)
WIRELESS COMMUNICATIONS
(414445 D) (2019 Pattern) (Semester-VII) (Elective IV)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Neat labelled diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) What is OFDM technique? Also, explain OFDMA transmitter and receiver. **[9]**

b) Explain the Principal of TDMA. What are different features of TDMA? **[9]**

OR

Q2) a) What is SDMA? Explain in detail Space Division Multiple Access Technique. **[9]**

b) How Code Division Multiple Access Technique is implanted while accessing a channel for multiple users? Support your theory with example. **[9]**

Q3) a) What is WAP? Explain Wireless Application Protocol model architecture in details. **[9]**

b) Explain SigFox protocol in details. **[8]**

OR

Q4) a) What is NFC? What are the different characteristics of NFC? **[9]**

b) What is Li-Fi? Explain the working principle of Li-Fi technology. **[8]**

P. T. O

Q5) a) Explain Bluetooth Security Architecture in detail. **[9]**

b) What is security? What are the different security issues in 1G, 2G, 3G and 4G? **[9]**

OR

Q6) a) Explain in details Visible Light Communication, Also, explain its applications. **[9]**

b) What are Wireless Security tools? Explain URH and Kismet in details.**[9]**

Q7) a) What is quantum technology? Explain quantum Technology for a 5G/6G wireless network? **[9]**

b) State and explain various applications of wireless technology. **[8]**

OR

Q8) a) Explain how 5G network works along-with its benefits. **[9]**

b) Explain Simultaneous Transmission and Reflection (STAR) for 360º coverage in details **[8]**

Total No. of Questions : 8]

SEAT No. :

P1452

[Total No. of Pages : 2

[6004]-574

B. E. (Information Technology)

DISTRIBUTED SYSTEMS

(2019 Pattern) (Semester - VIII) (414450)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Figures to right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable data, if necessary.***

Q1) a) What are the general characteristics of inter-process communication? What are various types of Synchronous and asynchronous communication in IPC? Why it is blocking receive has no disadvantages in Java. **[8]**

b) What is Network virtualization? What are the types of overlay networks? What are the various advantages of overlay networks? **[9]**

OR

Q2) a) Describe Lamport's clock algorithm and give an example of how to order events in a distributed system. What are the algorithm's limitations? **[8]**

b) Why do we need an election algorithm? Using appropriate diagrams. describe the bully algorithm step-by-step. **[9]**

Q3) a) What are the key issues in Replica Management? Explain the following with respect to content replication and placement with suitable diagram.**[9]**

i) Permanent Replicas

ii) Server-Initiated Replicas

iii) Client-Initiated Replicas

b) What is a primary-based protocol in a consistency protocol? Explain the working of replicated write protocols with active replication. **[9]**

OR

P.T.O.

Q4) a) What is checkpointing in a distributed system? Explain the working of Coordinated checkpointing recovery mechanism. **[9]**

b) What are two primary reasons for replication? Explain the causal consistency model with suitable example using distributed shared database. **[9]**

Q5) a) Describe the architecture of Sun Network File System in details. **[8]**

b) What is a Directory Service? What is the difference between DNS and x500? Describe in detail the components of X.500 service architecture. **[9]**

OR

Q6) a) Describe the design of a peer-to-peer download system designed to support very large multimedia files. How does the BitTorrent protocol operate? **[8]**

b) What are web services? Describe with a suitable diagram the general organization of the Apache web server. **[9]**

Q7) a) Explain the following in brief: **[9]**

i) Wearable devices

ii) PVM

iii) JINI

b) Explain with an application (e.g., Travel Booking Service) various key components of Service Oriented Architecture. **[9]**

OR

Q8) a) Explain in brief the following Distributed System monitoring tools: **[9]**

i) Zabbix

ii) Nagios

b) Explain in brief following Microkernels. **[9]**

i) Mach

ii) CHORUS

Total No. of Questions : 8]

SEAT No. : ____

P622

[Total No. of Pages : 2

[6004]-575

B.E. (Information Technology)
SOFTWARE DEFINED NETWORK (SDN)
(2019 Pattern) (Semester-VIII) (Elective-V) (414451A)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Black figures to the right indicate full marks.***

Q1) a) Describe various services of cloud using SDN? **[9]**

b) Describe NFV architecture and explain requirements of NFV frame work? **[9]**

OR

Q2) a) Explain various SDN applications in Network virtualization? **[9]**

b) Enlist benefits & challenges for Network Function Virtualization? **[9]**

Q3) a) Differentiate between SDN and network virtualization? **[9]**

b) Sketch and describe the wireless architecture in Data Center Network? **[9]**

OR

Q4) a) Explain SDN use cases in the data center in detail. **[9]**

b) Describe taxonomy of DCN topology & Explain Fat-Tree topology in detail? **[9]**

Q5) a) Explain security Analysis and potential attacks in SDN in detail? **[9]**

b) Enlist and describe various security principles of SDN? **[9]**

OR

P.T.O.

Q6) a) What are applications of Software Defined Network Security (SDN) Security? **[9]**

b) Demonstrate the Network Security enhancement using the SDN framework? **[9]**

Q7) a) Enlist and Explain Floodlight Controller classes of APIs? **[8]**

b) Describe importance of reactive application and explain design of reactive application? **[8]**

OR

Q8) a) Write a short note on Traffic Engineering for Service providers? **[8]**

b) Differentiate reactive versus proactive applications of SDN Applications **[8]**

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Total No. of Questions : 10]

SEAT No. : ____

P623

[Total No. of Pages : 2

[6004]-576

B.E. (Information Technology)
SOCIAL COMPUTING
(2019 Pattern) (Semester-VIII) (Elective-V) (414451(B))

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) What is data Mining? Draw and explain Architecture of a typical data mining system. **[9]**

b) What is classification? Explain with diagram. **[8]**

OR

Q2) a) Explain Hierarchical clustering Algorithm with single Linkage clustering. **[9]**

b) Write note on Text mining in social networks. **[8]**

Q3) a) Distinguish influence and Homophily. **[9]**

b) Explain in detail edge-reversal test. **[8]**

OR

Q4) a) What is measuring assortativity. **[9]**

b) Explain in detail Randomization test. **[8]**

Q5) a) What is Individual Behavior? Explain individual online behavior three categories. **[9]**

b) What is collective behavior analysis? Explain user migration in social media. **[9]**

OR

Q6) a) Write major components of behavior Analysis Methodology. **[9]**

b) Explain in details Classical Recommendation Algorithms. **[9]**

P.T.O.

Q7) a) Explain single linkage, Complete linkage, and average linkage. **[9]**

b) Difference between clustering and classification. **[9]**

OR

Q8) a) What are the node neighborhood-based methods. **[9]**

b) Explain in details Recommendation using social context. **[9]**

Q9) a) Explain in details mining Google+ **[9]**

b) Explain quality of analysis for processing Human language data. **[8]**

OR

Q10)a) Explain query Human Language Data with TF-IDF mining web pages: crawling web. **[9]**

b) Explain in detail TF-IDF. **[8]**

Total No. of Questions : 8]

SEAT No. :

P624

[Total No. of Pages : 2

[6004]-577

B.E.

INFORMATION TECHNOLOGY

Natural Language Processing

(2019 Pattern) (Semester - VIII) (414451C) (Elective - V)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) What is Lexical Semantic? What are the main approaches to meaning representative Compare and contrast them? **[8]**

b) Explain Word Sense Disambiguation. How it is handled in NLP? **[10]**

OR

Q2) a) Define cohesion and explain its role in discourse processing. **[6]**

b) Write a short note on : Relation of class model and state model. **[6]**

c) Explain Sematic meaning and its representation with respect to Indian languages. **[6]**

Q3) a) How Dependency path kernal is used in relation extraction. **[8]**

b) What is role of annotate knowledge in text reports. **[9]**

OR

Q4) a) How natural language processing is used in web search? Explain with an example. **[7]**

b) Write a note on : **[10]**

i) Frame semantics.

ii) Semantic role labeling.

Q5) a) Write algorithmic steps in detail for document separation. **[8]**

b) Write a note on : **[9]**

i) Domain knowledge.

ii) Domain Concepts.

iii) Knowledge Roles.

OR

P.T.O.

Q6) a) Give a suitable example for "Document Separation as a sequence Mapping problem". **[8]**

b) What is Role Data Preparation in Automatic Document Separation. **[9]**

Q7) a) Explain in detail working of iSTART. **[8]**

b) Write a note on Lexical resources : **[10]**

i) Stemmers.

ii) Part-of-Speech Tagger.

OR

Q8) a) Explain in detail "Evaluation of the IR System". **[6]**

b) Discuss in detail design Features of any Information Retrieval systems. **[6]**

c) How Classical Information Retrieval Models works? **[6]**

Total No. of Questions : 8] **SEAT No. :**

P1453 **[Total No. of Pages : 2**

[6004]-578

B.E. (Information Technology)

SOFT COMPUTING (Elective - V)

(2019 Pattern) (414451 D) (Semester - VIII)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answers: Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume Suitable data if necessary.***

Q1) a) What is Defuzzification? Explain any two methods of it with suitable eg. **[9]**

b) What is fuzzy logic? Enlist and explain it's application areas. **[8]**

OR

Q2) a) What is fuzzy inference system? Distinguish between Mamdani fuzzy inference system and Sugeno fuzzy inference system. **[9]**

b) What is Fuzziness? Explain the merits and demerits of fuzzy logic. **[8]**

Q3) a) What is GA? How GA is different than Multi-objective Genetic Algorithm (MOGA)? **[9]**

b) What are types of mutation and cross over techniques.? Explain in brief. **[9]**

OR

Q4) a) Explain Encoding in Genetic Algorithms in detail. **[9]**

b) How to implement GA based clustering Algorithm? **[9]**

P.T.O.

Q5) a) Explain the concept of fuzzy logic controlled Genetic Algorithms with suitable diagram. **[9]**

b) Explain Simplified Fuzzy ARTMAP with suitable case study. **[8]**

OR

Q6) a) Explain the working of Genetic Algorithm based back propagation network with suitable diagram. **[9]**

b) Compare and contrast Genetic Algorithm based Back-propagation Network and Fuzzy Logic Controlled Genetic Algorithms with suitable diagrams. **[8]**

Q7) a) Describe an application about how soft computing can be used in Information Retrieval and Semantic web. **[9]**

b) Describe how evolutionary computing is used in image processing. **[9]**

OR

Q8) Write Short Notes on following: (Any Three) **[18]**

a) Ant colony optimization (ACO)

b) Soft Computing in Software Engineering

c) Simulated Annealing

d) Particle Swarm Optimization (PSO).

Total No. of Questions : 8]

SEAT No. :

P625

[Total No. of Pages : 2

[6004]-579
B.E. (IT)
GAME ENGINEERING
(2019 Pattern) (Semester - VIII) (414451(E)) (Elective - V)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Explain Remodelling design for opponents move in gamification. **[6]**

b) Explain point system in game engineering. **[6]**

c) Explain feedback and reinforcement in game design. **[6]**

OR

Q2) a) How can game mechanics be used to enhance engagement in a specific context, such as a cricket league? **[6]**

b) How do game mechanics influence user engagement in digital products and services? **[6]**

c) What are the four objectives to accomplish on boarding? **[6]**

Q3) a) What are the "Three Levels" of rules in game design and how do they relate to gameplay? **[6]**

b) How do the "Rules of Digital Games" differ from those of traditional board or card games? **[5]**

c) What is the "Price of Anarchy" and how does it relate to network games and their outcomes? **[6]**

OR

Q4) a) What is "Partially Optimal Routing" and how does it impact network games? **[6]**

b) How do "Wardrop and Nash Equilibrium" affect the design and play of network games? **[5]**

c) What is "Selfish Routing" and how does it relate to network games? **[6]**

P.T.O.

Q5) a) What are the advantages and disadvantages of using LOVE 2D for game development, compared to other frameworks? **[6]**

b) What are some popular game engines/frameworks and what are their strengths and weaknesses? **[6]**

c) Discuss BigDoor platform? Explain any one usage of it? **[6]**

OR

Q6) a) What are some examples of successful use of BigDoor for gamification and what can we learn from them? **[6]**

b) What are some key features of Construct 2 and how they have contributed to its popularity among game developers? **[6]**

c) What are some key features of Sploder and how does it compare to other game engines in terms of ease of use and functionality? **[6]**

Q7) a) What are some ways in which game engineering can be used to create effective advertising campaigns? **[9]**

b) What are some key features of PUBG New State that distinguish it from other battle royale games? **[8]**

OR

Q8) a) How has Yahoo! used game engineering to gamify its question and answer platform? **[9]**

b) What are some of the unique challenges faced by game developers when designing and engineering block chain-based games? **[8]**

Total No. of Questions : 8]

SEAT No. :

P-1348

[Total No. of Pages : 2

[6004]-580A

B.E. (Information Technology)

ETHICAL HACKING AND SECURITY

(2019 Pattern) (414452A) (Semester - VIII) (Elective - VI)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answers: Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume Suitable data, if necessary.***

Q1) a) What is Metasploit? Explain Reconnaissance with Metasploit. **[6]**

b) Explain Browser Exploitation with an example. **[6]**

c) Explain Password Cracking Websites and Tools. **[6]**

OR

Q2) a) Explain Port Scanning with Metasploit. **[6]**

b) Explain PDF Hacking with an example. **[6]**

c) Explain Spyware in detail. **[6]**

Q3) a) Differentiate between Horizontal vs. Vertical Privilege Escalation. **[6]**

b) Explain Privilege Escalation on Windows with Examples. **[6]**

c) What is Authentication Bypass? Give an example. **[6]**

OR

P.T.O.

Q4) a) Differentiate between Vulnerabilities and Exploits. **[6]**

b) Give short notes on Malware and Social Engineering. **[6]**

c) Explain Linux Privilege Escalation with an example. **[6]**

Q5) a) What is Hacking? Explain any two Website Hacking Applications. **[6]**

b) Explain Cross-Site Request Forgery (CSRF). **[6]**

c) Explain the Denial of Service (DoS) attack. **[5]**

OR

Q6) a) Explain SQL Injection & Code Injection. **[6]**

b) Explain any two Applications used for Securing Modern Websites. **[6]**

c) Explain any three Web Application Security Risks. **[5]**

Q7) a) What is Wireless Security? Explain the working of Wireless Security. **[6]**

b) Explain Wired Equivalent Privacy (WEP) Protocol. **[6]**

c) Explain Threats to Wi-Fi Security. **[5]**

OR

Q8) a) What is Wi-Fi Hacking? Explain Essential Tools for Hacking Wireless Networks. **[6]**

b) What is Network Sniffing? Explain Types of Network Sniffers. **[6]**

c) Explain the Evil Twin attack. **[5]**

Total No. of Questions : 8]

SEAT No. :

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[6004]-581

B.E. (Information Technology)

AUGMENTED AND VIRTUAL REALITY

(2019 Pattern) (Semester - VIII) (414452B) (Elective - VI)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume Suitable data if necessary.***

Q1) a) Explain Perception of colors in detail. **[9]**

b) Describe different motion detection mechanism in detail. **[9]**

OR

Q2) a) Explain Ray Tracing and Shading Models in detail. **[9]**

b) Explain Three categories of tracking in VR systems. **[9]**

Q3) a) How does Augmented Reality Work? Explain with suitable example. **[9]**

b) Describe different applications of Augmented Reality. **[8]**

OR

Q4) a) Define Augmented Reality? Explain History of Augmented Reality. **[8]**

b) Describe different hardware components used in augmented reality. **[9]**

Q5) a) What is hybrid tracking? Explain with suitable examples. **[9]**

b) What is role of sensor in tracking? Explain in detail. **[9]**

OR

Q6) a) List and explain characteristics of Tracking Technology. **[9]**

b) Describe Spatial Display Model in detail. **[9]**

P.T.O.

Q7) a) What is natural-feature tracking? Describe with any one application. **[9]**

b) What is simultaneous localization and mapping in AR? **[8]**

OR

Q8) a) What software is used for augmented reality? Explain in detail. **[9]**

b) What is marker tracking in AR? Explain in detail. **[8]**

Total No. of Questions : 8]

SEAT No. :

P-628

[Total No. of Pages : 2

[6004]-582

B.E. (Information Technology)

BUSINESS ANALYTICS AND INTELLIGENCE

(2019 Pattern) (Semester - VIII) (414452C) (Elective - VI)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume Suitable data if necessary.***

Q1) a) Discuss with appropriate examples the various types of dashboard. **[8]**

b) What is a Balanced Scorecard? Discuss the four perspectives of a balanced scorecard. **[6]**

c) Discuss use of Tableau as a Business Intelligence (BI) tool. **[4]**

OR

Q2) a) Write a note on Business Performance Management. **[6]**

b) Discuss the common pitfalls in dashboard design. **[6]**

c) Discuss the use of Power BI as a Business Intelligence (Bl) tool. **[6]**

Q3) a) Write a note on : **[9]**

i) Multiple Goals

ii) Sensitivity Analysis

iii) What-If Analysis and Goal Seeking

b) What is predictive analytics? Explain the importance of predictive analytics with the help of an example. **[5]**

c) To which kind of problems are decision trees most suitable? Explain with appropriate example. **[4]**

P.T.O.

OR

Q4) a) Discuss Mathematical Programming Optimization with an example. **[5]**

b) Enlist the benefits of Decision Modeling with Spreadsheets. **[4]**

c) Write short note on : **[9]**

i) Certainty

ii) Uncertainty

iii) Risk

Q5) a) Enlist the advantages of using Business Intelligence in Finance. **[4]**

b) With the help of a real time case study explain the applications of Business Intelligence in the Retail Industry. **[7]**

c) Explain the importance of Business Intelligence in the Telecommunication domain with respect to any real time case study. **[6]**

OR

Q6) a) Discuss the real time Applications of BI in Customer Relationship Management with appropriate case study. **[6]**

b) Discuss the real time Applications of BI in Banking with appropriate case study. **[5]**

c) Write a short note on: ERP and Business Intelligence. **[6]**

Q7) a) What are rich reports? How are rich reports helping organizations to have a competitive advantage over their competitors. **[6]**

b) Discuss the Analytical Applications for Consumers with respect to online shopping websites. **[5]**

c) With respect to digital marketing platforms explain the application of BI in marketing. **[6]**

OR

Q8) a) Write a short note on: Issues of legality, Privacy and Ethics. **[6]**

b) Discuss the Emerging Technologies and their impacts in the domain of business analytics & business intelligence. **[5]**

c) Explain BI Search and Text Analytics with the help of diagram. **[6]**

Total No. of Questions : 8]

SEAT No. :

P-629

[Total No. of Pages : 2

[6004]-583

B.E. (Information Technology)

BLOCKCHAIN TECHNOLOGY

(2019 Pattern) (Semester - VIII) (414452D) (Elective - VI)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) What is Smart Contract? Explain types of Smart Contracts. **[7]**

b) What is Ethereum? Give it's comparison with Bitcoin. **[6]**

c) State and explain the various components of Ethereum. **[5]**

OR

Q2) a) What is Ethereum? Explain. **[7]**

b) Write Short Note on : **[6]**

i) Ethereum Virtual Machine: EVM.

ii) Ethereum Programming Languages

iii) Runtime Byte Code

c) Explain solidity in detail. **[5]**

Q3) a) Draw and Explain the Architecture of Hyper ledger Fabric System. **[6]**

b) What is Hyper ledger? Describe features of a Hyper ledger blockchain. **[6]**

c) Differences between Ethereum & Hyper ledger blockchain platforms. **[5]**

OR

Q4) a) State and explain benefits of Hyper ledger Fabric. **[6]**

b) How Does Hyper Ledger Fabric Work? Explain. **[6]**

c) What is Hyperledger Technology and Hyperledger fabric? **[5]**

P.T.O.

Q5) a) Short note on : **[7]**

i) Tokenizing Shares and Fund Raising

ii) Challenges to tokenization

b) State and explain different types of Consensus algorithm. **[6]**

c) How blockchain tokenization can help in enterprise systems? Elaborate. **[5]**

OR

Q6) a) What is token? Describe technology behind tokenization. **[7]**

b) Describe the Consensus mechanism in brief. **[6]**

c) Discuss following consensus algorithms used in blockchain technology. **[5]**

i) Proof of work

ii) Proof of activity

Q7) a) Explain blockchain applications in Supply Chain Financing. **[6]**

b) Explain different aspects of Risks and Limitations of Blockchain. **[6]**

c) State and explain different aspect of healthcare where Blockchain Technology can be used. **[5]**

OR

Q8) a) Explain role blockchain applications in Health Insurance. **[6]**

b) What are the selection Criteria for Blockchain platform for Applications? Explain. **[6]**

c) Explain the "Evil Sides" of Blockchain and Legal Regulations for Blockchain. **[5]**

Total No. of Questions : 8]

SEAT No. :

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[Total No. of Pages : 2

[6004]-584

B.E. (Instrumentation & Control)

PROCESS CONTROL TECHNIQUES

(2019 Pattern) (Semester - VII) (406261)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***
5) ***Use of calculator is allowed.***

Q1) a) Derive closed loop transfer function of feedback control loop and state its closed loop stability condition. **[8]**

b) Determine closed loop stability conditions of PI controller for given first order plant Gp(s) for set point change. **[9]**

$$G_p(s) = \frac{k_p}{\tau_p s + 1}$$

OR

Q2) a) List and explain control performance measures in feedback control loop in detail. **[8]**

b) Discuss procedure for tuning of PI Controller using Zeigler-Nichols closed loop method for any suitable plant transfer function. **[9]**

Q3) a) Discuss Feed-Forward and Feedback-Feedforward control with suitable example. **[9]**

b) Explain ratio control configurations using multiplier and divider. **[9]**

P.T.O.

OR

Q4) a) With neat sketch explain cascade control and its application. **[9]**

b) Illustrate split range control with suitable example. **[9]**

Q5) a) Explain relative gain array (RGA) and its important properties. Also discuss procedure for determination of RGA. **[10]**

b) Discuss design of static and dynamic decoupler in multivariable control system. **[7]**

OR

Q6) a) Discuss procedure for calculation of λ. Calculate λ for below process model and comment on loop interaction and pairing. **[10]**

$$G_p(s) = \begin{bmatrix} \dfrac{-2e^{-s}}{10s+1} & \dfrac{1.5e^{-s}}{s+1} \\ \dfrac{1.5e^{-s}}{s+1} & \dfrac{2e^{-s}}{10s+1} \end{bmatrix}$$

b) Analyze the direct and indirect effect of interaction with help of 2×2 systems. **[7]**

Q7) a) By using direct synthesis method determine PID structure and its settings for FOPDT model. **[10]**

b) Discuss PID controller design for the FOPDT model using IMC method. **[8]**

OR

Q8) a) With neat block diagram discuss model predictive controller and IMC based PID controllers. **[10]**

b) Explain Smith Predictor technique for compensation of delay time. **[8]**

✷ ✷ ✷

Total No. of Questions : 8]

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[6004]-586

B.E. (Instrumentation & Control)

PROJECT ENGINEERING AND MANAGEMENT

(2019 Pattern) (Semester - VII) (406262)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of logarithmic tables slide rule, mollier charts, electronic pocket calculator and steam table is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) Illustrate the significance of Risk Management Plan with appropriate example. Comment on prioritize of Risks. **[9]**

b) State the importance of tender document and indicate the information provided in the tender notice with suitable example. **[8]**

OR

Q2) a) State the role of Project Procurement Management & Project Procurement Plan and discuss with suitable example. **[9]**

b) How to create and implement a successful procurement Plan clarify with suitable example. **[8]**

Q3) a) Enlist various risk identification methods used for small projects and cite their sources with suitable example. **[9]**

b) Draw ISA symbols used in P & ID Diagram for following data. **[9]**

Pneumatic signal line, Ultrasonic guided signal, Two way valves fail open, Relief valve, Pressure Reducing regulator with external tap, shared signal from field to control Room, High selector & High Limiter (SAMA) Symbol, Level Regulator with mechanical linkage, Flow Element in line.

OR

Q4) a) What are the FEED documents? Elaborate in detail Instrument schedule and I/O schedule. **[9]**

b) State the significance of Instrument layout & Junction box layout with suitable example. **[9]**

P.T.O.

Q5) a) Elaborate Instrument layout & Junction box layout with suitable example. **[9]**

b) Illustrate the importance of Cable identification schemes and Cable trays used in detail engineering design. **[8]**

OR

Q6) a) Develop loop wiring diagram for any typical process. **[9]**

b) Prepare Manufacturing bill of material (MBOM) for any one application. **[8]**

Q7) a) Illustrate the installation and commissioning activities of the plant and documents require at this stage. **[9]**

b) State the importance of loop wiring diagram prepare the loop wiring diagram according to ISA S-5.4 for flow loop control. **[9]**

OR

Q8) a) Prepare a factory acceptance test (FAT) for a control panel. **[9]**

b) Elaborate the importance of Factory Acceptance Test (FAT) with suitable example. **[9]**

Total No. of Questions : 8]

SEAT No. :

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[6004]-587

B.E. (Instrumentation & Control)
DIGITAL IMAGE PROCESSING
(2019 Pattern) (Semester - VII) (Elective - III) (406263(A))

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Neat diagrams should be drawn wherever necessary.***
3) ***Use of Non-programmable Calculator is allowed.***
4) ***Assume suitable data, if necessary.***

Q1) a) Write a short note on linear stretching. **[8]**

b) Explain the role of high pass filtering in image sharpening. **[9]**

OR

Q2) a) Explain the image averaging technique. **[8]**

b) Explain low contrast stretching. **[9]**

Q3) a) Explain image pattern and pattern classes. **[9]**

b) Explain the need of classifiers in image processing. Draw the flow using any application. **[9]**

OR

Q4) a) How the image is represented. Explain the methods in detail. **[9]**

b) Explain the role of image descriptors in image processing. **[9]**

Q5) a) Write a short note on Vector Quantization. **[8]**

b) Explain the arithmetic coding for image processing. **[9]**

P.T.O.

OR

Q6) a) Explain the RLE compression technique. **[9]**

b) Explain the properties in image compression schemes. **[8]**

Q7) a) Explain the role of image processing in biometrics. **[9]**

b) How image processing is used in military application. **[9]**

OR

Q8) a) Explain the application in image processing in agriculture field. **[9]**

b) Write a short note on application of image processing in bio-medical engineering. **[9]**

Total No. of Questions : 8]

SEAT No. :

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B.E. (Instrumentation & Control)

DATA ANALYTICS

(2019 Pattern) (Semester - VII) (Elective - III) (406263B)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates :

1) ***All questions are compulsory.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of Logarithmic tables, electronic Pocket calculator and steam table is allowed.***
5) ***Assume suitable data if necessary***

Q1) a) What is regression? Explain linear regression with suitable example. **[8]**

b) Explain Apriori algorithm-with suitable example **[9]**

OR

Q2) a) Following is a list of five transactions that include items A, B, C, and D:
T1 : { A,B,C } T2 : { A,C } T3 : { B,C } T4 : {A,D } T5 : { A,C,D }
Which itemsets satisfy the minimum support of 2. **[8]**

b) Explain logistic regression. Explain use cases of logistic regression. **[9]**

Q3) a) Explain decision tree with suitable example. **[9]**

b) Explain Bayes them with application. **[9]**

OR

Q4) a) How Naive Baye's classification works? Give its applications. **[9]**

b) Explain the following with their significance: **[9]**

i) Entropy

ii) Information gain

iii) Gain ratio

P.T.O.

Q5) a) Explain Challenges in data visualization. **[9]**

b) Explain any three techniques for visual representation of data. **[9]**

OR

Q6) a) Which are conventional data visualization tools. Explain them in brief. **[9]**

b) Explain tools used for data visualization. **[9]**

Q7) a) What is Map-Reduce? Explain working of Map-Reduce with example. **[8]**

b) Explain Hadoop Distributed File System. **[9]**

OR

Q8) a) What are four major categories of NOSQL Tools. **[9]**

b) Explain following terms: **[8]**

i) Pig

ii) Hive

iii) HBase

iv) Mahout

Total No. of Questions : 8]

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[6004]-589

B.E. (Instrumentation & Control)
WIRELESS SENSOR NETWORKS
(2019 Pattern) (Semester - VII) (Elective - III) (406263C)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Answers Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Elaborate flooding strategies of routing protocol in wireless sensor networks. **[9]**

b) Analyze polling based, reservation based and token passing in MAC protocol. **[9]**

OR

Q2) a) Elaborate flooding traffic implosion problem in routing protocol. **[9]**

b) Suggest suitable routing algorithm designed to collect and deliver data to the data sink (Base station). Justify it. **[9]**

Q3) a) Suggest with neat sketch suitable connection oriented and connectionless TCP protocol. **[9]**

b) Explain with neat sketch UDP protocol. **[8]**

OR

Q4) a) What are the design issues in TCP protocol? **[9]**

b) Summarize the following terms with respect to TCP protocol: **[8]**

- ACK
- Packet transmission

P.T.O.

- Delivery ACK
- Retransmission of packets
- Order delivery
- Congestion control

Q5) a) Analyze the architecture of Middleware protocol. **[9]**

b) Analyze Wireless sensor networks middleware principle with neat sketch. **[9]**

OR

Q6) a) Justify the IrisNet is a two-tier architecture. **[9]**

b) Explain with neat sketch Middleware Linking Applications and Networks. **[9]**

Q7) a) Elaborate Layer wise attack in wireless sensor networks **[9]**

b) Elaborate design issues and ctallenges in Ad-Hoc network **[8]**

OR

Q8) a) Suggest suitable possible solution for jamming. Justify with neat sketch. **[9]**

b) Elaborate SPINS reliability requirements in sensors Networks. **[8]**

Total No. of Questions : 8]

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B.E. (Instrumentation & Control)
PROCESS MODELLING AND OPTIMIZATION
(2019 Pattern) (Semester - VII) (Elective - III) (406263-D)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***All questions are compulsory.***
2) ***Answers to the two sections should be written in seperate answer books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Black figures to the right indicate full marks.***
5) ***Use of logarithmic tables, slide rule, Mollier charts, electronic Pocket calculator and steam tables is allowed.***
6) ***Assume suitable data, if necessary.***

Q1) a) Explain pulse testing method. **[9]**

b) Explain merits and demerits of step and sine wave testing. **[8]**

OR

Q2) a) Explain relationships among time, Laplace and frequency domain. **[8]**

b) Explain sin wave testing method. **[9]**

Q3) a) Determine the stability of a 2 × 2 process with a diagonal feedback controller given as: **[9]**

$$G_m = \begin{bmatrix} 3 & 10 \\ 1 & 5 \end{bmatrix} \text{ and } B_s = \begin{bmatrix} 2 & 0 \\ 0.5 & 1 \end{bmatrix}.$$

b) Explain Nyquist plot for determining stability of multivariable process. **[9]**

OR

P.T.O.

Q4) a) How interaction between loops can be determine? Explain limitation of method. **[9]**

b) For the system given Find NI for this comment on stability also find proper paring of control and manipulated variables **[9]**

$$\begin{bmatrix} x \\ \mathrm{Y} \end{bmatrix} = \begin{bmatrix} 10\dfrac{e^{-3s}}{(5s+1)} & \dfrac{e^{-2s}}{(s+1)} \\ 2\dfrac{e^{-5s}}{s+1} & 7\dfrac{e^{-2s}}{(5s+1)} \end{bmatrix} \begin{bmatrix} \mathrm{P} \\ \mathrm{Q} \end{bmatrix}$$

Q5) a) For the functions given below, analyze the concavity and convexity in each ease. **[9]**

i) $f(x_1, x_2) = x_1^2 + x_2^2 + x_2^2$

ii) $f(x) = x_1^2 + 5x_1x_2 + 4x_2^2 + 2x_1 + 6x_2 + 2$

iii) $f(x) = x + 3x^2 + 6x^3$

b) What is constraints in optimization? Explain constrained and Unconstrained objective function with example. **[8]**

OR

Q6) a) How to find extremum of the objective functions and also explain it's importance. **[8]**

b) Explain quadratic approximation. **[9]**

Q7) a) Explain polynomial approximation method. **[9]**

b) Explain scanning and bracketing procedure for optimization of unconstrained problem. **[9]**

OR

Q8) a) Explain unidirectional search method for optimization. **[9]**

b) What is optimization? Explain the need of optimization with suitable example. **[9]**

Total No. of Questions : 8]

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[6004]-591
B.E.(Instrumentation & Control)
CLOUD COMPUTING
(406264 A) (2019 Pattern) (Semester-VII) (Elective IV)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates :

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Analyze the architecture of Virtual Machine with its brief operations. **[9]**

b) Comment on "Although virtualization in widely accepted today, it does have its limits". **[9]**

OR

Q2) a) Justify "Virtualization is the wave of the future". Explicate the process of CPU, memory and I/O device virtualization in data center. **[9]**

b) How hypervisor are works in cloud computing. **[9]**

Q3) a) Summarize the steps to create EBS volume snapshot? **[9]**

b) Elaborate the security products and features that are available in VPC?**[8]**

OR

Q4) a) Illustrate the storage of amazon EC2 instance? **[9]**

b) Comment on the performance expections by customer on Elastic Block Storage . **[8]**

P. T. O

Q5) a) Comment on: **[9]**

i) WSN: a driving force of IoT and cloud computing

ii) IAM: Identity and Access Management in cloud computing

iii) Significance of GPS in IoT.

b) Smart building is one of the major application of IoT and cloud computing. Elaborate with suitable diagram and examples. **[9]**

OR

Q6) a) Illustrate the RFID Tags and Device components? **[9]**

b) Justify "Availability is one of the most important security measure in IoT and cloud computing". **[9]**

Q7) a) Comment on: **[9]**

i) Location aware applications.

ii) Energy aware cloud computing

iii) Intelligent fabrics and paints.

b) Justify the impact of cloud on operating system in future. **[8]**

OR

Q8) a) Elaborate the docker with respect to process simplification, Broad support and Adoption, architecture. **[9]**

b) Comment on: **[8]**

i) Mobile Cloud Computing.

ii) Jungle Computing

Total No. of Questions : 8]

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B.E.(Instrumentation & Control)
SOFT COMPUTING
(406264 B) (2019 Pattern) (Semester-VII) (Elective-IV)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates :

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Neat labelled diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Difference between Crisp Set and Fuzzy Set. **[8]**

b) For the following fuzzy sets, find Union, Intersection and Complement operation

A={(X1,0.6), (X2,0.2), (X3, 1), (X4, 0.4)}

B={(X1,0.1), (X2,0.8), (X3, 0), (X4, 0.9)} **[9]**

OR

Q2) a) What is Fuzzy Logic? State the characteristics of Fuzzy Logic. **[8]**

b) Explain the following properties in Fuzzy Sets

i) Commutativity

ii) Associativity

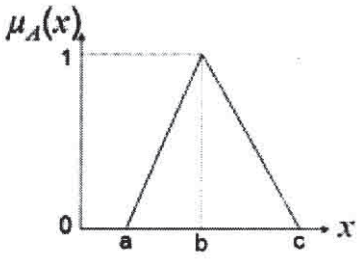
iii) Demorgan's Law **[9]**

Q3) a) Explain the Fuzzy Inference system with a labeled block diagram. **[8]**

b) What is membership function? **[9]**

For given values, a=2, b=6 and c=10. compute the fuzzy value corresponding to x = 8.

P. T. O



OR

Q4) a) What is Fuzzy implication? Explain with example. **[8]**

b) What is the purpose of Defuzzification? Explain any one method of Defuzzification.. **[9]**

Q5) a) Appraise the fuzzy system for speed control in smart car. **[9]**

b) Expalin a Fuzzy Logic Control System with an example. **[9]**

OR

Q6) a) Discuss on the static and dynamic properties of Fuzzy Controller. **[9]**

b) Construct a Fuzzy Controller with a suitable block diagram for a washing machine application. **[9]**

Q7) a) Elaborate the Neuro-Fuzzy method to learn fuzzy classification rules from data. **[9]**

b) Explain the architecture of Neuro-Fuzzy system with a labeled diagram.**[9]**

OR

Q8) a) What is the need to use Fuzzy Logic in Neural Network? Mention a commercial example of Neural trained Fuzzy System. **[9]**

b) Write a note on Fuzzified CMAC based self-learning controllers. **[9]**

Total No. of Questions : 8]

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B.E.(Instrumentation & Control)

AUTOMOTIVE INSTRUMENTATION

(406264 C) (2019 Pattern) (Semester-VII) (Elective IV)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of Calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) List passive safety systems. Explain any two passive safety systems. **[9]**

b) State the components of automatic high beam safety system in vehicle. Describe the working of its electronic system with neat block diagram. **[9]**

OR

Q2) a) State the difference between active and passive safety system in vehicle. Draw and explain the block diagram of pre-collision safety system. **[9]**

b) List different active safety systems. Explain any one active safety system with neat diagram. **[9]**

Q3) a) Define protocol. State the role of protocols in vehicles. Explain LIN protocol. **[9]**

b) Explain FlexRay communication protocol application in vehicles. **[8]**

OR

Q4) a) Explain the architecture of CAN communication protocol with neat diagram. **[9]**

b) Describe the application of Media Oriented Systems Transport (MOST) protocol in automotive with diagram. **[8]**

P. T. O

Q5) a) Explain in detail the role of inverter in electric vehicle with neat diagram. **[9]**

b) Elaborate the infrastructure required for electric vehicles. **[9]**

OR

Q6) a) Explain driving cycle and range with reference to electric vehicle. **[8]**

b) What is axial flux motor? Explain various components of axial flux motor with the working of motor. **[10]**

Q7) a) What is the role of IOT in vehicles. Explain vechicle to vehicle (V2V) communication technology in detail. **[9]**

b) Explain vehicle to infrastructure (V2I) communication network in vehicles. **[8]**

OR

Q8) a) With the help of neat block diagram, Explain the working of Vehicle to pedestrians (V2P) communication network system. **[8]**

b) State the advantages of IOT in automotive. Explain Vehicle to network (V2N) communication network in vehicles. **[9]**

Total No. of Questions : 8]

SEAT No. :

P-639

[Total No. of Pages : 3

[6004]-594

B.E. (Instrumentation & Control)

Advanced Control System

(2019 Pattern) (Semester - VII) (406264D) (Elective - IV)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams should be drawn wherever necessary.***
3) ***Use of Non- programmable Calculator is allowed.***
4) ***Assume suitable data if necessary.***

Q1) a) Derive the equation for the solution of the state space. **[8]**

b) Find the state model for the given transfer function using direct programming. Draw the state diagram also. **[10]**

$$\frac{Y(z)}{R(z)} = \frac{z+2}{z^2+10z+25}$$

OR

Q2) a) For a system with the state equation, **[8]**

$$\begin{bmatrix} x_1(k+1) \\ x_2(k+1) \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ -5 & -7 \end{bmatrix} \begin{bmatrix} x_1(k) \\ x_2(k) \end{bmatrix} \text{and } x(0) = \begin{bmatrix} 1 \\ 1 \end{bmatrix}.$$

Find the state transition matrix.

b) For a system with the state equation, $x(k + 1) = Gx(k) + Hu(k)$ and $y(k) = cx(k)$, where **[10]**

$$G = \begin{bmatrix} 1 & 0 & 0 \\ -3 & 1 & 2 \\ 1 & 1 & 4 \end{bmatrix}, \; H = \begin{bmatrix} 0 \\ 1 \\ 1 \end{bmatrix} \text{ and } C = \begin{bmatrix} 1 & 1 & 1 \end{bmatrix}.$$

Find the pulse transfer function.

P.T.O.

Q3) a) Explain the following terms : **[8]**

i) Full Order State Observer.

ii) Minimum Order State Observer

iii) Reduced Order State Observer

b) Find the state controllability, state observability and output controllability for the given system. **[9]**

$$x(k+1)=\begin{bmatrix}0 & 1\\ 10 & 25\end{bmatrix}x(k)+\begin{bmatrix}0\\ 1\end{bmatrix}u(k)$$

$$y(k)=\begin{bmatrix}1 & 0\end{bmatrix}x(k)$$

OR

Q4) a) Explain the duality property of the controllability and observability. **[5]**

b) Find the state feedback gain matrix for the system, $x(k + 1) = Gx(k) + Hu(k)$ and $y(k) = cx(k)$, with **[12]**

$$G=\begin{bmatrix}0 & 0 & -6\\ 1 & 0 & -11\\ 0 & 1 & -6\end{bmatrix},\ H=\begin{bmatrix}1\\ 0\\ 0\end{bmatrix} \text{ and } C=\begin{bmatrix}0 & 0 & 1\end{bmatrix}$$

the system is placed at the desired pole locations at, $-0.5 \pm j0.5, 2$

Q5) a) Explain the following terms : **[9]**

i) Positive definiteness.

ii) Positive semi-definiteness.

iii) Negative definiteness.

b) Determine the stability of the equilibrium state of the following system using Lyapunov method, **[8]**

$$\dot{x}=\begin{bmatrix}-9 & 0\\ -0 & -9\end{bmatrix}x(t)$$

OR

Q6) a) Write a short note on, Lyapunov's direct and second method for stability analysis of Continuous and Discrete Time LTI systems. **[9]**

b) Determine the stability of the equilibrium state of the following system using Lyapunov method, **[8]**

$$\begin{bmatrix} x_1(k+1) \\ x_2(k+2) \end{bmatrix} = \begin{bmatrix} -1 & 2 \\ -6 & -5 \end{bmatrix} \begin{bmatrix} x_1(k) \\ x_2(k) \end{bmatrix}$$

Q7) a) Explain the characteristics of non-linear systems. **[9]**

b) Explain the concept of singular points and their types. **[9]**

OR

Q8) a) Explain the method for construction of phase trajectory with example. **[9]**

b) Write a short note on phase plane analysis. **[9]**

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Total No. of Questions : 8]

SEAT No. : [ ]

P1425

[Total No. of Pages : 2

[6004]-595

B.E. (Instrumentation & Control)

PROCESS INSTRUMENTATION

(2019 Pattern) (Semester-VIII) (406268)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Figures to the right side indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable data, if necessary.***
5) ***Use of calculator is allowed.***

Q1) a) Develop suitable control strategy for distillation column pressure control. **[7]**

b) Develop cascade control scheme for top product composition control in distillation. **[10]**

OR

Q2) a) How reflux is important in continuous distillation. Why it is difficult to control? **[7]**

b) Develop inferential control for composition control of distillate. **[10]**

Q3) a) Develop control strategy used in spray dryer with neat control diagram.**[7]**

b) Develop suitable selective control strategy for multi-effect evaporators.**[10]**

OR

Q4) a) Develop suitable feedback control strategy for multi-effect evaporators.**[7]**

b) Develop cascade control scheme for dryer control. **[10]**

Q5) a) Develop time sequence diagram for batch reactor control. **[8]**

b) Develop temperature on temperature cascade control strategy for temperature control in exothermic reactors with neat diagram. **[10]**

OR

P.T.O.

Q6) a) Comment on recipe, formula, lot and procedure **[8]**

b) Develop temperature on flow cascade control strategy for temperature control in endothermic reactors with neat diagram. **[10]**

Q7) a) Develop appropriate controller for multiple pump control. **[8]**

b) Elaborate surge phenomenon with neat sketch. **[10]**

OR

Q8) a) Develop on-off level control in dual pump station. **[8]**

b) Develop anti-surge control system for compressors. **[10]**

Total No. of Questions : 8]

SEAT No. :

P2752

[Total No. of Pages : 2

[6004]-596

B.E. (Instrumentation and Control)
ADVANCED EMBEDDED SYSTEM
(2019 Pattern) (Semester -VIII) (406269)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2 Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Draw a neat block diagram of ARM-7 microcontroller and elaborate its operation in brief. **[9]**

b) Describe on chip ADC configuration process for ARM-7 processor. **[8]**

OR

Q2) a) Elaborate with neat sketch, 3-stage pipelining of ARM-7 **[9]**

b) Differentiate between interrupts and exceptions. **[8]**

Q3) a) Draw a neat block diagram and elaborate ARM Bus Technology. **[9]**

b) Draw the neat interfacing diagram elaborate the operation of 16×2 LCD interfacing with LPC 2148. **[9]**

OR

Q4) a) Draw a neat block diagram and Describe ARM memory architecture. **[9]**

b) Draw the neat interfacing diagram elaborate the operation of stepper motor interfacing with LPC 2148. **[9]**

Q5) a) Draw the neat interfacing diagram and elaborate the operation of GSM module interfacing with LPC 2148. **[9]**

b) Describe the function of EQU, ENTRY, EXPORT, and AREA assembler directives. **[8]**

OR

Q6) a) Draw the neat interfacing diagram elaborate the operation of Bluetooth module interfacing with LPC2148. **[9]**

b) Elaborate register usage in thumb. Justify how code density will be improved using Thumb. **[8]**

P.T.O.

Q7) Identify different parameters for health monitoring system. Develop the system using LPC2148 ARM-7 microcontroller to display the parameters. Provide the facility to communicate the information through zig-bee module. For this system.

a) Identify different parameters for health monitoring system. **[3]**

b) Enlist selected sensors. **[3]**

c) Develop block diagram. **[4]**

d) Elaborate the operation of the system with respect to block diagram. **[4]**

e) Develop the algorithm for the system. **[4]**

OR

Q8) It is decided to design smart home system. Identify different parameters for smart home system. Develop the system using LPC2148 ARM-7 microcontroller to display the parameters on LCD display. Provide the facility to communicate the information through SMS. For this system.

a) Identify different parameters for smart home system. **[3]**

b) Enlist selected sensors. **[3]**

c) Develop block diagram. **[4]**

d) Elaborate the operation of the system with respect to block diagram. **[4]**

e) Develop the algorithm for the system. **[4]**

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Total No. of Questions : 8]

SEAT No. : ____

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[Total No. of Pages : 2

[6004]-597

B.E. (Instrumentation & Control)
ELECTRIC VEHICLES
(2019 Pattern) (Semester-VIII) (Elective-V) (406270(A))

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Elaborate Basic Concept of electric traction. **[9]**

b) Analyze electric propulsion unit. **[9]**

OR

Q2) a) List electric components used in hybrid and electric vehicles. **[9]**

b) Draw & explain configuration and control of DC motor drives. **[9]**

Q3) a) Elaborate energy storage requirements in Hybrid and Electric Vehicles. **[9]**

b) Analyze following systems : Battery based energy storage. **[9]**

OR

Q4) a) Explain following components with respect to sizing: Power electronics. **[9]**

b) Explain following components with respect to sizing : Selecting the energy storage technology. **[9]**

Q5) a) What are Driving Cycles? Brief about types of driving cycles. **[9]**

b) Analyze Range modelling for : Battery electric vehicle. **[9]**

OR

Q6) a) Discuss range modelling for : Hybrid (ICE & others). **[9]**

b) Explain Range modelling for : Combustion engine vehicles. **[9]**

P.T.O.

Q7) a) Examine the energy management strategies used in hybrid and electric vehicles. **[8]**

b) Classify different energy management strategies. **[8]**

OR

Q8) a) Differentiate different energy management strategies. **[8]**

b) Analyze implementation issues of energy management strategies. **[8]**

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Total No. of Questions : 8]

SEAT No. :

P-1426

[Total No. of Pages : 2

[6004]-598

B.E. (Instrumentation & Control Engineering)

SAFETY INSTRUMENTATION SYSTEMS

(2019 Pattern) (Semester - VIII) (406270B) (Elective - V)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume Suitable data if necessary.***

Q1) a) Describe with neat block diagram of ideal & reality protection layer. **[9]**

b) What is mean by Scrubbers and Flares? Describe with neat block diagram the Wet Scrubber process. **[9]**

OR

Q2) a) Elaborate the Evacuation Procedure of the safety in detail. **[9]**

b) Discuss the SIS related to Fire and Gas (F&G) Systems. **[9]**

Q3) a) Describe As Low As Reasonably Practical (ALARP) SIL determination method. **[9]**

b) Examine the Layer of Protection Analysis (LOPA) assessment with neat block diagram. **[9]**

OR

Q4) a) Discuss the Risk Matrix of SIL determination method with neat diagrams. **[9]**

b) What is a Safety Integrity Level (SIL), and how is it used to manage risk in industrial processes? **[9]**

P.T.O.

Q5) a) What are failure modes, and how are they classified in terms of their impact on safety and reliability? **[8]**

b) Elaborate the Fault Tree analysis with the help of block diagram. **[9]**

OR

Q6) a) Describe the failure rate with the help of Bathtub curve. **[8]**

b) Define the mean time between failures (MTBF), and how is it related to failure rate and the overall reliability of an SIS? **[9]**

Q7) a) Elaborate the Scope of Analysis of safety life cycle. **[8]**

b) Discuss the Case Description of Furnace/Fired Heater Safety Shutdown System. **[9]**

OR

Q8) a) Discuss the Installation, Commissioning and Pre-startup Tests. **[8]**

b) Elaborate the Operation and Maintenance Procedures for safe operation. **[9]**

Total No. of Questions : 8]

SEAT No. :

P641

[Total No. of Pages : 2

[6004]-599

B.E. (Instrumentation and Control)
RENEWABLE ENERGY SYSTEM
(2019 Pattern) (Semester-VIII) (Elective-V) (406270C)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Use of calculator is allowed.***

SECTION-I

Q1) a) State the significance of energy storage system in renewable system. Elaborate the working of Lead Acid Rechargeable battery with neat diagram. **[10]**

b) Elaborate the working of Fuel cell with neat diagram. **[7]**

OR

Q2) a) State the significance of batteries in Renewable System. Elaborate on the charging technique for batteries with neat diagram. **[10]**

b) Elaborate the working of Fly wheel with neat diagram. **[7]**

Q3) a) What is solar panel? How solar panel is manufactured from solar cell? Elaborate on the Solar panel selection and array design. **[10]**

b) With a block diagram, explain the working of solar panel mounting and tracking. **[8]**

OR

Q4) a) What is Solar Tracker? State the need of Solar Tracker? Explain the working of Solar Tracker with neat diagram. **[10]**

b) Draw and explain the working of series and parallel operation of Solar Panels. State the advantages of series and Parallel Connection of solar panel. **[8]**

P.T.O.

Q5) a) State the applications of renewable energy. Explain the working of solar water cooker with neat diagram. **[10]**

b) Elaborate on the working of roof top solar photo voltaic system with neat diagram. **[7]**

OR

Q6) a) Justify how renewable energy is efficient from application point of view. Elaborate on the working of solar water pump with neat diagram. **[10]**

b) Elaborate on the working of solar electric vehicles with neat diagram. **[7]**

Q7) a) State the significance of wind energy. Describe the wind energy conversion technology with neat diagram. **[10]**

b) Elaborate the concept of wind farm with neat diagram. **[8]**

OR

Q8) a) State the significance of hybrid wind energy system. Draw and explain the working of wind + conventional grid wind energy system? **[10]**

b) State the significance of models in wind pattern predication. Elaborate on various models to predict wind pattern and their analysis. **[8]**

Total No. of Questions : 8]

SEAT No. :

P-1427

[Total No. of Pages : 2

[6004]-601

B.E. (Instrumentation Engineering)

CYBER SECURITY

(2019 Pattern) (Semester - VIII) (406271(A)) (Elective - VI)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume Suitable data if necessary.***
5) ***Use of calculator is allowed.***

Q1) a) Explain cryptographic hash functions. **[10]**

b) Explain Diffie-Hellman key exchange algorithm. **[8]**

OR

Q2) a) Explain in detail RSA algorithm along with its advantages and disadvantages. **[10]**

b) Describe in brief elliptic curve cryptography. **[8]**

Q3) a) Explain Needham Schroeder algorithm and Kerberos. **[9]**

b) Explain Firewall: Different types and functionalities. **[8]**

OR

Q4) a) Explain IP Security: IPv6 and IPSec. **[9]**

b) Explain Web Security: SSL, HTTPS. **[8]**

Q5) a) Explain quantitative vs. qualitative risk control practices. **[10]**

b) Explain Laws and Ethics in Information Security. **[8]**

P.T.O.

OR

Q6) a) Explain cloud computing and cybercrime. **[10]**

b) Describe risk identification, risk assessment, risk control strategies in detail. **[8]**

Q7) a) Explain windows forensic analysis. **[9]**

b) Explain network forensics. **[8]**

OR

Q8) a) Explain cyber crime investigation. **[9]**

b) Explain mobile forensics. **[8]**

Total No. of Questions : 8]

SEAT No. :

P-3141

[Total No. of Pages : 2

[6004]-602

B.E. (Instrumentation & Control)

AUTOMATION IN AGRICULTURE (Elective - VI)

(2019 Pattern) (Semester - VIII) (406271B)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates :

1) ***Answer QI or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of logarithmic tables slide rule, mollier charts, electronic pocket calculator and steam table is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) a) Explain the need of irrigation in India. Write a short note on Irrigation Scheduling. **[8]**

b) Explain CO_2 enrichment, measurement and control in a greenhouse. **[9]**

OR

Q2) a) Explain the various heating methodologies used in green house. **[8]**

b) Explain the need for measuring soil moisture. Explain resistance-based method to measure the moisture in Soil. **[9]**

Q3) a) Explain the process for manufacturing Ethanol from Molasses. **[10]**

b) Draw the Process Flow Diagram for a Sugar Plant. Explain the use of a Crystallizer. **[8]**

OR

Q4) a) Draw and explain Process Flow Diagram of Milk Processing in Dairy Plant. **[10]**

b) What are the various uses of Ethanol? Enlist various by-products of a Distillery plant. **[8]**

P.T.O.

Q5) a) Explain the International Code of hygiene for various Food Products. **[9]**

b) Write a short note on Biosensors. **[8]**

OR

Q6) a) Write a short note on: Codex Standards. **[5]**

b) Write a short note on: BIS Standards. **[5]**

c) Explain various design considerations for Cold Storage. **[7]**

Q7) a) Explain various trends in modern food industry. **[8]**

b) Explain the use of modern Instrumentation techniques like PLC and SCADA in the Food Industry. **[10]**

OR

Q8) a) Enlist various equipments used for creating and maintaining the controlled atmosphere. Explain any two equipments in detail. **[10]**

b) Explain various applications of Controlled Atmosphere Storage. **[8]**

Total No. of Questions : 8]

SEAT No. :

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[Total No. of Pages : 2

[6004]-603

B.E. (Instrumentation and Control)

ENVIRONMENTAL INSTRUMENTATION

(2019 Pattern) (Semester - VIII) (406271 - C) (Elective - VI)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) a) On which different parameters settling or rising of discrete particles depends? Enlist any three parameters. Which different zones are there in settling tank? Write a short note on coagulation-settling tank relation in 5-6 lines. **[10]**

b) Which different instruments are used in settling tanks, coagulation, and flocculation? List important 7 instruments except thermometer.**[7]**

OR

Q2) a) Why ground water monitoring is important-state in 2-4 lines. Discuss instrumentation advances / basic instrumentation related with ground water monitoring. Which different pollutants are present these days in ground water? **[10]**

b) Why the ground water OR soil gets toxic or contaminated? What are different ways to reduce this pollution-elaborate in 8-10 lines. **[7]**

Q3) a) Write a short note on -waste water sampling in 10-12 lines. Enlist four different ways that makes wastewater dangerous to humans and marine life, animals and birds, What is sustainability-discuss? **[10]**

b) Which pharmaceutical and medical-waste products contaminate waste water? How? —elaborate with example in 5-8 lines. **[8]**

OR

P.T.O.

Q4) a) Discuss in detail waste water treatment instrumentation OR Role of NGOs in rain water harvesting. **[10]**

b) Discuss Chemical Oxygen Demand (COD), Biochemical Oxygen Demand (BOD) in context to waste water. How rain water harvesting is useful-elaborate. **[8]**

Q5) a) Discuss energy-environment relationship/impact in details-with points: population increase, use of paper, damming of rivers, fertilizer consumption, tourism and use of motor vehicles. **[10]**

b) Discuss different air pollutants-list —what is their impact on health?**[7]**

OR

Q6) a) Discuss a sensor working principle for any air pollutant. How will you expand its sensing for advanced instrumentation for monitoring? **[10]**

b) Control of air or noise pollution — write a detailed note on. **[7]**

Q7) a) How will you design a weather station for your institution-elaborate - which instruments you will choose, website display- which parameters will you show, how many updates? **[10]**

b) Comment on global environmental analysis. **[8]**

OR

Q8) a) How virtual instrumentation in environmental engineering is useful - discuss with an example. **[10]**

b) Discuss REMS Rover Environmental Monitoring Station or equivalent instruments used by India. **[8]**

Total No. of Questions : 8]

SEAT No. : ____

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[Total No. of Pages : 6

[6004]-604

B.E. (Mechanical)

Heating, Ventilation, Air Conditioning and Refrigeration

(2019 Pattern) (Semester - VII) (402041)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of Scientific Calculator is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) a) Explain with neat sketch the flooded type evaporator. **[6]**

b) Explain with neat schematic diagram the frost control circuit used in VCR cycle. **[6]**

c) Explain with neat schematic CO_2 trans critical cycle. **[5]**

OR

Q2) a) Explain with a neat sketch Thermostatic Expansion Valve. **[5]**

b) Discuss the following terms used in thermodynamics analysis of Simple Ejector Refrigeration Cycle. **[6]**

i) Entrainment Ratio

ii) Entrainment efficiency

iii) Nozzle Efficiency

c) Explain with a neat sketch Low Pressure (LP) cut off used in VCR cycle.**[6]**

P.T.O.

Q3) a) Explain load calculations factors for air conditioning. (any four) **[8]**

b) The air-handling unit of an air-conditioning plant supplies a total of 4500 cmm of dry air which comprises by weight 20% fresh air at 40°C DBT, 27°C WBT, and 80 % recirculated air at 25°C DBT and 50% RH. The air leaves the cooling coil at 13°C saturated state. Calculate the following**[10]**

i) Total cooling load, and

ii) Room heat gain.

OR

Q4) a) Explain the terms : **[6]**

i) GRSHF

ii) BPF

iii) ERSHF

b) A conference room for sitting 100 persons is to be maintained at 22 °C DBT and 60% relative humidity. The outdoor conditions are 40 °C DBT and 27 °C WBT. The various loads in the auditorium are as follows: **[12]**

Sensible and latent heat loads per person 80 W and 50 W respectively;

lights and fans, 15000 W;

sensible heat gain through glass ceiling etc. 15000 W.

The air infiltration is 20 m^3/min and fresh air supply is 100 m^3/min.

Two-third of recirculated room air and one-third of fresh air are mixed before entering the cooling coil.

The bypass factor of the coil is 0.1.

Determine

i) Apparatus dew point,

ii) Grand total heat load and

iii) Effective room sensible heat factor.

Q5) a) What is infiltration and Ventilation? What are different Methods of Infiltration? **[5]**

b) A circular Duct of 400mm is selected to carry air at a velocity 440 m/min. If duct is replaced by rectangular Duct of aspect ratio 1.5. Find the size of rectangular Duct for equal friction when ; **[7]**

i) Velocity in two Duct is same.

ii) Discharge in two Duct is same.

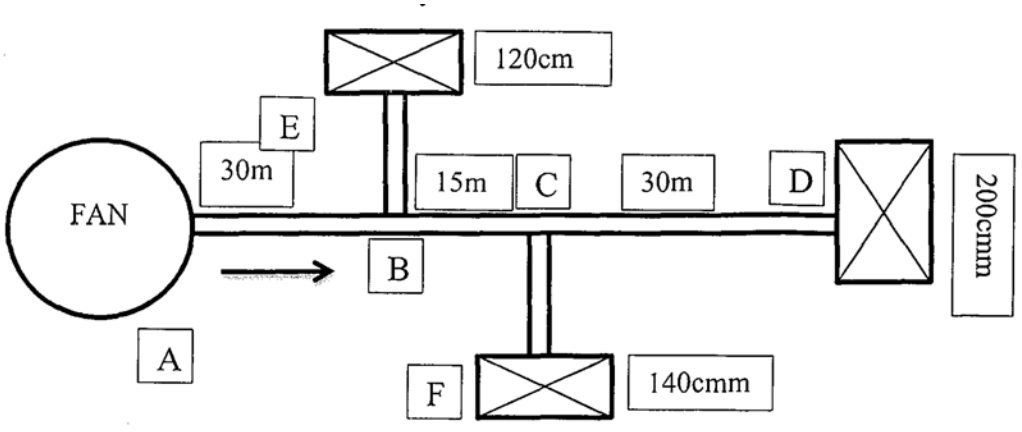
If $f = 0.015$, Find the pressure loss per 100m length of Duct. Take density of air = 1.15 kg/m^3

c) Write a note on FAN Law, List the different types of fans used in air conditioning system, state applications. **[6]**

OR

Q6) a) Explain Natural Ventilation and Mechanical Ventilation. **[4]**

b) In the air duct system, as shown figure below, air enters at A with a static pressure of 7.5 mm of water. The branch B is 15 m long and delivers 120 m^3/min. The branch at C is 22.5 m long and delivers 140 m^3/min. At the end D of the main duct, the air delivered is 200 m^3/min. Using friction chart and equal pressure drop method determine the diameter and velocity pressure in lengths AB, BC, CD, BE, CF Duct sections. Consider friction losses only. **[7]**



c) Define the following as applied to "Air Distribution System" Intake, Outlet, Grille, Register, Diffuser, Throw and Primary Air. **[7]**

Q7) a) Explain with neat sketch winter Air conditioning system. **[6]**

b) Draw and Explain water to water heat pump circuit. **[6]**

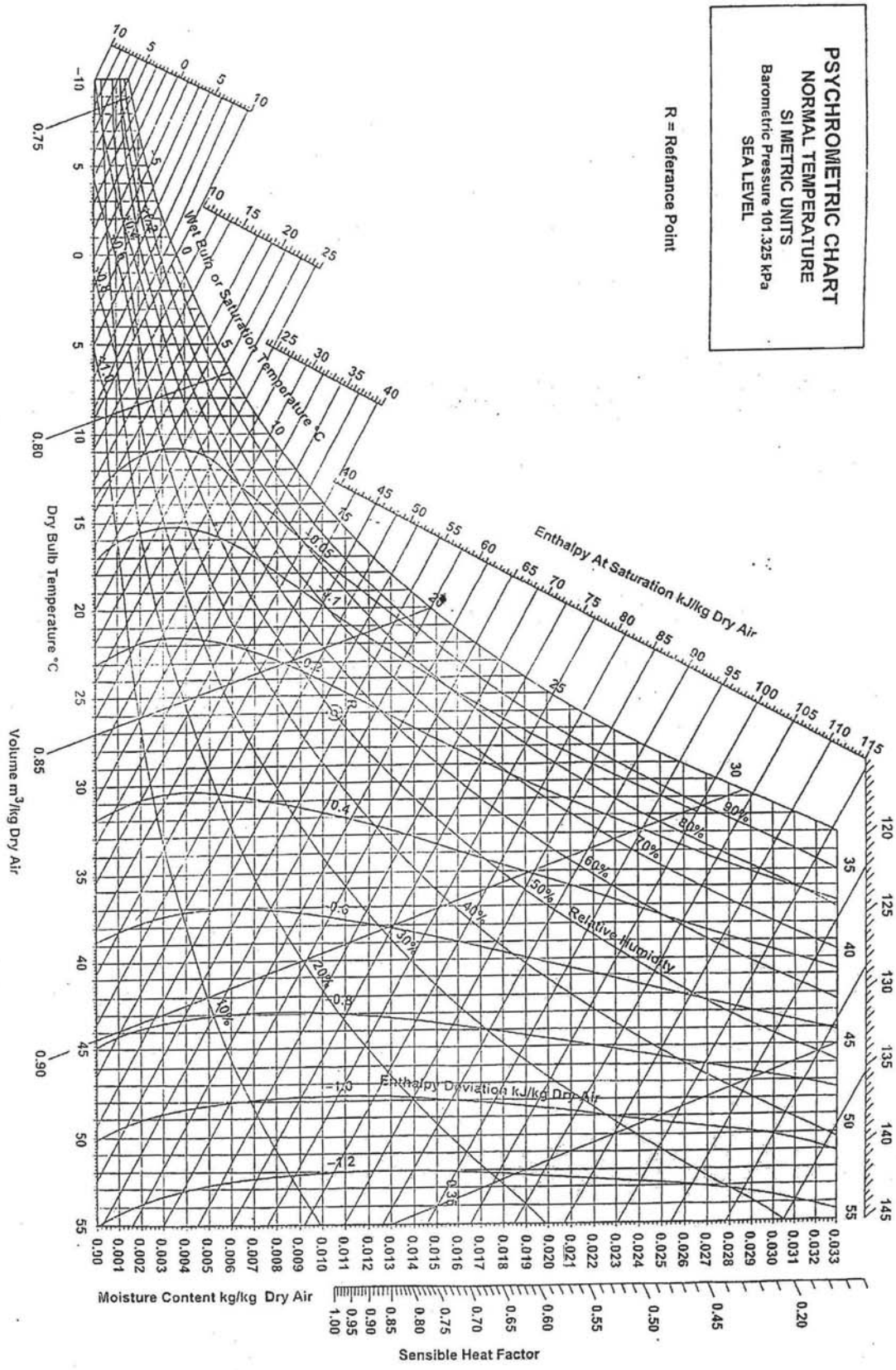
c) Write a short note on solid packed tower. **[5]**

OR

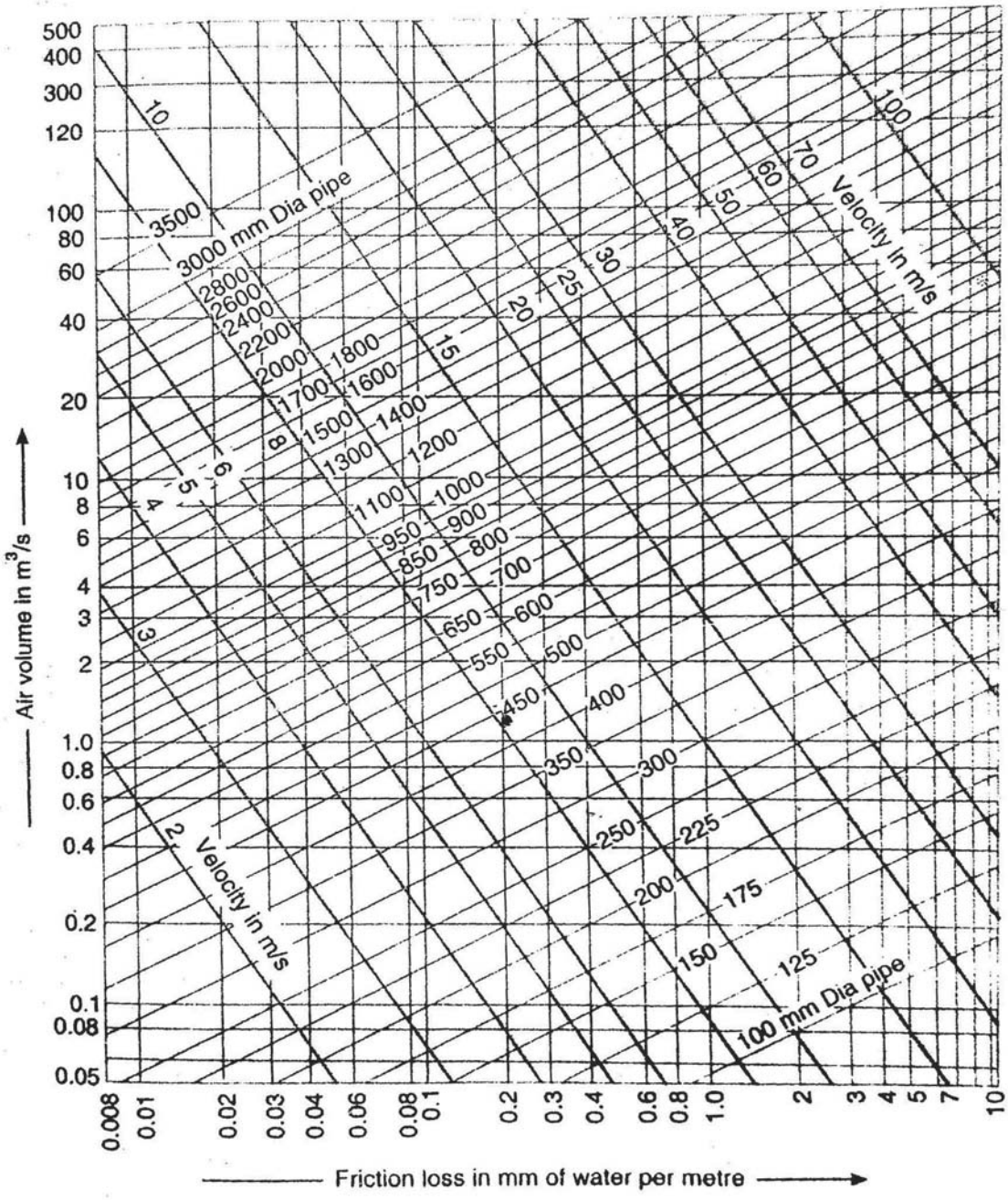
Q8) a) Explain with neat sketch All water system. **[6]**

b) Write a short note on Sorbents and Desiccants. **[6]**

c) Write a short note on Radiant cooling. **[5]**


PSYCHROMETRIC CHART
NORMAL TEMPERATURE
SI METRIC UNITS
Barometric Pressure 101.325 kPa
SEA LEVEL
R = Referance Point
Wet Bulb or Saturation Temperature °C
Dry Bulb Temperature °C
Enthalpy At Saturation kJ/kg Dry Air
Volume m³/kg Dry Air
Relative Humidity
Enthalpy Deviation kJ/kg Dry Air
Moisture Content kg/kg Dry Air
Sensible Heat Factor

Friction Chart for Circular Ducts



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Total No. of Questions : 8] **SEAT No. :**

P644 **[Total No. of Pages : 3**

[6004]-605
B.E. (Mechanical)
DYNAMICS OF MACHINERY
(2019 Pattern) (Semester - VII) (402042)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagram must be draw wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) A horizontal spring mass system with coulomb damping has a mass of 5 kg attached to a spring of stiffness 980 N/m. If the coefficient of friction is 0.25, calculate: **[8]**

i) the frequency of free oscillations.
ii) the number of cycles corresponding to 50% reduction in amplitude if the initial amplitude is 5cm.
iii) time taken to achieve this 50% reduction.

b) Explain with neat diagram mathematical model of a motor cycle. **[5]**

c) By using energy method, find the natural frequency of undamped free longitudinal vibrations. **[4]**

OR

Q2) a) Derive an expression for the motion of spring-mass dashpot system in case of: **[8]**

i) over damped system
ii) critically damped system
iii) under damped system.

b) A flywheel of mass 10 kg and radius of gyration 0.3 m makes torsional rotations under a torsion spring of stiffness 5 Nm/rad. A viscous damper is fitted and it is found that the amplitude is reduced by a factor 100 over any two successive cycles. Find **[5]**

i) Damping factor
ii) Damping coefficient
iii) Damped frequency
iv) Periodic time oscillation

c) A mass of 3kg is supported on an isolator having a spring constant of 3000 N/m and viscous damping. If the amplitude of free vibration of the max falls to one half its original value in 2 sec, determine the damping coefficient of the isolator. **[4]**

P.T.O.

Q3) a) Define quality factor and states its significance in frequencies response curve. **[8]**

b) A single cylinder vertical petrol engine of total mass 400 kg is mounted upon a steel chassis frame and causes a vertical static deflection of 2.5 mm. The reciprocating parts of the engine have a mass of 5 kg and move through a vertical stroke of 120 mm with SHM. A dashpot provided the damping resistance of which is directly proportional to the velocity and amounts to 20 KN at 1 m/s. If a steady state vibrations has been reached. **[10]**

Determine:

i) The amplitude of forced vibrations when the driving shaft of engine rotates at 540 rpm.

ii) The maximum dynamic force transmitted to the ground through chassis frame (which behaves as a spring). Through the dashpot and through the chassis frame and dashpot together.

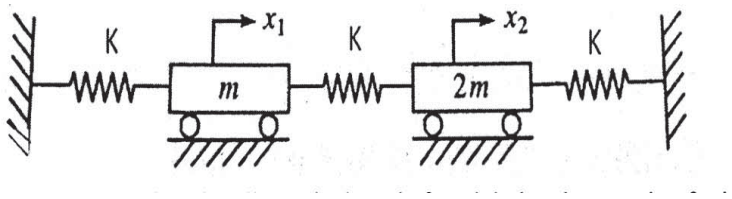
iii) The driving shaft speed at which resonance will occur.

OR

Q4) a) Explain forced vibration with rotating unbalance. **[8]**

b) The static deflection of an automobile on its springs is 100 mm. Find the critical speed when the automobile is travelling on a road, which can be approximated by a sine wave of amplitude 80 mm and a wavelength of 16 m. Assume the damping to be given by (damping ratio 0.05) also determine the amplitude of vibration at 75 km/hr. **[10]**

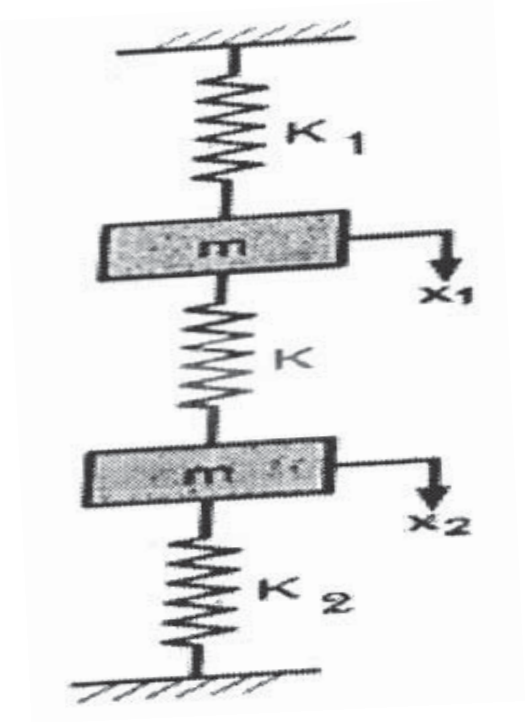
Q5) a) For the system shown in figure, find the natural frequencies of vibration and principal modes of vibration. **[10]**



b) Derive the concept of torsionally equivalent shaft and derive the equation for its equivalent length. **[8]**

OR

Q6) a) Determine the natural frequencies of the system shown in figure 1 using following data: K1 = K2 = 40 N/m, K = 60 N/m, m1 = m2 = 10 kg. **[10]**



b) How do you find Eigen value and Eigen vector by Matrix method. **[8]**

Q7) a) What is vibration isolation? Discuss various methods of vibration isolators. **[8]**

b) Write short notes on: Pass-by-noise. **[5]**

c) Write short notes on: Noise sources and control of industries. **[4]**

OR

Q8) a) Derive an relation between sound intensity level and sound pressure level. **[8]**

b) Write short notes on: FFT Spectrum analyzer. **[5]**

c) Explain with neat sketch the working of sound level. **[4]**

Total No. of Questions : 8]

SEAT No. :

P-645

[Total No. of Pages : 3

[6004]-606

B.E. (Mechanical)

AUTOMOBILE DESIGN

(2019 Pattern) (Semester - VII) (402044A) (Elective - III)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Draw suitable neat diagrams, whenever necessary.***
2) ***Figure to the right indicate full marks.***
3) ***Assume suitable data if required.***

Q1) a) A propeller shaft is required to transmit 45 kW power at 500 rpm. It is a hollow shaft, having an inside diameter 0.6 times of outside diameter. It is made of plain carbon steel and the permissible shear stress is 84 N/mm^2. Calculate the inside and outside diameters of the shaft. **[8]**

b) Describe the working of power steering unit with neat. **[5]**

c) Explain the construction and working of a rack and pinion type steering gear. **[5]**

OR

Q2) a) Pair of bevel gears, with 20° pressure angle, consists of a 20 teeth pinion meshing with a 30 teeth gear. The module is 4 mm, while the face width is 20 mm. The material for the pinion and gear is steel 50C4 (Sut = 750 N/mm^2). The gear teeth are lapped and ground (Class-3) and the surface hardness is 400 BHN. The pinion rotates at 500 rpm and receives 2.5 kW power from the electric motor. The starting torque of the motor is 150% of the rated torque. Determine the factor of safety against bending failure and against pitting failure. **[8]**

b) Difference between live axle and dead axle. **[5]**

c) Explain full floating axle with neat sketch. **[5]**

P.T.O.

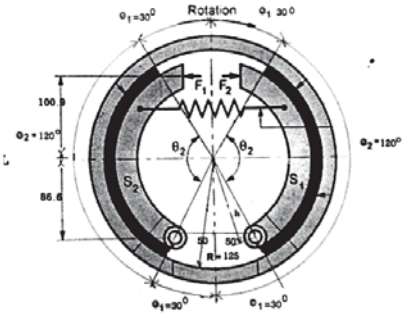
Q3) a) A train of mass 100000 kg rounds a curves of radius 150 meter at a speed of 72 km/hr. Find the horizontal thrust on the outer rail if the track is not banked. At what angle must the track is banked in order that there is no thrust on the rail? ($g = 9.81\ m/s^2$). **[8]**

b) Explain with neat sketch construction of disc type wheel. **[5]**

c) How the tyres are classified and rated. **[4]**

OR

Q4) a) An automotive type internal expanding double shoe brake is shown in figure. The face width of friction lining is ***40mm***. The co-efficient of friction between friction lining & brake drum is **0.32**. If maximum intensity of pressure is limited to ***1 MPa***. The angle θ_1 can be assumed to be zero. Calculate. i) Actuating Force "F", ii) Braking torque capacity of brake.**[8]**



b) Explain hydraulic braking system with neat sketch. **[5]**

c) Write short note on the following: Mechanical Brake. **[4]**

Q5) a) A helical compression spring is used to absorb the shock. The initial compression of the spring is 30 mm and it is further compressed by 50 mm while absorbing the shock. The spring is to absorb 250 J of energy during the process. The spring index can be taken as 6. The spring is made of patented and cold-drawn steel wire with an ultimate tensile strength of 1500 N/mm^2 and modulus of rigidity of 81 370 N/mm^2. The permissible shear stress for the spring wire should be taken as 30% of the ultimate tensile strength. Design the spring and **[8]**

calculate:

(i) wire diameter;

(ii) mean coil diameter;

(iii) number of active turns;

(iv) free length; and

(v) pitch of the turns.

b) Explain with neat sketch MacPherson strut front independent suspension system. **[5]**

c) Explain the working and construction of the shock absorber. **[5]**

OR

Q6) a) A semi-elliptic leaf spring used for automobile suspension consists of three extra full-length leaves and 15 graduated-length leaves, including the master leaf. The centre-to-centre distance between two eyes of the spring is 1 m. The maximum force that can act on the spring is 75 kN. For each leaf, the ratio of width to thickness is 9:1. The modulus of elasticity of the leaf material is 207000 N/mm^2. The leaves are pre-stressed in such a way that when the force is maximum, the stresses induced in all leaves are same and equal to 450 N/mm^2. **[8]**

Determine i) the width and thickness of the leaves; ii) the initial nip; iii) the initial pre-load required to close the gap C between extra full length leaves and graduated-length leaves.

b) Explain with neat sketch hydro gas suspension system. **[5]**

c) What is an interconnected suspension system? **[5]**

Q7) a) Write note on vehicle packaging Background. **[8]**

b) Write a short note on: Vehicle interior and ergonomics. **[5]**

c) Explain Mechanical packaging. **[4]**

OR

Q8) a) Write note on the following : **[8]**

i) Occupant Packaging.

ii) Anthropometry.

b) Discuss applications of biomechanics in vehicle. **[5]**

c) Write a short note: Seat Belt. **[4]**

Total No. of Questions : 8]

SEAT No. :

P-646

[Total No. of Pages : 2

[6004]-607

B.E. (Mechanical Engineering)

DESIGN OF HEAT TRANSFER EQUIPMENTS

(2019 Pattern) (Semester - VII) (Elective - III) (402044B)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Use of thermodynamic table and charts.***
3) ***Assume suitable data if necessary.***
4) ***Figures to the right indicate full marks.***

Q1) a) What are the advantages and disadvantages of the principle types of shell and tube heat exchangers? **[9]**

b) A shell and tube heat exchanger is designed for heating water from 25°C to 50°C with the help of steam. Condensing at atmospheric pressure. The water flows through tubes (2.5 cm ID, 2.9 cm OD and 2m long) and the steam condenses on the outside. Calculate the numbers of tubes required if the water flow rate is 500 kg/min and the individual coefficients of heat transfer on the steam and water side are 8000 and 3000 w/m^{2}K. Neglect all other resistances. **[9]**

OR

Q2) a) Explain briefly Bell-Delaware method used for design of shell and tube heat exchangers. **[9]**

b) In a tube in tube type parallel flow heat exchangers, the hot water at 80°c is cooled to 65°c by cold water entering the heat exchanger at 20°C and leaving at 35°C. What would be the exit temperatures if the flow rates of water are doubled. **[9]**

Q3) a) Explain working principle of evaporative condenser with neat sketch. **[9]**

b) Write short notes on following. **[8]**

i) Air cooled condenser

ii) Water cooled condenser

P.T.O.

OR

Q4) a) Explain the design parameters consideration of heat exchangers for application in airconditioning systems. **[9]**

b) Write and explain in brief the thermal analysis of condenser and evaporator. **[8]**

Q5) a) Explain working principle of coiled tube heat exchangers with neat sketch. **[9]**

b) Explain & state the factors affecting on design of heat exchangers. **[9]**

OR

Q6) a) What do you mean by compact heat exchangers and write the importance of Area density in it. **[9]**

b) The overall temperature rise of a cold fluid in a cross flow heat exchanger is 20°C and overall temperature drop of the hot fluid is 30°C. The effectiveness of the heat exchanger is 0.6. The heat transfer area $1m^2$ and overall heat transfer coefficient is 60 w/m^2K. Calculate the rate of heat transfer. Assume both fluids are unmixed. **[9]**

Q7) a) What is a cooling towers? Where are they used? **[8]**

b) Write short notes on : **[9]**

i) Wet Bulb temperatures

ii) Dew point temperatures

iii) Counter flow cooling towers

OR

Q8) a) Classify recuperative heat exchangers according to construction, flow arrangement. **[8]**

b) Write and explain the function of the fills and selection of materials in cooling towers. **[9]**

Total No. of Questions : 8]

SEAT No. :

P-647

[Total No. of Pages : 2

[6004]-608

B.E. (Mechanical Engineering)

MODERN MACHINING PROCESSES

(2019 Pattern) (Semester - VII) (Elective - III) (402044C)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume Suitable data, if necessary.***

Q1) a) Explain in detail with suitable sketch of electro chemical machining. Also discuss the effect of process parameters, merits, demerits and applications. **[9]**

b) Explain the chemical machining process with principle, construction, working process parameters and applications. **[8]**

OR

Q2) a) Explain electrochemical grinding process with principle, construction, working process parameters. **[8]**

b) Explain the effect of process parameters on material removal rate in electro chemical machining. **[5]**

c) Differentiate chemical machining and photochemical machining process.**[4]**

Q3) a) Explain in detail with suitable sketch of electro discharge machining. Also discuss the effect of process parameters, merits, demerits and applications. **[9]**

b) Explain electric Discharge Diamond Grinding with principle, construction, working process parameters and applications. **[9]**

P.T.O.

OR

Q4) a) Explain the effect of following factors on Metal removal rate and accuracy in EDM. **[8]**
i) Tool material ii) dielectric fluid

b) Differentiate electrical discharge grinding and electro discharge diamond grinding. **[6]**

c) Explain the principle of W-EDM with suitable sketch. **[4]**

Q5) a) Explain the material removal mechanism in diamond turn machining. **[9]**

b) Explain micro turning with suitable sketch. Also discuss the advantages, disadvantages and applications. **[8]**

OR

Q6) a) Explain micro drilling with suitable sketch. Also discuss the advantages, disadvantages and applications. **[8]**

b) Write note on micro engraving. **[5]**

c) Draw neat labeled diagram of diamond turn machine and also list applications. **[4]**

Q7) a) Explain Magnetorheological Finishing with principle, construction, working process parameters and applications. **[9]**

b) What is micro and nano system? Explain wet and dry etching process with suitable sketch. **[9]**

OR

Q8) a) Explain the photolithography process with principle, construction, working process parameters and applications. **[8]**

b) Compare MAF and AFF. **[6]**

c) What is Microsystems? Also write Application of Microsystems. **[4]**

Total No. of Questions : 8]

SEAT No. :

P-648

[Total No. of Pages : 3

[6004]-609

B.E. (Mechanical)

Industrial Engineering

(2019 Pattern) (Semester - VII) (402044D) (Electie - III)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q. 7 or Q.8.***
2) ***Figures to the right indicate full marks.***
3) ***Use of electronic calculator is allowed.***
4) ***Assume suitable data, if necessary.***

Q1) a) Sketch and explain in brief Material flow patterns. **[6]**

b) Explain product layout with advantage and disadvantage. **[6]**

c) Summarize the different principles of material handling? **[6]**

OR

Q2) a) Explain plant location also describe the factors to be considered while finalizing the plant location with suitable illustration. **[9]**

b) Explain different material handling equipment's with their application. **[9]**

Q3) a) Write short notes on : **[8]**

i) Assembly line balancing technique

ii) Capacity Planning

b) Explain the need for forecasting The past data about the load on a machine center is as given below : **[9]**

Month	Sells of cars
1	585
2	611
3	656
4	748
5	863
6	914
7	964

P.T.O.

i) If a five month moving average is used to forecast the next month's demand, compute the forecast of the load on the center in the 8th month.

ii) Compute a weighted three moving average for the 8th month, where the weights are 0.5 for the latest month, 0.3 and 0.2 for the other months, respectively.

OR

Q4) a) Enlist different types of production? Describe various functions of Production Planning& Control. **[8]**

b) A dealership for Skoda cars sells a particular model of the car in various months of the year shown in the table below. Estimate the forecast for the month of October 2022 Using (Take period n =3) : **[9]**

i) Moving average method

ii) Exponential smoothing method (Take exponential smoothing constant as 0.2)

iii) Comment on the results of above methods.

Month	Sells of cars
Jan 2022	85
Feb 2022	70
March 2022	90
April 2022	70
May 2022	80
June 2022	100
July 2022	85
August 2022	65
September 2022	75

Q5) a) Write short notes on : **[9]**

i) Just-in-time (JIT)

ii) MRP-I

iii) EOQ

b) Annual requirement of an item is 2400 units. Each item costs the company Rs. 6. The manufacturer offers discount of 5% if 500 or more quantities are purchased. The ordering cost is Rs. 32/- per order and inventory cost is 16% Weather it is a advisable to accept the discount? Comment. **[9]**

OR

Q6) a) The annual demand for an item is 3500 parts. The unit cost is Rs. 6 and the inventory carrying charges are estimated as 25% per annum. If the cost of one procurement is Rs. 150. Calculate : **[9]**

i) EOQ

ii) Number of orders per year

iii) Time between two consecutive order

iv) The optimal cost

b) Explain any thee selective control techniques of inventory. **[9]**

Q7) a) Describe the principles of ergonomics. **[5]**

b) Explain the steps involved in job evaluation. **[6]**

c) Write short a note on the "KRA". **[6]**

OR

Q8) a) Explain the quantitative & qualitative methods of Job evaluation. **[8]**

b) What is performance appraisal? Enlist various performance appraisal methods. Explain Rapid upper limb assessment (RULA) with level of MSD risk. **[9]**

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Total No. of Questions : 8]

SEAT No. :

P-649

[Total No. Of Pages : 2

[6004]-610
B.E.(Mechanical Engineering)
COMPUTATIONAL FLUID DYNAMICS
(402044F) (2019 Pattern) (Semester-VII) (Elective - III)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates :

1) ***Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of electronic pocket calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Derive two dimensional unsteady heat convection-diffusion equation. **[8]**

b) Explain the significance of I-D transient convection-diffusion system. **[5]**

c) Why boundary conditions are needed? List common thermal and flow boundary conditions used in CFD. **[5]**

OR

Q2) a) Describe and illustrate the solution of I-D transient convection-diffusion system. **[6]**

b) What is Explicit finite volume method (FVM)? **[6]**

c) Explain the 2D steady Convection Diffusion system by Central Difference approach. **[6]**

Q3) a) Describe and Illustrate the solution of lid driven cavity flow problem. **[6]**

b) Write a short note on SIMPLE algorithms. **[6]**

c) Explain the significance of the external flow simulation. **[5]**

OR

P. T. O

Q4) a) Write down the stepwise procedure to solve the lid driven cavity problem **[6]**

b) Develop the vorticity and stream function formulation for steady axisymmetric flow over a soild circular Cylinder. **[6]**

c) Explain the applications of external flow simulation. **[5]**

Q5) a) Write the advantages and disadvantages of turbulence modeling. **[6]**

b) Explain the Reynolds Averaged Navier-Stokes (RANS) and its applications. **[4]**

c) Give practical example of real life problem where one-equation turbulence model is used. Explain any "one-equation" turbulence model in detail.**[8]**

OR

Q6) a) Write a short note on Large Eddy Simulation (LES). **[6]**

b) Explain Eddy viscosity and its relevance with turbulence modelling. **[6]**

c) Explain k-ω models in details. **[6]**

Q7) a) Explain and illustrate mechanical forces and equilibrium for FSI formulation. **[9]**

b) What are balance laws in Eulerian form? **[8]**

OR

Q8) a) Explain and illustrate Eulerian Fluid System. **[6]**

b) What are the advantages and disadvantages of Lagrangian description?**[6]**

c) Write a short note on application of ALE formulation for FSI Equations.**[5]**

Total No. of Questions : 8] **SEAT No. :**

P-650 **[Total No. of Pages : 2**

[6004]-611

B. E. (Mechanical Engineering)

ELECTIVE IV: PRODUCT DESIGN AND DEVELOPMENT

(2019 Pattern) (Semester - VII) (402045A)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of electronic pocket calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) List down different methods used for product teardown process and explain any one. **[7]**

b) Describe in detail reverse engineering. **[6]**

c) Explain Economic analysis in product analysis. **[4]**

OR

Q2) a) What is concept selection? Explain Pugh's chart with example. **[7]**

b) Write a short note on SWOT analysis for a selection of profitable product. **[6]**

c) What is product policy of an organization? List down various product policies. **[4]**

Q3) a) What is Ergonomics in design? Explain types of Ergonomics with example. **[7]**

b) Explain BOM with example. **[6]**

c) Define Limit, Tolerance and Fit. **[4]**

OR

P.T.O.

Q4) a) What is product architecture? Explain types of product architecture. **[7]**

b) What is the need for engineering drawing? Classify engineering drawing. **[6]**

c) What is Fit? Describe the types of Fits. **[4]**

Q5) a) List down different methods of economic analysis of product and explain break even analysis. **[8]**

b) What is Rapid prototyping? Define and enlist various methods of prototyping **[6]**

c) Define letter of intent, purchase order and product costing in vendor development. **[4]**

OR

Q6) a) Explain stereolithography in detail with suitable sketch. **[8]**

b) What is production capacity planning? Explain the steps followed in planning. **[6]**

c) Why homologation certificate is important in design and development? Explain with example. **[4]**

Q7) a) Write a short note on APQP. **[8]**

b) Write a short note on DFMEA. **[6]**

c) Discuss the elements of PLM in detail. **[4]**

OR

Q8) a) List down types of FMEA and explain steps of FMEA. **[8]**

b) Differentiate Value analysis and value engineering. **[6]**

c) What are guidelines for design for robustness? Discuss. **[4]**

Total No. of Questions : 8]

SEAT No. :

P-651

[Total No. of Pages : 2

[6004]-612

B.E. (Mechanical)

ELECTIVE -IV: EXPERIMENTAL METHODS IN THERMAL ENGINEERING

(2019 Pattern) (Semester - VII) (402045B)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve 4 questions QI or Q2, Q 3 or Q4, Q 5 or Q6, Q 7 or Q8 is compulsory.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, wherever necessary.***

Q1) a) What is RTD? Explain different methods of construction of RTD.Also compare RTD with thermocouple. **[9]**

b) What is thermistor? Describe the resistance characteristics of thermistors. Write the advantages and disadvantages. **[8]**

OR

Q2) a) Sketch a typical radiation pyrometer, explain its working and list its notable characteristics. **[9]**

b) What is an optical pyrometer? Explain its Construction, Working & Its Applications. **[8]**

Q3) a) Explain different pressure measurement instruments and their comparison in details. **[10]**

b) Types of Sensors used in pressure measurement with its applications?**[8]**

OR

P.T.O.

Q4) a) Explain any TWO Pressure measurement in details. **[10]**

i) McLeod gauge.

ii) Bourdon tube pressure gauge.

iii) Bellow gauge.

iv) Pirani gauge.

b) Describe Transient response of pressure transducers in detail? **[8]**

Q5) a) Name the three methods for combustion products measurement and explain. Write the applications of pressure measurements. **[8]**

b) Explain the Principle of Laser Doppler Anemometer (LDA) with neat sketch. Also draw alternative schemes for accomplishing the scattering and measurement process in LDA. **[10]**

OR

Q6) a) Explain any TWO flow measurement techniques in details. **[8]**

i) Ultrasonic flow measurement.

ii) Flow measurements techniques used to validate CFD results.

iii) Micro channel flow measurement.

iv) Velocity measurement based on thermal effect.

b) State the objectives of flow visualization. Explain Schlieren system with neat sketch. **[10]**

Q7) a) State the necessity of a data acquisition system. Present the schematics of such a system and point out the function of each element comprising it. **[8]**

b) Describe data transmission with - A/D & D/A conversion - Data storage and Display **[9]**

OR

Q8) a) Describe predication of measurement parameter using ML Approaches such as Regression. **[8]**

b) Explain procedure of finding statistical parameter such as ANOVA (sAnalysis of Variance) and its Correlation. **[9]**

Total No. of Questions : 8]

SEAT No. :

P-652

[Total No. of Pages : 2

[6004]-613

B. E. (Mechanical Engineering)

ELECTIVE IV: ADDITIVE MANUFACTURING

(2019 Pattern) (Semester - VII) (402045C)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of electronic pocket calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Explain process Fused Filament Fabrication (FFF) with suitable sketch. **[6]**

b) Explain process Robocasting with suitable sketch. **[6]**

c) Explain process Multi-jet Modeling (MJM) with suitable sketch. **[6]**

OR

Q2) a) Explain process Plasma Deposition with suitable sketch. **[6]**

b) Explain process Direct Metal Deposition (DMD) with suitable sketch. **[6]**

c) Compare Fused Deposition Modeling (FDM) with Fused Filament Fabrication (FFF) Techniques. **[6]**

Q3) a) Explain use of Polymers in Additive Manufacturing with important process parameters,benefits, drawbacks, Limitations and appropriate applications. **[6]**

b) Describe rules and recommendations for metal based additive manufacturing process and product. **[6]**

c) Write a short note on Surface enhancement Techniques used in additive manufacturing based products. **[5]**

OR

P.T.O.

Q4) a) Explain use of Shape-Memory Alloys in Additive Manufacturing with important process parameters, benefits, drawbacks, Limitations and appropriate applications. **[6]**

b) Write a short note on Hot isostatic pressing of additive manufacturing based products. **[6]**

c) Explain error sources in Additive Manufacturing. **[5]**

Q5) a) Explain the Construction, Layout and sub-system of Material Jetting process based 3D Printers. **[6]**

b) Explain the Construction, Layout and sub-system of Direct Metal Laser Sintering [DMLS] process based 3D Printers. **[4]**

c) Explain the classification of Equipment Topology/Layout Frame Designs used in 3D Printers with illustrations. **[8]**

OR

Q6) a) Explain the Construction, Layout and sub-system of Fused Filament Fabrication [FFF] process based 3D Printers **[6]**

b) Explain the Construction, Layout, sub-system and sub-type of DELTA based 3D Printers' Topology/Layout Frame Designs. **[6]**

c) Explain the types of filling pattern used in different slicing and path planning. **[6]**

Q7) a) Explain how additive manufacturing is used in Automotive Industries. Also write merits, demerits and practical feasible applications with illustrations. **[9]**

b) Write a short note on Bio-materials and its applications. **[8]**

OR

Q8) a) Explain how additive manufacturing is used in Health-Care Sector. Also write merits, demerits and practical feasible applications with illustrations. **[9]**

b) Write a short note on 3D Printing and its application in Mass Production of goods. **[8]**

Total No. of Questions : 8]

SEAT No. :

P-653

[Total No. of Pages : 5

[6004]-614

B.E. (Mechanical Engineering)

OPERATION RESEARCH

(2019 Pattern) (Semester - VII) (402045D) (Elective - IV)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Answers in one answer books.***
3) ***Figures to the right indicate full marks.***
4) ***Assume Suitable data, if necessary.***

Q1) a) Use Simplex method to solve the following LPP. **[10]**

Maximize $Z = 2X_1 + X_2$

Subject to Constraints

$4X_1 + 3X_2 \leq 12;$

$4X_1 + X_2 \leq 8;$

$4X_1 - X_2 \leq 8;$

$X_1, X_2 \geq 0;$

b) Write the generalised syntax of LPP and discuss the following terms related to LPP. **[7]**

i) Objective function

ii) Constraint surface

iii) Feasible and infeasible points

iv) Optimum solution

OR

Q2) a) Use Graphical method to solve the following LPP. **[10]**

Minimize $Z = 10\ X_1 + 4X_2$

Subject to Constraints

$3X_1 + 2X_2 \geq 60$

$7X_1 + 2X_2 \geq 84$

$3X_1 + 6X_2 \geq 72$

$X_1, X_2 \geq 0$

b) Explain with the help of example generalized syntax and various terms involved in the LPP. **[7]**

P.T.O.

Q3) a) Discuss the following related to the transportation model : **[8]**

i) Feasible solution

ii) Optimum Solution

iii) Non-degenerate Basic feasible Solution

iv) Degenerate basic Feasible Solution

b) Find out the initial feasible solution by Vogel's Approximation Method (VAM). **[10]**

		Stores				Availability
		I	II	III	IV	
Warehouse	A	21	16	15	13	11
	B	17	18	14	23	13
Requirement	C	32	27	28	41	19
		6	10	12	15	

OR

Q4) a) An airline company has drawn up a new flight schedule that involves five flights. To assist in allocating five pilot to the five flights, it has asked them to state their preference scores by giving each flight a number out of 10. The higher the number, the greater is the preference. A few of these flights are unsuitable to some pilots, owing to domestic reasons. These have been marked wit "X"

		Flight Number				
		I	II	III	IV	V
	A	8	2	X	5	4
	B	10	9	2	8	4
Pilot	C	5	4	9	6	X
	D	3	6	2	8	7
	E	5	6	10	4	5

What should be the allocation of the pilots in order to meet maximum preference? **[12]**

b) Differentiate between assignment and transportation problem. **[6]**

Q5) a) A bank has decided to modernize its office .The major elements of the project are as follows. **[12]**

Activity	Description	Predecessor Activity	Duration (Days)
A	Design New premises	----	14
B	Obtain tenders from contractors	A	4
C	Select the contractor	B	2
D	Arrange details with selected contractor	C	1
E	Decide which equipment is to be used	A	2
F	Arrange storage of equipment	E	3
G	Arrange disposal of other equipment	E	2
H	Order new equipment	E	4
I	Take delivery of new equipment	H, L	3
J	Renovations take place	K	12
K	Remove old equipment for storage or disposal	D, F, G	4
L	Cleaning after the contractor finished	J	2
M	Return old equipment for storage	H, L	2

i) Draw an arrow diagram for this project.

ii) Find out the critical path

iii) For each non-critical activity find out the total, free and independent float or Slacks.

b) Explain in brief Following (Any 3) : **[6]**

i) Gradual failure

ii) Sudden failure

iii) Progressive failure

iv) Retrogressive failure

v) Random failure

OR

Q6) a) A truck owner finds from his past records that the maintenance cost per year of a truck whose purchase price is Rs. 8,000 are as follows :

Year	1	2	3	4	5	6	7	8
Maintenance Cost (Rs)	1000	1300	1700	2000	2900	3800	4800	6000
Resale price (Rs)	4000	2000	1200	600	500	400	400	400

Determine at which time it is profitable to replace the truck. **[10]**

b) Differentiate between CPM and PERT and also discuss various floats involved in the in CPM analysis of network. **[8]**

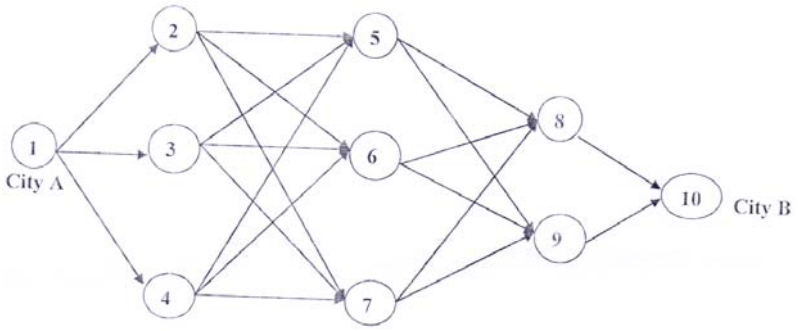
Q7) a) A company has five salesmen who have to be allocated to four marketing zones. The return (profit) from each zone depends upon the numbers of salesman working in that zone. The expected return for different numbers of salesman in different zones, as estimated from the past record, are given in the following table. Determine the optimum allocation policy. (Use DP) **[12]**

Number of salesman	Marketing Zones		
	Zone I	Zone 2	Zone 3
0	30	35	42
1	45	45	54
2	60	52	60
3	70	64	70
4	79	72	82
5	90	82	95
6	98	93	102
7	105	98	110
8	100	100	110
9	90	100	110

b) Write short note on Monto Carlo Simulation. **[5]**

OR

Q8) a) A salesman located in a city A decided to travel to city B. He knew the distances of alternative routes from city A to city B. He then drew a highway network map as shown in following figure. The city of origin A, is city 1. The destination city B is city 10. Other cities through which the salesman will have to pass through are numbered 2 to 9. The arrow representing routes between cities and distances in kilometres are located on each route. The salesman problem is to find the shortest route that covers all the selected cities from A to B. The time for each activity is given in the table. (Solve by using Dynamic programming). **[12]**



Activity	Duration	Activity	Duration
1-2	4	4-5	6
1-3	6	4-6	10
1-4	3	4-7	5
2-5	7	5-8	4
2-6	10	5-9	8
2-7	5	6-8	3
3-5	3	6-9	7
3-6	8	7-8	8
3-7	4	7-9	4
		8-10	7
		9-10	9

b) Explain in brief various steps involved in the simulation. **[5]**

Total No. of Questions : 8]

SEAT No. :

P-654

[Total No. of Pages : 2

[6004]-615

B. E. (Mechanical Engineering)

ELECTIVE IV: AUGMENTED REALITY AND VIRTUAL REALITY

(2019 Pattern) (Semester - VII) (402045E)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of electronic pocket calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Explain Virtual Objects. **[6]**

b) Describe and illustrate VR system with inputs, processes and outputs. **[6]**

c) Explain collision detection in VR system. **[6]**

OR

Q2) a) What are the four system elements of typical immersive VR system? Explain and illustrate them. **[8]**

b) What are the four user inputs are required in VR system? **[5]**

c) Explain and illustrate 3D trackers. **[5]**

Q3) a) Compare Augmented Reality with Virtual Reality. **[6]**

b) Explain the four platforms by which Augmented Reality is used today. **[6]**

c) Write a short note on Head attached displays and available technology in market. **[5]**

OR

P.T.O.

Q4) a) Explain and illustrate the steps of the basic process for the creation of marker-based Augmenting Reality **[6]**

b) Explain four tracking challenges, which lead to recognition problems in Augmenting Reality(AR). **[6]**

c) Describe and classify the interaction in AR interfaces. **[5]**

Q5) a) Describe and illustrate head-coupled displays, its characteristics and market available technology used in VR systems. **[6]**

b) Write a short note on VR Kit. **[5]**

c) Explain human eye's features and characteristics relevant to the design of display of VR systems. **[7]**

OR

Q6) a) Write a short note on sensor hardware used in VR systems. **[6]**

b) Explain physical simulation with respect to the following:

Rigid bodies, Mass, Forces due to fields, Forces due to direct intervention, Forces due to collisions, Dead reckoning, Collision detection, The physics library. **[6]**

c) Explain and illustrate the steps of modelling virtual worlds. **[6]**

Q7) a) Explain how VR can be subjected to Computational Fluid Dynamics (CFD) techniques to discover air or fluid flow around the object, and surface temperature profiles. **[9]**

b) How to simulate the combined augmented and virtual reality application in game development domain? **[8]**

OR

Q8) a) Explain how AR can be used in Flight Tracking. **[6]**

b) Explain how AR/VR can be used in flight simulation. **[5]**

c) Explain how VR can be used in educational training domain. **[6]**

Total No. of Questions : 8]

SEAT No. :

P-655

[Total No. of Pages : 3

[6004]-616

B.E. (Mechanical Engineering)

Computer Integrated Manufacturing

(2019 Pattern) (Semester - VIII) (402048)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q. 7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of electronic pocket calculator is allowed.***
5) ***Assume suitable data, if necessary.***

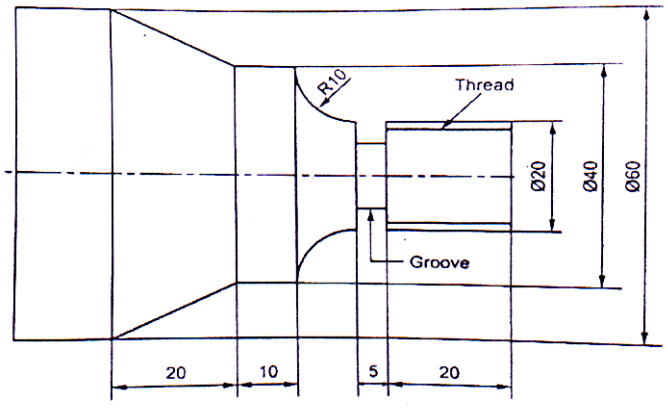
Q1) a) Define Computer aided Manufacturing (CAM). Explain CAM with its objectives & benefits to industry. **[6]**

b) Write a complete part program using G code & M code for given job Figure 1b as below. Assume suitable data and feed for machining. **[12]**

Billet size – Dia. 60mm & length – 90mm

Thread – Do = 20mm, Dc = 17mm & pitch = 2.5mm.

Groove – width – 5mm & depth – 5mm.



(All dimensions are in mm)

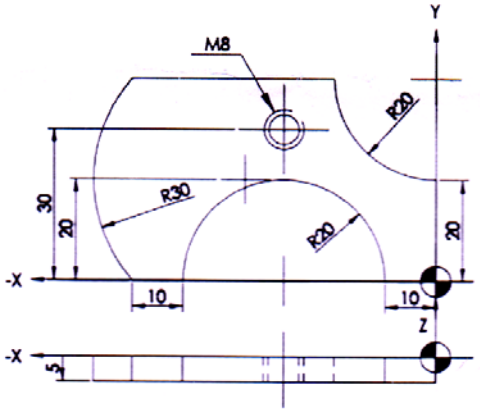
Fig. 1b

OR

P.T.O.

Q2) a) Differentiate between Numerical control Machine (NC) & Computerized Numerical control Machine (CNC). **[6]**

b) Write a CNC program for the part shown in Figure 2b. Assume suitable data. **[12]**



(All dimensions are in mm)
Fig. 2b

Q3) a) Explain Computer Aided Process Planning (CAPP) and its Benefits. **[8]**

b) Explain the importance of control system in automated production system. Write the concept in short Inventory & Shop floor control. **[9]**

OR

Q4) a) Write a note on Material Requirement Planning with input, working, outputs and benefits. **[8]**

b) Explain Computer aided inspection & quality control. Explain any two methods of computer aided inspection technique. **[9]**

Q5) a) Explain with neat sketch concept of Flexible Manufacturing System (FMS). Write Objectives & area of application. **[6]**

b) Consider a condition of 5 machines and 10 parts. Create group of machines by using Rank order clustering method. **[12]**

Machines	1	2	3	4	5	6	7	8	9	10
Ml	1	1	1	1	1		1	1	1	1
M2		1	1	1					1	1
M3	1				1	1	1			
M4		1	1	1				1	1	1
M5	1	1	1	1	1	1	1	1		

OR

Q6) a) What is Group Technology? Explain the part classification and Opitz Coding system. **[6]**

b) Five machines will constitute a GT cell. The from to data for the machines are shown in the table below. Determine the most logical sequence of machines for this data using hollier method. **[12]**

From :	1	2	3	4	5
1	0	10	80	0	0
2	0	0	0	85	0
3	0	0	0	0	0
4	70	0	20	0	0
5	0	75	0	20	0

Q7) a) What is Internet of Things (IoT)? Explain & illustrate the components of Internet of Things (IoT). **[8]**

b) What are the aspects of Digital manufacturing? Explain features and any five benefits of Digital Manufacturing. **[9]**

Q8) a) What is Industry 4.0? Explain the functions of components of Industry 4.0. **[8]**

b) Explain and illustrate Cyber-Physical Manufacturing Systems with Features of Cyber physical system (CPS). **[9]**

⌘⌘⌘

Total No. of Questions : 8]

SEAT No. :

P656

[Total No. of Pages : 4

[6004]-617

B.E. (Semester - VIII)

MECHANICAL

Energy Engineering

(402049) (2019 Pattern)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right of each question indicate full marks.***
4) ***Assume suitable data wherever necessary and mention the same clearly.***
5) ***Use of steam tables, Mollier chart and calculator is allowed.***

Q1) a) The runoff data of one river at a particular site is as below. **[6]**

Sr. No.	Month	Discharge in millions of Cu m per month	Sr. No.	Month	Discharge in millions of Cu m per month
1.	Jan.	80	7.	July.	150
2.	Feb.	40	8.	Aug.	250
3.	March.	50	9.	Sept.	200
4.	Apr.	0	10.	Oct.	120
5.	May.	20	11.	Nov.	80
6.	June .	100	12.	Dec.	100

From above data Determine

i) Mean Flow

ii) Draw Flow Duration Curve

P.T.O.

b) Describe with simple diagram Plant Layout of High Capacity Diesel Engine Power Plant. **[6]**

c) Discuss working of Sodium Graphite reactor with its diagram. **[6]**

OR

Q2) a) Elaborate function of different components of high head hydro-electric power plant with simple diagram. **[6]**

b) Explain following in brief related to diesel power plant **[6]**

i) Site selection criteria

ii) Applications

c) Discuss working of Pressurized Water Reactor with its diagram and limitations. **[6]**

Q3) a) The air enters the compressor of 5 MW capacity gas-turbine power plant at1bar, 30 degrees Celsius. The maximum cycle temperature, pressure is 550 degrees Celsius, 5 bar respectively. The two stage expansion with reheating pressure of 2.24 bar is used in the plant. In the re-heater gas is heated up to maximum cycle temperature. The gases are expanded up to 1 bar in second turbine. The isentropic efficiency of compressor, both turbines is 80%, 85% respectively. Take adiabatic index for air gas as 1.4,1.33 respectively. Take specific heat for air, gas as 1 kJ/Kg-K, 1.15 kJ/Kg-K respectively. Neglect mass flow rate of fuel. Draw cycle arrangement and T-s diagram and determine **[9]**

i) The thermal efficiency of cycle

ii) Mass flow rate of air

b) Define cogeneration. Why Cogeneration technique is used in gas power cycle? Discuss Cogeneration in gas power cycle with simple block diagram. **[8]**

OR

Q4) a) Air enters the compressor of a gas.turbine power plant having capacity 10 MW at 1 bar and 27 degrees Celsius. The maximum cycle temperature, pressure is 577 degrees Celsius, 6.5 bar respectively. The two stage compression with perfect inter-cooling arrangement is incorporated in the plant. The compression in both stages and expansion in turbine are isentropic. Take adiabatic index, specific heat for both air and gas as 1.4,1 kJ/Kg-K respectively. Assume calorific value of fuel as 45 MJ/Kg. Draw cycle arrangement and T-s diagram and determine **[9]**

i) The thermal efficiency of cycle with considering effect mass flow rate of fuel on air.

ii) Fuel consumption on per hour basis (with inter-cooling arrangement)

b) Describe the Integrated Gasification Combined Cycle plant with cycle arrangement, merits and demerits. **[8]**

Q5) a) A steam power station has an installed capacity of 120 MW and maximum demand of 100 MW. The coal consumption is 0.4 kg per kWh and cost of coal is Rs. 80 per ton. The annual expenses on salary bill of staff and other overhead charges excluding cost of coal are Rs. 50×10^5. The power station works at a load factor of 0.5 and the capital cost of the power station is Rs. 4×10^5. If the rate of interest and depreciation is 10%. Determine total annual energy generation and the cost of generating per kWh. **[6]**

b) Elaborate the typical layout of electrical equipment in power plant with diagram. **[6]**

c) List out various methods of thermal energy storage. Describe anyone method with simple diagram. **[5]**

OR

Q6) a) A power generation station with maximum demand as 20 MW having following annual data. Capacity factor = 0.4, Load factor =0.6 and use factor = 0.45. **[6]**

Determine

i) Annual energy produced

ii) Reserve capacity over and above peak load

iii) Number of hours during which plant is not working

b) State main functions of circuit breaker. Describe working of any one circuit breaker system with diagram. **[6]**

c) Describe methods of estimation of Energy pricing. **[5]**

Q7) a) Elaborate working of Low temperature flat plate collector solar power plant with diagram and advantages. **[6]**

b) Discuss the working of superheated steam geothermal energy system with diagram and disadvantages. **[6]**

c) Explain working principle of fuel cells? Enlist different types of fuel cells. **[6]**

OR

Q8) a) Explain following terms in brief related to wind power systems **[6]**

i) Cut-out Speed

ii) Cut-in Speed

iii) Betz Limit

iv) Rated Speed

v) Blade Tip ratio

vi) Co-efficient of power

b) Discuss the working of Claude's Ocean Thermal Energy system with simple diagram and advantages. **[6]**

c) Write note on:- Open type MHD system. **[6]**

Total No. of Questions : 8]

SEAT No. : ____

P1428

[Total No. of Pages : 4

[6004]-618
B.E. (Mechanical)
QUALITY AND RELIABILITY ENGINEERING
(2019 Pattern) (Semester - VIII) (Elective - V) (402050 A)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Draw suitable neat diagrams, whenever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Explain following basic concepts of Reliability (Any 4): **[8]**

i) Failure Rate ($\lambda(t)$)

ii) Hazard Rate (h(t))

iii) MTTF

iv) MTBF

v) Probability Density Function (PDF)

vi) Cumulative Distribution Function (CDF)

b) What is Reliability? Distribution between Quality and Reliability of a product. Explain the causes of Unreliability in mechanical system. **[9]**

OR

Q2) a) What are the different modes of Failure? Draw & explain a specimen 'Bath Tub Curve' showing various life characteristic phases/regions.**[8]**

b) The failures of brakes of Ten Automobiles are observed to be 43500, 52000, 72000, 84500, 93500, 101000, 111500, 116000 & 123500 miles of operations. Plot the probability density, probability distribution, reliability and the hazard function of the failure time to brakes. **[9]**

P.T.O.

Q3) a) Calculate the reliability of the system shown in following Fig. (1). The value shows the reliability of individual components in the system. **[10]**

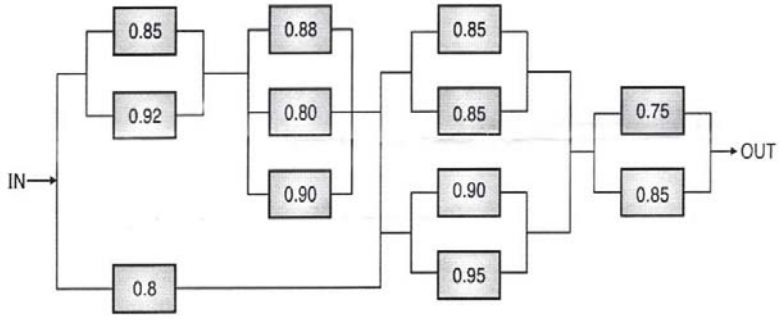


Fig.(1)

b) A system consists of three components 1, 2 and 3 having failure rates $\lambda_1 = 0.006$, $\lambda_2 = 0.004$ and $\lambda_3 = 0.001$ per hour respectively. Assuming mission time of 20 hrs. and system reliability of 0.92, find failure rates as well as reliability of each subsystem for entire mission period by 'ARINC' method of Reliability Allocation. **[8]**

OR

Q4) a) Evaluate the Reliability of System shown in following Fig. (2) By Conditional Probability Approach. **[10]**

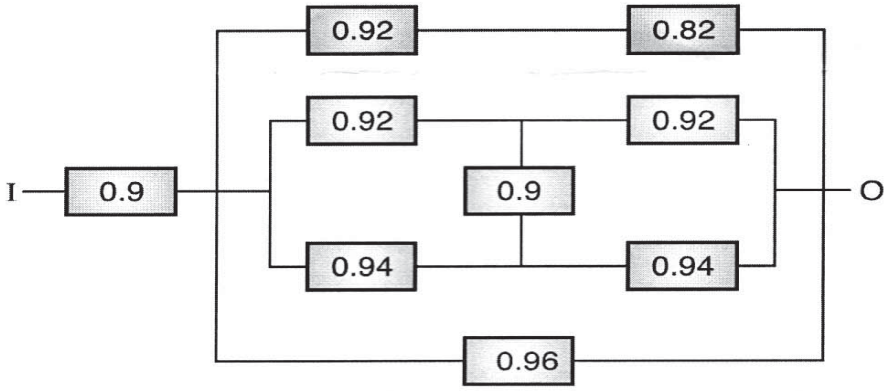


Fig.(2)

b) A system consists of three units connected in series, with reliabilities $R_1 = 0.70$, $R_2 = 0.80$ and $R_3 = 0.9$. It is desired that the reliability of the system to be 0.65. How should this be apportioned among three units by Minimum Effort Method? **[8]**

Q5) a) What is FMECA? Give the procedure of FMECA. State importance of RPN in FMECA, with example. **[8]**

b) Fig. (3) shows three valves, A, B and C, a pump (P), a pipeline and a tank to collect water pumped from the pond. Construct the fault tree corresponding to the top event "No Flow of Water Into The Tank". **[9]**

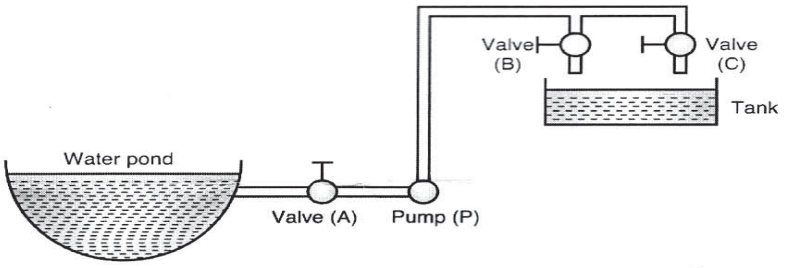


Fig.(3)

OR

Q6) a) Write Short notes on(Any 2): **[8]**

i) Fault Tree Analysis.

ii) Ishikawa for failure representation (Cause Effect Diagram)

iii) Symbols used in FTA

b) For an emergency operation theatre in a hospital, the power is obtained from the main city supply through a transformer connected is series. To ensure an uninterrupted supply, an auxiliary generator is also used with a suitable switch over. Refer Fig. (4). The probability of failure of the main city supply is 0.01 and transformer reliability is 0.996. The auxiliary power generator has a reliability factor of 0.99. Draw a block diagram for the system. Construct the fault tree and calculate reliability of the system.**[9]**

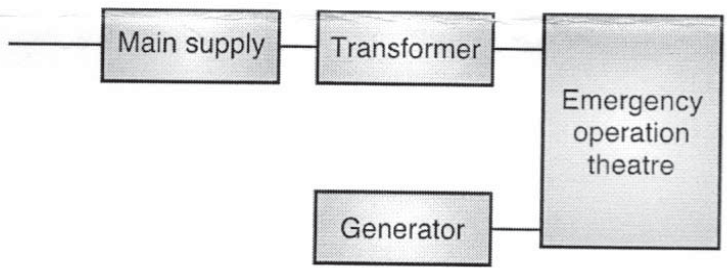


Fig.(4)

Q7) a) Define Maintainability and Availability for the system from the following data collected at a plant. **[8]**

Mean time before failure: 35 Hrs.
Mean time to repair: 10 Hrs.
Administrative and logistic time: 50% of MTTR
Calculate operational availability and inherent availability of the plant.

b) A beam is subjected to mean stress 180 N/mm^2 and standard deviation 20 N/mm^2. The mean strength of beam material is 280 N/mm^2 and standard deviation 40 N/mm^2. (Given: for Z = -2.24, Area = 0.4875) **[10]**

Determine:

i) Reliability of the beam.
ii) Minimum factor of safety.
iii) Average factor of safety.

OR

Q8) a) What is meant by Accelerated test in evaluating Reliability? Give at least six point differences between Highly Accelerated Life Testing (HALT) and Accelerated Life Testing(ALT) **[8]**

b) The following data is obtained while Accelerated life testing of a rubber Gasket: **[10]**

Failure No.	1	2	3	4	5	6	7	8	9
MTTF(hrs.)	24	22	12	28	35	38	30	19	25

Find out the reliability and plot the variation of reliability against time using:

i) Mean ranking method and
ii) Median ranking method

Total No. of Questions : 8]

SEAT No. :

P-2865

[Total No. of Pages : 2

[6004]-619

B.E. (Mechanical Engineering)

ENERGY AUDIT AND MANAGEMENT

(2019 Pattern) (Semester - VIII) (402050B) (Elective - V)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8***
2) ***Figures to the right side indicate full marks.***
3) ***Use of Calculator is allowed.***
4) ***Assume Suitable data if necessary.***

Q1) a) Explain 'Simple Payback Period' method of financial analysis with its advantages and limitation. **[6]**

b) Explain the term Time Value of Money. **[6]**

c) Explain various types of cash flows for an investment. **[5]**

OR

Q2) a) Describe the factors influencing costing of steam, compressed air, natural gas and Electricity. **[8]**

b) A sum of Rs. 4,00,000/- is deposited in a bank at the beginning of a year. The bank pays 5% interest annually. How much money is in the bank account at the end of tenth year, if no money is withdrawn? **[5]**

c) Write Notes on Return on Investment. **[4]**

Q3) a) Explain the energy saving opportunities in the compressed air system. **[8]**

b) A centrifugal pump is pumping 85 m^3/hr. of water and pressure rise in the pump is 6 kg/cm^2. If power drawn by motor is 25KW. Find out the pump efficiency. Assume motor efficiency as 90% & water density as 998 Kg/m^3. **[10]**

OR

P.T.O.

Q4) a) Enlist the types of stream traps and explain any two with a neat sketch. **[8]**

b) Calculate pump efficiency from the data given : pump flow is 0.40 m^3/s, power absorbed : 325 KW, suction head+1m, Delivery head 55m, motor efficiency 88%, type of drive: direct coupled, density of water 996 kg/m^3. **[10]**

Q5) a) What are advantages of power factor (PF) improvement in electrical system? Explain how PF is improved? **[10]**

b) Explain various energy saving opportunities in electrical system? **[8]**

OR

Q6) a) List the types of motors and explain different losses occurring in electric motors. **[8]**

b) Explain the following terms in brief : **[10]**

i) Lux

ii) Colour rendering index

iii) Ballast

iv) Luminance

v) Luminous efficiency

Q7) a) Explain the various types of recuperators with schematic sketch. **[9]**

b) What are benefits of waste heat recovery? Explain the concept of heat wheel. **[8]**

OR

Q8) a) How does a shell and tubes heat exchanger work? Give typical examples. **[8]**

b) Write notes on : **[9]**

i) Heat wheel

ii) Heat pipes

Total No. of Questions : 8]

SEAT No. : ____

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[6004]-620

B.E. (Mechanical)

MANUFACTURING SYSTEM AND SIMULATION

(2019 Pattern) (Semester-VIII) (Elective-V) (402050C)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or 2, Q.3 or 4, Q.5 or 6, Q.7 or 8,***
2) ***Draw suitable neat diagrams, whenever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Explain different steps in simulation study? **[9]**

b) What is the difference between Monte Carlo and discrete-event simulation? **[8]**

OR

Q2) a) Discuss simulation as a decision-making tool? **[9]**

b) Explain Agent-based model with neat diagram? **[8]**

Q3) a) What are different Tools for Developing the Problem Statement? **[9]**

b) How is a Discrete-Event Simulation Carried Out? Explain in details? **[9]**

OR

Q4) a) What are the components of system in modelling and simulation? **[9]**

b) Explain following Input data in details. **[9]**

i) Deterministic input data

ii) Probabilistic input data

iii) Discrete input data

iv) Continuous input data

Q5) a) How AutoMod is a leading graphical simulation software that provides true-to scale 3-D simulation? **[9]**

b) Explain which software has manufacturing-oriented modeling elements and rule-based decision logic? **[8]**

OR

Q6) a) How to improve production efficiencies and reduce operating costs through simulation by using simulation software? **[9]**

b) Explain Validation Model Assumptions in details? **[8]**

P.T.O.

Q7) a) Explain Application of discrete event simulation for Assembly line balancing? **[9]**

b) Explain systematic modelling and simulation approach for JIT performance optimisation? **[9]**

OR

Q8) a) How Discrete event simulation are supporting production planning and scheduling decisions in digital factories? **[9]**

b) Explain discrete event simulation evaluation of distributed operating room scheduling? **[9]**

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Total No. of Questions : 8]

SEAT No. :

P658

[Total No. of Pages : 2

[6004]-621

B.E. (Mechanical Engineering)

ENGINEERING ECONOMICS AND FINANCIAL MANAGEMENT

(2019 Pattern) (Elective-V) (Semester-VIII) (402050D)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Figures to the right indicate full marks.***
3) ***Use of an electronic pocket calculator is allowed.***
4) ***Assume suitable data, if necessary.***

Q1) a) What Is Return on Investment (ROI)? How Do You Calculate Return on Investment (ROI)? **[6]**

b) From the following ledger balances of Sunshine Co. Ltd., prepare the Balance Sheet of the company as on 31st March 2014 as per Schedule VI of the Companies Act. **[12]**

Particulars	Rs.	Particulars	Rs.
Equity share Capital	26,00,000	Advances to employees	1,50,000
General Reserves	30,000	Discount on issue of	
12% Debenture	4,00,000	debentures (unwritten off)	12,500
Land & Buildings	15,54,970	Tools and equipment	3,75,000
Goodwill	10,00,000	Gratuity Fund	3,00,000
Bank Overdraft	2,45,100	Debtors	1,38,520
Proposed Dividend	82,000	Cash at bank	1,57,160
Prepaid Insurance	25,000	Stores & Spares	1,77,800
Mutual Fund	1,68,000	Profit & Loss A/c	
Interest Payable	32,400	(Credit)	21,490
		Bills Receivable	44,600
		Sundry Creditors	92,560

OR

P.T.O.

Q2) a) Explain a Balance Sheet in detail with a suitable example. **[10]**

b) What are the steps followed in preparation for the Profit and Loss Account and Balance Sheet from incomplete records? **[8]**

Q3) a) State advantages and disadvantages of budgeting. **[8]**

b) State the objectives of budgetary control **[9]**

OR

Q4) a) What is a budget and what are the steps followd in budgeting? **[9]**

b) What is zero-base budgeting? State its advantages and disadvantages. **[8]**

Q5) a) What are government fiscal and exchange rate policies. **[9]**

b) What is Gresham's law and state its limitations. **[8]**

OR

Q6) a) What is the role of international business and finance in the economic development of a country? **[9]**

b) What do you understand from barter and stock exchange, Explain in detail. **[8]**

Q7) a) Write a short note on: **[10]**

i) Accelerators

ii) Crowd Funding

iii) Venture Capitals

iv) Sensitivity Analysis

v) Harvesting-Exit Strategies

b) What is a business valuation? Explain any three Valuation Methods. **[8]**

OR

Q8) a) Explain the factors affecting investment decisions for startups. **[10]**

b) What is Pre-Money and Post-Money Valuation? Describe in detail. **[8]**

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Total No. of Questions : 8]

SEAT No. : [ ]

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[6004]-622

B.E. (Mechanical)

ORGANIZATIONAL INFORMATICS

(2019 Pattern) (Elective-V) (Semester-VIII) (402050E)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) What are phases of product development? **[9]**

b) Write note on following for Product data issues. **[9]**

i) Availability

ii) Change

iii) Confidentiality

OR

Q2) a) Write features of various PLM software **[9]**

b) What are benefits of product data management system? **[9]**

Q3) a) Explain evolution from MRP to MRP II into ERP. **[9]**

b) Write features and applications of ERP modules. **[8]**

OR

Q4) a) Enlist various ERP Software and explain any one of them with its feature. **[9]**

b) Distinguish between Business Engineering and Business Process Engineering. **[8]**

Q5) a) How MES integration with ERP make manufacturing agile? **[9]**

b) What are benefits of tracking and tracing and explain it in manufacturing execution systems. **[8]**

OR

P.T.O.

Q6) a) Explain various models in details for MES. **[9]**

i) Detailed production scheduling.

ii) Product definition management.

iii) Production Execution management.

b) What are advantages of ERP implementation? **[8]**

Q7) a) Explain following term in case of Information system. **[9]**

i) Cloud Computing

ii) Artificial intelligence systems

b) What is E-commerce business model, explain it in detail? **[9]**

OR

Q8) a) Explain the term-Information requirement & system for SCM, CRM & SRM. **[9]**

b) Explain Security of an Information System. **[9]**

Total No. of Questions : 8]

SEAT No. :

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[Total No. of Pages : 2

[6004]-623

B.E. (Mechanical Engineering)

COMPUTATIONAL MULTI-BODY DYNAMICS

(2019 Pattern) (Semester-VIII) (Elective-V) (402050F)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of an electronic pocket calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Derive the Newton-Euler equation of motion for a rigid body in a multibody system. **[9]**

b) For the rolling disc shown in the Figure 1b, Discuss the constraints applied. **[9]**

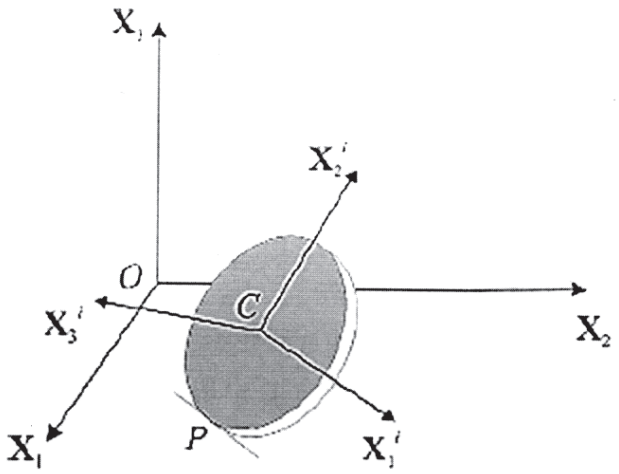

Figure 1b

OR

Q2) a) What are the two procedures to formulate the dynamic equation of constrained multibody systems? Discuss anyone in detail. **[9]**

b) Explain and illustrate Lagrange's form of D' Alembert's principle. **[9]**

P.T.O.

Q3) a) Discuss the kinematic equivalence of a revolute-revolute composite joint for a three-body system. **[9]**

b) Determine the velocity constraints for a revolute joint. **[8]**

OR

Q4) a) Determine the mass matrix for a planar body whose motion is completely defined. **[9]**

b) What is the Inverse Dynamics of a multi-body system? Discuss Newton's method for the same. **[8]**

Q5) a) Represent mathematically the screw motion of a body in space. **[9]**

b) Determine the angular velocity vector in terms of Euler parameters for a body in space. **[9]**

OR

Q6) a) Explain the use of constraints in Kinematics Analysis of Spatial Systems. **[9]**

b) What are open- chain and closed-chain kinematic systems? How are Equations of motion generated for open-chain and closed-chain constrained spatial systems? **[9]**

Q7) a) How the force exerted by a spring is considered in the multi-body dynamic analysis? **[9]**

b) What are the domain-specific applications of Kinematic and Multibody Dynamics Simulation software? **[8]**

OR

Q8) a) What is Multibody Dynamics simulation software? Explain the working of Commercial Multibody Dynamics Simulation software. **[9]**

b) Discuss the effect of Coulomb friction in the reaction forces of a multi-body system. **[8]**

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Total No. of Questions : 8]

SEAT No. :

P-1429

[Total No. of Pages : 2

[6004]-624

B.E. (Mechanical Engineering)

PROCESS EQUIPMENT DESIGN

(2019 Pattern) (Semester - VIII) (402051A) (Elective - VI)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8.***
2) ***Use of electronic pocket calculator is allowed.***
3) ***Figures to the right indicate full marks.***
4) ***Neat diagrams must be drawn wherever necessary.***
5) ***Assume Suitable data, if necessary.***

Q1) a) Explain design of thick cylinders subjected to internal pressure based on maximum principal stress theory and derive equation to find thickness of cylinder wall. **[9]**

b) What are methods of pre-stressing of cylinders, demonstrate any one in detail with sketch. **[9]**

OR

Q2) a) A closed cylinder of 300 mm inner diameter is to be designed to withstand an internal pressure of 25 MPa. The cylinder is to be made of plain carbon steel l5C8. (Sut=440 N/mm^2, Syt= 240 N/mm^2 and $\nu = 0.29$) If the factor of safety based on yield strength is 1 .5, determine the thickness of cylinder wall using : **[8]**

i) Maximum principal stress theory:
ii) Maximum principal strain theory:
iii) Maximum shear stress theory:
iv) Distortion energy theory:

b) Explain with neat sketch the different types of formed heads used as end closures in cylindrical pressure vessel. **[10]**

Q3) a) Explain the three types of floating roofs used in floating roof type tank with sketches. **[9]**

b) Explain spherical vessel with neat labeled sketch used for storage of gasses. **[8]**

P.T.O.

OR

Q4) a) Explain shell and tube type of heat exchanger with neat labeled sketches. **[8]**

b) List the different types of mechanical agitators. Explain any one agitator with neat labeled sketch. **[9]**

Q5) a) Describe with neat labeled sketch, the construction and working of a rotameter. **[8]**

b) Discuss with neat labeled sketch, any type of flow meter used to measure flow of highly corrosive liquids involving measurement of erosive slurries. **[9]**

OR

Q6) a) Describe with neat labeled sketches, the construction and working of LVDT with its advantages and disadvantages. **[9]**

b) List the different types of speed measuring devices. Explain with neat sketches the construction and working of any two of them. **[8]**

Q7) a) List the fabrication methods used for manufacturing of Pressure Vessels. Explain bending operation used in manufacturing of ressure vessels. **[9]**

b) List NDT methods are used for detection of surface defects. Discuss Magnetic particle testing method. **[9]**

OR

Q8) a) Explain how Al/lOT can be used to overcome challenges at Fuel Pumping station. **[9]**

b) Differentiate between Destructive and Non destructive Testing. Explain Eddy Current testing used for detection of surface defect. **[9]**

Total No. of Questions : 8]

SEAT No. :

P-1430

[Total No. of Pages : 4

[6004]-625

B.E. (Mechanical Engineering)

RENEWABLE ENERGY TECHNOLOGIES

(2019 Pattern) (Semester - VIII) (402051B) (Elective - VI)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of electronic pocket calculator is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) a) Explain below solar cells with neat sketch. **[6]**

i) Mono Crystalline

ii) Cd-Te and

iii) CIGS

b) Explain the effects of factors affecting electricity generated by a solar cell. **[6]**

c) If for a given solar power plant, total revenue generated in 25 years is Rs. 19966500 and installation cost of the plant is Rs. 7535730. Calculate Cost Pay Back Time (CPBT) andLife Cycle cost for producing a kWh of electricity by 100 wpsolar PV system over a life time of 25 years. **[6]**

OR

Q2) a) Explain following third generation solar cells with neat sketch. **[8]**

i) Polymer based solar cell
ii) Quantum Dots solar cell
iii) Multi Junction Tandem cells and
iv) Hybrid solar cell

b) Design a standalone PV system for the load specified in the table.**[10]**

P.T.O.

Load	Number	Power Rating (Watt)	Hr/day
Light (CFL)	3	18	5
Fan	2	50	8
Computer	1	100	2

Find :

i) Energy supplied (Wh) by the battery to inverter input considering inverter efficiency = 85 %.

ii) Considering Depth of Discharge (DOD) of 50 %, calculate the required charge capacity of battery (24V).

iii) Considering two days of autonomy, calculate battery charge capacity.

iv) Calculate no. of batteries needed for 24 V system voltage if the available battery configuration is 12 V and 100 Ah.

v) Calculate the number of panels of 60 wp for the above case considering 6 sunshine hours of 1000 W/m^2 -day.

Assume battery efficiency = 80 %, Assume controller circuit efficiency = 100%.

Q3) a) Explain different components of wind turbines with neat sketch. **[6]**

b) Explain the following topologies for a wind turbine. **[6]**

i) Rotor axis rotation

ii) Rotor Position and

iii) Rotor Speed

c) Write a short on Wind power generation curve and Betz coefficient. **[6]**

OR

Q4) a) Explain Horizontal and Vertical Axis turbine with neat sketch. **[8]**

b) A propeller type wind turbine has the following data : **[10]**

Speed of free wind at a height of 10 m = 12 m/s

Air density = 1.226 kg/m^3

α=0.14

Height of the tower = 100 m

Diameter of the rotor = 80 m

Wind velocity at the turbine reduces by 20 %.

Generator efficiency = 85 %

Find

i) Total power available in the wind

ii) Power extracted by the turbine

iii) Electrical power generated

iv) Axial thrust on the turbine

Maximum axial thrust on the turbine

Q5) a) Explain off shore and on shore wind farms providing their advantages and disadvantages. **[6]**

b) Write a short note on : **[6]**

i) ICT based monitoring and control of wind farm

ii) Solar PV tracking

c) Explain Pitch controlled and Stall controlled power control for wind turbines. **[5]**

OR

Q6) a) List out and explain various components of solar photovoltaic system. **[6]**

b) Write a short note on : **[6]**

i) Effect of dust on PV and remedies

ii) Site selection for wind farm

c) Write a short note on Yaw control mechanism used in wind turbine with neat sketch. **[5]**

Q7) a) List out and explain various type of biomass. **[6]**

b) Write a short note on Bio-Diesel. **[6]**

c) Explain process of pyrolysis with neat sketch. **[5]**

OR

Q8) a) Explain following characteristics of biomass : **[6]**

i) Ultimate analysis

ii) Proximate analysis and

iii) Thermo- gravimetric analysis

b) Write a short note on Bio-Hydrogen. **[5]**

c) A biomass gasifier is used to run a compression ignition engine. The engine operates in the dual fuel mode with 80% diesel replacement. The gasifier engine system produces 210Kw of power. Calculate the biomass feeding rate to the gasifier if the efficiency of the engine is 30% and the calorific value of biomass is 16000 kJ/kg. Consider the efficiency of gasifier is 0.7. **[6]**

Total No. of Questions : 8]

SEAT No. :

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[Total No. of Pages : 2

[6004]-626

B.E. (Mechanical Engineering)

AUTOMATION AND ROBOTICS

(2019 Pattern) (Semester - VIII) (402051C) (Elective - VI)

Time : 2½ Hour] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of electronic pocket calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Compare salient features, applications and limitations of pneumatic and hydraulic drives. **[9]**

b) Explain in brief : **[9]**

i) DC Servomotors

ii) Stepper motors

iii) AC servo motors

iv) Brushless DC motors (BLDC)

OR

Q2) a) Compare salient features, applications and limitations of mechanical and electrical drives. **[9]**

b) What are the factors, which must be considered while choosing the drive system for robots? **[9]**

Q3) a) Describe the construction, working, selection and design considerations of sensors used in various robotic applications. **[9]**

b) What are the end-effectors? Explain their types, classification, significance and applications used in robotics. **[8]**

P.T.O.

OR

Q4) a) Describe the construction, working, selection and design considerations of grippers used in various robotic applications. **[8]**

b) Explain and compare active and passive compliance. Also explain remote control compliance (RCC) device for assembly operations. **[9]**

Q5) a) Compare, explain and illustrate direct and inverse kinematics applicable to robotics along with its applications. **[9]**

b) Explain and illustrate Newtonian and Eularian approach for formulation of equations of motion of planar two link manipulator applicable to robotics. **[9]**

OR

Q6) a) Establish the mathematical expressions of forward transformation of a spatial 2 degree of freedom arm with RR and PP two joints manipulators. **[9]**

b) Explain DH Parameters with one example of basic robot. **[9]**

Q7) a) What are the design considerations for functional safety in robotic applications? **[8]**

b) Explain and illustrate the following terms related to Mobile Robots: **[9]**

i) Wheeled robots

ii) Legged robots

iii) Tracked robots

iv) Hybrid Terrestrial Mobile robots.

OR

Q8) a) List out and explain the considerations in robot cell design and selection.**[8]**

b) What are the uses of robots in manufacturing applications? **[9]**

Total No. of Questions : 8]

SEAT No. :

P-662

[Total No. of Pages : 3

[6004]-627

B.E. (Mechanical Engineering)

INDUSTRIAL PSYCHOLOGY AND ORGANIZATIONAL BEHAVIOR (Elective - VI)

(2019 Pattern) (Semester - VIII) (402051D)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary***
3) ***Figures to the right indicate full marks.***

Q1) a) What do you mean by performance management? Explain the objective and process of performance management. **[9]**

b) What are different factors that affect on job satisfaction? Explain any one theory of motivation. **[8]**

OR

Q2) a) Explain the process of recruitment. **[5]**

b) What are different health and safety considerations in industry? **[6]**

c) Write short notes on (Any Two) : **[6]**

i) Leadership.

ii) Time Management.

iii) Stress Management.

P.T.O.

Q3) a) What are different organizational structures? Explain anyone with an example. **[6]**

b) Explain the concept of Ethics in organizations. **[5]**

c) Write notes on: (Any Two) : **[6]**

i) Process of learning.

ii) Human Relations Theory.

iii) Organizational behavior.

OR

Q4) a) Explain the concept of organization. What is the Human Relations theory of organization? **[9]**

b) Explain Classical, Operant, Social and Cognitive theory of learning. **[8]**

Q5) a) Discuss the concept of group with any two commonly used techniques in group decision making. **[9]**

b) Explain the term Conflict. What are the different ways of Conflict management? **[9]**

OR

Q6) a) Explain any two Leadership models. **[6]**

b) Discuss how teamwork affects in organizational culture. **[6]**

c) Write a note on (Any Two) : **[6]**

i) Interpersonal relationship.

ii) Transactional Analysis.

iii) Johari Window.

Q7) a) What are key factors of good organizational culture? **[6]**

b) Explain the concept of Customer-Responsive Culture. **[6]**

c) Write notes on (Any Two) : **[6]**

i) Classical organizational theory.

ii) Humanistic Theory.

iii) Open-System Theory.

OR

Q8) a) Discuss the concept of organizational culture. What is strong and weak culture? **[9]**

b) Explain concept of organizational change and discuss the approaches to manage organizational change. **[9]**

Total No. of Questions : 8]

SEAT No. :

P-663

[Total No. of Pages : 2

[6004]-628

B.E. (Mechanical Engineering)

ELECTRICAL AND HYBRID VEHICLE

(2019 Pattern) (Semester - VIII) (402051E) (Elective - VI)

Time : 2½ Hour] ***[Max. Marks : 70***

Instructions to the candidates :

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of electronic pocket calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Explain the Application of three types of Motors and their Design with Examples. **[9]**

b) Describe and Illustrate the Energy Storage System Types and Packs Classification. **[9]**

OR

Q2) a) Determine the rating of motor required for following data: **[9]**

Gross curb weight(GCW) = 150Kg
Battery rating = 30Ah
Working voltage = 72V
Efficiency of motor = 95%
Acceleration required = 0 to 60 km/hr in 10 seconds
Road gradient = 10º
Vehicle range = 150Km

b) Find out battery rating considering the given data: **[9]**
Speed = 25Km/hr max,
Motor rating = 250 Watts, 24 Volts,
Motor efficiency = 85%, to cover distance of 100km.
Assume suitable data, if necessary.

P.T.O.

Q3) a) Explain power flow control in electric drive-train topologies. **[9]**

b) Differentiate between Mechanical Differential and Electric Differential.**[8]**

OR

Q4) a) Describe and Illustrate the Effect of Rolling, Pitch & Yaw on velocity and movements. **[9]**

b) Describe and Illustrate the Brake System and its types. **[8]**

Q5) a) Describe and illustrate the body loads based on varieties of Electric Vehicle Configurations. **[9]**

b) Describe and illustrate the Aesthetics and Ergonomics consideration for varieties of electric vehicle configuration. **[9]**

OR

Q6) a) What is Retrofitting? Describe and illustrate the retrofitting of Two-wheeler vehicles. **[9]**

b) Explain Need of vehicle Testing. What are the National/International Testing/Regulation/Licensing/Approval Organizations and Agencies? **[9]**

Q7) a) What are the Charging Methods and the Charging Standards? **[9]**

b) Describe and illustrate Charger Architectures. **[8]**

OR

Q8) a) Describe and illustrate a Typical Structure of Battery Management Systems (BMS) along with its necessity. **[9]**

b) Write detail note on end of life management of EVs and their batteries.**[8]**

Total No. of Questions : 8]

SEAT No. :

P-664

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[6004]-629

B.E. (Mechanical Sandwich)
ENERGY ENGINEERING AND MANAGEMENT
(2019 Pattern) (Semester - VII) (402064) (Self-Study-III)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates :

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right side indicate full marks.***
3) ***Use of calculator is allowed.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain the importance of solar energy power generation with reference to present world energy scenario. **[8]**

b) What are the advantages and disadvantages of concentrating collectors over flat-plate collections? **[9]**

OR

Q2) a) With a neat sketch explain a typical geothermal field. **[8]**

b) Explain the working principle of a photovoltaic cell. **[9]**

Q3) a) Write definition, objective and principles of energy management. **[9]**

b) Discuss different aspects of Energy Policy and strategy in Energy conservation systems. **[9]**

OR

Q4) a) Write note on energy policy. **[9]**

b) Describe energy and environment. **[9]**

P.T.O.

Q5) a) Give a typical energy audit reporting format. **[8]**

b) What are the different types of energy audit? Discuss the scope of preliminary energy audit. **[9]**

OR

Q6) a) Write short note on energy audit software. **[8]**

b) Which information is to be collected during detailed energy audit? **[9]**

Q7) a) Differentiate between load curve and load duration curve. **[9]**

b) What is the significance of two part tariff and three part tariff? Explain the advantages of each over other. **[9]**

OR

Q8) a) Define the following : **[9]**

i) Connected load

ii) Maximum demand

b) Write short notes on types of tariffs for electrical energy. **[9]**

Total No. of Questions : 8]

SEAT No. :

P-665

[Total No. of Pages : 3

[6004]-630

B.E. (Mechanical Sandwich)

INDUSTRIAL ENGINEERING AND ORGANIZATIONAL MANAGEMENT (Self - Study - IV)

(2019 Pattern) (Semester - VII) (402065)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***All questions are compulsory***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of Scientific Calculator allowed.***
5) ***Assume Suitable data wherever necessary.***

Q1) a) Describe the factors that are responsible for selection of suitable site to start new industry. **[8]**

b) Differentiate between Product layout and process layout. **[5]**

c) Describe the application of following material handling equipment. Justify your answer. **[5]**

i) Forklift Truck

ii) Belt conveyor

OR

Q2) a) Explain the factors required for location of factory for following product.**[8]**

i) Two-wheeler automobile manufacturing.

ii) Food processing industry

b) Explain the principles of Material handling. **[5]**

c) Explain Principles of plant Layout. **[5]**

P.T.O.

Q3) a) Explain meaning and need of Production Planning and Production control. **[8]**

b) Describe the objectives of Production Forecasting. **[5]**

c) A Manufacturer has to supply the customers 3600 units of his products per year. Shortages are not permitted. Inventory carrying cost amounts Rs 1.2 per unit per annum. The set-up cost per run is Rs 80. Find **[5]**

i) Economic Order quantity

ii) Optimum number of orders per annum

iii) Average annual Inventory cost (Minimum)

iv) Optimum period of supply per optimum order

OR

Q4) a) Discuss the functions of Production Planning and control. **[8]**

b) Discuss the need of requirements of Good Forecasting. **[5]**

c) A manufacturing company requires 9000 units per year. Ordering cost is Rs 120 per order and carrying cost is 20%. Purchase price per unit is Rs. 50. Determine **[5]**

i) EOQ

ii) Optimum number of orders.

iii) Total cost including acquisition of material.

Q5) a) Explain various terms associated with Line balancing. **[9]**

b) Describe with neat sketch Terms and Symbols used in Network analysis. **[8]**

OR

Q6) a) What is flow line production? What are its advantages and limitations? **[9]**

b) Describe what do you mean by CPM and PERT in network analysis. **[8]**

Q7) a) What is Job Evaluation? What are its objectives? **[9]**

b) Define ergonomics and what its objectives are? explain. **[8]**

OR

Q8) a) What is Merit Rating and how it helps the industries. Explain with example. **[9]**

b) Explain various environmental factors that affect the Man-Machine system. **[8]**

x x x

Total No. of Questions : 8]

SEAT No. :

P-1454

[Total No. of Pages : 4

[6004]-631

B.E. (Mechanical Sandwich)

Design of Transmission Elements

(2019 Pattern) (Semester - VIII) (402066)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q. 7 or Q.8.***
2) ***Answers in one answer books.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Derive the Petroffs equation to find out the coefficient of friction in slider contact bearing. **[6]**

b) A single row deep grove ball bearing is subjected to the following work cycle. **[12]**

Sr No	Radial load (Fr) in KN	Thrust load (Fa) in KN	Radial factor (X)	Thrust factor (Y)	Race rotating	Service factor	Speed (rpm)	Fraction of cycle
1	1.5	0.25	1.0	0.0	Inner	1.2	400	1/10
2	1.0	0.75	0.56	2.0	Outer	1.8	500	1/5
3	5.0	1.1	0.56	2.0	Inner	1.5	600	3/5
4	1.0	----	1.0	0.0	Outer	2.0	800	Remaining

Apply the concept of design and select the suitable bearing : The rated life of the bearing is 15000 hrs. Use following data

Bearing number	6011	6211	6311	6411
Dynamic capacity 'C' KN	28.1	43.6	71.5	99.5

OR

P.T.O.

Q2) a) A 30 HP (22.065 KW) electric motor is directly coupled to a shaft of 25mm diameter, which is supported by two cylindrical roller bearing. The shaft transmits power to another shaft through a flat pulley of 300 mm diameter which is placed mid way between the two bearings. The coefficient of friction between the belt and pulley is 0.3, while angle of lap is 180 degree. The belt is horizontal. The load factor is 1.5 and the expected life of the bearing is 50,000 hrs. Apply the concept of design and select the suitable bearing from manufacturer's catalog. Use following table : **[12]**

Bearing No	NU2205	NU2305
Basic dynamic capacity (C) in KN	15.99	31.39

Explain how the bearing are designated and what NU2205 bearing means.

b) Derive the Stribeck's equation to find out the static capacity of the rolling contact bearing. **[6]**

Q3) a) Apply the knowledge and derive the expression for braking acting on the brake drum in the following situation. **[12]**

i) Line of action of breaking force passes through the fulcrum of the lever.

ii) Line of action of breaking force is offset by distance 'c' from the fulcrum of the lever and is between the fulcrum and centre of brake drum.

iii) Line of action of breaking force is offset by distance 'c' from the fulcrum of the lever and is on one side of the fulcrum as well as centre of brake drum.

iv) Also Explain the concept of self locking in brakes.

b) Explain with the help of neat sketch construction and working of centrifugal clutch. **[5]**

OR

Q4) a) Derive the expression for torque transmission capacity of plate clutch using uniform pressure theory and uniform wear theory. **[5]**

b) A single plate clutch consisting of two pairs of contacting surfaces is used to connect an electric motor running at 1500 rpm with a machine. The machine is equivalent to a rotor of mass 200 kg and a radius of gyration 300mm. The inner and outer diameter of the contacting surfaces is 150mm and 250 mm respectively. The coefficient of friction is 0.2 and the intensity of pressure is limited to 0.3 N/mm^2. The clutch is engaged suddenly so as to connect the stationary machine with the electric motor. Assuming the clutch as brand new. **[12]**

i) Calculate the power transmitting capacity of the clutch.

ii) Calculate the time required by machine to attain its full speed.

iii) Calculate the amount of heat generated during the engagement.

Q5) a) A multi speed gear box is to be designed for a small-size, general purpose machine tool for spindle speeds varying between 63 r.p.m. minimum and 630 r.p.m. maximum speeds. If the recommended geometric progression ratio is as per R5 series : **[12]**

i) Draw the candidate structure diagrams for a machine tool gear box and

ii) Select the optimum structure diagram using node method of optimization

iii) Draw optimum speed diagram

iv) Calculate speed if input shafts and ratio of pulley diameters

v) Draw kinematic (Gearing) diagram for a given gear box.

b) Differentiate between Structure diagram and speed diagram. **[6]**

OR

Q6) a) Draw speed ray diagram, layout for six speed gear box and calculate Input shaft speed for a multi speed gear box having any one of the following structural formula : **[12]**

i) 2(3) 3(1)

ii) 2(l) 3(2)

The output speeds are 160 r.p.m. minimum and 100 r.p.m. maximum speeds. The motor shaft speed is 1440 r.p.m.

b) What are the advantages of geometric progression (GP) and Justify why in multi speed gear box the value of GP is in the range 1 to 2. **[6]**

Q7) a) Explain with the help of neat sketch construction (layout). working, advantages and limitation of battery operated electric vehicle. **[10]**

b) Discuss power management in hybrid electric vehicle. **[7]**

OR

Q8) a) Discuss the following characteristics of hybrid electric vehicle components. **[10]**

i) Traction force Vs Vehicle speed

ii) Battery power Vs Scale of Charge

b) Discuss Basic elements and working of Series hybrid vehicle. **[7]**

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Total No. of Questions : 8]

SEAT No. : ____

P1431

[Total No. of Pages : 3

[6004]-632

B.E. (Mechanicial Sandwich)

MACHINE DYNAMICS AND VIBRATION

(2019 Pattern) (Semester - VIII) (402067)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Draw Neat diagrams wherever necessary.***
3) ***Use of scientific calculator is allowed.***
4) ***Assume suitable data, if necessary.***
5) ***Figures to the right side indicate full marks.***

Q1) a) Classify mechanical vibrations. Give at least one engineering example of each type. **[6]**

b) A vertically suspended spring-mass system has time period of 1 sec. of free vibration. Determine time period of free vibrations when both ends of the same spring are fixed and the same mass is attached at the center of spring. **[6]**

c) For the system of springs and mass shown in the figure, determine time period of free vibration of the mass m. Take m = 10 kg, k_1 = 300 N/m, k_2 = 200 N/m, $k_3 = k_4$ 400 N/m. **[5]**

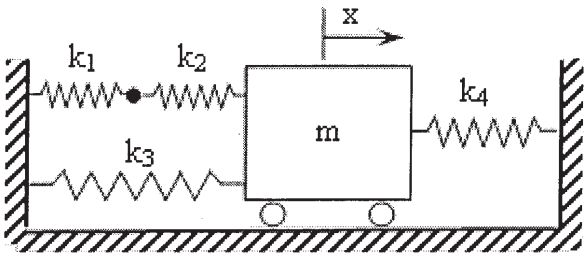

Figure: Q1 c)

OR

P.T.O.

Q2) a) Draw the neat labeled time-displacement graph of free vibration of 1-dof viscously damped system for different damping conditions- (i) zero damping, (ii) under damping, (iii) critical damping and (iv) over damping. **[6]**

b) Write a short note on the free vibration of a single DOF spring mass system with Coulomb damping with reference to the following points- i) time-displacement graph ii) loss of amplitude per cycle iii) frequency of free vibration. **[6]**

c) Derive an expression for the natural frequency of a simple spring-mass system in terms of static deflection of spring. **[5]**

Q3) a) Explain with neat sketch the transient state and steady state of vibration related to forced vibration. **[6]**

b) A single DOF mass-spring-damper oscillator is excited by a harmonic force f(t) = 10 sin(20 t) N. The oscillator has a mass of 10 kg, stiffness 1000 N/m and damping coefficient 50 N-s/m. Determine i) Steady state amplitude and ii) Maximum acceleration of vibration of mass iii) Quality factor of the system iv) Maximum force transmitted to the support. **[11]**

OR

Q4) a) Define the following terms in relation to forced vibration. i) Magnification factor and Quality factor ii) Force transmissibility and Motion transmissibility. **[6]**

b) A rotor of 10 kg mass is mounted midway on a horizontal shaft of diameter 3 cm which is simply supported with a span of 1.2 m in bearings at both the ends. The center of gravity of the rotor is 0.2 mm offset from its axis of rotation. The modulus of elasticity of shaft material is 200 GPa. Determine - i) Static deflection of rotor ii) Critical speed of shaft in rpm iii) Amplitude of steady state lateral vibrations of rotor and iv) dynamic load on each bearing at a speed of 3000 rpm. **[11]**

Q5) a) Explain the matrix method (eigen value problem) to determine natural frequencies and mode shapes of a multi-dof (2-dof) system. **[6]**

b) For the system of spring and masses shown in the figure - i) Derive differential equations of motion in terms of displacement x_1 and x_2 of masses ii) Determine natural frequencies and corresponding mode shapes by solving the differential equations iii) Describe the mode shapes graphically. **[12]**

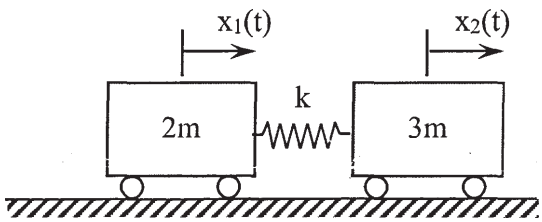

Figure: Q 5 b)

OR

Q6) a) Explain the significance of natural frequency and mode shape of a two degree of freedom system with suitable example. **[4]**

b) Two equal masses of magnitude 'm' are attached to a light string of length 3L which is stretched with static tension 'T' between two supports as shown in figure. Assuming that the static tension 'T' is so high that the dynamic change in it is negligible due to small vertical displacements of masses. Derive differential equations of motion for small vertical displacements x_1 and x_2 of masses and determine natural frequencies and mode shapes. Describe the mode shapes graphically. **[14]**

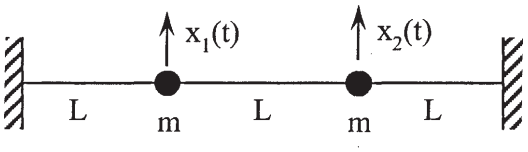

Figure: Q No 6 b)

Q7) a) Explain in brief various methods and techniques for vibration control. **[6]**

b) Explain with neat sketches the working principle of seismic sensor for vibration measurement. **[6]**

c) The static deflection of the vibrometer mass is 20 mm. The instrument when attached to machine vibrating with a frequency of 10 Hz, records the relative amplitude of 0.3 mm. Find the amplitude of displacement, velocity and acceleration of the machine vibration. **[6]**

OR

Q8) a) Explain with neat labeled sketches a typical arrangement of vibration measurement system. **[6]**

b) What is Dynamic vibration absorber? Explain working principle of undamped dynamic vibration absorber. **[6]**

c) Explain the method of vibration based condition monitoring of machines. **[6]**

Total No. of Questions : 8]

SEAT No. :

P666

[Total No. of Pages : 2

[6004]-633

B.E. (Mechanical Sandwich)

ARTIFICIAL INTELLIGENCE IN MECHANICAL ENGINEERING

(2019 Pattern) (Semester - VIII) (402068)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Use of electronic calculator is allowed.*
4) *Assume suitable data, if necessary.*
5) *Figures to the right indicate full marks.*

Q1) a) Explain Decision tree algorithm with an example. **[10]**

b) Explain Naive Bayes algorithm with an example. **[7]**

OR

Q2) a) What is regression? Explain the Linear and logistic regression in depth. **[10]**

b) Explain the measures of impurity: Entropy, Information Gain, and Gini Index. **[7]**

Q3) a) What is importance of data in machine learning? Explain the difference between training data and Testing data in a Dataset. **[10]**

b) Determine Accuracy, Precision, Recall, Fl Score from the following confusion matrix. **[8]**

n= 200	Predicted Yes	Predicted No
Actual Yes	80	70
Actual No	20	30

OR

Q4) a) What are the steps involved in the development of regression model? Explain with an example. **[10]**

b) What is model evaluation in machine learning? **[8]**

Q5) a) Explain Convolutional Neural Network (CNN) in detail and write its applications. **[10]**

b) Explain Markov Decision Process with real life examples. **[8]**

OR

P.T.O.

Q6) a) What is Reinforcement Learning? Explain various stages of Reinforcement learning with suitable diagram. **[10]**

b) Write a short note on artificial neural network. **[8]**

Q7) a) Enlist the applications of AIML in manufacturing industry? Explain any one in detail. **[9]**

b) Explain applications of AIML in additive manufacturing. **[8]**

OR

Q8) a) Explain the role of artificial intelligence in the mass adoption of electric vehicles. **[9]**

b) Explain an intelligent approach for classification of Nuts, Bolts, Washers and Locating Pins? **[8]**

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Total No. of Questions : 8]

SEAT No. :

P-2866

[Total No. of Pages : 2

[6004]-634

B.E. (Mechanical Engineering) (Sandwich)

AUTOMOBILE ENGINEERING

(2019 Pattern) (Semester - VIII) (402069A) (Elective - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Use of electronic calculator is allowed.***
4) ***Assume suitable data, if necessary.***

Q1) a) Describe the Mechanical brake system with neat sketch. **[6]**

b) Sketch and explain the different types of tyres used in automobile. **[6]**

c) Explain anti-lock braking system used in automobile. **[5]**

OR

Q2) a) Explain the working principles of hydraulic brake system with neat sketch. **[6]**

b) Write down the types of tread patterns in tyres. **[6]**

c) Explain with neat sketch types of rims used in automobile. **[5]**

Q3) a) Explain the working of electrical fuel pump. **[8]**

b) Explain with neat sketch wiper mechanism. **[10]**

OR

Q4) a) Explain lighting system of any car. **[8]**

b) Describe with neat sketch types of head lamp used in automobile. **[10]**

P.T.O.

Q5) a) What is the purpose of servicing vehicles? What are advantages of it. **[8]**

b) Explain various Emission standards used to control emission from vehicle. **[10]**

OR

Q6) a) Explain exhaust gas re-circulation system used in automobile. **[8]**

b) Describe principle of working and application of various light sensors used in modern automobile. **[10]**

Q7) a) Write a short note on the following. **[9]**

i) Ignition and fuel management system.

ii) Fuel cell

b) Write a note on Hybrid vehicles. **[8]**

OR

Q8) a) Write a short note on the following **[8]**

i) Artificial Intelligence and engine management

ii) Advantages of HV

b) Explain with neat sketch lay out of electric vehicle. **[9]**

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Total No. of Questions : 8]

SEAT No. : ____

P-2867

[Total No. of Pages : 2

[6004]-635

B.E. (Mechanical Sandwich) (Elective - I)

REFRIGERATION AND AIR CONDITIONING

(402069B) (2019 Pattern) (Semester - VIII)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat sketches/diagrams must be drawn wherever necessary***
3) ***Figures to the right indicate full marks for the sub-questions.***

Q1) a) State the function of flash intercooler provided in a compound vapour compression refrigeration system. **[8]**

b) Classify multi evaporator systems. Draw the schematic arrangement of the different components of one such system and explain its operation. Represent the pressure involved on p-h chart. **[9]**

OR

Q2) a) Compare cascade and multi-compressor system. **[8]**

b) Explain the Linde system for the liquefaction of air. What methods have been suggested for making this system more efficient? **[9]**

Q3) a) Define and explain the following terms **[9]**

a) Bypass factor of coil,

b) ADP and

c) GSHF & ESHF

b) Which are the main factors affecting the human comfort, and how can these be categorized? **[9]**

OR

P.T.O.

Q4) a) Write down the body heat balance equation and explain the different terms included in it. **[9]**

b) What are the indoor quality of air requirements? **[9]**

Q5) a) Explain with neat sketch working of summer air conditioning system. Represent various psychrometric processes required in summer air conditioning on psychrometric chart. **[9]**

b) Explain with neat sketch working of evaporative condensers. **[9]**

OR

Q6) a) Write short notes on "All water air conditioning system". **[9]**

b) Explain with neat sketch working of TXV and EXV expansion devices. **[9]**

Q7) a) How ducts are classified? Define the duct aspect ratio, should it have a large or small value, why? **[9]**

b) Write short notes on fan law. Write explanation of fan characteristic curves. **[8]**

OR

Q8) a) Present a brief account of duct shape, duct material and duct construction. **[9]**

b) Give classification of the air filters. Explain in brief the different types of filters used in the air conditioning system. **[8]**

Total No. of Questions : 8]

SEAT No. :

P-2868

[Total No. of Pages : 2

[6004]-636

B.E. Mechanical Engineering (Sandwich)

FLUID POWER CONTROL

(2019 Pattern) (Semester - VIII) (402069C) (Elective - I)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates :

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7or Q.8.***
2) ***Neat diagrams must be drawn whenever necessary.***
3) ***Use of electronic calculator is allowed.***
4) ***Assume suitable data, if necessary.***

Q1) a) What is a pressure reducing valve? What is its purpose? **[8]**

b) What is a servo valve? How does it work? **[9]**

OR

Q2) a) What is the basic function of a hydraulic relief valve? How does it operate? **[8]**

b) What is a pressure compensated, hydraulic flow control valve? Where is it used? **[9]**

Q3) a) Draw and explain Hydraulic Motor braking system. **[8]**

b) Draw a hydraulic circuit which prevent the system from accidently falling on an operator, they also prevent overloading of the system. **[10]**

OR

Q4) a) Name some applications where it would be desirable to have two cylinders synchronized in movement. **[8]**

b) Design a circuit to show how two sequence valves can be used in conjunction with a four-way control valve to operate two cylinders in sequence. **[10]**

P.T.O.

Q5) a) How do pneumatic actuators differ from Hydraulic Actuators? **[8]**

b) Draw and explain with symbol and schematics; Filter, Regulator and Lubricator. **[10]**

OR

Q6) a) What are the advantages and disadvantages of a unit which contains a regulator, filter and a lubricator built into one housing. **[8]**

b) Name three types of pneumatic directional control valves and give an example of an application for each. **[10]**

Q7) a) What are some of the parameters that must be considered when designing a high-pressure hydraulic system? **[8]**

b) Make a circuit drawing showing the use of a rotary hydraulic actuator which is controlled by a four way, three position, closed center hydraulic control valve and two flow control valves. **[9]**

OR

Q8) a) Name the steps required to size an air compressor. **[8]**

b) Name the four important considerations that must be considered when analyzing or designing a pneumatic circuit. **[9]**

Total No. of Questions : 8] **SEAT No. :**

P1432 **[Total No. of Pages : 2**

[6004]-637

B.E. (Mechanical Sandwich Engineering)

ADDITIVE MANUFACTURING

(2019 Pattern) (Semester - VIII) (Elective - I) (402045C)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain Fused Deposition Modeling (FDM) process with suitable sketch. List its Benefits, Limitations & Applications. **[9]**

b) Explain any one energy deposition process with suitable sketch. List its Benefits, Limitations & Applications. **[9]**

OR

Q2) a) Explain Multi-Jet Modeling (MJM). What are the advantages and limitations of MJM. **[8]**

b) Write note on **[6]**

i) colour jet printing

ii) multi-jet fusion

c) Explain Robocasting process in detail. **[4]**

Q3) a) Explain the AM process selection based on applications. **[9]**

b) Explain DFAM. What are the rules and recommendations for DFAM. **[8]**

OR

Q4) a) Discuss the significance of Surface enhancement Techniques in AM. Explain any two Surface enhancement Techniques. **[7]**

b) Write short note on **[6]**

i) Shape Memory Alloys

ii) Biomimetic materials

c) Write short note on 4D printing **[4]**

P.T.O.

Q5) a) Explain the functions of Cooling system, Powder Handling System, Laser controller in additive manufacturing machine. **[8]**

b) Explain 3D printer design considerations for **[9]**

i) Print bed

ii) Heater

iii) Nozzles

OR

Q6) a) What are the different types of Types of In-fill pattern? Describe in details. **[7]**

b) Describe any three Preparatory function [G code] used in additive manufacturing. **[6]**

c) Explain function of gas circulation system in AM. **[4]**

Q7) a) Write short note on

i) 5D Printing

ii) Bio-printing **[9]**

b) Explain the applications of AM in Health care industry, Food-Processing and consumer application industry with suitable case study. **[9]**

OR

Q8) a) Explain the applications of AM in Automotive, Aerospace and Construction industry with suitable case study. **[8]**

b) Explain Mass Customization and Future trends in AM. **[6]**

c) Write short note on bio-materials. **[4]**

Total No. of Questions : 8]

SEAT No. :

P-3143

[Total No. of Pages : 2

[6004]-638

B.E. (Mechanical SW)

AUTOMATION AND ROBOTICS (Elective - I)

(402051C) (2019 Pattern) (Semester - VIII)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary***
3) ***Figures to the right side indicate full marks.***
4) ***Use of Calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) Explain D.C. Servo Motors with neat sketch. **[7]**

b) Write the different between Hydraulic Drives and Electrical Drives. **[5]**

c) Explain any two Micro actuators. **[6]**

OR

Q2) a) Explain Motion Transmission Systems for Robot. **[6]**

b) What are Cycloidal Gearbox and How Does it Works? **[8]**

c) State the application of Electrical Drives. **[4]**

Q3) a) What are Design Considerations of Grippers. **[8]**

b) Explain Machine Vision System used in Robotic Applications. **[6]**

c) Give the Classification of Switches. **[3]**

OR

Q4) a) Discuss various types of End-Effectors used in robotics. **[6]**

b) Explain the working of any two types of Transducers with neat sketch. **[8]**

c) Write a short note on Tooling Interface used in robotics application. **[3]**

P.T.O.

Q5) a) With the help of suitable illustration explain the significance of D-H parameters. **[7]**

b) A moving frame {U V W} and fixed frame {X Y Z} are initially coincident, then moving frame {U V W} rotate 90 degree about Z axis and then followed by a rotation 90 degree X axis. Then {U V W} locates the points P, at U = 20 V = 30 W = 40. Determine its coordinates with respect to {XYZ}. **[6]**

c) Write notes on : Static Analysis. **[4]**

OR

Q6) a) Derive an equation of motion for serial manipulators using Lagrangian formulation. **[6]**

b) Explain different types of joint use in robots. **[5]**

c) With the help of suitable illustration explain the significance of Jacobian Transformation. **[6]**

Q7) a) Explain Robot-based Manufacturing System with suitable illustration. **[8]**

b) Write a short notes on : **[10]**

i) Industry 4.0

ii) Mobile Robots

OR

Q8) a) Write the different between Simulation and Off-line Programming. **[6]**

b) Write a any three Applications of Robots in Non-manufacturing field. **[12]**

Total No. of Questions : 8]

SEAT No. :

P2869

[Total No. of Pages : 2

[6004]-639

B.E. (Mechanical Engineering [Sandwich])

PRODUCT DESIGN AND DEVELOPMENT

(2019 Pattern) (Semester - VIII) (Elective - II) (Theory) (402045A)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of electronic pocket calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Describe benchmarking and state its importance in Product Development. **[9]**

b) Explain SWOT analysis in detail. What can you use SWOT analysis for? **[9]**

OR

Q2) a) What is concept analysis? State the types and classify the concept analysis. **[10]**

b) What is the role of the subtract and operate procedure in assessing the manufacturing complexity of a product during teardown. **[8]**

Q3) a) How does Geometric Dimensioning and Tolerancing (GD&T) contribute to the overall quality and manufacturability of a new product? Provide examples to support your answer. **[8]**

b) How do limits, fits, and tolerances impact the functionality and performance of a newly developed product? Provide specific examples to illustrate your answer. **[9]**

OR

Q4) a) How does the integration of ergonomics in the design process impact the success of a new product? State and example of improved product with ergonomic consideration. **[9]**

b) How does “design for safety” contribute to risk reduction and accident prevention in new product development? Illustrate with real-life example. **[8]**

P.T.O.

Q5) a) Explain the role of FEA (Finite Element Analysis) in the new product development process. Discuss its benefits and limitations in predicting and optimizing product performance. **[10]**

b) Discuss the key elements and steps involved in conducting a break-even analysis during new product development. Evaluate the significance of break-even analysis in assessing the financial viability and profitability of a new product. **[8]**

OR

Q6) a) Evaluate the make vs. buy decision-making process in new product development. Discuss the factors to consider when deciding whether to manufacture components internally or outsource them, considering aspects like cost, quality and capacity. **[10]**

b) Discuss the purpose and significance of a letter of intent (LOI) in new product development. Evaluate the key components of an LOI and its role in establishing partnerships, securing resources, and mitigating risks. **[8]**

Q7) a) Discuss the role and significance of Advanced Product Quality Planning (APQP) in new product development. What is its effectiveness in ensuring robust design and development on product quality and customer satisfaction. **[8]**

b) How does Value Analysis and Value Engineering contribute to optimizing product design and development? Discuss its key principles and methodologies. **[9]**

OR

Q8) a) Explain the significance of Design for Six Sigma (DFSS) in new product development. Discuss how DMAIC drive continuous improvement and customer satisfaction. **[9]**

b) Discuss the concept of agile product development and its benefits in the fast-paced business environment. **[8]**

Total No. of Questions : 8] **SEAT No. :**

P2870 **[Total No. of Pages : 4**

[6004]-640
B.E. (Mechanical) (Sandwich)
OPERATIONS RESEARCH
(2019 Pattern) (Semester - VIII) (Elective-II) (402045 D)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data, if necessary.***

Q1) a) Discuss the Linear Programming Model in OR. **[5]**

b) Use the graphical method to solve the following LP problem. **[12]**

Maximize $Z = 2x_1 + x_2$

Subject to the constraints

i) $x_1 + 2x_2 \leq 10$

ii) $x_1 + x_2 \leq 6$

iii) $x_1 - x_2 \leq 2$

iv) $x_1 - 2x_2 \leq 1$ and $x_1, x_2 \geq 0$

OR

Q2) a) Discuss the following terms related to LPP. **[5]**

i) Objective function

ii) Feasible solution

iii) Infeasible solution

iv) Optimum solution

v) Linear constraints

b) A company makes two kinds of leather belts, belt A and belt B. Belt A is a high qualitybelt and belt B is of lower quality. The respective profits are Rs. 4 and Rs. 3 per belt. The production of each of type A requires twice as much time as a belt of type B, and if all belts were of type B, the company could make 1,000 belts per day. The supply of leather is sufficient for only 800 belts per day (both A and B combined). Belt A requires a fancy buckle and only 400 of these are available per day. There are only 700 buckles a day available for belt B. What should be the daily production of each type of belt? Formulate this problem as an LP model and solve it using the simplex method. **[12]**

P.T.O.

Q3) a) Explain the difference between assignment and transportation problems. **[6]**

b) Apply MODI method to obtain optimal solution of transportation problem using the data. **[12]**

	D_1	D_2	D_3	D_4	Supply
S_1	19	30	50	10	7
S_2	70	30	40	60	9
S_3	40	8	70	20	18
Demand	5	8	7	14	34

OR

Q4) a) What is unbalance transportation problem? How it can be balanced? **[6]**

b) A travelling salesman has to visit five cities. He wishes to start from a particular city, visit each city once and then return to his starting point. The travelling cost (in' 000 Rs) of each city froma particular city is given below: **[12]**

		To City				
		A	B	C	D	E
	A	∞	2	5	7	1
	B	6	∞	3	8	2
From City	C	8	7	∞	4	7
	D	12	4	6	∞	5
	E	1	3	2	8	∞

What should be the sequence of visit of the salesman so that the cost is minimum?

Q5) a) Explain the CPM and PERT analysis of network model. **[6]**

b) An insurance company has decided to modernize and refit one of its branch offices. Some of the existing office equipment will be disposed of but the remaining will be returned to the branch after the completion of the renovation work. Tenders are invited from a number of selected contractors. The contractors would be responsible for all the activities in connection with the renovation work excepting the prior removal of the old equipment and its subsequent replacement. The major elements of the project have been identified, as follows, along with their durations and immediately preceding elements. **[12]**

Activity	Description	Duration (weeks)	Immediate Predecessors
A	Design new premises	14	-
B	Obtain tenders from the contractors	4	A
C	Select the contractor	2	B
D	Arrange details with selected contractor	1	C
E	Decide which equipment is to be used	2	A
F	Arrange storage of equipment	3	E
G	Arrange disposal of other equipment	2	E
H	Order new equipment	4	E
I	Take delivery of new equipment	3	H, L
J	Renovations take place	12	K
K	Remove old equipment for storage or disposal	4	D, F, G
L	Cleaning after the contractor has finished	2	J
M	Return old equipment for storage	2	H, L

i) Draw the network diagrams showing the interrelations between the various activities of the project.

ii) Calculate the minimum time that the renovation can take from the design stage.

iii) Find the effect on the overall duration of the project if the estimates or tenders can be obtained in two weeks from the contractors by reducing their numbers.

iv) Calculate the "independent float' that is associated with the non-critical activities in the network diagram.

OR

Q6) a) What is replacement analysis? Describe some important replacement situations. **[6]**

b) A firm is considering the replacement of a machine, whose cost price is Rs. 12,200, and its scrapvalue is Rs. 200. From experience the running(maintenance and operating) costs are found to be as follows:**[12]**

Year:	1	2	3	4	5	6	7	8
Running cost (Rs.):	200	500	800	1,200	1,800	2,500	3,200	4,000

When should the machine be replaced?

Q7) a) What is Looping and Dangling errors in network. **[5]**

b) A small project involves 7 activities, and their time estimates are listed in the following table. Activities are identified by their beginning (i) and ending (j) node numbers. **[12]**

Activities (i-j)	Estimated Duration (Weeks)		
	Optimistic	Most likely	Pessimistic
1-2	1	1	7
1-3	1	4	7
1-4	2	2	8
2-5	1	1	1
3-5	2	5	14
4-6	2	5	8
5-6	3	6	15

i) Draw the network diagram.

ii) Find the expected duration and variance for each activity. What is the expected project length?

iii) Calculate the variance and standard deviation of the project length. What is probability that the project.
will be completed:

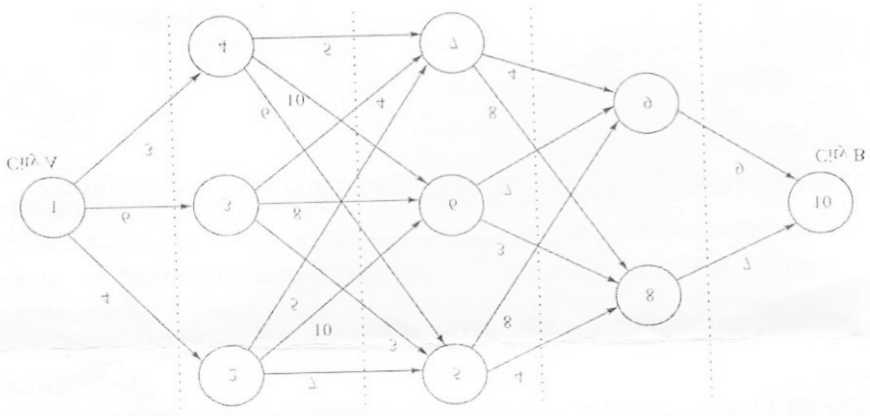
1) at least 4 weeks earlier than expected time.

2) no more than 4 weeks later than expected time.

OR

Q8) a) Explain the various steps involved in simulation process. **[5]**

b) A salesman located in a city A decided to travel to city B. He knew the distances of alternative routes from city A to city B. He then drew a highway network map as shown in the Fig. The city of origin A, is city 1. The destination city B, is city 10. Other citites through which the salesman will have to pass through are numbered 2 to 9. The arrow representing routes between cities and distances in kilometers are indicated on each route. The salesman's problem is to find the shortest route that cover all the selected cities from A to B. **[12]**



Total No. of Questions : 8]

SEAT No. : ____

P-1455

[Total No. of Pages : 2

[6004]-641

B.E. (Mechanical Sandwich)

ELECTRICAL AND HYBRID VEHICLE (Elective - II)

(402051 E) (2019 Pattern) (Semester - VIII)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Four questions from the following.***
2) ***Draw neat labeled diagrams wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of non-programmable electronic calculator is permitted.***
5) ***Assume Suitable/Standard data if necessary.***

Q1) a) Explain the application of motors and their design with examples. **[8]**

b) Write a short note on **[9]**

i) Battery cooling

ii) Thermal control and protection.

iii) Battery safety and maintenance, control

OR

Q2) a) Determine the rating of motor required for following data: **[8]**

Gross curb weight (GCW) = 150Kg

Battery rating = 30Ah

Working voltage = 72V

Efficiency of motor = 95%

Acceleration required = 0 to 60 km/hr in 10 seconds

Road gradient = 10°

Vehicle range = 150Km

b) Describe and illustrate the motors (prime mover) classification, construction, working. **[9]**

P.T.O.

Q3) a) Differentiate between Mechanical Differential and Electric Differential. **[8]**

b) Explain the Power train Components and Sizing Calculation. **[9]**

OR

Q4) a) Describe and Illustrate the Dynamic equation related to mechanics of vehicle movement. **[8]**

b) Explain power flow control in electric drive-train topologies. **[9]**

Q5) a) State and explain the different types of frames used in electric vehicle and the associated Chassis/Frame building Problems. **[9]**

b) What is Retrofitting? Describe and illustrate the retrofitting of Two-wheeler vehicles. **[9]**

OR

Q6) a) Describe and illustrate the Front/Rear Suspension Systems Design for varieties of Electric Vehicle Configuration. **[9]**

b) Explain Need of vehicle Testing. What are the National/International Testing/Regulation/Licensing/Approval Organizations and Agencies? **[9]**

Q7) a) What are the Requirements for Charging System? **[9]**

b) Describe and illustrate Charger Architectures. **[9]**

OR

Q8) a) Explain the electric vehicle chargers (Level 1, Level 2, and Level 3). **[9]**

b) Explain following: grid voltages, frequencies and wiring, real power, apparent power and power factor. **[9]**

Total No. of Questions: 8]

SEAT No. : ____

P2871

[Total No. of Pages : 4

[6004]-642
B.E. (Mechanical Sandwich)
QUALITY AND RELIABILITY ENGINEERING
(2019 Pattern) (Semester-VIII) (402050A) (Elective-II)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.No.1 or Q.No.2, Q.No.3 or Q.No.4, Q.5 or Q.No.6, Q.No.7 or Q.No.8.***
2) ***Figures to the right indicate full marks.***

Q1) a) Define the term "reliability" and Explain its importance. **[5]**

b) Explain the following terms related to probability **[5]**

i) Event

ii) Experiment

iii) Mutually Exclusive Events

iv) Equally Likely Events

v) Independent

c) A manufacturer of an electronic actuator buys his requirement of sensors from four different suppliers. On an average, Firm A_1 Supplies 35% of the requirements, Firm A_2 supplies 20% of his requirements, Firm A_3 supplies 23% of his requirements and Firm A_4 supplies 22% of the requirements. A quality test carried out on sensors supplied by each firm reveals that **[8]**

5% of supplies from A_1 are below standard.

7% of supplies from A_2 are below standard.

9% of supplies from A_3 are below standard.

11% of supplies from A_4 are below standard. Whenever a substandard sensor is used the actuator is found to give unsatisfactory performance. Each actuator uses sensor supplied by A_1 or A_2 or A_3 or A_4.

If in an test, an actuator is found to give unsatisfactory performancy what is the probability that the sensor in actuator was supplied by A_1, A_2 and A_4?

OR

Q2) a) Explain the following regions of Bath Tub Curve **[5]**

i) Infant Mortality or Burn in period

ii) Normal operation period

iii) Wear out or Aging period

b) Explain normal and Weibull distribution stating their significance. **[5]**

c) During the transport of a large number of electronic components the probability of failures of any component is 0.2. If we take a random sample of 10 components received Determine the Probability of **[8]**

i) Getting just 3 defective components

ii) Getting exactly 7 good components

iii) 5 or more of them being good.

Q3) a) Express the reliability of series system in terms of its component reliabilities. **[5]**

b) Explain standby redundancy. **[5]**

c) Determine the system reliability of the system shown in fig.1. **[7]**

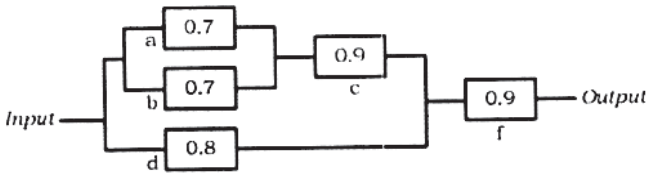


Fig. 1

OR

Q4) a) Explain the reliability of a parallel system in terms of its component reliabilities. **[5]**

b) Explain Tie Set and Cut Set method of reliability Evaluation. **[5]**

c) Four units are connected in series with reliabilities 0.85, 0.9, 0.8 and 0.95. Calculate the system reliability. If the reliability is to be increased to a value of 0.65 How should this be apportioned among the four units according to minimum effort method. **[7]**

Q5) a) Explain the process of FMEA? **[5]**

b) Draw and explain any five symbols used in fault tree construction. **[5]**

c) In the block diagram shown in fig 2. Let I and O be the input and output terminals. There are two sub-systems P and Q that are connected in series, The system fails when either of these two sub-systems fails. Draw the fault Tree diagram. **[8]**

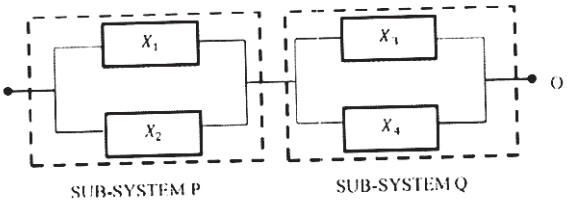


Fig 2

OR

Q6) a) Explain Ishikawa diagram for Failure representation with suitable example. **[5]**

b) Explain four points of differences between Fault Tree Analysis (FTA) and Failure Mode and Effects Analysis (FMEA) Approach **[5]**

c) The logic gate diagram for FTA has been shown in fig 3. The basic failure modes of A, B, C, and D have failure rates 0.002, 0.004,0.005 and 0.008 per hour respectively. Find the failure rate of T_0. Assume a mission time of 100 hrs. **[8]**

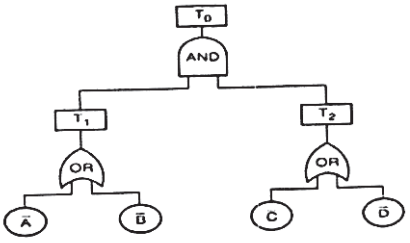


Fig 3.

Q7) a) Explain the term Availability and Maintainability with the help of suitable example. **[5]**

b) Explain in brief the reliability test conducted at various stage of the life cycle. **[5]**

c) In a short sample "accelerated life testing" of a system based on Weibull distribution. The following data is recorded. **[7]**

Failure No.	1	2	3	4	5	6	7	8	9
MTTF (hrs.)	24	22	12	28	35	38	30	19	25

Plot the variation of reliability against time using

i) Mean rank method.

ii) Median Rank Method

OR

Q8) a) Explain the preventive maintenance and corrective maintenance **[5]**

b) Explain the term Margin of Safety & Factor of safety **[5]**

c) Write short Note on (Any Two) **[7]**

i) MTTR and MTBF.

ii) Highly Accelerated Life testing.

iii) Reliability Growth Testing.

iv) Reliability Centered Maintenance

Total No. of Questions : 8]

SEAT No. :

P-667

[Total No. Of Pages : 2

[6004]-643
B.E. (Mechanical SW)
402044E: INTERNET OF THINGS
(2019 Pattern) (Semester - VIII) (Elective - II)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates :

1) ***Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of Calculator is allowed.***
5) ***Assume suitable data if necessary***

Q1) a) Explain any four Arduino's built-in functions. **[7]**

b) What are the main design principles and needed capabilities in IoT? **[7]**

c) Explain Basic Embedded C Programming. **[4]**

OR

Q2) a) Describe three types of serial communication protocols supported by Arduino family communication peripherals. **[10]**

b) List and explain the libaries of Ardunio **[8]**

Q3) a) Compare Physical versus Cloud Servers used in communication. **[7]**

b) What are the popular communication technologies? Explain any four. **[10]**

OR

Q4) a) Explain Cloud Storage models and Communication. **[8]**

b) Explain and illustrate mapping of OSI model on TCP/IP. **[9]**

P.T.O

Q5) a) Describe the steps in client communicate with a server using HTTP. **[9]**

d) Describe three parts of Message Queueing Telemetry (MQTT) protocol.**[8]**

OR

Q6) a) Explain SQL Back-end Application. **[8]**

d) Explain the terms/abbreviations Apache. My SQL, PHP, HTML and CSS of Web development. **[9]**

Q7) a) Explain Brownfield IoT **[8]**

d) Data Aggregation for the IoT in Smart Cities **[10]**

OR

Q8) a) Explain IoT applications for Connected Vehicles, Agriculture and Healthcare. **[10]**

d) Explain Smart Homes/Home automation. **[8]**

Total No. of Questions : 8] **SEAT No. :**

P-668 **[Total No. of Pages : 2**

[6004]-644

B.E. (Printing Technology)

GRAVURE PRINTING TECHNIQUES

(2019 Pattern) (Semester - VII) (408283)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Attempt Q.No. 1 or Q.No. 2, Q.No. 3 or Q.No. 4, Q.No. 5 or Q.No. 6, Q.No. 7 or Q.No. 8***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data, jf necessary.***
4) ***Neat diagrams must be drawn wherever necessary.***

Q1) a) Describe different Types of Inks and Solvents used for Gravure. **[12]**

b) Explain Compatibility of Resin with Solvents. **[5]**

OR

Q2) a) Explain gravure process in detail with diagram. **[8]**

b) Purpose of slow drying and fast-drying solvents. **[5]**

c) Define Ink Transfer in Sheetfed Gravure. **[4]**

Q3) a) What is Viscosity and how to affect print quality? **[5]**

b) Explain Flammability of solvents. **[12]**

OR

Q4) a) Define dryer and its Types. Need of Dryers used on a gravure press. **[12]**

b) Define OSHA (Occupational Safety and Health Association) Standards). **[5]**

P.T.O.

Q5) a) What is Impression Cylinder and affect print quality due to pressure. **[13]**

b) Explain specifications for impression rollers. **[5]**

OR

Q6) a) Explain ESA and Effect of ESA on Print Quality. **[13]**

b) Effect of ESA parameters on ink transfer. **[5]**

Q7) **Write a note on :**

a) Web Viewing System. **[6]**

b) Electronic Lins Shaft. **[6]**

c) Gravure Troubleshooting. **[6]**

OR

Q8) **Write a note on :**

a) 3” and 6” air expandable shafts. **[6]**

b) Web aligner. **[6]**

c) Mounting Techniques of Web Aligner System. **[6]**

x x x

Total No. of Questions : 8] **SEAT No. :**

P669 **[Total No. of Pages : 2**

[6004]-645
B.E. (Printing Technology)
DIGITAL PRINTING TECHNIQUES
(2019 Pattern) (Semester - VII) (408284)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data, if necessary.***
4) ***Neat diagram must be drawn wherever necessary.***

Q1) a) Explain Inkjet digital proofing. **[10]**

b) Differentiate between soft proofing and hard proofing. **[8]**

OR

Q2) a) Explain the concept of OCR. **[10]**

b) Explain any 2 process control parameters-Baseline, Characterization, Calibration. **[8]**

Q3) a) Explain the elements of Digital Camera. **[10]**

b) Explain RAW to Tiff and JPEG conversion techniques. **[7]**

OR

Q4) a) Explain in details all the file formats used in Digital camera. **[10]**

b) What are the different types of scanners. Explain any 1 in details. **[7]**

Q5) Explain QR code and Barcode scanning techniques and its application. **[18]**

OR

Q6) Explain direct imaging techniques. Also explain various types of inks used in digital printing process and its properties. **[18]**

P.T.O.

Q7) a) Explain the concept of Print on Demand with workflow diagram. **[10]**

b) Explain in-line post press operations. **[7]**

OR

Q8) a) Explain the detailed workflow of variable data printing technique for scratch card for New Year event. **[10]**

b) Explain PDF types used for Variable data Printing. **[7]**

◀▶ ◀▶ ◀▶

Total No. of Questions : 8]

SEAT No. :

P-670

[Total No. of Pages : 2

[6004]-646

B.E. (Printing Technology)
PAPER BOARD AND CORRUGATION PACKAGE TECHNOLOGY
(2019 Pattern) (Semester - VII) (Elective - III) (408281A)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates :

1) ***Attempt Q.No.1 or Q.No.2, Q.No.3 or Q.No.4, Q.No.5 or Q.No.6, Q.No.7 or Q.No. 8.***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data, if necessary.***
4) ***Neat diagrams must be drawn wherever necessary.***

Q1) a) Explain in detail the process of manufacturing paper bags and multiwall sacks along with its applications. **[10]**

b) Explain "Shrink sleeves" with applications and diagram. **[7]**

OR

Q2) a) Explain in detail the process of manufacturing fiber tubes along with its applications. **[10]**

b) Explain "Wrap around labels" with applications and diagram. **[7]**

Q3) Explain in detail the manufacturing of punching die with combination of laser machine and manual method along with neat diagrams. **[18]**

OR

Q4) a) Explain the importance of V-notches on die along with neat diagram. **[9]**

b) Draw a neat diagram of STE and label all the parts. Also explain the application of each part in brief. **[9]**

P.T.O.

Q5) Explain in detail the manufacturing of single wall corrugation board along with neat diagram of machine. **[17]**

OR

Q6) a) Explain various types of flutes used in corrugation industry along with their technical specifications and applications. **[10]**

b) Draw a diagram of double wall corrugated board, label the diagram and explain the applications of the same. **[7]**

Q7) Explain the RCT in detail along with diagram and its application. **[18]**

OR

Q8) a) Write a short note on ECT. **[9]**

b) Write a short note on FCT. **[9]**

Total No. of Questions : 8]

SEAT No. : ____

P-671

[Total No. of Pages : 2

[6004]-648

B.E. (Printing Technology)

MULTIMEDIA ADVERTISING

(2019 Pattern) (Semester - VII) (Elective - IV) (408282A)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Figures to the right indicate full marks.***

Q1) What is AIDA model, where and how it is used in field of advertising. Explain with suitable example. **[18]**

OR

Q2) What are different types of market segmentation, explain with suitable example. **[18]**

Q3) Describe concept of Brand Equity. What are different dimensions and advantages of brand equity? **[17]**

OR

Q4) State features, advantages, and limitations of

a) Print media **[9]**

b) Television (audio visual) medium **[8]**

P.T.O.

Q5) Draw neat and labelled diagram of product life cycle and its revival and explain appropriate types of advertising done. in various stages of life of product.**[18]**

OR

Q6) Which types of market survey are more effective, why? Explain with suitable case. **[18]**

Q7) "Effective advertising is advertising done in terms of campaign". Justify this statement with suitable example. **[17]**

OR

Q8) What are different components of print advertisement which contribute in its construction. Explain any 4 types of headlines with suitable example of advertisement **[17]**

x x x

Total No. of Questions : 8] **SEAT No. :**

P-672 **[Total No. of Pages : 2**

[6004]-649

B.E. (Printing Technology)

PROCESS OPTIMIZATION AND TOTAL QUALITY MANAGEMENT IN PRINTING

(2019 Pattern) (Semester - VII) (Elective - IV) (408282B)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data, if necessary.***
4) ***Neat diagrams must be drawn wherever necessary.***
5) ***Use of electronic pocket calculator is allowed.***

Q1) What are the different types of measurement instruments used in the Printing industry? How are these instruments calibrated? Why is calibration required for these instruments? **[17]**

OR

Q2) What is TPM? Explain QM, Training & Education, Office TPM pillars with suitable examples with reference to printing industry. **[17]**

Q3) What do ISO12647 standards recommend? Describe ISO12647 in detail. **[18]**

OR

Q4) What is the purpose of ICC (International Color Consortium)? Explain the role of an ICC profile in print production. **[18]**

P.T.O.

Q5) What is print process control? Explain print process control giving an example? **[17]**

OR

Q6) What is Characterisation? Calculate CIEXYZ of the given colour patches using the below given 3×3 matrix **[17]**

	R	G	B
Patch 1	0.408	0.60	0.075
Patch 2	0.114	0.114	0.866

$$\text{Matrix}: \begin{bmatrix} 0.412 & 0.357 & 0.181 \\ 0.212 & 0.715 & 0.072 \\ 0.019 & 0.119 & 0.950 \end{bmatrix}$$

Q7) What is Multiple Linear Regression? Explain Multiple Linear Regression with an example. **[18]**

OR

Q8) What is correlation? Explain positive and negative correlation. Calculate coefficient of correlation (r) using the below equation for the 5 DeltaE measurements provided below. **[18]**

$$r = \pm \sqrt{\frac{\left(y_{est} - \bar{y}\right)^2}{\left(y_j - \bar{y}\right)^2}}$$

Yest = measured values (1,89635803 1,33318182 0,52346324 0,66334739 0,34095419)

Yj = estimated values (1,9963 1,8331 0,3234 0,9633 0,8409)

Ybar = average of the measured values

Total No. of Questions : 8]

SEAT No. :

P-1433

[Total No. of Pages : 2

[6004]-650

B.E. (Printing Engineering)

OPERATION MANAGEMENT IN PRINTING AND PACKAGING

(2019 Pattern) (Semester - VIII) (408290)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data, if necessary***
4) ***Neat diagrams must be drawn wherever necessary.***
5) ***Use of electronic pocket calculator is allowed.***

Q1) State Continuous or flow production system its features, advantages, limitations if any. **[18]**

OR

Q2) State about Batch and mass production systems their features, advantages, limitations if any. **[18]**

Q3) Find an optimal sequence for following sequencing problem. Also find total elapsed time **[17]**

Job :	1	2	3	4
Machine M1	6	5	4	7
Machine M2	4	5	3	2
Machine M3	1	3	4	2
Machine M4	2	4	5	1
Machine M5	8	9	7	5

OR

P.T.O.

Q4) Find the optimal sequence for following sequencing problem of 4 jobs on 5 machines, when passing is not allowed. Its processing time (in hours) is given below : **[17]**

Job	Machine				
	M1	M2	M3	M4	M5
A	7	5	2	3	9
B	6	6	4	5	10
C	5	4	5	6	8
D	8	3	3	2	6

Q5) What are functions of production planning and control, explain with suitable case study. **[18]**

OR

Q6) What are stages of production planning and control, explain in greater details. **[18]**

Q7) What is product life cycle, what is its impact on production planning and control. **[17]**

OR

Q8) Compare and contrast between product breakdown structure and work breakdown structure. **[17]**

Total No. of Questions : 8]

SEAT No. :

P-1456

[Total No. of Pages : 2

[6004]-651

B.E. (Printing)

ADHESIVES AND COATINGS IN PACKAGING

(2019 Pattern) (Semester - VIII) (408291)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q.No.1 or Q.No.2, Q.No.3 or Q.No.4, Q.No.5 or Q.No.6, Q.No.7 or Q.No.8.***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data, if necessary***
4) ***Neat diagrams must be drawn wherever necessary.***

Q1) a) Explain the following : Adhesives used for tapes - Rubber-based, Acrylic- based, Silicone-based **[10]**

b) Compare the type of adhesives for general label and pressure-sensitive labels. Explain any 3 points of differentiation. **[7]**

OR

Q2) a) Explain raw material testing in adhesives **[6]**

b) Explain in detail following tests : Tack, Peel Resistance, Cohesive strength. **[5]**

c) Explain special characteristics required in case of food grade adhesives. **[6]**

Q3) a) Today, plastics are being replaced with water barrier coatings. Explain in detail the advantages and limitations of paper with barrier coatings. **[12]**

b) Explain what is release liners in case of labels. Why coating is important in this application? **[5]**

P.T.O.

OR

Q4) a) Explain the following polyolefins (polyethylene), waxes, ethylene vinyl alcohol (EVOH), polyvinylidene chloride (PVDC) used as coatings. **[12]**

b) Differentiate between PE coatings and Wax coatings. **[5]**

Q5) a) Describe slot die coating method. Draw neat diagrams wherever necessary. **[8]**

b) Describe the difference between air knife and doctor blade in gravure application. Draw a neat diagram of 5 roll coating machine. **[10]**

OR

Q6) a) Describe extrusion coating lamination. **[8]**

b) Explain coating rod method and draw neat diagram of Meyers coating rob method. **[10]**

Q7) a) Describe any 3 adhesion test methods. **[12]**

b) Explain scratch resistance testing with a neat diagram. **[6]**

OR

Q8) a) Explain significance of various standards to test the adhesives. **[6]**

b) In testing ofAdhesives explain Durability, Stability, Tack. **[12]**

Total No. of Questions : 8]

SEAT No. : ____

P1457

[Total No. of Pages : 2

[6004]-652

B.E. (Printing Technology Engineering)

FOOD AND PHARMACEUTICAL PACKAGING

(2019 Pattern) (Semester - VIII) (Elective-V) (408288 A)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data, if necessary.***
4) ***Neat diagrams must be drawn wherever necessary.***
5) ***Use of electronic pocket calculator is allowed.***

Q1) a) Explain coating technology with examples. **[9]**

b) Write down Different Types of Extrusion technology with diagram. **[9]**

OR

Q2) a) Explain extrusion coating and lamination process. **[9]**

b) Explain Metallization process and its benefits. **[9]**

Q3) a) Explain how filling system works for food and pharmaceutical packaging. **[9]**

b) Explain Induction Sealing process with the composition of CAP. **[9]**

OR

Q4) a) Explain the workflow Horizontal Form Fill Seal Machine (HFFS) with applications. **[8]**

b) What is WADS or liners explain with diagram and its uses. **[9]**

Q5) a) Explain the structure of Pouch Making process with diagram. **[9]**

b) Explain types of Blister packaging with applications. **[9]**

OR

P.T.O.

Q6) a) What type of packaging is called as Sachets explain the procedure of making sachets. **[9]**

b) What is Retort Packaging and its benefits. **[9]**

Q7) a) What is the Need and Regulations for Pharmaceutical Materials. **[8]**

b) What are the Legislative and Safety Aspects for Food and Pharmaceuticals. **[9]**

OR

Q8) a) What are the Regularity Aspects of Pharmaceutical Packaging. **[8]**

b) Which Quality Specifications given by World Health Organization (WHO). **[9]**

Total No. of Questions : 8] **SEAT No. :**

P2872 **[Total No. of Pages : 1**

[6004]-654
B.E. (Printing Technology Engineering)
SUSTAINABLE PACKAGING
(2019 Pattern) (Semester - VIII) (Elective - VI) (408289A)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data if necessary.***
4) ***Neat diagrams must be drawn wherever necessary.***
5) ***Use of an electronic pocket calculator is allowed.***

Q1) Explain in detail the Effective and Efficient Packaging Design. **[18]**

OR

Q2) Explain the edible materials used for sustainable packaging and its challenges. **[18]**

Q3) Explain in detail Linear Economy and its drawbacks for sustainability. **[17]**

OR

Q4) Explain the role of Industry 4.0 in Sustainable Packaging. **[17]**

Q5) Explain the phases of the Life Cycle Assessment. **[18]**

OR

Q6) Explain in detail Carbon Footprint and its impact on Environment. **[18]**

Q7) What are the considerations of Packaging in Supply Chain Management. **[17]**

OR

Q8) Explain the importance of color and package shape on consumer preference. **[17]**

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Total No. of Questions : 8] **SEAT No. :**

P2873 **[Total No. of Pages : 1**

[6004]-655

B.E. (Printing Technology Engineering)

MANAGEMENT INFORMATION SYSTEMS & DATA SCIENCE

(2019 Pattern) (Semester - VIII) (Elective-VI)(408289 B)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data if necessary.***
4) ***Neat diagram must be drawn wherever necessary.***
5) ***Use of electronic pocket calculator is allowed.***

Q1) Explain the term 'Decision', types of decisions and aids to decision making process in detail with suitable example. **[17]**

OR

Q2) Explain the types of decisions taken by different levels of management with suitable examples. Also explain structured and unstructured types of decisions with suitable examples. **[17]**

Q3) Explain the process of production control and production optimization using MIS in today's highly competitive business environment with suitable examples. **[18]**

OR

Q4) Explain with suitable examples various techniques used in data as well as information security in E-commerce business. And also explain the role of 'Real time information' in printing industry with examples. **[18]**

Q5) Explain the various types of reports of MIS with suitable examples. **[17]**

OR

Q6) Explain the classification of 'Accounting' and also explain 'Financial Accounting' and 'Cost Accounting' with suitable examples. **[17]**

Q7) Explain in detail various types of costs involved along with suitable examples related to the printing business. **[18]**

OR

Q8) Explain the term 'Estimation' and purpose and functions of estimation of a job in detail with suitable example. **[18]**

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Total No. of Questions : 8]

SEAT No. :

P-673

[Total No. of Pages : 3

[6004]-656

B.E. (Production)

Automation and Control Engineering

(2019 Pattern) (Semester - VII) (411081)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right side indicate full marks.***
3) ***Use of Calculator is allowed.***
4) ***Assume Suitable data if necessary.***

Q1) a) With neat sketch, explain the principle of working of time delay valve and also state its applications. **[6]**

b) Draw a suitable pneumatic circuit for a system driven by a single acting cylinder with actuation of at least two (of three) manually operated valves. **[6]**

c) Determine the theoretical work done to compress 5 m^3 of free air per minute from 1 bar pressure to 6 bar pressure. Assume that compression follows law $P.V^{1.25} = C$. **[6]**

OR

Q2) a) A compressor has an output of 60 cm^3/s and the system requires 80 cm^3/s for 40 seconds. The initial working pressure is 10 bar. The pressure drop cannot be below 6 bar. What size of receiver is needed? How long will it take to recharge the receiver if the demand decreases to 25 cm^3/s. **[8]**

b) Explain with neat sketch the working of FRL unit. **[6]**

c) Explain with neat sketch the working of twin pressure valve. **[4]**

Q3) a) What is sign flag? What is its significance? Explain with suitable example. **[9]**

b) What are the criteria for selection of microcontroller in any embedded system? **[8]**

P.T.O.

OR

Q4) a) Write the microprocessor program (Mnemonics) to perform following. **[9]**

Functions :

- Load the number 3C H in register B
- Load the number 7F H in register D
- Increment the contents of register B by one
- Subtract the content of register B from that of register D and
- Display the answer at port 1.

b) Explain various instructions used in microprocessor to perform : **[8]**

i) Data transfer

ii) Arithmetic-operations

iii) Logical operations

iv) Branch operations

Q5) a) Draw a ladder diagram that can be used to start a motor and then after a delay of 100 sec. start a pump. When the motor is switched off there should be a delay of 10 sec before the pump is switched off Clearly mention the input and output devices used and their configuration. **[9]**

b) With neat sketch explain the function of a relay as a latch. **[8]**

OR

Q6) a) Draw the PLC logic diagram to control a process which is desired to start by turning on the motor in 10 seconds after the part touches the limit switch. The process should be terminated automatically when the finish part touches the second limit switch. An emergency switch will stop the process any time when it is pressed. **[9]**

b) State the conditions in which the PI controller should be used. What are performance characteristics of PI control? **[8]**

Q7) a) Explain with neat sketch the multi-channel data acquisition system. **[9]**

b) Explain with neat sketch the architecture of Remote Terminal Unit (RTU) **[9]**

OR

Q8) Write short notes on : **[18]**

a) Digital communication unit

b) Human machine interface

c) Distributed control system

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Total No. of Questions : 8] **SEAT No. :**

P674 **[Total No. of Pages : 3**

[6004]-657
B.E. (Production Engineering)
OPERATIONS RESEARCH
(2019 Pattern) (Semester - VII) (411082)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Assume suitable data if necessary.***
4) ***Use graph paper for graphical solution.***

Q1) a) Describe distinguishing characteristics of dynamic programming. **[9]**

b) Describe algorithm of dynamic programming. **[8]**

OR

Q2) a) Describe Computational procedure in dynamic programming. **[5]**

b) Consider the following N.L.P.: **[12]**

Minimize = $2x_1^2 - 24x_1 + 2x_2^2 - 8x_2 + 2x_3^2 - 12x_3 + 200$

By separating this function into three one-variable functions, show that function is convex. Solve the problem by solving each one-variable function by calculus.

Q3) a) Describe the replacement model in which maintenance cost and value of money changes with time. **[5]**

b) The initial cost of the machine is Rs.5,000. As the time passes the resale value is decreased and after some period it remains constant Rs. 500. Year end resale value, Yearly operating cost, Yearly maintenance cost is shown in table. Determine the optimum length of service of a machine before it should be replaced. **[12]**

Year of service	1	2	3	4	5
Year end sales value	3000	2500	2000	1500	500
Annual operating cost	1000	1100	1200	1300	1400
Annual maintenance cost	400	500	700	900	1100

OR

P.T.O.

Q4) a) A machine costs Rs. 15,000/-. Operating costs are Rs. 500/- for the five years. In the sixth and succeeding years operating cost increases by Rs. 100/- per year. Assuming 10% value of money per year. Find the optimum length of time to hold the machine before we replace it. **[12]**

b) Describe the group replacement model with suitable illustration. **[5]**

Q5) a) The pay off of different strategies against conditions (events) shown in following table. **[12]**

Which strategy should the concerned executive will choose on the basis of

i) MaxiMax criteria or criteria of optimism.

ii) MaxiMin criteria or criteria of Pessimistic (Wald Criteria)

iii) MiniMax Regret criteria

	Status of Nature (Product Demand)			
Strategy	N1	N2	N3	N4
S1	152	153	150	151
S2	154	151	159	151
S3	151	153	152	149

b) Describe the following with suitable illustration. **[6]**

i) Savage Criteria

ii) Criteria of Realism

OR

Q6) a) The pay off of different strategies against conditions (events) shown in following table. **[8]**

Which strategy should the concerned executive will choose on the basis of

i) Hurwicz criteria [alfa = 0.6]

ii) Laplace criteria or Criteria of Rationality

	Status of Nature (Product Demand)			
Strategy	N1	N2	N3	N4
S1	152	153	150	151
S2	154	151	159	151
S3	151	153	152	149

b) Solve the following game by dominance and select the strategies and find the game value. **[10]**

		Player B			
		I	II	III	IV
Player A	I	2	1	2	0
	II	3	4	2	4
	III	4	2	4	0
	IV	0	4	0	8

Q7) a) Describe various arrangements of service facilities(structure of the service system) **[6]**

b) In a bank 5 customers arrives on an average after every 5 minutes for withdrawing the cash. On an average the cashier at the payment counter takes 3minutes to serve 6 customers. **[12]**
Calculate:

i) Arrival rate and service rate
ii) Average number of customers in the bank(in the system)
iii) Average number of customers in the queue or average queue length
iv) Average time of a customer spends in the system.
v) Average waiting time of a customer in the queue before service.

OR

Q8) a) Write note on Monte Carlo Simulation. **[8]**

b) Discuss Assumptions and limitations of queuing theory. **[10]**

Total No. of Questions : 8]

SEAT No. :

P-675

[Total No. of Pages : 2

[6004]-658

B.E. (Production Engineering)

SIMULATION, MODELING AND DIGITAL TWIN

(2019 Pattern) (Semester - VII) (Elective - III) (411083A)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume suitable data if necessary.***
4) ***Use of Non-programmable scientific calculators is allowed.***
5) ***Figures to the right indicate full marks.***

Q1) a) With example describe how the simulation models are designed? **[8]**

b) How the model can be validated using three step approach? **[9]**

OR

Q2) a) With suitable example describe how the verification and validation of the simulation models are done. **[8]**

b) Write short note on accreditation of models. **[9]**

Q3) a) Define digital twin. Explain the types of industries it is used. **[9]**

b) Along with suitable example, explain application of digital twin in product-based industries. **[9]**

OR

Q4) a) What are the key requirements to implement digital twin in the industries? **[9]**

b) Write short note on tools and techniques used in incorporating digital twin in industries. **[9]**

P.T.O.

Q5) a) Briefly explain the working and trends in the process industry. **[8]**

b) How the data is collected and analyzed for improvement of process in digital twin? **[9]**

OR

Q6) a) What are the control system requirements in a process industry? Elaborate some of them. **[8]**

b) Write short note on **[9]**

i) Automation Simulation

ii) Digital enterprise

Q7) a) Explain how digital twin can be applied for improvement in product quality. **[9]**

b) Write short note on continuous prediction and tuning of production process through Simulation. **[9]**

OR

Q8) a) How the flexibility in production can be achieved by applying digital twin? **[9]**

b) Write short note on: **[9]**

i) Improvement in production process by application of digital twin

ii) Improveinent in process safety by application of digital twin

Total No. of Questions : 8]

SEAT No. :

P-676

[Total No. of Pages : 2

[6004]-659

B.E. (Production Engineering)

TOTAL QUALITY MANAGEMENT

(2019 Pattern) (Semester - VII) (Elective - III) (411083B)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of Calculator is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) a) Explain Stages of FMEA in detail. **[9]**

b) Discuss advantages and limitations in Benchmarking Quality. **[9]**

OR

Q2) a) What are the types of Benchmarking? **[9]**

b) Explain QFD Process and discuss benefits of QFD. **[9]**

Q3) a) Describe the concept of maintainability and availability in detail. **[9]**

b) Explain Weibull Distribution with suitable sketch. **[8]**

OR

Q4) a) Describe BathTub curve with suitable sketch. **[9]**

b) Explain concept of MTBF and MTTF in reliability. **[8]**

P.T.O.

Q5) a) What are the requirements for quality coordination of quality activities? **[9]**

b) How to organize for quality implementation? **[9]**

OR

Q6) a) Explain the concept of six sigma. **[9]**

b) Discuss how to plan for an audit. **[9]**

Q7) a) Describe ISO 9001:2000 QMS Requirements. **[9]**

b) Discuss the benefits of EMS. **[8]**

OR

Q8) a) What are the requirements of ISO 14001. **[8]**

b) Explain implementation and operation of EMS. **[9]**

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Total No. of Questions : 8]

SEAT No. :

P-677

[Total No. of Pages : 2

[6004]-660

B.E. (Production)

ARTIFICIAL INTELLIGENCE IN MANUFACTURING

(2019 Pattern) (Semester - VII) (411083C) (Elective - III)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q.No. 1 or Q.No. 2, Q.No. 3 or Q.No. 4, Q.No. 5 or Q.No. 6, Q.No. 7 or Q.No. 8***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume suitable data, if necessary.***

Q1) a) Explain the Building-Block Hypothesis of a binary coded GA. **[10]**

b) Can you declare GA as global optimizer? Explain it. **[8]**

OR

Q2) a) State the advantages and disadvantages of GA. **[10]**

b) Explain the Application of GA in Optimization Problems. **[8]**

Q3) a) What is a neural network? How artificial neural networks work? **[10]**

b) What are the types of back propagation? Explain in brief. **[8]**

OR

Q4) a) What is back propagation neural networks explain its architecture? **[10]**

b) What is Adaptive Resonance Theory network? Explain. **[8]**

Q5) a) How is AI used in the manufacturing industry? **[10]**

b) What are the six steps in the monitoring procedure? Explain in brief. **[7]**

OR

P.T.O.

Q6) a) Explain AI in design and manufacturing. **[10]**

b) What is machine vision in manufacturing? Explain in brief. **[7]**

Q7) a) Explain the role of Artificial Intelligence in warehouse management. **[10]**

b) How is AI used in inventory management? **[7]**

OR

Q8) a) What is AI visual inspection? **[10]**

b) How AI is used for appropriate cutting tool selection? **[7]**

Total No. of Questions : 8] **SEAT No. :**

P-678 **[Total No. of Pages : 2**

[6004]-661

B. E. (Production Engineering)

WORLD CLASS MANUFACTURING

(2019 Pattern) (Semester - VII) (Elective - III) (411083D)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Attempt Q.No. 1 or Q.No. 2, Q.No. 3 or Q.No. 4, Q.No. 5 or Q.No. 6, Q.No. 7 or Q.No. 8***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume suitable data, if necessary.***

Q1) a) Explain Computer Aided Process Planning used as Information tool in WCM. **[6]**

b) List various steps in Purchase cycle. **[6]**

c) Which are the Maintenance Stages? **[5]**

OR

Q2) a) Explain Rapid Prototyping used as Material Processing & Handling tool in WCM. **[6]**

b) Explain various types of Stores. **[6]**

c) Which are six big losses in TPM? **[5]**

Q3) a) What is Statistical Quality Control? **[6]**

b) Explain 3M with exmple. **[6]**

c) Discuss Poka-Yoke with example. **[6]**

OR

Q4) a) What is Rapid Prototyping as a Product development tool **[6]**

b) What is Spaghetti Chart used for? Explain. **[6]**

c) What is Product Mix? Explain. **[6]**

P.T.O.

Q5) a) Discuss organization structure of any world class organization. **[8]**

b) Explain various motivation techniques. **[9]**

OR

Q6) a) Define Organizational Learning. Explain characteristics of Learning Organization. **[8]**

b) Discuss how root cause analysis techniques are used in WCM? **[9]**

Q7) a) Discuss effect of Green Manufacturing. **[9]**

b) Write Short Note on Clean Manufacturing. **[9]**

OR

Q8) a) Write short note on Agile Manufacturing. **[9]**

b) Discuss a case study related to WCM of any organization. **[9]**

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Total No. of Questions : 8]

SEAT No. :

P-679

[Total No. of Pages : 2

[6004]-662

B.E. (Production Engineering)

PLANT MAINTENANCE AND INDUSTRIAL SAFETY

(2019 Pattern) (Semester - VII) (Elective - IV) (411084A)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Neat diagrams must be drawn whenever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***
5) ***Use of logarithmic tables, slide rules, Mollier charts, electronic pocket calculator and steam table is allowed.***

Q1) a) What are the causes of machine vibration? **[5]**

b) Discuss the wear debris analysis techniques. **[6]**

c) What are the benefits of condition monitoring? **[6]**

OR

Q2) a) How cost comparison is done in condition monitoring? **[7]**

b) Discuss the various techniques used in condition monitoring. **[10]**

Q3) a) Explain safety committees and its structure. **[8]**

b) Describe roll of management and roll of government in Industrial safety. **[10]**

OR

Q4) a) Write a note on 'World Safety Organization'. **[8]**

b) What do you mean by safety? Discuss how Safety Engineering helps in improving productivity of an organization. **[10]**

P.T.O.

Q5) a) What do you mean by accident? Explain various direct and in-direct costs of accident. **[7]**

b) Explain role of Safety Education and training in Industry. **[10]**

OR

Q6) a) Explain accident reporting and investigation procedures. **[7]**

b) What is personal protective equipment? Explain different PPE used for different purpose and an importance of PPE. **[10]**

Q7) a) Discuss the engineering method of controlling chemical hazards in industry. **[8]**

b) Explain in detail Workmen's Compensation Act. **[10]**

OR

Q8) a) Explain the codes and regulations for workers safety and health. **[8]**

b) Explain Explosive Act in detail. **[10]**

x x x

Total No. of Questions : 8]

SEAT No. : ____

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[Total No. of Pages : 2

[6004]-663

B.E. (Production)

SURFACE ENGINEERING

(2019 Pattern) (Semester - VII) (Elective - IV) (411084B)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Neat diagrams must be drawn whenever necessary.***
3) ***Figures to the right indicate full marks.***

Q1) a) Which are the different metal cladding processes? Explain any one. **[10]**

b) Describe any one carburizing process. **[8]**

OR

Q2) a) Which thermal spray coating processes? Explain HVOF (High Velocity Oxy - Fuel Spraying). **[10]**

b) State the advantages and applications of diffusion coating processes. **[8]**

Q3) a) Describe chemical vapor deposition process with its advantages. **[10]**

b) Which are surface engineering problems related to substrate characteristics. **[8]**

OR

Q4) a) Explain any Plasma-based surface engineering processes for wear and corrosion protection. **[10]**

b) Which are the advantages of ion implantation? **[8]**

P.T.O.

Q5) a) Describe measurement of Thickness of Coatings and Films by indentation method. **[10]**

b) Explain magnetic particle testing of surface defects. **[7]**

OR

Q6) a) What is Adhesion Testing? Why test Adhesion? **[10]**

b) Which are the different destructive testing methods of modified Surfaces? Explain any one. **[7]**

Q7) a) Describe X-ray Photoelectron Spectroscopy (XPS) to analyze the surface morphology of nanomaterials? **[10]**

b) Write note on simulation of actual application environment in tribometer.**[7]**

OR

Q8) a) Describe the use of Laser in Surface Engineering. **[10]**

b) Which paints and coatings that address Environmental Issues? Discuss.**[7]**

x x x

Total No. of Questions : 8]

SEAT No. :

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[Total No. of Pages : 2

[6004]-664

B.E. (Production)

REVERSE ENGINEERING

(2019 Pattern) (Semester - VII) (Elective - IV) (411084C)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume suitable data if necessary.***
4) ***Use of Non-programmable scientific calculators is allowed.***
5) ***Figures to the right indicate full marks.***

Q1) a) Briefly discuss four phases of RE data processing chain with fundamental RE operations. **[8]**

b) Discuss the various types of hardware used in reverse engineering along with it's advantages and disadvantages. **[9]**

OR

Q2) a) Discuss contact method used in data collection in reverse engineering along with it's advantages and disadvantages. **[8]**

b) Write short notes on **[9]**

i) Polygon phase

ii) Nurbs surface phase

Q3) a) Briefly discuss with a example the selection process for a reverse engineering system. **[9]**

b) Write short note on: **[9]**

i) internal Measurement Systems

ii) X-ray Tomography

OR

P.T.O.

Q4) a) How to identify business opportunities and technical requirements while selecting a reverse engineering system. **[9]**

b) Discuss Structured-light and Stereoscopic Imaging Systems. **[9]**

Q5) a) Explain how the cloud data is modeled in reverse engineering. **[8]**

b) With appropriate diagram briefly explain the concept of integration of reverse engineering and rapid prototyping for layer- based model generation. **[9]**

OR

Q6) a) Write short note on data processing used in reverse engineering. **[8]**

b) With suitable example explain the concept of construction of first line segment. **[9]**

Q7) a) With appropriate example briefly explain the application of reverse engineering in automotive industries. **[9]**

b) Discuss the limitations for applying reverse engineering concepts in the real world. **[9]**

OR

Q8) a) What are the legal aspects of reverse engineering? **[9]**

b) How the reverse engineering concepts can be applied in Medical device industries? **[9]**

Total No. of Questions : 8]

SEAT No. :

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[Total No. of Pages : 3

[6004]-665

B.E. (Production Engineering)

ENTREPRENEURSHIP AND INNOVATIONS

(2019 Pattern) (Semester - VII) (Elective - IV) (411084D)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of electronic pocket calculators is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) Explain the Contribution of Industry to National Economy. **[9]**

b) List and explain the policies that government can use to encourage entrepreneurship. **[9]**

OR

Q2) a) Explain the Role of Entrepreneurship in Small Scale Enterprises and Economic Development. **[9]**

b) In the Indian context, explain the specific role that entrepreneurship has fulfilled in the development of small scale sector. **[9]**

Q3) a) For any company explain any three elements in the project identification? **[8]**

b) What are the tools used in project identification? What are the objectives of project identification? **[9]**

OR

P.T.O.

Q4) a) **[9]**

Liabilities	Rs.	Assets	Rs.
Equity Share Capital	10,000	Fixed assets (less depreciation Rs. 10,000)	26,000
7% Preference Share Capital	2,000	Current Assets:	
Reserves and Surplus	8,000		
6% Mortgage Debentures	14,000	Cash	1,000
Current Liabilities:		Investments (10%)	3,000
Creditors	1,200	Sundry debtors	4,000
Bills payable	2,000	Stock	6,000
Outstanding expenses	200		
Tax Provision	2,600		
	40,000		40,000

From the following balance sheet of Mr. Arvind Industries Ltd., as 31st March 2022.

Other information:

i) Net sales Rs. 60,000

ii) Cost of goods sold Rs. 51,600

iii) Net income before tax Rs. 4,000

iv) Net income after tax Rs. 2,000

Calculate:

I) Current Ratio

II) Proprietary Ratio

III) Stock turnover ratio

b) What is planning and control in project? **[8]**

Q5) a) Explain the role of planning and control for a project. **[8]**

b) List and explain the different sources from which a project idea can be generated. **[9]**

OR

Q6) a) What are project controls in project management? **[8]**

b) What is project control Example? **[9]**

Q7) a) What are the legal issues for the entrepreneur? **[9]**

b) What are the five most important business issues that can lead to legal problems for global marketers? **[9]**

OR

Q8) a) How does the law affect the business? **[9]**

b) What are some basic laws associated with doing business? **[9]**

x x x

Total No. of Questions : 8]

SEAT No. :

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[Total No. of Pages : 3

[6004]-666

B.E. (Production Engineering)

Computer Integrated Design and Manufacturing

(2019 Pattern) (Semester - VII) (411088-A)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q. 7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) What is CIM? Explain its evolution. **[8]**

b) Explain with neat sketch fused deposition RP. State its advantages, limitations. **[9]**

OR

Q2) a) Explain any two-manufacturing module in MRP - II. **[10]**

b) Explain with neat sketch stereolithography RP method. **[7]**

Q3) a) Write the meaning of following G and M code - **[6]**

G00, G03, G90, M02, M04, M06

b) Write a CNC program in G and M code for a part as shown in fig No.1. Also write a remark for each block. **[12]**

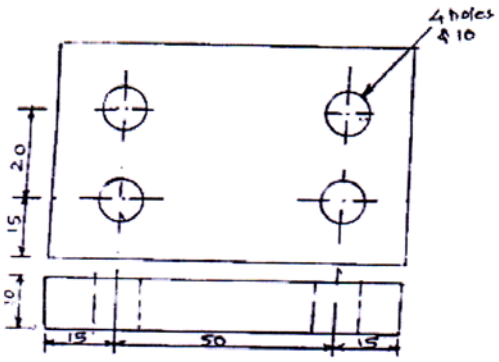

Fig. No. 1(All dimension are in MM)

OR

P.T.O.

Q4) a) Write different classification of NC machine tools along with sketches. **[6]**

b) Write a CNC program in G and M code for a part as shown in fig No. 2. Also write a remark for each block. **[12]**

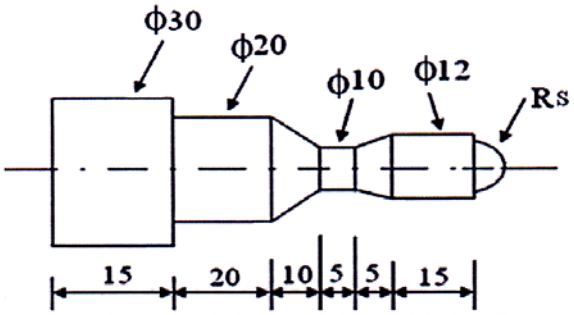

Fig. No. 2(All dimension are in MM)

Q5) a) Fig. No. 3 shows three springs, having stiffness 20, 15 and 25 N/mm, connected in parallel. One end of the assembly is fixed, and a force of 600 N is applied at the other end. Determine the deflections of individual spring **[12]**

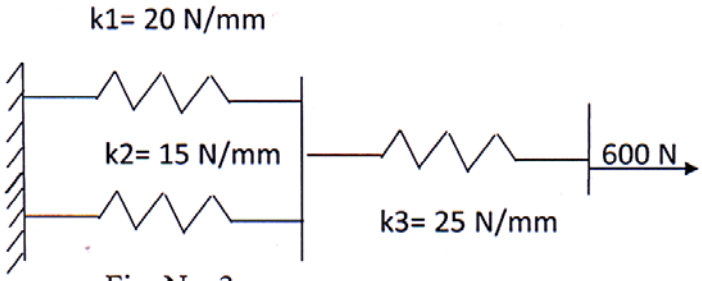

Fig. No. 3

b) Write properties of global stiffness matrix. **[6]**

OR

Q6) a) A stepped bar is made of two materials joined together as shown in following fig.No.4. The bar is subjected to an axial pull of 20KN. Determine the displacement, reaction force at support, using a 1D spar element $A_1 = 75mm^2$, $E_1 = 200GPa$ $A_2 = 30mm^2$, $E_2 = 120GPa$. **[12]**

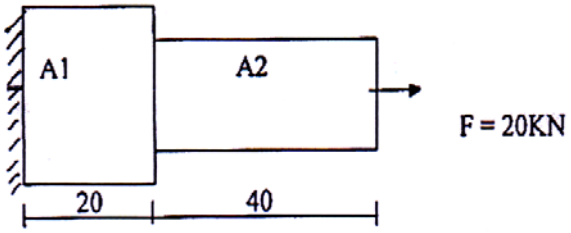

Fig.No.4 (All dimensions are in MM)

b) Explain different coordinate reference systems used in FEA. **[6]**

Q7) a) Explain different layouts in FMS. **[9]**

b) Consider a CNC machining center processing raw parts one at a time in M/M/1 fashion. Let parts arrive at a rate of 15 parts/ hour and service rate of 25 parts/ hour. Find machine utilization, mean number of parts in system and in queue, mean waiting time in system and in queue. **[8]**

OR

Q8) a) Explain the concept of cellular manufacturing. **[8]**

b) What is meant by ASRS? What are the advantages of AGVS over the other material handling system? **[9]**

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Total No. of Questions : 8]

SEAT No. :

P-1434

[Total No. of Pages : 3

[6004]-667

B.E. (Production)

INDUSTRIAL ROBOTICS

(2019 Pattern) (Semester - VIII) (411089)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates :

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***

Q1) a) What is robot dynamic analysis and state its significance in robotics? **[8]**

b) The serial planar robot with two prismatic joints, with link lengths 20 cm and 35 cm and the masses as 2.5 kg and 3 kg respectively. Determine the joint torques or forces acting on the gripper. **[10]**

OR

Q2) a) Explain the principal of partitioned control scheme used in controlling the motor connected at robotic joint. **[8]**

b) For a 1 DOF planar robot, link moves from initial position to final position ($\theta_1 = 0°$) to final position at 45°. Determine the inertia tensor of link in base coordinate system if link length l = 0.15 m and mass of link m = 2.5 kg. Assume that the link is of circular cross section. **[10]**

Q3) a) Give the detail classification of sensors. What is the role of sensors in robotics? **[6]**

b) The image of an object is represented by an array of pixels. The light intensity values at the different pixels are given below. **[12]**

110	100	85	75
120	104	56	85
90	85	65	75
105	70	95	88

P.T.O.

Determine pre-processed data using :

i) Masking operation

ii) Neighborhood averaging method with a 3 × 3 size of neighborhood

iii) Median filtering with a 3 × 3 neighborhood

OR

Q4) a) How digital image is represented for robotic vision? **[6]**

b) The 8 × 8 array of pixels indicating each element as the gray level of pixel is given below. i) Construct the histogram and find threshold value. ii) Convert it into black and white image. iii) Perform shape analysis (first and second order moments, centroids, run length encoding, principal angle) The 8x8 array of pixels indicating each element as the gray level of pixel is given below. i) Construct the histogram and find threshold value. ii) Convert it into black and white image .iii) perform shape analysis (first and second order moments, centroids, run length encoding, principal angle). **[12]**

7	12	13	11	12	11	13	13
13	13	10	15	15	17	14	15
9	12	14	16	16	15	15	17
8	12	14	16	15	15	15	11
9	12	15	15	15	15	15	15
7	13	14	16	16	16	11	13
8	7	6	10	12	10	8	8
6	9	8	9	10	13	12	11

Q5) a) Discuss the concept of Counter Path Defining using 'via' point, blending Technique. **[6]**

b) Explain the steps and importance of the following in robot programming. **[10]**

i) Mastering and calibration

ii) TCP

iii) Payload capacity

iv) Work object

v) Robot teaching

OR

Q6) a) Explain the Lee's Algorithm used for motion planning. **[8]**

b) Explain following MOVE, WAIT, SIGNAL, DELAY with an robot welding example. **[8]**

Q7) Write short note on : **[18]**

a) Assembly robots

b) Robot material handling systems

c) AI application in industry

OR

Q8) Write short note on : **[18]**

a) Pick and place robots

b) ANN

c) Loading and unloading automation

□□□

Total No. of Questions : 8]

SEAT No. :

P684

[Total No. of Pages : 1

[6004]-668
B.E. (Production)
E-MOBILITY IN AUTOMOBILE
(2019 Pattern) (Semester - VIII) (Elective - V) (411090 (A))

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.l or Q.2 Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figrues to the right indicate full marks.***
4) ***Assume Suitable data if necessary.***

Q1) a) What are the requirements and challenges of EV motors? **[9]**

b) Discuss classification of Electrical Vehicle motors. **[8]**

OR

Q2) a) Compare electrical vehicle motors with industrial motors. **[9]**

b) Explain principle and construction of BLDC and PMSM. **[8]**

Q3) a) Explain types of power transfer mediums for Electrical Vehicles. **[9]**

b) What is BMS in electric vehicle? Explain in detail. **[9]**

OR

Q4) a) Which battery is used for EVs and HEVs traction and Why? **[9]**

b) Discuss earth protection system for charging stations in EV. **[9]**

Q5) a) What is the working principle of V2G? **[9]**

b) Discuss the configuration of EV. **[8]**

OR

Q6) a) What are components of EV system? **[9]**

b) Which type of charging strategy is utilized for V2G? **[8]**

Q7) a) What is the control strategy of fuel cell? **[9]**

b) How fuels are controlled in the current automobile system? **[9]**

OR

Q8) a) What is APU control system. **[9]**

b) Explain fuel cell hybrid Electric Vehicles. **[9]**

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Total No. of Questions : 8]

SEAT No. :

P1458

[Total No. of Pages : 2

[6004]-669
B.E. (Production)
SMART MANUFACTURING
(2019 Pattern) (Semester - VIII) (Elective-V)(411090 (B))

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data, if necessary.***
4) ***Neat diagrams must be drawn wherever necessary.***

Q1) a) What is hardware requirement in smart manufacturing? **[6]**

b) Explain modern connectivity for manufacturing equipment in smart manufacturing. **[6]**

c) Describe Modern data infrastructure approach to manufacturing data collection and analysis. **[5]**

OR

Q2) a) What is role of Automation and Robotics in smart manufacturing. **[6]**

b) Explain automation using software in smart manufacturing. **[6]**

c) Explain Condition-based and predictive asset management in smart manufacturing. **[5]**

Q3) a) Describe model development in process modeling of smart manufacturing. **[6]**

b) Explain data technologies of industry 4.0. **[6]**

c) Which are the challenges of Industrial AI and predictive analytics for smart manufacturing systems? **[5]**

OR

Q4) a) Which are the steps of getting the required set of equation in model development? **[6]**

b) Explain operations technologies of industry 4.0. **[6]**

c) Explain data-based design of experiments. **[5]**

P.T.O.

Q5) a) Write note on Smart manufacturing concepts. **[6]**

b) Explain High-fidelity dynamic modeling and model approximation. **[6]**

c) Which are the multidisciplinary system design optimization approaches? **[6]**

OR

Q6) a) Describe Computational framework in smart manufacturing. **[6]**

b) Explain PAROC in smart manufacturing. **[6]**

c) What is Asset autonomy in smart manufacturing? **[6]**

Q7) a) Which are the characteristics of process data? Explain in brief. **[6]**

b) Describe use of PLS in soft sensing. **[6]**

c) Describe use of Artificial neural networks for soft sensor building. **[6]**

OR

Q8) a) Explain Inferential control and state estimation-based approaches. **[6]**

b) Describe use of PCA in soft sensing. **[6]**

c) Explain PLS in process monitoring and part of soft sensor technology. **[6]**

Total No. of Questions : 8]

SEAT No. :

P1435

[Total No. of Pages : 2

[6004]-670
B.E. (Production Engineering)
MANUFACTURING SYSTEM DESIGN
(2019 Pattern) (Semester - VIII) (Eletive-V) (411090C)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8 .***
2) ***Figures to the right indicate full marks.***

Q1) a) What are different steps followed in designing a manufacturing system? **[8]**

b) Write short note on: Manufacturing system design Configuration. **[8]**

c) Brief shortly about Hybrid Manufacturing System. **[3]**

OR

Q2) a) Write factor which considered in Station Level Design. **[8]**

b) Write short note on Line Balancing. **[8]**

c) What is a Need of Manufacturing System? **[3]**

Q3) a) Write short note on Group technology. **[8]**

b) Write Advantage, Disadvantage And applications of FMS. **[8]**

c) Mentioned Methods for Part Family Formation. **[3]**

OR

Q4) a) What is Cellular Manufacturing? Write it's advantages and disadvantages. **[8]**

b) Explain Different type of codes in Design and Manufacturing Attributes. **[8]**

c) Write advantages and limitation of Group Technology. **[3]**

P.T.O.

Q5) a) Explain Lean Production with suitable example. **[8]**

b) Write short note on: **[8]**

i) Value stream Mapping

ii) JIT

OR

Q6) a) Write Short note on Zero Inventory. **[8]**

b) What is Opportunity cost? Explain. **[8]**

Q7) a) What are material selection parameter in process planning. **[8]**

b) What do you understand about Aggregate Production Planning? **[8]**

OR

Q8) a) What are different steps in Process planing? **[8]**

b) Which are the process plan activities? **[8]**

Total No. of Questions : 8]

SEAT No. :

P685

[Total No. of Pages : 3

[6004]-671

B.E. (Production Engineering)

ERGONOMICS AND WORK MANAGEMENT

(2019 Pattern) (Semester - VIII) (411090 D) (Elective - V)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.l or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume Suitable data if necessary.***

Q1) a) Describe the principles of auditory displays. **[8]**

b) Describe types of visual displays with neat sketches. **[9]**

OR

Q2) a) Describe the types of information. **[8]**

b) Describe Desktop PC seating workplace arrangement considering ergonomic risk factors. **[9]**

Q3) a) Define Work study. Describe the various objectives of work study. **[8]**

b) Productivity increases standard of leaving. Justify with illustration.. **[9]**

The following information regarding the output produced and input consumed for a particular time period for a ABC company is given below:

Compute various productivity indexes

Details	Rs
Output	200000
Labour	50000
Capital	30000
Material	25000
Energy	7500
other expenses	2500

OR

P.T.O.

Q4) a) Define Basic work content. Describe the factors which affects the basic work content (i.e. excess work content). **[8]**

b) Define productivity. State the advantages of productivity. The following information regarding the output produced and input consumed for a particular time period for a ABC company is given below: **[9]**

The following information regarding the output produced and input consumed for a particular time period for a ABC company is given below:

Compute various productivity indexes

Details	Rs
Output	45,000
Labour	13,500
Capital	23,200
Material	25,000
Energy	1,500
other expenses	2,500

Q5) a) Define Micro motion study. Describe various symbols (therbigs) used in micro motion study with their meaning. **[9]**

b) Describe the economic and technical factors to be considered while selecting the job for method study. **[9]**

OR

Q6) a) Describe principles of motion economy related to use of human body with neat sketches. **[9]**

b) Describe Multiple activity chart with suitable illustration & appropriate symbols with their meaning. **[9]**

Q7) a) Define time study. Describe various steps to carry out time study. **[9]**

b) The time study is carried for an operation. They elemental data for the time (minutes) for a particular operation and the rating is shown as follows: **[9]**

Calculate:

i) Normal (Basic) time.

ii) Standard time considering allowance of 15%.

Element No.	Cycle1	Cycle2	Cycle3	Cycle4
1	3	3.1	3.2	2.9
2	3.5	3.4	3.5	3.6
3	3	3.1	2.9	3.1
4	2	1.9	2	2
5	2.5	2.5	2.4	2.6
6	1.4	1.6	1.5	1.4
7	2	1.9	2	2.1

OR

Q8) a) Describe various types of allowances considered during calculation of standard time. **[9]**

b) Describe the process to carry out work sampling study. State how the standard time is calculated using work sampling study. **[9]**

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Total No. of Questions : 8]

SEAT No. :

P-1437

[Total No. of Pages : 2

[6004]-672

B.E. (Production)

FACILITY PLANNING

(2019 Pattern) (Semester - VIII) (411091A) (Elective - VI)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume Suitable data if necessary.***

Q1) a) Explain in detail functions of the Warehouse. **[8]**

b) Discuss in detail Fixed Automation System with advantages and limitations. **[10]**

OR

Q2) a) Discuss in detail Single-Stage Multi machine Systems. **[8]**

b) Define Just-in-Time manufacturing. Explain in detail elements of JIT. **[10]**

Q3) a) Explain in detail Enclosure Systems in facility planning. **[8]**

b) Discuss in detail building Automation Systems. **[10]**

OR

Q4) a) Discuss in detail Atmospheric Systems used in any manufacturing organization. **[10]**

b) Discuss in detail Life Safety Systems in an organization. **[8]**

P.T.O.

Q5) a) Explain in detail Special Facility Layout Model. **[7]**

b) List the Facility Location Models. Explain any one of them. **[10]**

OR

Q6) a) Describe in detail Order Picking System. **[10]**

b) Discuss in detail Fixed-Path Material Handling Model. **[7]**

Q7) a) Explain the factors influencing selection of facility location. **[8]**

b) Explain in detail the Factor-Rating Method of facility location. **[9]**

OR

Q8) a) Explain in detail Center-of-Gravity Method of facility location. **[8]**

b) Discuss in detail Agglomeration and Degglomeration of any type of facility. **[9]**

Total No. of Questions : 8]

SEAT No. :

P-686

[Total No. Of Pages : 3

[6004]-673

B.E. (Production Engineering)

ADDITIVE MANUFACTURING

(411091B) (2019 Pattern) (Semester-VIII) (Elective - VI)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates :

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume suitable data if necessary.***
4) ***Use of non-proggrammable scientific calculators is allowed.***
5) ***Figures to the right indicate full marks.***

Q1) a) Explain advantages, disadvantages and applications of Cubital's Solid Ground Curing process. **[6]**

b) Explain with neat sketch the micro-fabrications process. **[6]**

c) Explain advantages, disadvantages and applications of Rapid Freeze Prototyping. **[6]**

OR

Q2) a) Explain the advantages, disadvantages and applications of stereolithography process. **[6]**

b) Explain the advantages, disadvantages and applications of D-MEC's Solid Creation System process. **[6]**

c) Explain in brief Meiko's Rapid Prototyping process, its principle and applications. **[6]**

Q3) a) Explain with neat sketch the working principle, advantages, disadvantages and applications of Paper Lamination Technology (PLT). **[9]**

b) Explain with neat sketch the working principle, advantages, disadvantages and applications of Multi-Jet Modeling System. **[8]**

P.T.O

OR

Q4) a) Explain with neat sketch the working principle, advantages, disadvantages and applications of Laminated object manufacturing (LOM). **[9]**

b) Explain with neat sketch the working principle, advantages, disadvantages and applications of Fused Deposition Modeling. **[8]**

Q5) a) Explain with neat sketch the working principle, advantages, disadvantages and applications of Electron Beam Melting **[8]**

b) Explain with neat sketch the working principle, advantages, disadvantages and applications of Three-Dimensional Printing. **[9]**

OR

Q6) a) Explain with neat sketch the working principle, advantages, disadvantages and applications of Laser Engineered Net Shaping. **[8]**

b) Explain with neat sketch the working principle, advantages disadvantages and applications of Selective Laser Sintering. **[9]**

Q7) a) Create the flow chart of computer aided tissue engineering and outline its overview. **[6]**

b) Explain in brief (any three) **[12]**

i) Planning Reconstructive Surgery with RP Technology

ii) Knee Implants

iii) Scaffolds for Tissue Engineering

iv) Customized Tracheobronchial Stents

v) Inter-Vertebral Spacers

vi) Cranium Implant

OR

Q8) a) Explain in brief the concept of Tissue Engineering and need for computer Aided Tissue Engineering. **[6]**

b) Explain in brief (any three) **[12]**

i) Cranium Implant

ii) Scaffolds for Tissue Engineering

iii) Knee Implants

iv) Customized Tracheobronchial Stents

v) Inter-Vertebral Spacers

vi) Planning Reconstructive Surgery with RP Technology

Total No. of Questions : 8]

SEAT No. :

P-1438

[Total No. of Pages : 2

[6004]-674

B.E. (Production Engineering)

RELIABILITY ENGINEERING

(2019 Pattern) (Semester - VIII) (411091C) (Elective - VI)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume Suitable data if necessary.***
5) ***Use of logarithmic tables, slide rules, molier charts, electronic pocket calculator and steam table is allowed.***

Q1) a) Explain the term 'Availability' of 'Maintainability' with the help of suitable example. **[7]**

b) An air compressor has to be designed that its minimum reliability is 0.9, for an operation time of 1000 hours. The minimum availability value over the same period has to be 0.99. Estimate time to failure and mean repair time. **[10]**

OR

Q2) a) Explain difference between Preventive maintenance and Corrective maintenance. **[7]**

b) Explain in detail Reliability and Maintainability Trade-off. **[10]**

Q3) a) What is reliability allocation? Discuss the advantages of reliability allocation method. **[8]**

b) A system consists of three units connected in series, with reliabilities R_1= 0.70, R_2 = 0.80 and R_3 = 0.90. It is desired that the reliability of the system be 0.65. How this should be apportioned among three units according minimum effort method. **[10]**

OR

P.T.O.

Q4) a) Explain minimum effort method to determine system reliability. **[8]**

b) A system of 3 components 1, 2 and 3 having failure rates λ_1= 0.006, λ_2= 0.004 and λ_3= 0.001 per hour respectively. Assuming mission time of 20 hrs and system reliability of 0.92. Find failure rates as well as reliability of each subsystem for entire mission period. **[10]**

Q5) a) Explain Ishikawa diagram for failure representation. **[7]**

b) What is meant by FMEA and FMECA? What are specific advantages that could be derived from an FMEA diagram in minimizing potential failures? **[10]**

OR

Q6) a) SPM (Special purpose machine) requires a continuous DC supply during operation. A required DC supply is made available through AC to DC converters. Two converters are used in order to ensure uninterrupted DC supply. Converters receive power supply from sub-station which is directly connected to the main supply line. Draw a block diagram and Construct fault tree for the system. **[7]**

b) Discuss the method of obtaining criticality of a component or a subsystem using Risk Priority Number (RPN). **[10]**

Q7) a) Differentiate between Highly Accelerated Life Testing (HALT) and Accelerated Life Testing (ALT). **[8]**

b) In a short sample "accelerated life testing" of a system based on Weibull distribution the following data are recorded. **[10]**

Failure No	1	2	3	4	5	6	7
MTTF (hrs)	28.0	12.0	21.5	26.0	35.0	38.0	30.0

Plot the variation of reliability against time using:

i) Mean ranking and

ii) Median ranking method.

OR

Q8) a) Discuss in detail Reliability growth testing. **[8]**

b) Explain briefly the various methods of assessing reliability of a component through accelerated tests. **[10]**

Total No. of Questions : 8]

SEAT No. :

P-687

[Total No. Of Pages : 2

[6004]-675
B.E. (Production Engineering)
(411091D): DATA ANALYTICS (ELECTIVE - VI)
(2019 Pattern) (Semester-VIII)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates :

1) ***All questions are compulsory i.e.Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Assume suitable data if necessary***
3) ***Use of electronic pocket calculator is allowed.***
4) ***Neat diagrams must be drawn wherever necessary.***

Q1) a) Explain linear and multiple regressions in detail. **[9]**

b) Explain Neural network in detail with application. **[9]**

OR

Q2) a) Write short note on i) Data mining ii) Applications of data analysis. **[9]**

b) Explain conjoint analysis and its need. **[9]**

Q3) a) Write a short note on
i) Regression and classification ii) Classification Techniques **[8]**

b) Explain support vector machine algorithm with example. **[9]**

OR

Q4) a) Explain random forest in detail with example **[8]**

b) Explain predictive analysis with example. **[9]**

P.T.O

Q5) a) What is prescriptive analysis with example. **[8]**

b) Explain Decision tree with example **[9]**

OR

Q6) a) Explain principal component analysis in detail. **[8]**

b) Explain genetic algorithm in detail. **[9]**

Q7) a) Write a short note on
i) Markov Chain analysis ii) Regression based ML model **[10]**

b) Explain Monte Carlo simulation in detail **[8]**

OR

Q8) a) Explain Q learning and its application. **[8]**

b) Write a short note on
i) Reinforcement learning ii) SARSA Learning **[10]**

Total No. of Questions : 8]

SEAT No. :

P-688

[Total No. of Pages : 3

[6004]-676

B.E. (Production Sandwich Engineering)

MANUFACTURING AUTOMATION

(2019 Pattern) (Semester - VII) (411121)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary and mention it clearly.***
5) ***Use of non-programmable calculator is allowed.***

Q1) a) Draw pneumatic circuit for 3/2 push button DC valve by using single acting cylinder. **[6]**

b) Explain construction and working of solenoid valve type valve. factors to be considered for selecting solenoids? **[6]**

c) List seven basic elements used in Electro pneumatic circuits. List the advantages of electrical actuation of pneumatic. Draw the sketch of Direction control valve actuator. **[6]**

OR

Q2) a) Design and Testing of Pneumatic Circuit for Single Cycle Automation of Multi cylinders in the Sequence of A + B + B – A–. **[6]**

b) Define Pneumatics. List advantages and disadvantages of pneumatics. List Applications of Pneumatic systems? What are the Basic Components of Pneumatic System factors to be considered. While selecting Components of Pneumatic System. **[6]**

c) Comparison between Pneumatic, Electro Pneumatic. **[6]**

Q3) a) State any four important features of 8051 microcontroller. **[6]**

b) Compare data memory and program memory. (4 Points). **[6]**

c) Differentiate between Harvard and Von-Neuman architecture (4 Points). **[6]**

P.T.O.

OR

Q4) a) Define automated Transfer Line Explain In-line-straight line arrangement of workstations, Segmented In-Line Configurations Rotary Indexing Type System Configurations. **[6]**

b) Explain the features and Applications of Material Handling / transport five categories of Equipment. **[6]**

c) Define AGV list Types of AGV. What are the components of AGV? What are the Benefits of AGV? Explain variety of areas to support processing and handling throughout a facility. **[6]**

Q5) a) List principal components of automatic identification technologies, List AIDC technologies six categories. List applications of AIDC technologies in production and distribution? What are the parameters to measure the error rate in AIDC? **[6]**

b) Explain configuration of Manual assembly line technology difference between manual assembly line and mixed-model line advantages. **[6]**

c) Features and operations of single-station manufacturing cells? Difference between single-station manned cell and single-station automated cell. **[5]**

OR

Q6) a) A rotary indexing table is driven by a five-slotted Geneva mechanism. The driver rotation is 50 revolutions per minute. Determine : **[6]**

i) The total cycle time of the indexing table

ii) The available processing time for the indexing table

b) Define manufacturing system. Explain following manufacturing systems **[6]**

i) single-station cells

ii) multistation systems with fixedrouting and

iii) multistation systems with variable routing.

Give Examples of Single- Station Manned and Automated Cells.

c) Explain the following Powered conveyor mechanism used for transporting materials : **[5]**

i) Roller

ii) Skate - wheel

iii) Belt

iv) In- floor towline

Q7) a) Explain HCI to make the man and machine interaction more vibrant and interactive designing model in software engineering, Explain Design Process & Task Analysis. **[6]**

b) Explain the Elements of Digital Communication Systems, Advantages, disadvantages of digital communication, need for Pulse Modulation? **[6]**

c) Artificial Neural Networks (ANNs)? Explain Basic Structure of ANNs, Types of Artificial Neural Networks, Explain Machine Learning in ANNs strategies, Common types of discrete nodes, Explain Applications of Neural Networks. **[5]**

OR

Q8) a) Define of SCADA. What is SCADA? Explain the features and Applications of SCADA system, SCADA systems consisting, Difference Between SCADA and HMI. **[6]**

b) Define ANN, what are the Concept and Fundamentals of (ANN) Artificial Neural Networks? Explain Biological Neural Networks (ANN), Essential components of a neuron, Explain Basic architecture of Artificial Neural Networks, Explain learning situations in neural networks, and its Applications. **[6]**

c) Define Human Computer Interface Introduction (HCI), In Which areas and where HCI can be implemented with distinctive importance, Guidelines in (HCI), software tools in HCI. **[5]**

Total No. of Questions : 8] **SEAT No. :**

P689 **[Total No. of Pages : 3**

[6004]-677
B.E. (Production Sandwich)
OPERATION RESEARCH
(2019 Pattern) (Semester - VII) (411122)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right side indicate full marks.***
3) ***Use of Calculators is allowed.***
4) ***Assume Suitable data if necessary.***
5) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***

Q1) a) Distinguish between pure and mixed integer programming problems. **[6]**

b) Describe recursive equation approach to solve dynamic programming problem. **[6]**

c) Write short note on Kuhn-Tucker conditions for non linear programming problem. **[5]**

OR

Q2) a) Explain the methodology used in the cutting plane method. **[6]**

b) Explain in brief Goal Programming. State its assumptions. **[6]**

c) What are the essential characteristics of Dynamic Programming. **[5]**

Q3) a) Discuss the various types of replacement situations. **[8]**

b) The following failure rates have been observed for a certain type of light bulb.

Week	1	2	3	4	5
Percentage failure by the end of the week	10	25	50	80	100

There are 1000 bulbs in use, and it costs Rs.2/- to replace an individual bulb, which is burnt out. If all bulbs were replaced simultaneously it would cost 50 paise per bulb. It is proposed to replace all bulbs at fixed intervals of time, whether or not they burnt out, and to continue replacing burnt out bulbs as and when they fail. At what intervals all the bulbs should be replaced? At what group replacement price per bulb would a policy of strictly individual replacement become preferable to the adopted policy? **[10]**

OR

P.T.O.

Q4) a) A fleet owner finds form his past records that the cost per year of running a truck and resale values whose purchase price is Rs. 6000/- are given as under. At what stage the replacement is due? **[8]**

Year:	1	2	3	4	5	6	7	8
Running cost in Rs.	1000	1200	1400	1800	2300	2800	3400	4000
Resale value in Rs.	3000	1500	750	375	200	200	200	200

b) Machine A costs Rs. 45,000/- and the operating costs are estimated at Rs. 1000/- for the first year, increasing by Rs. 10, 000/- per year in the second and subsequent years. Machine B costs Rs. 50000/- and operating costs are Rs. 2000/- for the first year, increasing by Rs. 4000/- in the second and subsequent years. If we now have a machine of type A, should we replace it by B? If so when? Assume both machines have no resale value and future costs are not discounted. **[10]**

Q5) a) Two firms are competing for business under the conditions so that one firm's gain is another firm's loss. Firm A 's payoff matrix is given below:

FIRM B				
		No advertising	Medium advertising	Heavy advertising
FIRM A	No advertising	10	5	-2
	Medium advertising	13	12	15
	Heavy advertising	16	14	10

Suggest optimum strategies for the two firms and the net outcome there of. **[6]**

b) Explain the following terms with reference to game theory **[6]**

i) Payoff matrix

ii) Pure and mixed Strategies

iii) Saddle point

c) Discuss different types of Decision making environments. **[5]**

OR

Q6) a) Solve the following game by dominance and find the game value. **[10]**

Player B					
		I	II	III	IV
Player A	I	3	2	4	0
	II	3	4	2	4
	III	4	2	4	0
	IV	0	4	0	8

b) Solve following 2 x m game theory problem using by graphical method. **[7]**

		Player B			
		B1	B2	B3	B4
Player A	A1	2	1	0	-2
	A2	1	0	3	2

Q7) a) On an average 96 patients per 24-hours day require the service of an emergency clinic. Also on an average, a patient requires 10 minutes of active attention. Assume that the facility can handle only one emergency at a time. Suppose that it costs the clinic Rs. 100 per patient treated to obtain an average servicing time of 10 minutes, and that each minutes of decrease in this average time would cost Rs. 10 per patient treated. How much would have to be budgeted by the clinic to decrease the average size of the queue from one and one-third patients to half patient. **[8]**

b) A bakery keeps stock of a popular brand of cakes. Previous experience shows the daily demand pattern for the item with associated probabilities, as given:

Daily demand (no.s)	0	10	20	30	40	50
Probability	0.01	0.20	0.15	0.50	0.12	0.02

Use the following sequence of random Numbers to simulate the demand for next 10 days. Also find out the average demand per day Random Numbers: 25, 39, 65, 76, 12, 05, 73, 89, 19, 49. **[10]**

OR

Q8) a) Draw the sketch of queuing system and explain various components of it. **[8]**

b) A branch of Punjab national bank have only one typist. Since the typist work varies in length (Number of pages to be typed), the typing rate is randomly distributed approximating a Poisson distribution with mean service rate of 8 letters per hour. The letters arrive at the rate of 5 per hour during the entire 8 hour work day. If the is valued at Rs. 1.5 per hour, Determine

i) Equipment Utilization
ii) The percentage time that an arrival letter has to wait.
iii) Average system time.
iv) Average cost due to waiting on the part of typewriter. **[10]**

Total No. of Questions : 8]

SEAT No. :

P-690

[Total No. of Pages : 2

[6004]-678

B.E. (Production Engineering) (Sandwich)

ADDITIVE MANUFACTURING

(2019 Pattern) (Semester - VII) (Elective - III) (411123A)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume Suitable data if necessary.***

Q1) a) What is Stereolithography Apparatus (SLA)? Write down its Principle. process, advantages and applications. **[9]**

b) Elaborate on how rapid prototyping is transforming the jewellery industry. **[8]**

OR

Q2) a) What is Solid Ground Curing (SGC) Process? Explain in detail. **[9]**

b) What are the basic microfabrication techniques? What is the difference of microfabrication and nanotechnology? **[8]**

Q3) a) What is Fused Deposition Modelling (FDM)? Write down its Principle, process, advantages and applications. **[9]**

b) Write a short note on Multi-Functional RPM Systems (M-RPM). **[8]**

OR

Q4) a) With a neat diagram, explain Melted Extrusion Modelling (MEM). **[9]**

b) What is the working principle of Laminated Object Manufacturing? What are the applications of Laminated Object Manufacturing? **[8]**

P.T.O.

Q5) a) List out Solid Based Additive Manufacturing Systems and explain any one method in detail. **[9]**

b) What is Selective Laser Sintering (SLS)? Write down its Principle, process, advantages and applications. **[9]**

OR

Q6) a) With neat sketch, explain Laser Engineered Net Shaping (LENS). **[9]**

b) What is Three Dimensional Printing? Write down its Principle, process, advantages and applications. **[9]**

Q7) a) Write Short notes on Computer Aided Tissue Engineering (CATE). **[9]**

b) What is cranial implant? Explain in detail. **[9]**

OR

Q8) Write a short note on (Any 3) **[18]**

a) Knee Implants.

b) Scaffolds for Tissue Engineering.

c) Customized Tracheobronchial Stents.

d) Inter-Vertebral Spacers.

Total No. of Questions : 8]

SEAT No. : ____

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[Total No. of Pages : 3

[6004]-679

B.E. Production Sandwich Engineering

INDUSTRIAL ROBOTICS

(2019 Pattern) (Semester - VII) (Elective - III) (411123B)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Figure to the right indicates full marks***
3) ***Neat Diagram must be drawn wherever necessary***
4) ***Assume Suitable data if necessary***
5) ***Use of Logarithmic Table, Slide rule is Electronic pocket calculator is allowed.***

Q1) a) Differentiate between sensor & transducer with example and explain the role of sensors in robots. **[9]**

b) Explain the working of LVDT with application. **[9]**

OR

Q2) a) With neat sketch explain the working of following sensors in robots: **[9]**

i) Tactile Array Sensor

ii) Slip Sensor

iii) Potentiometer

b) Explain any three temperature measuring sensors. **[9]**

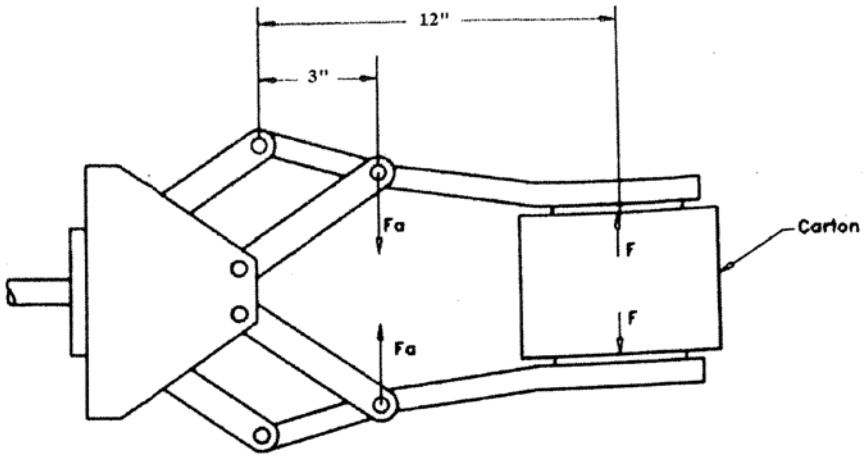
Q3) a) With neat sketch explain the methods of constraining the work piece between fingers in mechanical grippers. **[7]**

b) A vacuum gripper is used to lift flat steel plates whose dimension are 0.25× 24 × 36 inches. The gripper will use two cups, 5.0 inches in diameter each & they will be located at 18 inches apart for stability. As safety factor of 2 should be used to allow for acceleration of the plate determine the negative pressure required to be lift the plates if the density of steel is 0.28 lb/in^3. **[10]**

OR

P.T.O.

Q4) a) An angular movement gripper is used for holding the cardboard carton, the gripper force is 60lb. The gripper is to be activated by piston device to apply an actuating force Fa. Determine the piston device force Fa to close the gripper. **[7]**



b) Explain the following types of magnetic grippers with neat sketch. **[10]**

i) Permanent Magnetic gripper

ii) Electro Magnetic gripper

Q5) a) Explain following Programming Languages **[10]**

i) High level language

ii) Machine language

b) Explain any four programming methods. **[8]**

OR

Q6) a) With neat sketch explain levels of robot programming. **[8]**

b) Explain the following methods for defining positions in space. **[10]**

- By joint movements
- By x, y, z coordinate motions (world coordinates)
- By tool coordinate motions

Q7) a) Explain with example how assembly operations are growing applications areas for industrial robots. **[8]**

b) Explain any three processing operations performed by robots. **[9]**

OR

Q8) a) What is Artificial Intelligence & explain role of Artificial Intelligence in robotics. **[8]**

b) Write a note on: - **[9]**

i) Walking Robots

ii) Climbing Robots

iii) Machine Mounted Robots

x x x

Total No. of Questions : 8]

SEAT No. : ____

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[Total No. of Pages : 3

[6004]-680

B.E. (Production Engineering) (Sandwich)

RELIABILITY ENGINEERING

(2019 Pattern) (Semester - VII) (Elective - III) (411123C)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Figure to the right indicates full marks***
3) ***Neat Diagram must be drawn wherever necessary***
4) ***Assume Suitable data if necessary***
5) ***Use of Logarithmic Table, Slide rule is Electronic pocket calculator is allowed.***

Q1) a) In order to test the strength of a glue, ten similar structures constructed using the Glue were subjected to a continuous vibratory load & the duration of survival of each structure was noted, the values obtained being the following. **[6]**

Specimen No.	Hours of Survival
1	60
2	62
3	58
4	50
5	61
6	55
7	59
8	62
9	54
10	55

b) Explain MTTF for series and parallel system. **[8]**

c) Explain what is partially redundant system? **[4]**

OR

P.T.O.

Q2) a) Write the formulas for MTTF, MTTR and MTBF. **[5]**

b) The time to failure of a high speed rotor under adverse thermal environment follow A uniform distribution law over the interval 60 Hours to 74 Hours. Calculate the mean time to failure for rotor. **[5]**

c) Define MTTF & Explain in brief Failure Density (fd). **[8]**

Q3) a) Write general procedure for Fault Tree Analysis (FTA). **[7]**

b) Explain in brief Event Representation in Fault Tree Analysis (FTA). **[5]**

c) The function of strategic experiment is monitored continuously by two observation Station A and B, functioning independently. It is necessary that at least 2, one of them function satisfactorily to monitor the progress of the experiment. Each of these observations stations receives power supply from two independent sources connected in parallel. A receives a power from C & D, and B receives a power from E & F for each observation station, the power from any one source is sufficient for operation. Draw the block diagram and the fault tree diagram for the system. **[5]**

OR

Q4) a) Explain in brief Logic Gates in the Fault Tree Analysis. **[5]**

b) Let A and B be two variables, each of which can be in a binary state 0 or 1. What are the possible values for $\bar{A}+B$ & $\bar{B}*A$. **[6]**

c) Explain DE Morgen's Law. **[6]**

Q5) a) Write down the properties of Auto and Cross correlation functions. **[6]**

b) Explain Poissons Distribution Verses Binomial Distribution. **[6]**

c) The distribution function for a random phenomenon obeying a uniform probability Law over an interval "a" and "b" is expressed by **[6]**

$F_x(x) = 0$ for $x <= a$

$F_x(x) = (x - a)/(b - a)$ for $a <= x <= b$

$F_x(x) = 1$ for $x > b$

Compute the mean and variance for the uniform probability law.

OR

Q6) a) Compare Normal and lognormal distribution. **[8]**

b) Write Characteristics of Poissons Distribution. **[4]**

c) What are the characteristics of Weibull distribution. **[6]**

Q7) a) Explain redundancy concept and its types. **[7]**

b) Explain in unit redundancy and element redundancy. **[6]**

c) Explain imperfect switching in redundancy. **[4]**

OR

Q8) a) Compare perfect and imperfect switching in redundancy. **[7]**

b) The power supply to the operating unit of a hospital is provided by a generator whose failure rate follows an exponential distribution law with parameters $\lambda 1 = 0.005$ per hour. A standby battery unit is coupled through a decision switch which has a reliability $r_d = 0.90$. Calculate the reliability of the power supply s/m for a mission time of 10 hours if the battery failure rate follows a distribution law with parameter $\lambda 2 = 0.001$ per hour. **[5]**

c) Explain in brief unit redundancy. **[5]**

Total No. of Questions : 8]

SEAT No. :

P-693

[Total No. of Pages : 2

[6004]-681

B.E. (Production Sandwich Engineering)

MICRO ELECTRO MECHANICAL SYSTEMS

(2019 Pattern) (Semester - VII) (Elective - III) (411123D)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume Suitable data if necessary.***

Q1) a) Write a short note on Engineering Mechanics for Microsystems Design an Introduction. **[8]**

b) Explain the concept of Fracture Mechanics in relation to MEMS with a suitable example. **[9]**

OR

Q2) a) How is stress analysis related with MEMS? Explain its process with FEA? **[9]**

b) Can Mechanical Vibrations be controlled with MEMS? Discuss with an example. **[8]**

Q3) a) Discuss the concept of Scaling. Explain it in relation to Rigid Body Dynamics. **[9]**

b) How are electrostatic forces acting in an Electromechanical System? Can they be optimized with MEMS? How? **[9]**

OR

P.T.O.

Q4) a) How is Heat Transfer affected and restrained with MEMS **[9]**

b) What do you mean by Scaling Laws? How are they influenced in MEMS? **[9]**

Q5) a) Discuss the concept of Bulk Manufacturing for Micro Machining. **[8]**

b) Summarize the concept of Micromachining in brief **[9]**

OR

Q6) a) Why is it critical to control Surface Micromachining Process? Discuss its concept and Process with Parameters. **[9]**

b) Write a note on Micromanufacturing **[8]**

Q7) a) Discuss the various Membrane-Transducer Materials. **[9]**

b) Discuss the concept of fluroscience detection **[9]**

OR

Q8) a) Discuss any 2 of following **[9]**

i) CLOC
ii) E Nose
iii) Chemotransistors
iv) Mass sensitive Chemosensors

b) What I calorimetric spectroscopy? Explain in brief. **[9]**

Total No. of Questions : 8]

SEAT No. : ____

P-694

[Total No. of Pages : 2

[6004]-682

B.E. (Production Engineering) (Sandwich)

CREATIVE PRODUCT DESIGN (Elective - IV)

(2019 Pattern) (Semester - VII) (411124A)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8***
2) ***Figures to the right indicate full marks.***
3) ***Use of a programmable calculator is not allowed.***
4) ***Write all necessary steps.***

Q1) a) What are the key points of Traditional Brainstorming. **[10]**

b) Give summary of 6-3-5 Method. **[7]**

OR

Q2) a) Explain the process of executing Morphological analysis. **[10]**

b) Write short note on Pugh's concept. **[7]**

Q3) a) Discuss the Steps in Product Teardown. **[10]**

b) What is Product Portfolio Architecture. Discuss with example. **[8]**

OR

Q4) Write short notes on following Benchmarking Process tools **[3 × 6 = 18]**

a) Indented Assembly Cost Analysis

b) Function-Form Diagrams

c) Trend Analysis

P.T.O.

Q5) a) Give any ten guidelines for Design for Assembly. **[10]**

b) What are the objectives of Design for Environment. **[7]**

OR

Q6) a) Discuss Global, Regional and Local Issues related to Environment. **[10]**

b) Mention Product Structure Guidelines and reasons in DFE. **[7]**

Q7) a) Explain the various stages of Product Life Cycle with the help of Diagram. **[8]**

b) State the Advantages of Product life Cycle. **[5]**

c) Discuss PLM Vs PLCM. **[5]**

OR

Q8) a) Discuss following terms in context of Product data / Information.

[3 × 4 = 12]

i) Definition data of the product.

ii) Life cycle data of the product.

iii) Metadata that describes the product and lifecycle data.

b) Discuss PLM Vs PLCM. **[6]**

Total No. of Questions : 8]

SEAT No. :

P-695

[Total No. of Pages : 2

[6004]-683

B.E. (Production Engineering - Sandwich)

MECHATRONICS (Elective - IV)

(2019 Pattern) (Semester - VII) (411124B)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Figure to the right indicates full marks.***
2) ***Neat Diagram must be drawn wherever necessary.***
3) ***Assume Suitable data if necessary.***
4) ***Use of Logarithmic Table, Slide rule is Electronic pocket calculator is allowed.***

Q1) a) Write an assembly language code that reverse the data stored in BX. **[8]**

b) Write a program in 8086 assembly language that accepts a character string of maximum size of 10 characters from the keyboard and converts the string to upper case. **[10]**

OR

Q2) a) Explain the concept of Asynchronous Communication. **[8]**

b) Write a Short note on **[10]**

i) Serial Interface Standards

ii) Interface adapters.

Q3) a) Explain in detail about the internal architecture of the (PLC) programmable logic Controllers. **[9]**

b) Discuss about the programmable logic controllers and configurations.**[8]**

OR

P.T.O.

Q4) a) Draw a ladder diagram for 3 motor operation for following condition: **[9]**

i) Start push button starts motor M1. After 15 seconds M2 and M3 starts

ii) Stop push button stops M3 and after 15 seconds motor M2 and M1.

b) Explain the working of PLC based Traffic light control with the help of ladder diagram. **[8]**

Q5) a) Explain the role of modelling and simulation in the analysis of Mechatronics systems. **[7]**

b) Explain the System Modelling **[10]**

i) Mechanical System

ii) Thermal Sytem.

OR

Q6) a) Explain the Time Domain analysis Sytem in Details. **[9]**

b) Describe the Following with example. **[8]**

Damping Frequency and Damping Factor.

Q7) a) State the objectives of Engineering measurements. **[6]**

b) List the types of enors in measurement. Give their and state the remedies. **[6]**

c) State and explain any, here desirable static and dynamic characteristics of an instrument. **[6]**

OR

Q8) a) Explain with neat diagram Feedback transducer system. **[9]**

b) Two cylindrical parts of different height are produced and made to move in a conveyor and randomly placed. Tolerance in height is specified for both the parts. Give the schematic diagram for measuring the height of both the parts and counting them by the proper sensors. **[9]**

Total No. of Questions : 8]

SEAT No. :

P-696

[Total No. of Pages : 2

[6004]-684

B.E. (Production Engineering) (Sandwich)

ELECTIVE - IV : CAD/CAM

(2019 Pattern) (Semester - VII) (411124C)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 OR Q.2, Q.3 OR Q.4, Q.5 OR Q.6, Q.7 OR Q.8***
2) ***Figures to the right indicate full marks.***
3) ***Use of a programmable calculator is NOT allowed.***
4) ***Write all necessary steps.***

Q1) a) Discuss important features of Rapid Prototyping & applications. **[9]**

b) Discuss classification of Rapid Prototyping - FDM, LOM, SLA, SLS. **[9]**

OR

Q2) a) Explain CAD and Data exchange format & data format details. **[9]**

b) Discuss Part Slicing and Orientation and its importance. **[9]**

Q3) a) Explain Computer integrated production management system & enterprise resource planning. **[9]**

b) Discuss working principles of CNC Turning center and Milling center. **[8]**

OR

Q4) a) Discuss The Siemens Model of CIM & IBM concept of CIM. **[9]**

b) Discuss steps in developing CNC part program in detail. **[8]**

P.T.O.

Q5) a) Discuss Computer Aided Process Planning. **[9]**

b) Computer integrated production management system, inventory material requirement planning. **[9]**

OR

Q6) a) Explain manufacturing resource planning & enterprise resource planning. **[9]**

b) Discuss Computer application in manufacturing & inspection and quality control. **[9]**

Q7) a) Discuss the elements of Product Life Cycle. **[9]**

b) Discuss machine cell design and Cellular manufacturing. **[8]**

OR

Q8) a) Explain Part Families, Part classification and coding, **[9]**

b) Explain production flow analysis & Rank Order Clustering Algorithm. **[8]**

Total No. of Questions : 8]

SEAT No. :

P-697

[Total No. of Pages : 3

[6004]-685

B.E. (Production and Sandwich Engineering)

DATA ANALYTICS

(2019 Pattern) (Semester - VII) (411124D) (Elective - IV)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Figures to right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable data, if necessary.***

Q1) a) What is predictive analysis? Discuss with at least five real-time applications. **[9]**

b) What is univariate, bivariate and multivariate analysis? Write the difference between them? Discuss with examples. **[9]**

OR

Q2) a) The job market is being studied in several neighborhoods. Let x represent total number of jobs in a given neighborhood, and y represents entry level jobs in the same neighborhood. A sample six neighborhood gave the following information. **[12]**

i) Find out the linear regression model using least square method

ii) For a neighborhood with 40 jobs, how many jobs are predicted at entry level?

x	16	33	50	28	50	25
y	2	3	6	5	9	3

b) What do you understand by neural network in deep learning? Write are the advantages, disadvantages and application of the neural network. **[6]**

P.T.O.

Q3) a) The following is data collected by the 'A' ice-cream manufacturer's sales department in the 'P' city. Let x represent temperature observed in months ( ) and y represents sell of the ice- cream in the same month (tons). They want to analyze their sells with months and their temperatures. The collected data is transferred to R&D department and you are the head of R&D. The company asking you to find out covariance and correlation between temperature and monthly ice-cream sell? **[12]**

Months	Jan	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
x	15	21	31	34	38	37	31	28	23	25	16	13
y	09	18	21	23	25	19	14	12	10	12	09	08

b) Write the difference between covariance and correlation. **[6]**

OR

Q4) What is mean by classification algorithm in machine learning? Discuss any three from the following: **[18]**

a) Logistic regression

b) Naive bays

c) K-NN

d) Decision Tree

e) Random Forest

Q5) a) The following data shows the box office collection of three films 'A', 'B' and 'C', which were released in the years 1975, 2001 and 2020 respectively, and having a box office collection 35, 137 and 332 Cr in the order mention above. **[12]**

Movie	Year	Movie income (Cr)	Average movie income in box office in particular year (Cr)	Std.deviation
A	1975	35	12.5	4.65
B	2001	137	35	12.95
C	2020	332	169	51.52

From the above given data, which movie shows the maximum collection in respective year as compare to others?

b) In a class, average placement salaries of the student are 3.1 LPA and given salaries are normally distributed with standard deviation of 2. Then, find how many percentages of student lies between salaries offered from 7.46 LPA to 10 LPA? **[6]**

OR

Q6) a) The average IQ of the adult population is 100. A researcher believes the average IQ of adults is lower. A random Sample of five are tested and scored 69, 79, 89, 99 and 109 with standard deviation 15.81. **[9]**

i) State null hypothesis (Ho) and alternative hypothesis (Ha)

ii) At 99% confidence interval level, is there enough evidence to suggest that the average TQ is lower.

b) Discuss the following : **[9]**

i) Expert system

ii) Principal component analysis

iii) Genetic algorithm

Q7) a) A factory has machine that dispenses 80 ml of the fluid in a bottle. An employee believes the average amount of fluid is not 80 ml. Using 40 sample, he measures the average amount dispensed by the machine is 78 ml with std. dev. of 2.5. **[10]**

i) State null hypothesis (Ho) and alternative hypothesis (Ha)

ii) At 95% confidence interval level, is there enough evidence to support the idea that machine not working properly?

b) Assume that SAT score are normally distributed and the SAT score of 1150 has a z score of 0.44. Find out how many percentages of students scored above and below the 1150 SAT score? Show the answers using nrmal distribution plot. **[6]**

OR

Q8) Discuss the following : **[16]**

a) Markov chain analysis

b) Monte carlo simulation

c) Q Learning

d) SARSA

▽▽▽▽

Total No. of Questions : 8]

SEAT No. :

P-3142

[Total No. of Pages : 2

[6004]-686

B.E. (Production Engineering) (Sandwich)

SUPPLY CHAIN MANAGEMENT

(2019 Pattern) (Semester - VIII) (411134 A) (Elective - V)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain Multiechelon Cycle inventory. **[9]**

b) Explain how safety inventory can be estimated and managed in practice. **[8]**

OR

Q2) a) Write a short note on Economics of Scale Exploit Quantity Discounts. **[9]**

b) What are the important measures to measure product availability? **[8]**

Q3) Explain the following design options for a transportation network. **[17]**

a) Direct shipping with milk runs

b) All shipments via DC

c) Tailored Network

OR

Q4) a) Explain role of IT in transportation. **[9]**

b) What are the factors influencing network design decisions? **[8]**

P.T.O.

Q5) a) What are the obstacles for achieving coordination in Supply chain? **[9]**

b) Discuss the impact of E-Business on customer service in mobiles, laptops industry. **[9]**

OR

Q6) a) What actions should be taken by managers for achieving coordination in supply chain? **[9]**

b) What are the different effects seen because of Bullwhip Characteristics in demand fluctuations in Supply Chain. **[9]**

Q7) a) Explain the process of risk management in supply chain network design.**[9]**

b) Explain the role of pricing and revenue management in supply Chain Management. **[9]**

OR

Q8) a) Explain the role of IT in pricing and revenue management. **[9]**

b) Explain in detail Impact of financial factors on supply chain decisions.**[9]**

▽▽▽▽

Total No. of Questions : 8]

SEAT No. :

P1436

[Total No. of Pages : 2

[6004]-687

B.E. (Production Sandwich Engineering)

PLANT ENGINEERING AND MAINTENANCE

(2019 Pattern) (Semester - VIII) (Elective-V) (411134 B)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Figure to the right indicates full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable data if necessary.***
5) ***Use of Logarithmic Table, Slide rule is Electronic pocket calculator is allowed.***

Q1) a) Write a note on MICLASS. **[8]**

b) Explain various types of maintenance. **[9]**

OR

Q2) a) What is usage monitoring? Explain its advantages. **[8]**

b) Write a short note on Maintenance problems occurring in product and process type industries and Power plants and their management. **[9]**

Q3) a) What is reliability? Explain relationship with maintenance. **[8]**

b) Explain various models for calculating life cycle costs. **[9]**

OR

Q4) a) Explain life cycle costing. **[8]**

b) Explain effect of life cycle costing on maintenance. **[9]**

Q5) a) Explain in short various fire prevention practices. **[9]**

b) Write short note on Pollution Control. **[9]**

OR

P.T.O.

Q6) a) Write short note on Recycling of waste. **[9]**

b) Write short note on Energy conservation, management and audit. **[9]**

Q7) a) Write short note on Reliability Centered Maintenance. **[9]**

b) Write short note on Total Productive Maintenance. **[9]**

OR

Q8) a) Explain the condition based maintenance with aid of vibration signature. **[9]**

b) What is Terotechnology? Explain its influence on plant engineering and maintenance. **[9]**

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Total No. of Questions : 8]

SEAT No. : ____

P1439

[Total No. of Pages : 2

[6004]-688
B.E. (Production SW)
INDUSTRIAL RELATIONS & HUMAN RESOURCE MANAGEMENT
(2019 Pattern) (Semester - VIII) (Elective-V) (411134 (C))

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Figure to the right indicates full marks.***
3) ***Neat diagram must be drawn wherever necessary.***
4) ***Assume suitable data if necessary.***
5) ***Use of Logarithmic Table, Slide rule is Electronic pocket calculator is allowed.***

Q1) a) What are the Objectives Estimating man power requirement? **[8]**

b) What Recruitment and selection process follow in IT Industry? **[9]**

OR

Q2) a) Enlist and brief Main resources of recruitment. **[8]**

b) What are the Assessment Devices follow in manufacturing firm? **[9]**

Q3) a) What parameters involved in Training Process? **[9]**

b) Explain Methodology follow in Training Process. **[9]**

OR

Q4) a) Explain the Need and objectives of training process. **[9]**

b) Describe Methods of Training **[9]**

Q5) a) Why it is necessary to follow Ethics in appraisal system? **[9]**

b) Explain in brief Concepts of Performance Management. **[9]**

OR

P.T.O.

Q6) a) What are the Different methods of Performance Appraisal? **[9]**

b) What is Rating Errors? Brief with example **[9]**

Q7) a) What are the main reasons of Resignation? What measures Industry has to follow to maintain retention ratio? **[9]**

b) What are the main aspects responsible for Layoffs? What will be the solution to overcome this issue? **[8]**

OR

Q8) a) Write note on Separation Schemes and Golden handshake. **[9]**

b) What is the Role of HRD in developing Industrial Relations? **[8]**

Total No. of Questions : 8]

SEAT No. :

P-2874

[Total No. Of Pages : 2

[6004]-689
B.E. (Production Sandwich Engineering)
MARKETING MANAGEMENT
(411I34D) (2019 Pattern) (Semester-VIII) (Elective - V)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates :

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) What is Market Segmentation? Discuss in relation with current market scenario with suitable examples. **[8]**

b) How is strategic decision making is done in Marketing Management? Discuss. **[9]**

OR

Q2) a) Discuss in Brief Gathering Marketing Information with Production Engineering perpective. **[9]**

b) What is the relation between segmenting the market and product positioning in the market? Discuss with suitable example. **[8]**

Q3) a) Discuss the concept of Product Development from Marketing Perspective. **[9]**

b) Write a note on Price Theories of Marketing Organization for new product. **[9]**

OR

Q4) a) Explain the concept of designing and managing product promotions. Discuss in relation with New Product Development. **[9]**

b) What are intermediaries one needs of face during marketing of products during product development. **[9]**

P.T.O

Q5) a) Explain Sales Force and Sales Terries in regards to Marketing management. **[8]**

b) Discuss the concept of services marketing. **[9]**

OR

Q6) a) Discuss the relationship between Technological Innovations and Marketing. **[9]**

b) Write a note about social marketing and its importance **[8]**

Q7) a) What is marketing research? Discuss its importance with reference to Marketing Management. **[9]**

b) How are quantitative tools useful in Marketing Research. Discuss in brief. **[9]**

OR

Q8) a) Explain the importance of Marketing Research from an Engineering Perspective. **[9]**

b) Discuss in brief the Structure and Methods of Marketing Research. **[9]**

Total No. of Questions : 8]

SEAT No. :

P698

[Total No. of Pages : 2

[6004]-690

B.E. (Civil) (Honors)
ARCHITECTURE AND TOWN PLANNING
Traffic and Transportation planning
(2019 Pattern) (Semester-VII) (401401)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8***
2) ***Figures to the right indicate full marks.***
3) ***Neat figures must be drawn wherever necessary.***
4) ***Assume suitable data if required.***
5) ***Use of non-programmable scientific calculator is allowed.***

Q1) a) Describe in detail the Overtaking Sight Distance with formula. **[6]**

b) Explain the design considerations for cycle tracks in India. **[6]**

c) Write a note on : "Hierarchy of road in India" **[5]**

OR

Q2) a) Describe in detail the Stopping Sight Distance with formula. **[6]**

b) Explain the parking norms and standards mentioned in National Building Code 2016. **[6]**

c) Explain the norms for Carriageway, Width and Footpath in India. **[5]**

Q3) a) Draw a neat sketch of a fully clover leaf intersection and mark all the traffic movements. Discuss the advantages and disadvantages of it. **[6]**

b) Draw the neat sketch of rotary intersection and show all the design elements in it. Also explain any two design elements of it. **[8]**

c) Write down the functions of passenger terminals. **[3]**

OR

Q4) a) Enlist the various types of grade separated intersections and explain any one with figure. **[7]**

b) What is freight terminal? Write down its function. **[6]**

c) What is the aim to provide road safety information to road users? Also enlist the various activities conducted by Government of India for road safety. **[4]**

P.T.O.

Q5) a) Write a note on: Nagpur Road Plan. **[6]**

b) Explain the Lowry Model for land use. **[6]**

c) Write a note on: Bombay Road Plan. **[6]**

OR

Q6) a) Write a note on: Lucknow Road Plan. **[6]**

b) Explain the Lowry Gairn Model for land use. **[6]**

c) Write a note on urban spatial structure and its influence on transport linkages. **[6]**

Q7) a) Elaborate BRTS. **[6]**

b) Describe the Urban Transport Problems in India. **[6]**

c) Write a note on 'Transportation System Management'. **[6]**

OR

Q8) a) Explain the concept MRTS in India. **[6]**

b) What is Sustainable Urban Transportation? Explain the need of Sustainable Urban Transportation. **[6]**

c) Which data is required to plan the city bus transportation in urban area? **[6]**

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Total No. of Questions : 10]

SEAT No. : ____

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[Total No. of Pages : 2

[6004]-691

B.E. (Civil) (Honors)

WORK METHOD STATEMENTMAKING

(2019 Pattern) (Semester-VII) (401301)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Attempt Q.1 or Q. 2, Q.3 or Q.4, Q.5 or Q.6 Q.7 or Q.8 and. Q.9 or Q.10***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary and clearly state.***
5) ***Use of cell phone is prohibited in the examination hall***
6) ***Use of electronic pocket calculator is allowed.***

Q1) Explain in Method Statement for Pier Protection and Kerb Median Fixing for metro projects **[14]**

OR

Q2) Explain General Safety measures while excavation **[14]**

Q3) Explain Method Statement for Vertical Bearing Installation in metro projects.**[14]**

OR

Q4) Write Method statement for Open Foundation in case of metro projects. **[14]**

Q5) Role of Quality Assurance Manager in case of metro projects. **[14]**

OR

Q6) Explain in brief Method Statement for Span load test **[14]**

P.T.O.

Q7) Explain Sequence of Work for construction of Concourse Pier arm Platform Pier armwith integrated pier cap & portal beams. **[14]**

OR

Q8) Explain in brief Method Statement for Overhead Launching Girder. **[14]**

Q9) Explain in brief for Underslung Segment Launcher erection of Ground Supported Staging System. **[14]**

OR

Q10)Write a Method Statement for Load Testing of Launching Girder. **[14]**

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Total No. of Questions : 8]

SEAT No. :

P700

[Total No. of Pages : 2

[6004]-693

B.E. (E&TC) (Honors)
BLOCK CHAIN TECHNOLOGY
Smart Contracts & Cryptocurrency
(2019 Pattern) (Semester-VII) (404181HBCT)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Attempt QNo.1 or QNo.2, Q.No.3 or Q.No.4. Q.No.5 or QNo.6, Q.No.7 or Q.No.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
5) ***Assume suitable data: if necessary***

Q1) a) Discuss in detail Pros and Cons of GHOST protocol. **[8]**

b) Explain the smart contract and its working in detail. **[9]**

OR

Q2) a) Define following terms: **[8]**

i) Vulnerability

ii) Attacks

iii) Sidechain

iv) Namecoin

b) Explain life cycle of smart contract. List & Discuss its types. **[9]**

Q3) a) List and explain different domain name services available for blockchain cryptocurrencies. **[9]**

b) Explain need of crypto exchange. Give example of any crypto exchange. **[9]**

OR

Q4) a) Does blockchain secure medical records? Discuss How? **[9]**

b) Discuss the detailed Roots of Bitcoin along with Legal Aspects of Crypto currency Exchange. **[9]**

P.T.O.

Q5) a) List and explain types of bitcoin wallets. **[8]**

b) Differentiate between digital currency and cryptocurrency. **[9]**

OR

Q6) a) Write note following. **[8]**

i) Bitcoins Network

ii) Bitcoin Payments

b) Explain working of bitcoin transaction in detail. **[9]**

Q7) a) Demonstrate use of blockchain technology in medical sector. **[9]**

b) Discuss different investment management platforms of blockchain in detail. **[9]**

OR

Q8) a) Discuss the future of AI and blockchain. **[9]**

b) Discuss IBM Block chain. **[9]**

Total No. of Questions : 8]

SEAT No. : ____

P701

[Total No. of Pages : 2

[6004]-694

B.E. (E&TC) (Honors) (Robotics)
INDUSTRIAL ROBOTICS & AUTOMATION
(2019 Pattern) (Semester-VII) (404181 HR)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Attempt Q.no.1 or Q.No.2, Q.No.3 or Q.No.4 Q.No.5 or QNo.6, Q.No.7 orQ.No.8.***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data, if necessary.***
4) ***Neat diagrams must be drawn wherever necessary.***

Q1) a) Explain General approach to control system design of pneumatic control. **[6]**

b) Explain schematic layout and travel step diagram of Pneumatic Control. **[6]**

c) Explain Karnaugh -Veitch mapping. **[6]**

OR

Q2) a) Draw symbols and drawings, schematic layout of pneumatic control. **[6]**

b) Explain in detail constructional features, types of cylinders. **[6]**

c) Explain in detail filter, lubricator and regulator. **[6]**

Q3) a) Explain Special design features of CNC systems. **[6]**

b) Explain General rules for product design for automation. **[6]**

c) Explain condition monitoring of manufacturing systems. **[5]**

OR

Q4) a) Drive system for CNC machine tools. **[6]**

b) Design of parts for high speed feeding and orienting, **[6]**

c) Write a note on CIM **[5]**

P.T.O.

Q5) a) Design of Mechatronics Systems. **[6]**

b) Give possible design solutions. **[6]**

c) Case study of engine management system. **[6]**

OR

Q6) a) Challenges in engine management system. **[6]**

b) Case study of pick and place robot. **[6]**

c) Stages in design of Mechatronics systems. **[6]**

Q7) a) Explain types and construction of Pumps and motors. **[6]**

b) Power pack-elements of Hydraulic system design. **[6]**

c) Selection criteria for cylinder's valves, pipes. **[5]**

OR

Q8) a) Draw construction and explain types, operation of PLC. **[6]**

b) Explain types operation, application of Servo and proportional valves. **[6]**

c) Short note on ladder diagram. **[5]**

Total No. of Questions : 8]

SEAT No. : ____

P702

[Total No. of Pages : 2

[6004]-695

B.E. (Mechanical) (3D Printing Honors)
ADDITIVE MANUFACTURING SYSTEM DESIGN
(2019 Pattern) (Semester-VII) (402014MJ)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Draw suitable neat diagrams, wherver necessary.***
2) ***Figure to the right indicate full marks.***
3) ***Assume suitable data if required.***

Q1) a) What is Atomization? Types of Atomization & Explain centrifugal atomization with neat sketch. **[10]**

b) Sketch & explain plasma atomization and it's Benefits. **[8]**

OR

Q2) a) Explain plasma rotating electrode process with it's schematic diagram. construction & working with its benefit. **[10]**

b) Explain:

i) Carbonyl Reactions

ii) Electrolysis. **[8]**

Q3) a) Write in detail about powder delivery nozzles and it's types with diagram. **[10]**

b) Explain: **[7]**

i) Inert gas cooling system

ii) Gas recirculating system.

OR

Q4) a) Explain the design and structure of nozzle with Nozzle movement system. **[10]**

b) Explain the relation of bed heating to warpage of print. **[7]**

P.T.O.

Q5) a) Explain steps of Calibrating 3D printer with a laser pointer. **[10]**

b) Differentiate between : Single printing and Multi-printing mode. **[8]**

OR

Q6) a) Explain steps of calibration: **[10]**

i) Choose the right values

ii) Calibrate the extruder

iii) Calibrate your 3D Printer axes.

b) What are the filament settings? How to determine the correct temperature of filament? **[8]**

Q7) a) Explain quality monitoring and inspection in Additive manufacturing system. **[10]**

b) What is the Sensor? Explain the types of Sensors used in 3D Printer. **[7]**

OR

Q8) a) What are the common faults and trouble shooting in 3D Printing system? **[10]**

b) What are different ASM/ASTM Standards for Additive Manufacturing system and explain it's significance. **[7]**

Total No. of Questions : 8]

SEAT No. :

P703

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[6004]-696

B.E. (Mechanical/Automobile) (Honors)
MODELLING AND SIMULATION OF EHV
(2019 Pattern) (Semester-VII) (302034MJ)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Solve Q.No.1 or Q.No.2, Q.No.3 or Q.No.4, Q.No.5 or Q.No.6, Q.No.7 or Q.No.8.***
2) ***Figures to the right indicate full marks.***
3) ***Draw the neat sketch wherever necessary.***

Q1) a) Explain A Motor Control Unit in electric vehicle with its functional features? **[4]**

b) Explain Electronic Control Unit of electric vehicle with its types and working principal? **[8]**

c) What is Battery/Cell Control System in EV? Explain with its functions and working principal? **[8]**

OR

Q2) a) Explain Torque and speed coupling in electric vehicle? **[4]**

b) Explain EV and EHV configuration based on power electronics? **[8]**

c) Explain the importance of Sensor Management and Integration for electric vehicle with functional and application point of view? **[8]**

Q3) a) Explain EV configuration and list out the components involved in it? **[8]**

b) Explain the important feature of following (any four). **[8]**

i) Unicycle

ii) Bicycle

iii) Dicycle

iv) Tricycle

v) Qudracycle

OR

P.T.O.

Q4) a) Explain front and rear wheel drive for electric vehicle with its advantages and disadvantages? **[8]**

b) Explain Propulsion and Power distribution system in electric vehicle with its main components? **[8]**

Q5) a) Explain Frame building Problems? Also list out Types of Frame Damage & Hc to Spot it? **[8]**

b) What do you mean by the term "DFMEA"? Explain the objective feature that c achieve the in the process of system or equipment design? **[8]**

OR

Q6) a) Explain Chassis frame layout with suitable sketch? Also list out various types Loads on the Chassis frame? **[8]**

b) Explain the following parameters related to vehicle dynamics in detail. **[8]**

i) Aerodynamic drag

ii) Aerodynamic lift

iii) Side force

iv) Rolling movement

Q7) a) Explain Durability along with Factors Affecting Electric Car Durability? **[10]**

b) Explain Fatigue analysis. List out The factors which affect the fatigue behavior? **[8]**

OR

Q8) a) Explain the phases involved in Crashworthiness Design along with its important features? **[10]**

b) What do you mean by Topology and Topography Optimization, explain with suitable example? **[8]**

Total No. of Questions : 8]

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P704

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[6004]-697

B.E. (Mechanical) (Honors)
ELECTRICAL ENERGY SYSTEMS
(2019 Pattern) (Semester-VII) (402024MJ)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Discuss classification of compressors and explain working of rotary compressor with schematic diagram. **[10]**

b) List the components of a compressed air system with their functions.**[8]**

OR

Q2) a) Discuss energy efficiency opportunities in compressed air system. **[10]**

b) Explain the simple steps that can be followed in shop — floor for quantification of compressed air leakages. **[8]**

Q3) a) Discuss energy saving opportunities in air conditioning systems. **[10]**

b) Explain different heat Transfer Loops in Refrigeration System. **[7]**

OR

Q4) a) Explain Vapour Compression Refrigeration system with schematic diagram. **[10]**

b) What is the function of cooling tower? List performance parameters of it. **[7]**

P.T.O.

Q5) a) How do you assess the performance of fans? Explain. **[10]**

b) Explain Municipal water pumping system. **[8]**

OR

Q6) a) What are types of fans? Discuss axial fans with schematic diagram. **[10]**

b) Discuss the parameters affecting pump system curves. **[8]**

Q7) a) Discuss terminology used in lighting system. **[10]**

b) What are Advantage and limitations of adopting diesel power plant? **[7]**

OR

Q8) a) What is a lamp and describe briefly the most commonly used lamps? **[10]**

b) Discuss energy conservation measures possible in lighting system. **[7]**

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Total No. of Questions : 8]

SEAT No. : ____

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[6004]-698

B.E. (Mechanical Engineering) (Honors)
SYSTEM MODELLING AND SIMULATION
(2019 Pattern) (Semester-VII) (302044 MJ)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Assume suitable data if necessary.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicates full marks.***

Q1) a) With an example, illustrate the 1-Port resistor component. **[9]**

b) Explain the 2-Port element with an example. **[9]**

OR

Q2) a) Give an example to demonstrate the element of the 3-Port junction. **[9]**

b) Describe in brief the causality for basic 3-Port element **[9]**

Q3) a) Describe the steps involved in creating a circuit. **[9]**

b) Explain the term fluid resistance in detail **[8]**

OR

Q4) a) Describe the various stages involved in creating a fluid circuit. **[8]**

b) Explain the term fluid inertia in detail **[9]**

Q5) a) Give an example of the fundamental causality assignment process. **[9]**

b) Explain in brief nonlinear simulation. **[9]**

OR

P.T.O.

Q6) a) How should system equations be represented in standard form? **[9]**

b) Explain in brief automated simulation **[9]**

Q7) a) Give an illustration of the first-order system. **[8]**

b) Describe the steps involved in obtaining the free response. **[9]**

OR

Q8) a) Describe the methods used to solve ordinary differential equations. **[8]**

b) With an example to illustrate the second-order system. **[9]**

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Total No. of Questions : 8]

SEAT No. :

P706

[Total No. of Pages : 2

[6004]-699

B.E. (Honors) (Artificial Inteligence)
MACHINE LEARNING
(2019 Pattern) (Semester-VII) (410301)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q. 1 or Q. 2, Q. 3 or Q. 4 , Q. 5 or Q. 6, Q.7 or Q.8***
2) ***Neat diagrams must be drawn wherever necessary***
3) ***Use of logarithnic tables slide rule mollier charts, electronic pocket calculator and steam tables is allowed.***
4) ***Assume suitable data, if necessary***

Q1) a) Define random forest and explain out of bag samples in random forest in detail. **[8]**

b) What is Support Vector Machine? Explain how it works. **[9]**

OR

Q2) a) Define SVM and explain SVM as a Penalization Method in detail. **[9]**

b) What is random Forest? Explain following w.r.t random forest **[8]**

i) Bias

ii) Variance

Q3) a) How to train a perceptron? State the reasons while perceptron training why instances are given one by one instead of whole samples. **[9]**

b) Explain regularization in Neural Networks in detail. **[9]**

OR

Q4) a) Draw and explain, Bayesian network with suitable Example. **[9]**

b) What is multilayer perceptron? Explain multilayer perceptron as a Universal Approximator in detail. **[9]**

P.T.O.

Q5) a) Write short note on: **[9]**

i) Unsupervised as Supervised Learning

ii) Generalized Association Rules

b) What is hierarchical clustering? Explain two strategies for hierarchical clustering in detail. **[8]**

OR

Q6) a) Write short note on: **[8]**

i) Self-Organizing Maps

ii) PCA-Spectral Clustering

b) Write and explain K-medoids Clustering algorithm with example. **[9]**

Q7) a) Explain finding state sequence and model selection in HMM detail. **[9]**

b) Define Bayes Theorem. Elaborate Naïve Bayes Classifier working with example. **[9]**

OR

Q8) a) What is HMM? Explain three Basic Problems of HMMs in detail. **[9]**

b) What is regression? Explain Linear regression with example. **[9]**

Total No. of Questions : 8]

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P707

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[6004]-700

B.E. (Honors)
CYBER SECURITY
Internet of Things and Embedded Security
(2019 Pattern) (Semester-VII) (410401)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q. 1 or Q. 2, Q. 3 or Q. 4 , Q. 5 or Q. 6, Q.7 or Q.8***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Describe IoT security CONOPS document, Network and security integration? **[8]**

b) Explain data purging **[9]**

OR

Q2) a) Explain following **[8]**

i) Security monitoring

ii) Penetration testing

b) Describe attribute-based access control mechanism for IoT? **[9]**

Q3) a) Describe cryptographic module principals for IoT? **[9]**

b) Enlist and explain the phases of cryptographic key management fundamentals. **[9]**

OR

Q4) a) Describe cryptographic control in Zigbee protocol. **[9]**

b) Explain cryptographic control for IoT protocols? **[9]**

P.T.O.

Q5) a) Explain holistic IAM program for IoT? **[9]**

b) Explain IEEE 1609.2? **[8]**

OR

Q6) a) Discuss authorization & access control for IoT? **[9]**

b) Explain identity management & access management for the IoT? **[8]**

Q7) a) Explain the following identity management model. **[9]**

i) Local Identity

ii) Federated identity

b) Describe local identity management model for IoT? **[9]**

OR

Q8) a) Explain the following identity management models. **[9]**

i) Network identity

ii) Global web identity

b) Describe Identity Portrayal? **[9]**

Total No. of Questions : 8]

SEAT No. :

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[6004]-701

B.E. (Computer Engineering) (Honours in Data Science)
MACHINE LEARNING AND DATA SCIENCE
(2019 Pattern) (Semester-VII) (410501)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q. 1 or Q. 2, Q. 3 or Q. 4 , Q. 5 or Q. 6, Q.7 or Q.8***
2) ***Neat diagrams must be drawn wherever necessary***
3) ***Figures to the right indicate full marks***
4) ***Assume suitable data, if necessary***

Q1) a) Explain unsupervised learning. **[6]**

b) What do you mean by divisive clustering techniques? Explain with an example. **[6]**

c) What is the role of dendrograms in choosing number clusters in hierarchical clustering? **[6]**

OR

Q2) a) What are the types of hierarchical clustering methods? Explain. **[6]**

b) For what type of data Density-Based Spatial Clustering is suitable? Which parameters are required by DBSCAN algorithm? **[6]**

c) Explain K-Medians clustering algorithm. **[6]**

Q3) a) Explain a biological neuron along with its parts. **[4]**

b) What is the difference between Forward propagation and Backward Propagation in Neural Networks? **[6]**

c) What is the role of the Activation functions in Neural Networks? List down the names of some popular Activation Functions used in Neural Networks. **[7]**

OR

P.T.O.

Q4) a) Enlist limitations of MLP. **[4]**

b) Explain the process of training a perceptron. **[6]**

c) Explain back propagation algorithm. **[7]**

Q5) a) Does the size of the feature map always reduce upon applying the filters? Explain why or why not. **[6]**

b) Illustrate Gradient descent optimization using an example. **[6]**

c) Explain Recurrent Neural Network **[6]**

OR

Q6) a) Explain Recursive Neural Network **[6]**

b) Explain the different layers in CNN. Explain the significance of the RELU Activation function in Convolution Neural Network. **[6]**

c) Illustrate Long-short Term Memory along with its structure. **[6]**

Q7) a) What are various text similarity measures? Explain any two of them. **[6]**

b) Write short note on **[6]**

i) Stemming

ii) Lemmatization

c) What are the practical uses of feature extraction? **[5]**

OR

Q8) a) What do you mean by topic modeling? Explain Latent Dirichlet Allocation. **[6]**

b) Explain feature selection and extraction. **[6]**

c) Write short note on document representation. **[5]**

Total No. of Questions : 8]

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[6004]-702

B.E. (Honors)
INTERNET OF THINGS
Machine Learning for Internet of Things
(2019 Pattern) (Semester-VII) (410601)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q. 1 or Q. 2, Q. 3 or Q. 4 , Q. 5 or Q. 6, Q.7 or Q.8***
2) ***Neat diagrams must be drawn wherever necessary***
3) ***Figures to the right indicate full marks***
4) ***Assume suitable data, if necessary***

Q1) a) Explain kNearest neighbour (KNN) with Example **[10]**

b) Explain Random forest (RF) algorithm **[8]**

OR

Q2) a) Explain Entropy, Information Gain, Gini Index in decision tree. **[9]**

b) Explain Association Rule (AR) algorithm with example **[9]**

Q3) a) What is importance of Least-Squares-Solver for Shallow Neural Network. Explain alternatives for same. **[8]**

b) With the help of block diagram explain IOT Based Smart Buildings **[9]**

OR

Q4) a) Explain steps involved in Hardware Implementation of Least-Squares-Solver for Shallow Neural Network. **[8]**

b) Model Optimization in Machine Learning Accelerators. **[9]**

P.T.O.

Q5) Write short note on

a) Real-Time IoT Imaging with Deep Neural Networks **[6]**

b) Sensor Data Analysis and Deep learning **[6]**

c) lOT DATA FILTER MODEL **[6]**

OR

Q6) a) What are the core challenges in embedded and mobile deep learning? Explain with examples. **[10]**

b) What are different Steps to build Deep Learning Algorithms on an Embedded Platform? Explain in detail. **[8]**

Q7) a) How machine learning can be applied in a monitoring system to efficiently manage irrigation problems? **[8]**

b) Explain design of any one real time patient monitoring system. **[9]**

OR

Q8) Write short note on

a) Smart Transportation **[8]**

b) Role of machine learning in video surveillance system for smart security systems. **[9]**

Total No. of Questions : 8]

SEAT No. :

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[6004]-703
B.E.(Computer Engineering) Honors
Virtual Reality for Game Development
(2019 Pattern) (Semester-VII) (410701)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates :

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Neat labelled diagrams must be drawn wherever necessary.***

Q1) a) Differentiate between Define stage & Make stage **[8]**

b) What is learn stage? Explain with example. **[9]**

OR

Q2) a) Explain steps in iterative design? **[8]**

b) Explain make stage with example. **[9]**

Q3) a) Explain example of animation in Game development using Unity. **[9]**

b) Differentiate between Unreal engine Vs Unity Engine **[9]**

OR

Q4) a) How to create and script enemy in Unity. **[9]**

b) Explain NPCs and Interactions with example. **[9]**

P. T. O

Q5) a) Explain steps to add sound and music in Unity **[9]**

b) How to deploy project in Unity? **[8]**

OR

Q6) a) Explain Unity project for shopping items in Unity **[9]**

b) How to create battle system in VR environment. **[8]**

Q7) a) Explain Motion sickness with example. **[9]**

b) Explain all hardware challenges involved in Virtual Reality game development? **[9]**

OR

Q8) a) What is seizures? Explain with example. **[9]**

b) Give the summary of all factors that contribute to adverse effects. **[9]**

Total No. of Questions : 8]

SEAT No. :

P-1440

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[6004]-704

B.E. (Semester - VIII)

HONORS IN ARCHITECTURE & TOWN PLANNING

Land use and Land cover

(2019 Pattern) (401403)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates :

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7or Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to Right indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Define surveys along with their types and discuss their significance in the field of urban planning. **[9]**

b) Explain the planning parameters used in architectural town planning and their role in guiding the development of urban areas? **[9]**

OR

Q2) a) Prepare a sample questionnaire form for a socio-economic survey in the context of urban planning. **[9]**

b) What are the application of Geographic Information Systems (GIS) and Remote Sensing (RS) in the analysis of Land Use/Land Cover (LULC) patterns and their relevance to urban planning? **[9]**

Q3) a) What is the land use classification and Explain classification on industrial areas, including considerations for zoning and environmental impact? **[9]**

b) Explain the planning parameters for traffic and transportation zones, including considerations for road networks, parking facilities and public transportation systems. **[8]**

OR

P.T.O.

Q4) a) What is the importance of afforestation in urban planning and its benefits for the environment and public health? **[9]**

b) Explain the concept of green belts and their importance in promoting environmental sustainability and resilience in urban areas. **[8]**

Q5) a) Explain the principles and objectives of urban planning. **[9]**

b) State the environmental aspects of land use planning, including the protection of natural resources, conservation of biodiversity and mitigation of environmental risks. **[9]**

OR

Q6) a) What is the role of the Urban and Regional Development Plans Formulation and Implementation (URDPFI) guidelines in land use planning? **[9]**

b) Explain the relationship between the demand and supply of land in urban areas and its implications for land use planning, including issues of land scarcity, affordability and the need for strategic land allocation. **[9]**

Q7) a) Explain the concept of neighborhood planning and its role in promoting community-based development including the key elements of a neighborhood plan and the strategies for implementation. **[8]**

b) What is Development plan? State its purpose, scope and the process for preparation and approval. **[9]**

OR

Q8) a) Explain the concept of new towns and satellite towns, including their objectives, planning principles and process for implementation. **[8]**

b) What are the key provisions and objectives of the Maharashtra Land Revenue Code 1966? Explain its role in regulating Land transactions, revenue collection and land administration. **[9]**

Total No. of Questions : 8]

SEAT No. :

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[6004]-705
B.E. (Civil)
(401303): HONORS IN METRO CONSTRUCTION
Tunnel Engineering
(2019 Pattern) (Semester-VIII)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates :

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Figures to the right indicate full marks.***
3) ***Draw neat figures wherever necessary.***
4) ***Assume suitable data if necessary.***

Q1) a) Explain in detail about the drilling pattern. **[6]**

b) Explain about excavation process of large tunnels. **[6]**

c) Explain about over break and factors responsible for over break. **[6]**

OR

Q2) a) Explain about the TBM method of tunneling. **[6]**

b) Write about broblems of drilling and blasting for large tunnels. **[6]**

c) Explain about Advanced Excavation Techniques. **[6]**

Q3) a) Explain about the underground environment. **[6]**

b) Explain about Monitoring and control in tunnel construction. **[6]**

c) Explain about Ground deformation monitoring in tunneling. **[5]**

OR

P.T.O

Q4) a) Explain method of ventilation in underground space. **[6]**

b) Explain Vibrating wire displacement sensor in tunneling. **[6]**

c) Explain about use of inclinometer in tunneling. **[5]**

Q5) a) Write about tunnel Lighting systems. **[6]**

b) Explain about advances in road heading. **[6]**

c) Explain about advances in TBM technologies. **[6]**

OR

Q6) a) Explain about the slurry shield method of tunneling. **[6]**

b) Explain about rocks which were observed during Pune Metro Tunnel Construction. **[6]**

c) Explain about line drilling and pre-splitting techniques of controlled blasting techniques. **[6]**

Q7) a) Explain about submerged and floating tunnels. **[6]**

b) Explain about Incident Recall Technique (IRT). **[6]**

c) Explain in detail about evaluation of performance of supervisors on safety. **[5]**

OR

Q8) a) Write about a safety audit in the tunnel. **[6]**

b) Explain material safety data sheet (MSDS) and First Aid knowledge. **[6]**

c) Explain about safety survey, safety inspection and safety sampling. **[5]**

Total No. of Questions : 8]

SEAT No. : ____

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[6004]-708

B.E. (E & TC) (Honors)

BLOCKCHAIN SOLUTIONS

(2019 Pattern) (Semester - VIII) (404183HBCT)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates :

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Draw & explain construction of Naive Blockchain. **[6]**

b) What is the use of memory hard algorithm in cryptography. Explain in detail. **[6]**

c) What is Hashcash? Explain its connection with bitcoin. **[6]**

OR

Q2) a) What is direct cyclic graph in crypto? Describe its benefits in blockchain. **[6]**

b) Explain the development process of smart contracts in blockchain. **[6]**

c) Describe evolution of Toy industry with blockchain. **[6]**

Q3) a) Compare Pseudo-anonymity with anonymity with reference to Blockchain Security. **[6]**

b) What is need of Zcash in blockchain? Write its features. **[6]**

c) What are main types of blockchain attacks? **[6]**

OR

Q4) a) What are the general precautionary measured to be taken to avoid Blockchain attacks? **[6]**

b) What is Algorand blockchain? Explain how it works. **[6]**

c) What is selfish mining? Explain with example. **[6]**

P.T.O.

Q5) a) What is the role of blockchain in IoT based record management system? **[6]**

b) Explain how blockchain can help for building smart cities in India. **[6]**

c) Justify. Blockchain can be used to improve confidentiality & data integrity security. **[6]**

OR

Q6) a) "Blockchain to enhance performance of central Banking". How much you agree? Justify. **[6]**

b) Can the blockchain be the best platform for finance industry to assure security? **[6]**

c) Describe the implementation of healthcare system and IoT on blockchain platform. **[6]**

Q7) a) Discuss the limitations of Blockchain in Education sector. **[6]**

b) Describe any three Myths Vs Reality cases of Blockchain technology. **[6]**

c) What are the flaws of blockchain technology. Explain in detail. **[4]**

OR

Q8) a) Compare myths & reality of blockchain technology. **[6]**

b) "Businesses Need Blockchain". Describe the myths & Reality of the statement. **[6]**

c) Describe Myth "Blockchain & Bitcoin are same". **[4]**

Total No. of Questions : 8]

SEAT No. :

P711

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[6004]-709
B.E. (E&TC) (Honors)
ARTIFICIAL INTELLIGENCE IN ROBOTICS
(2019 Pattern) (Semester - VIII) (404183HR)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicates full marks.***
4) ***Use of Calculator is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) a) Write Heuristics search techniques in AI. **[5]**

b) Explain various types of uniformed search algorithm. **[5]**

c) What is real coded genetic algorithm. **[8]**

OR

Q2) a) What is simulated annealing? **[5]**

b) Write in details about informed search algorithm. **[5]**

c) Write in details about ant colony optimization. **[8]**

Q3) a) What is image based robot guidance? **[5]**

b) Write about application of image processing in robotics. **[5]**

c) Write in detail about machine vision algorithm. **[8]**

OR

Q4) a) Explain image based camera exploration for autonomous robot. **[5]**

b) Write in details about types of image processing. **[5]**

c) Explain automatic sorting and inspection algorithm. **[8]**

Q5) a) What is mobile robot motion planning? **[5]**

b) What is autonomous robot hand? **[5]**

c) Explain with block diagram path planning robot. **[7]**

OR

Q6) a) What is task based hybrid closure grasping? **[5]**

b) Explain accurate motion control for fast mobile robot. **[5]**

c) Explain with block diagram obstacle avoidance robot. **[7]**

P.T.O.

Q7) a) What is tool management in AI in flexible automation? **[5]**

b) Explain applications of various intelligent system in AI in flexible automation. **[5]**

c) What is process planning in flexible automation? **[7]**

OR

Q8) a) Write short note on Real time scheduling. **[5]**

b) Explain tool management in detail. **[5]**

c) Write short note on route optimization for AS/RS systems. **[7]**

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Total No. of Questions : 8]

SEAT No. :

P712

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[6004]-710
B.E. (Automobile and Mechanical Engineering Honors)
3D PRINTING APPLICATION AND ENTREPRENEURSHIP
(2019 Pattern) (Semester - VIII) (402016MJ)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.No.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat sketch diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary and state them in your answer clearly.***
5) ***Use non-programmable pocket size electronic calculator is allowed.***

Q1) a) Write short note on biomedical applications 3D printing. **[5]**

b) What is Functionally graded material (FGMs) and its applications? **[6]**

c) Give examples with application of custom made body parts and implants in 3D printing. **[6]**

OR

Q2) a) Differentiate between Direct Laser Printing and Inkjet Printing. **[7]**

b) What are the advantages, limitation and challenges in AM in biomedical and health care application? Also highlight the post processing in AM.**[10]**

Q3) a) Differentiate between functional manufacturing and functional CAD modelling. **[8]**

b) What is mean by the class customization and commercial requirement of consumer product? **[10]**

OR

Q4) a) Give examples of the application of 3D printing in consumer products and explain in details how 3D printing is useful in daily utilities? **[10]**

b) Explain the following terms to terms of additive manufacturing (Any Two). **[8]**

i) Ergonomics Design Considerations

P.T.O.

ii) Design Flexibility

iii) Operational Productivity

Q5) a) Write short note on Functional CAD modeling and customized Creative Art Expressions. **[7]**

b) Explain the following terms **[10]**

i) Wax Pattern

ii) Master Pattern

iii) Rubber Mold Making

iv) Wax injection.

OR

Q6) a) How additive manufacturing play vital role in creative arts? Also highlight challenges, advantages and limitation. **[8]**

b) What are the functional and manufacturing requirement of different types of Jewellery with respect additive manufacturing? **[9]**

Q7) a) Explain rapid prototyping processes with respect to following aspect **[10]**

i) Functional Material

ii) Support Material

iii) Printing Time

iv) Strength

b) Explain the following terms **[8]**

i) Internal Bench-marking

ii) Competitive Bench-marking

OR

Q8) a) Differentiate between Manufacturer-centric Vs. Consumer-centric Business models. **[8]**

b) What is entrepreneurship and, Current Approach of Manufacturing Enterprises? **[10]**

Total No. of Questions : 8] **SEAT No. :**

P-1459 **[Total No. of Pages : 2**

[6004]-711

B.E. (Semester - VIII)

HONORS IN ELECTRIC VEHICLES

e-Vehicle standards, Charging and Safety

(2019 Pattern) (302036MJ)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of Calculator is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) a) List and explain in short any four battery charging and discharging parameters. **[9]**

b) How do you evaluate battery performance? Write any four methods to extend EV battery life? **[8]**

OR

Q2) a) Write a note on Control architecture in EV charging. **[9]**

b) Explain Electric Vehicle Charging and grid integration standards with any two suitable examples? **[8]**

Q3) a) Explain Testing procedures for following parameters of EV batteries :**[9]**

i) Battery performance

ii) Battery life

iii) battery safety

b) Write a note on Future trends in battery testing. **[9]**

OR

P.T.O.

Q4) a) Explain Specific Requirements for L, M and N Category Electric Power Train Vehicles with protection against direct and indirect contacts. **[9]**

b) How batteries of EV are tested? Explain mechanical and electrical testing for EV batteries **[9]**

Q5) a) Write a note on various failure modes and mechanism of Battery. **[9]**

b) Discuss in short the Safety and Abuse Response for Lithium Ion Rechargeable Battery Chemistries? **[8]**

OR

Q6) a) Explain the effects of following parameters on Li-ion batteries? **[9]**

i) Anode material.

ii) Cathode material.

iii) SOC on Thermal Stability.

b) Explain Evaluation Techniques for Batteries and Battery Materials. **[8]**

Q7) a) Write a note on EV Charging Infrastructure in India. **[9]**

b) Explain categories of charging stations. **[9]**

OR

Q8) a) Write a note on Standardization and regulations for EV Charging in india. **[9]**

b) Explain following impacts on power system **[9]**

i) Harmonic Impact.

ii) Harmonic Compensation.

iii) Current Demand Impact.

Total No. of Questions :8]

SEAT No. : ____

P1460

[Total No. of Pages : 2

[6004]-712

B.E. (Mechanical)/(Honors)

SUSTAINABLE ENERGY CONVERSION SYSTEMS

Energy Management in Utility Systems

(2019 Pattern) (Semester-VIII) (402026MJ)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of electronic pocket calculator is allowed.***
5) ***Assume suitbale data, if necessary.***

Q1) a) Write down types of Wind turbine & explain any one in detail. **[6]**

b) Write a short note on Stall Control, Pitch Control. **[6]**

c) What is the difference between variable speed and variable frequency? **[5]**

OR

Q2) a) What is a PMG system on a generator? How does it work. **[6]**

b) Explain the hybrid wind power energy system with suitable diagram? **[6]**

c) Write a short note on offshore wind power. **[5]**

Q3) a) What is a biochemical conversion? Explain sources for energy generation? **[6]**

b) What is biogas production and explain its types in detail? **[6]**

c) Write down the Environment benefits of biochemical and thermo-chemical conversion. **[6]**

OR

Q4) a) What is Briquetting? Write down the use and advantages of briquetting. **[6]**

b) Explain Types of gasifiers and Industrial applications of gasifiers. **[6]**

c) Explain the Sources of energy generation in detail. **[6]**

P.T.O.

Q5) a) Explain Need and importance of Energy storage in Conventional energy system. **[6]**

b) Write a short note on thermal Energy Storage. **[6]**

c) What are the various types of chemical energy storage systems? **[5]**

OR

Q6) a) Explain Need and importance of Energy storage in Nonconventional Energy Systems. **[6]**

b) What are the different types of nuclear waste storage. **[6]**

c) Explain Techno Commercial Analysis in energy storage system. **[5]**

Q7) a) Write a short note on Maximum demand controllers with example. **[6]**

b) Explain the principle of Soft starters with energy saver. **[6]**

c) Explain IOT application for chiller system. **[6]**

OR

Q8) a) Write a short note on Electronic ballast, Occupancy sensors. **[6]**

b) Explain Energy efficient transformers in detail. **[6]**

c) What is Energy efficient lighting controls?. **[6]**

Total No. of Questions : 8]

SEAT No. :

P713

[Total No. of Pages : 2

[6004]-713
B.E. (Mechanical Engineering) /(Honors)
SYSTEMS ENGINEERING MANAGEMENT
(2019 Pattern) (Semester - VIII) (302046MJ) (Theory)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.No.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) What are examples of information management? **[6]**

b) Describe Risk Management Process in Project Management. **[6]**

c) How do you monitor risk factors? **[4]**

OR

Q2) a) What are the steps used to Analyse risk? **[6]**

b) What are the key processes in information management? **[6]**

c) How do you manage risk profile? **[4]**

Q3) a) What are elements of a configuration management plan? **[6]**

b) What are the activities in configuration identification? **[6]**

c) What are the four process of project evaluation? **[6]**

OR

Q4) a) What is control activities in project management? **[6]**

b) What are the activities of configuration status accounting? **[6]**

c) What is Configuration Management in Project Management. **[6]**

P.T.O.

Q5) a) What is project management measurement? **[6]**

b) What is the measurement plan in project development process? **[6]**

c) What are the activities about modelling? **[6]**

OR

Q6) a) How do you measure project performance? **[6]**

b) Describe in brief the ways to measure progress of activities in a project? **[6]**

c) How to do modeling measurements? **[6]**

Q7) a) What are the principles of quality assurance? **[6]**

b) How do you develop quality assurance activities? **[6]**

c) What is threat and incident management? **[6]**

OR

Q8) a) What are the elements of quality assurance system? **[6]**

b) Why is quality assurance important? **[6]**

c) How to do an evaluation of an activity? **[6]**

Total No. of Questions :8]

SEAT No. :

P1443

[Total No. of Pages : 2

[6004]-714

B.E. (Artificial Intelligence and Machine Learning) (Honours)
SOFT COMPUTING AND DEEP LEARNING
(2019 Pattern) (Semester-VIII) (410303)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right indicate marks.***
4) ***Assume suitbale data, if necessary.***

Q1) a) Explain how genetic algorithm are different from evolutionary programming? **[6]**

b) What are operators in genetic algorithm? List and explain GA operators in brief? **[6]**

c) Explain Encoding methods? **[6]**

OR

Q2) a) What are types of crossover and mutation techniques? **[6]**

b) Mention application area of genetic algorithm? **[6]**

c) What is difference between genetic algorithm and genetic programming? **[6]**

Q3) a) List out the strength and weakness of artificial neural network? **[6]**

b) Explain in brief architecture of multilayer feed-forward neural network? **[6]**

c) Explain how weights are updated in perceptron network? **[5]**

OR

Q4) a) Explain Types of Artificial Neural Network (ANN) **[6]**

b) Explain Single layer and multilayer Perceptrons. **[6]**

c) Explain Self-Organizing Map in neural network? **[5]**

P.T.O.

Q5) a) Explain why to use deep learning? **[6]**

b) Explain in brief architecture of deep network? **[6]**

c) Explain different Deep Learning libraries? **[6]**

OR

Q6) a) Explain Restricted Boltzman Machines in details? **[6]**

b) Explain different Deep Learning platform. **[6]**

c) Explain any one Use Cases of Deep Learning? **[6]**

Q7) a) Explain in detail Convolution Neural Network(CNN)? **[6]**

b) Explain different Properties of CNN representations? **[6]**

c) List and explain different Applications of CNN.? **[5]**

OR

Q8) a) Explain in details Recurrent Neural Network (RNN)? **[6]**

b) Explain Sequential processing LSTM model in details? **[6]**

c) Explain difference between CNN and RNN.? **[5]**

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Total No. of Questions : 8]

SEAT No. :

P-714

[Total No. of Pages : 2

[6004]-715
B.E.(Computer) /(Cyber Security)/(Honors)
INFORMATION SYSTEM MANAGEMENT
(2019 Pattern) (Semester - VIII) (410403)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.No.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Draw neat figures wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Use of calculator is allowed.***
6) ***Assume suitable data, if necessary.***

Q1) a) List each of the eras in IT infrastructure evolution and describe its distinguishing characteristics. **[6]**

b) Explain what type of services provided by Cloud Computing. **[6]**

c) What are the advantages and disadvantages of Grid computing. **[5]**

OR

Q2) a) Explain how using a competitive forces model to help firms make good infrastructure investments. **[6]**

b) Should all firms move toward green computing? Why or why not? **[6]**

c) Elaborate cloud computing essential characteristics. **[5]**

Q3) a) Distinguish between an structured and unstructured decision. **[6]**

b) List and describe the stages in decision making. **[6]**

c) Explore types of knowledge management systems. **[6]**

OR

Q4) a) List and explain the activities in Knowledge Business Value Chain. **[6]**

b) List and describe the analytic functionalities provided by BI systems. **[6]**

c) Describe the elements of a business intelligence environment. **[6]**

P.T.O.

Q5) a) Describe dimensions that influenced the level of project risk. **[6]**

b) Explore information system planning with business planning. **[6]**

c) List tangible and intangible benefits of Information System. **[5]**

OR

Q6) a) List and describe the variables addressed by project management. **[6]**

b) What are elements of a management structure for information systems projects in a large corporation. **[6]**

c) Identify & discuss what are the Consequences of Poor Project Management. **[5]**

Q7) a) What are the components of information security? Explain with its example? **[8]**

b) What is bitcoin? Enlist & explain features of bitcoin with its benefits in brief. **[10]**

OR

Q8) a) What is block chain? Explain key elements of block chain? **[8]**

b) List and explore any four password management practices. **[10]**

Total No. of Questions : 8]

SEAT No. :

P-715

[Total No. of Pages : 2

[6004]-716
B.E. (Computer Engineering) (Data Science) (Honors)
ARTIFICIAL INTELLIGENCE FOR BIG DATA ANALYTICS
(2019 Pattern) (Semester - VIII) (410503)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.No.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain fundamental of neural networks in big data. **[6]**

b) What is perceptron? Explain Types of Perceptron. **[6]**

c) What is feed forward neural netwok explain with example. **[8]**

OR

Q2) a) Explain architecture of artificial neural networks. **[6]**

b) Difference between linear and nonlinear neural networks? **[6]**

c) Explain recurrent neural networks with example. **[8]**

Q3) a) What is Spark? Explain the key features of Spark. **[4]**

b) What is Hadoop Streaming? How Streaming is works in Hadoop. **[6]**

c) Explain map reduce in big data with example. **[8]**

OR

Q4) a) Explain the pyspark in big data analytics using hadoop. **[4]**

b) Explain Hadoop Ecosystem in detail. **[6]**

c) What is HDFS? Explain Hadoop Distributed File System architecture. **[8]**

P.T.O.

Q5)	a)	Explain Scalable Machine Learing on Big Data using Spark.	**[6]**
	b)	What are the different Features of Hive in Big Data.	**[6]**
	c)	Write a short note on: Data Warehousing.	**[4]**

OR

Q6)	a)	What are the different key characteristics of a Data Warehouse?	**[6]**
	b)	What is Hive Big Data and its Benefits?	**[6]**
	c)	Write a short note on: Data mining.	**[4]**

Q7)	a)	Explain the challenges of natural language processing.	**[6]**
	b)	List and explain the applications of computer vision.	**[6]**
	c)	Explain NLP application: Sentiment Analysis.	**[4]**

OR

Q8)	a)	List and explain the applications of NLP.	**[6]**
	b)	Explain in details feature extraction of NLP.	**[6]**
	b)	Explain object detection application in Computer Vision.	**[4]**

Total No. of Questions : 8]

SEAT No. :

P-2875

[Total No. Of Pages : 2

[6004]-717
B.E.(Honors)
INTERNET OF THINGS SECURITY
(410603) (2019 Pattern) (Semester-VIII)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates :

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain in detail-Security Goals in IoT. **[6]**

b) What is Public-Key-Based Authentication? Explain with suitable example. **[6]**

c) Explain - Existing Security Schemes for IoT. **[5]**

OR

Q2) a) What is Identity-Based Authentication? Explain with suitable example. **[6]**

b) Explain CoAP protocol for the IoT environment. **[6]**

c) What is Lightweight Cryptography? Explain with example. **[5]**

Q3) a) Explain the data life cycle in IoT, with suitable example. **[6]**

b) How can we protect data in IoT? Which parameters are used to protect the data in IoT? **[6]**

c) How can security be provided in the Network Layer of IoT Architecture? **[6]**

OR

Q4) a) How can security be provided in the Service Layer IoT Architecture? **[6]**

b) What are the Threats Caused in Maintenance of IoT? **[6]**

c) How can security be provided in the Application Interface Layer of IoT Architecture? **[6]**

P.T.O

Q5) a) How to provide Security in Identification and Tracking Technologies? Explain with suitable example. **[6]**

b) List and explain main potential attacks in 6LoWPAN. Discuss security protocols and privacy issues in 6LoWPAN. **[5]**

c) Using which secutity schemes information in Wireless Sensor Networks (WSNs) can be protected? **[6]**

OR

Q6) a) What are the security attacks in WSNs? How to avoid them? **[6]**

b) What are the threats and challenges to achieve security in the - identification and tracking technologies of the IoT Environment. **[5]**

c) How do you maintain confidentiality and security for IoT based health care applications? **[6]**

Q7) a) How can security be provided in Smart Cities? **[6]**

b) What can be the security threats to the Connected Cars? How can security be provided to Connected Cars? **[6]**

c) How can Blockchain Technology be used in the Security and Privacy in IoT? **[6]**

OR

Q8) a) Describe blockchain enabled food supply chain traceability system in detail. **[6]**

b) Comment on "Blockchain in IoT". **[6]**

c) Briefly discuss the case study on "Smart Home". **[6]**

Total No. of Questions : 8]

SEAT No. :

P716

[Total No. of Pages : 2

[6004]-718
B.E. (Honors) (Computer Engineering)
VIRTUAL REALITY AND AUGMENTED REALITY
Application Development Using Augmented Reality and Virtual Reality
(2019 Pattern) (Semester - VIII) (410703)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Make suitable assumptions if necessary.***
4) ***Figures to the right indicate full marks.***

Q1) a) What is ARcore? Explain the features of ARCore. **[6]**

b) Explain : SLAM algorithm. **[6]**

c) Identify the feature points of AR foundation. **[5]**

OR

Q2) a) Explain the terms: **[6]**

i) Environmental Detection

ii) Occlusion

b) Explain anatomy of SLAM algorithm. **[6]**

c) What is Vuforia? Explain the features of Vuforia. **[5]**

Q3) a) What programming languages are commonly used for AR and VR development, what are the strengths and weaknesses of each of them? **[6]**

b) What are some of the most significant trends, and what do these trends suggest about the feature of AR and VR development. **[6]**

c) Discuss the importance of User experience in AR and VR application, and how programming languages can be used to enhance UX. **[6]**

OR

P.T.O.

Q4) a) Explain the role of unreal engine in AR and VR development. **[6]**

b) What are some of the most popular technologies offer for AR and VR development? **[6]**

c) What unique challenges do AR and VR applications present to developers, and how to these challenges to impact the choice of programming languages? **[6]**

Q5) a) What is HTC Vive? Explain the Working of HTC vive. **[5]**

b) Explain the terms: **[6]**

i) Tracking system

ii) Monitoring system

c) Explain: The contrast of hardware requirements for developing AR and VR applications. **[6]**

OR

Q6) a) Evaluate the challenges of testing AR and VR applications on different devices. **[4]**

b) What are some best practices for testing applications across multiple devices, and what are some common pitfalls to avoid? **[6]**

c) Explain Advantages and Disadvantages of AR and VR system. **[7]**

Q7) a) What are some trending application areas in AR and VR applications? **[6]**

b) Explain the role of aerospace and defense in AR and VR. **[6]**

c) What are some of the key areas of growth in AR and VR, and how are these trends likely to shape the future of the industry? **[6]**

OR

Q8) a) Evaluate the potential for AR and VR for healthcare applications. **[6]**

b) Discuss the impact of AR and VR on entertainment industry. **[6]**

c) Discuss the potential impact of AR and VR in education and learning. **[6]**

Total No. of Questions : 8]

SEAT No. :

P-717

[Total No. of Pages : 2

[6004]-720

B.E. (Automobile) (Semester - VII)
INDUSTRIAL ENGINEERING
(2019 Pattern) (416483)

Time : 2 Hours] ***[Max. Marks : 50***

Instructions to the candidates :

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7or Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Explain Roles of Industrial Engineer. **[7]**

b) Explain Five S technique of Productivity Improvement. **[6]**

OR

Q2) a) Explain briefly the factors affecting productivity. **[7]**

b) There are two industries manufacturing two types of plugs. The standard time per piece is 1.5 minute. Output of the two industries is 300 and 200 respectively per shift of 8 hours then. **[6]**

i) What is productivity of each industry per shift of 8 hours?

ii) What is production of each industry per week (6 days) on the basis of double shift.

Q3) a) Explain objectives, scope of Work Study. What are human factors in work study? **[6]**

b) Explain factors affecting rate of working. **[6]**

OR

P.T.O.

Q4) a) What is Allowance? Explain any two types of Allowance. **[6]**

b) Write short note on MOST (Maynard Operation Sequence Technique). **[6]**

Q5) a) Explain in detail factors affecting selection of location for the Industrial plant. **[6]**

b) Explain the difference between product layout and process layout. **[7]**

OR

Q6) a) Explain factors affecting plan layout. **[6]**

b) Define material handling. What are the objectives of material handling? **[7]**

Q7) a) Explain the functions of Production Planning and Control. **[6]**

b) Explain the objectives of Inventory Control. **[6]**

OR

Q8) a) Explain the difference between Production Planning and Production Control. **[6]**

b) Write a short note on Material Requirement Planning. **[6]**

Total No. of Questions : 8]

SEAT No. :

P-718

[Total No. of Pages : 4

[6004]-721

B.E. (Mechanical) (Semester - VII)
TURBO MACHINERY
(2019 Pattern) (402043)

Time : 2 Hours] *[Max. Marks : 50*

Instructions to the candidates :

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right of each question indicate full marks.***
4) ***Assume suitable data wherever necessary and mention the same clearly.***
5) ***Use of steam tables, Mollier chart and calculator is allowed.***

Q1) a) Sketch Pelton wheel bucket and explain the effect of its size, shape and number on its function. **[6]**

b) The external and internal diameters of an inward flow reaction turbine are 2m and lm respectively. The head on the turbine is 65 m. the width of the vane at inlet and outlet are same and equal to 0.25 m. The runner vanes are radial at inlet and discharge is radial at outlet. The speed is 220 rpm and the discharge is 6 m^3/sec. **[8]**

Determine :

i) The vane angle at outlet of the runner and guide blade angle at inlet.
ii) The hydraulic efficiency.

OR

Q2) a) Explain the following terms. **[6]**

i) Specific speed

ii) Run away speed

iii) Degree of reaction

P.T.O.

b) A jet of water moving with V m/s strikes at the centre of a curved vane which is moving with u m/s. If the outgoing jet makes an angle θ with the incoming jet, prove that, **[8]**

i) Maximum efficiency, $\eta_{max} = \frac{8}{27}(1+\cos\theta)$

ii) Blade speed, u = V/3

Q3) a) What is compounding of steam turbine? Explain any one of the following. **[5]**

i) Velocity compounding

ii) Pressure compounding

b) Steam enters an impulse wheel having a nozzle angle of 20º at a velocity of 450 m/s. The exit angle of moving blades is 20º and relative velocity of steam may be assumed to remain constant over the moving blades. If the blade speed is 185 m/s, **[7]**

determine:

i) Blade angle at inlet

ii) Work done/kg of steam

iii) Power developed when the turbine is supplied with 1.8 kg/s of steam

iv) Diagram efficiency

OR

Q4) a) Show that for Parson's Reaction turbine, the degree of reaction is 50%.**[5]**

b) Following data refer to the single row of impulse steam turbine mean diameter of the blade ring = 1.1 m, Speed = 3000rpm, Nozzle

angle = 17deg., ratio of blade velocity to the steam velocity = 0.45, blade friction factor = 0.82, Blade angle at exit is less by 3 deg to that at inlet, steam mass flow rate = 10.2 kg/s. Draw a velocity diagram and find the following. **[7]**

i) Blade angles at inlet and outlet

ii) Tangential force

iii) Axial force

iv) Power developed.

Q5) a) Explain NPSH in centrifugal pump. **[4]**

b) A Centrifugal pump running at 950 rpm is working against a head 20 m. The external diameter of the impeller is 460 mm and outlet width is 50 mm. If the vane angles at outlet is 40° and manometric efficiency is 75 %. Determine the following : **[8]**

i) Flow velocity at outlet

ii) Absolute velocity of water leaving the vane

iii) Angle made by the absolute at outlet with the direction of motion at outlet

iv) Rate of flow through the pump

v) Specific speed.

OR

Q6) a) Explain various efficiencies of a centrifugal pumps. **[4]**

b) A Centrifugal pump having outer diameter equal to two times inner diameter and running at 1250 rpm works against a total head of 80 m.The velocity of flow through the impeller is constant and is equal to 3 m/s.

The vanes are set back at width at an angle of 30º at outlet. If the outer diameter of the impeller is 600 mm and width at outlet is 50 mm. Determine the following: **[8]**

i) Vane angle at inlet

ii) Work done per second by

iii) Manometric efficiency

Q7) a) Differentiate between centrifugal compressor and axial flow compressor. **[4]**

b) Air at a temperature of 300 K flows in a centrifugal compressor running at 18500 rpm. The other data is given as follows :

i) Isentropic total head efficiency = 75%

ii) The temperature rise of air passing through the compressor

iii) The static pressure ratio

Assume that the absolute velocities of air at inlet and exit of compressor are same. Take Cp = 1.005 kJ/kg K. **[8]**

OR

Q8) a) Explain Construction and working of centrifugal compressor with neat diagram. **[4]**

b) The impeller of the centrifugal compressor has the inlet and outlet diameter of 0.3 and 0.6 m respectively. The intake is from the atmosphere at 100 kPa and 300 K, without any whirl component. The outlet blade speed is 11000 rpm and velocity of flow is constant at 125 m/s. If the blade width at inlet is 6 cm, determine the following : **[8]**

i) Specific work

ii) Exit pressure

iii) Mass flow rate

iv) Power required to compressor if the overall efficiency is assumed to be 75%.

Total No. of Questions : 10]

SEAT No. :

P2876

[Total No. of Pages : 2

[6004]-729
B.E. (Automobile Engineering)
AUTOMOTIVE SYSTEMS AND TESTING
(2015 Pattern) (Semester - II) (416495)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Draw and Explain Front axle. **[5]**

b) What are the requirements of suspension systems? **[5]**

OR

Q2) a) What is meant by sprung and unsprung mass? Explain with example of each. **[5]**

b) Classify brakes. **[5]**

Q3) a) Differentiate Disc Wheels and Alloy Wheels. **[5]**

b) What are the functional requirements of tyres? **[5]**

OR

Q4) a) What is meant by rising spring stiffness? How it can be achieved in Air Suspension. **[5]**

b) Write a short note on Disc Brake. **[5]**

Q5) a) Write a short note on following. **[10]**

i) Top Speed

ii) Ride Comfort

iii) Gradability

iv) EGR System

v) Wind Noise & its measurement

b) What is meant by Catalytic Converter? What are its types? Explain Briefly. **[8]**

OR

P.T.O.

Q6) a) What are the different sources of interior noise generation of a vehicle? Explain briefly. **[8]**

b) Explain Briefly. **[10]**

i) Full Scale Test

ii) Sensor types and selection parameters.

iii) Engine Noise and Vibrations

Q7) a) Write a short note on Oil Consumption Test. **[8]**

b) What is meant by proving ground? Explain Briefly. **[8]**

OR

Q8) a) Explain any two following transient cycles tests, **[8]**

i) World Harmonized Transient Cycle (WHTC)

ii) European Transient Cycle (ETC)

iii) Non Road Transient Cycle (NRTC)

b) Explain Pavement Track and Mud Track. **[8]**

Q9) a) Write a short note on Seats and its types. **[8]**

b) Write a short note on following (Any Two) **[8]**

i) Frontal Crash Test

ii) Rear Crash Test

iii) Pole Crash Test

iv) Braking Distance Test

OR

Q10)a) Explain Bharat New Vehicle Safety Assessment Program. **[8]**

b) Write a short note on following. **[8]**

i) Crash Test Dummies

ii) Crash Test Sensors

◀▶ ◀▶ ◀▶

Total No. of Questions : 10]

SEAT No. :

P-2877

[Total No. of Pages : 3

[6004]-730

B.E. (Automobile Engineering)

AUTOMOTIVE SYSTEM DESIGN

(2015 Pattern) (Semester - II) (416496)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Answer five questions from the following.***
2) ***Figures to the right indicate full marks.***
3) ***Use electronic pocket calculator is permitted.***
4) ***Assume suitable data if necessary.***

Q1) a) How do you classify clutches? **[4]**

b) Gear ratios for a LMV are as follows : **[6]**

First gear ratio = 4.2:1

Second gear ratio = 2.56:1

Third gear ratio = 1.52:1

Top gear ratio = 1:1

Inverse of diametral pitch of each gear may be assumed as 3.25mm. The smallest pinion in a gear train must have at least 15 teeth. Speed of engine shaft is 2 times speed of lay shaft. Assuming straight teeth. Calculate center distance between shafts, number of teeth on each gear.

OR

Q2) a) An automobile power unit gives a maximum toque of 13.52 Nm. The clutch is a single plate dry disc having effective clutch lining of both sides of plate disc. The coefficient of friction is 0.3 and the maximum axial pressure is 8.29×10^4 Pa and external radius of friction surfaces is 1.25 times the internal radius. Calculate the dimensions of clutch plate and total axial pressure that must be exerted by clutch springs. **[6]**

b) What is the purpose of rear axle final drive? **[4]**

P.T.O.

Q3) a) Why a hollow propeller shaft normally used? **[4]**

b) A three speed gear box gives 3 forward speeds and one reverse with a top gear of unity and bottom and reverse gear ratio of approximately 3.3:1. The centre distance between the shafts is to be 110 mm approximately. Gear teeth of module 3.25 mm. find the number of gear teeth. **[6]**

OR

Q4) a) Explain the characteristics of a propeller shaft. **[4]**

b) Narrate about clutch frictional materials and their properties. **[6]**

Q5) In a hydraulic braking system the force on foot pedal is 100N, pedal leverage ratio is 4.4, cross sectional area of master cylinder is 4 cm^4, cross sectional area of front piston 20 cm^4. Cross sectional area of the rear piston is 5 cm^4. Distance moved by effort is 1 cm. Calculate the following. **[18]**

a) Front to rear brake ratio

b) Total force ratio

c) Distance moved by output

d) Cylinder movement ratio

e) Total movement ratio

OR

Q6) Explain the following : **[18]**

a) Brake fade.

b) Brake torque.

c) Brake balance.

d) Braking efficiency.

e) Properties of friction lining.

f) Components used in hydraulic brake system.

Q7) a) A semi elliptic type spring has leaves of 75 mm width and 10 mm thickness, effective length is 900 mm. If the stress is not to exceed 220.725 MPa, when the spring is loaded to 4905 N. Estimate the required number of leaves and the deflection under this condition. If the spring is just flat under load, what is the initial radius? Take E = 196.2 GPa. **[10]**

b) Write a note on air springs. **[6]**

OR

Q8) Discuss on : **[16]**

a) What is nipping in leaf springs?

b) Brake fade and Brake torque.

c) Brake balance and Braking efficiency.

d) Components used in hydraulic brake system.

Q9) Design a Tensile Bar for Minimum Cost of the following materials. Assume Factor of Safety of 2.0. **[16]**

Material	Mass density (Kg/m^3)	Yield strength (MPa)	Material cost Rs/N
Steel	3000	16	130
Al alloy	3000	32	50
Magnesium alloy	2100	32	20

Length of the bar is 200 mm and a constant tensile load on bar is of 5000N.

OR

Q10)a) What do you understand by optimum and adequate design? **[6]**

b) Write note on : **[10]**

i) Design for natural tolerances.

ii) Statistical considerations in design.

Total No. of Questions : 10] **SEAT No. :**

P2878 **[Total No. of Pages : 2**

[6004]-732
B.E. (Automobile Engineering)
HYBRID ELECTRIC AND FUEL CELL VEHICLE
(2015 Pattern) (Semester - II) (Elective - III) (416497 B)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever ncessary.***
3) ***Figures to the right side indicates full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Discuss the advantages, Disadvantages and applications of Series hybrid vehicle. **[5]**

b) Differentiate between Synchronous motor and Induction motor. **[5]**

OR

Q2) a) Elaborate the role of electric vehicle in automotive sector. **[4]**

b) Explain the Six characteristics of BLDC motor in EVs. **[6]**

Q3) a) List various perfromance of hybrid vehicle and explain grade ability performance in detail. **[5]**

b) Suggest the good requirements of solar panel in electric vehicle. **[5]**

OR

Q4) a) Explain the various components of hybrid vehicles with its function. **[5]**

b) Explain the regenerative braking system in hybrid vehicle with its features. **[5]**

Q5) a) Describe the construction and working principle of lithium ion battery with its features. **[8]**

b) Define the concept of hybridness and explain its importance in design of hybrid vehicle. **[8]**

OR

P.T.O.

Q6) a) What are the various possible power flows in parallel hybrid vehicle? Explain any one with neat layout. **[8]**

b) Suggest and justify the design consideration you should consider for battery in hybrid vehicle? **[8]**

Q7) a) Describe the advantages, Disadvantages and application of fuel cell in vehicle. **[9]**

b) Explain the construction and working of lead acid battery with its features. **[9]**

OR

Q8) a) Define the following terms related to EHV battery. **[9]**

i) Specific power

ii) Energy efficiency

iii) Reserved capacity (RC)

iv) Cold cranking Amps (CCA)

b) Explain the construction and working of hydraulic accumulator in hybrid vehicle. **[9]**

Q9) a) Explain the construction and working of vane pump. **[8]**

b) Explain the construction and working of Proton Exchange Membrane fuel cell with neat sketch. **[8]**

OR

Q10)a) List and explain various factors affecting on energy of battery. **[8]**

b) With the help of neat layout explain flywheel hybrid technology. **[8]**

Total No. of Questions : 10]

SEAT No. :

P2879

[Total No. of Pages : 2

[6004]-733
B.E. (Automobile Engineering)
AUTOMOTIVE HYDRAULICS AND PNEUMATICS
(2015 Pattern) (Semester - II) (Elective - III) (416497 C)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Classify the types of hydraulic fluids. What are desirable properties of hydraulic fluid? **[6]**

b) Explain the working and construction of Vane Pump. **[4]**

OR

Q2) a) Explain practical application Pascal's law. **[6]**

b) Explain the classification of Pumps. **[4]**

Q3) a) Explain any four types of liners actuators with a neat sketch. **[6]**

b) What are the applications of tandem and telescopic cylinders? **[4]**

OR

Q4) a) Draw and explain working of balanced vane motors. **[6]**

b) Explain working of solenoid actuated valve with neat sktech. **[4]**

Q5) a) Explain double-Pump hydraulic system with neat circuit diagram. **[8]**

b) Compare the different types of speed controlling methods of hydraulic cylinder. **[8]**

OR

Q6) a) Draw "synchronizing circuit" and explain its working. **[8]**

b) Explain with neat sketch control of a single - acting and double - acting hydraulic cylinder. **[8]**

P.T.O.

Q7) a) Draw sketch of 4/2 DCV and explain it's working. **[8]**

b) Explain working of solenoid operated valve with application. **[8]**

OR

Q8) a) Explain lubrication, mufflers and filters pneumatic system. **[8]**

b) Draw a neat sketch of radial piston air motor and explain its working. **[8]**

Q9) a) Explain air brake, maintenance and troubleshooting of pneumatic circuit. **[10]**

b) Explain the power steering mechanism. **[8]**

OR

Q10) a) Explain the types and applications of accumulators. **[10]**

b) Explain hydro-pneumatic suspension. **[8]**

Total No. of Questions : 10]

SEAT No. :

P-2880

[Total No. of Pages : 2

[6004]-735

B.E. (Automobile Engineering)

TRANSPORT MANAGEMENT & MOTOR INDUSTRIES

(2015 Pattern) (Semester - II) (416498B) (Elective - IV)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Mention the duties of conductor and drivers of state transport organization in case of accident. **[5]**

b) Write down road offences and penalties for the same. **[5]**

OR

Q2) a) Why tax is levied on motor vehicle explain at least 5 points? **[5]**

b) Write a short note on Motor Vehicle Act. **[5]**

Q3) a) Explain the effect of non-payment of tax. **[5]**

b) What is insurance? Why it is important for motor vehicles. **[5]**

OR

Q4) a) What is third party insurance? **[5]**

b) Explain the benefits of warranty system. **[5]**

Q5) a) What is the role depot, Draw and Explain layout for S T Depot. **[9]**

b) Explain in detail management information system for passenger transport operation. **[9]**

OR

Q6) a) Explain in detail fleet management & fleet maintenance for transport operation & write down its advantages. **[9]**

b) Write a note on storage & transportation of petroleum product. **[9]**

P.T.O.

Q7) a) Explain in detail modes of transport. **[8]**

b) Explain the role of petroleum conservation and research association. **[8]**

OR

Q8) a) Write a note on MSRTC, BEST, PMT bus services. **[8]**

b) Explain the factor that affects the goods and passenger transport operation. **[8]**

Q9) a) What is global positioning system? Explain its function and role in automobile industry. **[8]**

b) Explain the role of VRDE in automobile sector. **[8]**

OR

Q10)a) Explain in detail CIRT. **[8]**

b) Explain the role of ARAI in vehicle development. **[8]**

Total No. of Questions : 10]

SEAT No. :

P-2881

Total No. of Pages : 2

[6004]-748

B.E. (Chemical Engineering)

PROCESS MODELING AND SIMULATION

(409349) (2015 Pattern) (Semester - II) (409349)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8 and Q.9 or Q.10.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain the terms - distributed parameter system with example. **[5]**

b) State the applications of mathematical modeling in process industries. **[5]**

OR

Q2) a) Draw and explain a flow chart for the four different phases of model building. **[5]**

b) Develop modeling equation of continuity with figure. **[5]**

Q3) a) Develop the modeling equation for the shell and tube heat exchanger. **[5]**

b) Draw figure and write down assumptions you made for model equation for laminar flow of a fluid through a packed bed column. **[5]**

OR

Q4) a) Develop the mathematical model for triple effect evaporator. **[5]**

b) Draw the diagram for the model equation of flow through packed bed column. Write assumptions. **[5]**

P.T.O.

Q5) a) Develop the modeling equation for the batch distillation column. **[8]**

b) Develop model equation for Absorber and write assumptions you made. **[8]**

OR

Q6) a) Develop a model for cooling tower. Write all assumption. **[8]**

b) Derive the model equation for continuous binary distillation in tray column. **[8]**

Q7) a) Develop the mathematical modeling equation for the Continuous stirred tank reactor by considering reversible reaction. **[8]**

b) As semi-batch reactor is run at constant temperature by varying the rate of addition of one of the reactants "A". The irreversible exothermic reaction is first order in reactants "A" & "B". The tank is initially filled to its 40% level with pure reactant "B" at a concentration C_{Bo}. Maximum cooling water flow is begun, and reactant "A" is slowly added to the perfectly stirred vessel. Write the equations describing the system. Without solving the equations, try to sketch the profiles of F_A, C_A, & C_B with time during the batch cycle. **[10]**

OR

Q8) a) Derive a mathematical model for plug flow reactor. **[10]**

b) Develop the model equation for trickle bed reactor. **[8]**

Q9) a) Write short notes on use of numerical methods to solve the differential equations. **[8]**

b) Write a short note on - Unsteady state analysis in reactor system with example. **[8]**

OR

Q10) a) Derive the model equation for effluents treatment reactor. **[8]**

b) List out the software's available for the simulation of process plant. Explain anyone. **[8]**

Total No. of Questions : 10]

SEAT No. : ____

P-2882

Total No. of Pages : 4

[6004]-758

B.E. (Civil)

ENVIRONMENTAL ENGINEERING - II

(2015 Pattern) (401001) (Semester - I)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Solve Q.No.1 or 2, 3 or 4, 5 or 6, 7 or 8, 9 or 10.***
2) ***Figures to the right indicate full marks.***
3) ***Draw neat diagram wherever necessary.***
4) ***Use of logarithmic table, slide rule and electronic pocket calculator are allowed.***
5) ***Assume suitable data if necessary, stating it clearly.***

Q1) a) What are the factors considered for estimating sewage flow generated from a sewer district. Hence determine the quantity of maximum sewage flow generated from a town.having population of 40000 and water supply rate of 150 lpcd. Take peak factor of 3. **[6]**

b) State the Manning's formulae used for computing velocity of flow in sewer. Explain the effect of sewer surface on velocity of flow. **[4]**

OR

Q2) a) Explain the significance of minimum and maximum velocity of flow in the sewer. **[4]**

b) During BOD measurement, 20 ml of sample was diluted to 1000ml. If Initial DO of the sample = 9.2mg/L and DO after 5 days = 3.1 mg/L, determine 5day BOD of the sample. The experiment was conducted at 20°C. Hence determine the ultimate. BOD of the sewage (Constant (Kd) at 20°C = 0.1/d). **[6]**

P.T.O.

Q3) a) Explain the difference between primary and secondary treatment of sewage with reference to principle of working, impurities removed and corresponding BOD removal. **[6]**

b) What factors are responsible for self purification of a polluted river? If sewage flow of 2MLD having BOD_5 at 20ºC of 100 mg/L is discharged in to a river having flow of 500 m^3/d and BOD_5 at 20°C is 10mg/L, determine the BOD_5 at 20°C of river water mixture on downstream of point of disposal. **[4]**

OR

Q4) a) Differentiate between oxidation pond and extended aeration process with reference to HRT, method of aeration, BOD removal efficiency. **[6]**

b) Explain oxygen sag curve showing point of critical deficit. **[4]**

Q5) a) Differentiate between aerated lagoon and oxidation pond with reference to method of oxygen supply, HRT and land requirement. **[6]**

b) Write short note on rotating biological contactors (RBC). **[4]**

c) Design an oxidation pond for following data. **[6]**

i) Raw sewage flow = 2 MLD,

ii) Raw sewage BOD_5 = 220 mg/L,

iii) Desired BOD_5 of treated effluent = 20 mg/L,

iv) BOD removal rate constant = 0.1/d,

v) BOD loading rate for the given latitude of the place = 300Kg/Ha/d.

vi) Elevation of the place = 500m above MSL

Determine,

1) Corrected BOD loading rate **[1]**

2) Area and dimensions of the oxidation pond **[4]**

3) Detention time required **[1]**

OR

Q6) a) Differentiate between facultative pond and facultative aerated lagoon. **[4]**

b) Write short note on root zone treatment system for sewage treatment. **[4]**

c) Design an aerated lagoon for following data. **[8]**

i) Raw sewage flow = 2 MLD,

ii) Raw sewage BOD_5 = 220mg/L,

iii) Desired BOD_5 of treated effluent = 20mg/L,

iv) Kinetic constants:

Y= 0.6, Kd = 0.05/d, BOD removal rate constant(Kd) at 20°C = 0.1/d

v) SRT 05 days

Determine,

1) Volume and dimensions of aerated lagoon

2) Biological solids produced during treatment

3) Oxygen requirement

Q7) a) Explain the principle and working of gravity thickener. **[4]**

b) Differentiate between standard rate and high rate digester. **[4]**

c) Design a septic tank with soil absorption system consisting soak pit for an apartment. Use following data. **[10]**

i) No. of users = 100, no.of fixture units required = 40.

ii) Discharge per fixture unit = 10 lpm. Consider 70% fixtures discharge simultaneously.

iii) Area required for sedimentation = 0.92 m^2/10 lpm

iv) Sludge storage capacity = 0.073 m^3/capita

v) Digestion volume required = 0.031 m^3/capta

vi) Percolation rate of soil = 2min/cm

vii) percolation rate of crushed stone = 1.25m^3/m^3/d

Determine,

1) Peak sewage flow **[2]**

2) volume and dimensions of septic tank **[4]**

3) Soil absorption area and dimensions of soak pit **[4]**

OR

Q8) a) Draw the treatment flow sheet for sewage treatment consisting UASB reactor as method for secondary treatment. **[4]**

b) Explain the principle and working of high rate digester. Hence how it is different from standard rate digester. **[6]**

c) Draw a flow chart of sewage treatment plant consisting of activated sludge process as method of secondary treatment. Write principal of working of each unit and the impurities removed in each stage of the treatment plant.**[8]**

Q9) a) Explain the principle of working and need of following treatment units**[8]**

i) Equalization and

ii) Neutralization

b) State the sources and characteristics of sugar factory wastewater and draw suitable treatment flow sheet. **[8]**

OR

Q10)State the sources and characteristics of following wastewater. Hence draw suitable flow diagram for treatment of these wastewater. (Any two) **[16]**

i) Distillery wastewater,

ii) Dairy wastewater and

iii) Sugar factory wastewater

x x x

Total No. of Questions : 10]

SEAT No. : ____

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[Total No. of Pages : 2

[6004]-759

B.E. (Civil)

Transportation Engineering

(2015 Pattern) (Semester - I) (401002)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer, Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Figures to the right indicate full marks.***
3) ***Use of logarithmic tables, slide rule, Mollies charts, electronics pocket calculator and steam tables is allowed.***
4) ***Assume suitable data if necessary.***
5) ***Neat diagrams must be drawn wherever necessary.***

Q1) a) State the various recommendations of Jaykar committee? **[5]**

b) Discuss the Third twenty year road development plan and its salient features? **[5]**

OR

Q2) Enumerate the procedure of super elevation design. **[10]**

Q3) a) Find the stopping sight distance on a highway at a descending gradient of 2 % for a design speed of 80 kmph. Assume reaction of driver = 2.5 sec and design coefficient of friction = 0.35 **[5]**

b) Enlist various methods of conducting the traffic volume survey. **[5]**

OR

Q4) a) Write a short note on highway drainage. **[5]**

b) What is Origin and Destination study? State the various applications of O and D study. **[5]**

Q5) a) Explain in brief the procedure of conducting 'Impact Test' on aggregate. **[6]**

b) Explain in brief the procedure of conducting 'Penetration Test' on bitumen. **[6]**

c) Write a note on types of Bitumen. **[5]**

P.T.O.

OR

Q6) a) Discuss in brief the necessity of design of bituminous mixes. **[6]**

b) How is foamed bitumen produced? State where they can be used. **[6]**

c) Write a note on Cutback Bitumen. **[5]**

Q7) a) Discuss in brief the CBR test and its importance in pavement design. **[6]**

b) Enumerate the stepwise procedure of design of flexible pavement as per IRC guidelines. **[6]**

c) Differentiate between flexible and rigid pavements. **[5]**

OR

Q8) a) What is CBR? Calculate the CBR value of a soil sample, if the load sustained by specimen at 2.5 mm and 5.0 mm penetration is recorded as 60.5 kg and 80.0 kg respectively. **[6]**

b) Discuss in brief load stresses acting on a rigid pavement. **[6]**

c) Define 'Vehicle Damage Factor'. Explain its importance in the design of flexible pavement. **[5]**

Q9) a) Differentiate between Cold Mix and Hot Mix Asphalt Technology. **[5]**

b) Explain in brief the construction process of Bituminous Macadam (BM). **[6]**

c) Explain the importance of providing prime Coat, tack coat and seal coat in pavements. **[5]**

OR

Q10) a) Write a note on Dry Lean Concrete? **[5]**

b) How is the structural evaluation of pavement done using FWD? **[6]**

c) Explain how WMM layer is prepared in the field. **[5]**

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Total No. of Questions : 10]

SEAT No. : ____

P-2884

[Total No. of Pages : 4

[6004]-760

B.E. (Civil)

STRUCTURAL DESIGN AND DRAWING - III

(2015 Pattern) (Semester - I) (401003)

Time : 3 Hours] ***[Max. Marks : 70***

Instructions to the candidates :

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8 and Q.9 or Q.10.***
2) ***Figures to the right indicate full marks.***
3) ***Latest IS 456, IS 1343, IS 3370, IS 1893 are allowed in the examination.***
4) ***The designs should be as per the latest IS codal provisions.***
5) ***If necessary, assume suitable data and indicate clearly.***
6) ***Use of electronic pocket calculator is allowed.***

Q1) a) Why high strength materials are used in prestressed concrete constructions. **[4]**

b) In a prestressed concrete beam of span 10 m with sectional dimensions 200 mm × 300 mm, is prestressed with wires of area 320 sq.mm located at constant eccentricity of 50 mm and carrying initial stress of 1000 N/sq.mm. Calculate % loss of stress in wires, if the beam is post-tensioned.

Use following data: Es = 210 kN/sq.mm, Ec = 35 kN/sq.mm, Relaxation of steel stress is 5 % of initial stress, Shrinkage of Concrete 200×10^{-6}, Creep coefficient 1.6, Slip at anchorage 1 mm, Frictional coefficient for wave effect is 0.00l5 per m. **[6]**

OR

Q2) a) Differentiate clearly between pre and post tensioned concrete beams.**[4]**

b) In a unsymmetrical I section of prestressed concrete beam with a span 8 m and supporting Live Load of 2 kN/m. The top flange is 300 mm wide and 60 mm thick, bottom flange is 100 mm wide and 60 mm thick. The overall depth of the beam in 400 mm. Calculate the Initial and Final stresses

P.T.O.

at centre of the beam if the effective prestressing force 100 kN is located at 50 mm from bottom at centre of the beam. Assume density of concrete is 24 kN/m^3 and 20 % losses. **[6]**

Q3) a) In an end block of a post tensioned beam of size 350 mm × 500 mm. The prestressing force is 800 kN applied to concentric prestressing at both the ends by a bearing plate of size 200 mm × 200 mm. Calculate the bursting force and design of reinforcement using Fe 415 steel. **[5]**

b) Calculate the depth of the one way post tensioned slab of span 10 m. The Live Load is 10 kN/m^2, f_{ck} is 30 MPa, The structure is type I structure, loss ratio is 0.8 and cube strength of concrete is 23 MPa. **[5]**

OR

Q4) a) Write advantages of Post Tensioned Slabs. **[3]**

b) In a post tensioned rectangular beam of width 300 mm and span 15 m, subjected to Live Load of 10 kN/m. The stresses in concrete not to exceed 16.5 N/mm^2 in compression and 1.1 N/mm^2 in tension and the loss is 15% calculate Maximum depth of the beam, minimum prestressing force and the eccentricity. **[7]**

Q5) Design a cantilever T shaped retaining wall and draw reinforcement details for the following data. **[17]**

a) Total height of the wall = 4.5 m

b) Density of Soil = 17 kN/c.m

c) Angle of internal friction = 32°

d) SBC of soil = 200 kN/m^2

e) Coefficient of friction between base and soil = 0.6

f) Backfill is levelled.

g) Use M20 and Fe 500, concrete and steel

OR

Q6) Design a cantilever L shaped retaining wall and draw reinforcement details for the following data. **[17]**

a) Total height of the wall = 2.8 m

b) Depth of foundation = 1.0 m.

c) Density of Soil = 17 kN/m^3

d) Angle of internal friction = 30^o

e) SBC of soil = 180 kN/m^2

f) Coefficient of friction between base and soil = 0.5

g) Backfill is levelled.

Q7) Design a circular water tank with flexible base for 5 Lakhs litres of capacity. Consider diameter of the tank is 15 m. Use M30 and Fe 415 concrete and steel. **[17]**

OR

Q8) Design a circular water tank with rigid base for 10 m diameter and 3.7 m height. Use M30 and Fe 500 concrete and steel. **[17]**

Q9) a) Calculate natural frequency of a fixed beam of span L carries central point load W, neglect mass of the beam. **[6]**

b) Derive the expressions for equivalent spring stiffnesses for prings are in series and springs are in parallel. **[10]**

OR

Q10) Estimate the base shear and its distribution for a G + 3 building situated in Pune by using seismic coefficient method using following data. **[16]**

Plan of the building: 3 panels each of 4 m × 4 m in horizontal and also vertical directions.

Elevation of the building: 3 bays each 4 m in horizontal direction and 4 storeys (including ground) each of 3 m in vertical direction.

Live Load on floors = 2.5 kN/sq.m
Floor Finish = 1.0 kN/sq.m

Live Load on roof = 1.5 kN/sq.m
Water Proofing = 1.0 kN/sq.m

Thickness of slabs: 125 mm
Sizes of all beams: 230 mm × 400 mm
Sizes of all columns: 230 mm × 400 mm
Width of Brick Wall: 230mm on each beam on typical floors.

✷ ✷ ✷

Total No. of Questions : 10]

SEAT No. :

P2885

[Total No. of Pages : 2

[6004]-763
B.E. (Civil)
ADVANCED CONCRETE TECHNOLOGY
(2015 Pattern) (Semester - I) (Elective - I) (401004 C)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagram must be drawn wherever ncessary.***
3) ***Figures to the right indicates full marks.***
4) ***Your answers will be valued as a whole.***
5) ***Use of electronic pocket calculator is allowed.***
6) ***Assume suitable data, if necessary.***
7) ***Use of IS code 10262, 456 is not allowed.***

Q1) a) Explain self-curing concrete. **[4]**

b) Explain grading curves of aggregate. How grading of aggregates effect-on properties of concrete. **[6]**

OR

Q2) a) What is mean by green concrete? State the various materials used in green concrete. **[4]**

b) What are the guideline for quality control and quality assurance of concrete? How to check the quality of concrete in fresh and hardened state? **[6]**

Q3) a) Compare the high performance concrete and High strength concrete with respect to material, mechanical properties and elastic properties. **[4]**

b) Write short note on **[6]**

i) Previous concrete

ii) Vacuum concrete

OR

Q4) a) State advanced non-destructive testing methods. Explain any one in details. **[4]**

b) Explain step by step procedure to design the Self compacting concrete. **[6]**

P.T.O.

Q5) a) What are the factors affecting the fiber interaction with matrix? **[4]**

b) Explain the basic concept of using fibers in the concrete composite. Explain the role of fibers improving the mechanical properties under tension and bending. **[6]**

c) What are the different types of fibers used in the construction industry? Write the properties and application. **[6]**

OR

Q6) a) Explain the historical development of fiber reinforced concretcomposite. Explain the role of fibers improving the properties of concrete. **[4]**

b) Enlist different metallic fibers. Explain their any two properties in brief. **[6]**

c) Define the fiber reinforced concrete composite? Enlist different naturally occuring fibers. Explain any two in brief. **[6]**

Q7) a) Explain the behavior of hardened polymeric fiber reinforced concrete under flexure? **[4]**

b) What precautions should be taken during mixing and casting for fiber reinforced concrete composite? **[6]**

c) Describe the SIFCON material with reference to definition, structure properties and its application. **[6]**

OR

Q8) a) Explain the quality control test to be conducted on fibre reinforce concrete. **[6]**

b) Explain the procedure to mix fibres in concrete. Why workability of concrete reduces with addition of fibres? **[6]**

c) Give the examples of naturally occurring fibres and their applications? **[4]**

Q9) a) What are the different tests conducted on cement mortar as a ferrocement material? Explain any one in detail. **[6]**

b) Explain closed mould technique for ferrocement with merits and demerits. **[6]**

c) Explain how ferrocement differs than concrete? Write about tensile property of ferrocement. **[6]**

OR

Q10)a) Give the examples of precast concrete element available in market and its advantages and disadvantages with respect to on-site construction. **[6]**

b) Explain the properties and specifications of ferrocement material. **[6]**

c) Explain the manufacturing process of industrial precast pipes. **[6]**

♦ ♦ ♦

Total No. of Questions : 8]

SEAT No. :

P2886

[Total No. of Pages : 2

[6004]-764
B.E. (Civil)
ARCHITECTURE AND TOWN PLANNING
(2015 Pattern) (Semester - I) (Elective - I) (401004 D)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q8.***
2) ***Figures to the right indicates full marks.***
3) ***Assume suitable data if necessary.***

Q1) a) Enlist and explain any two qualities of Architecture and its outcome. **[7]**

b) Enlist the objectives and elaborate the importance of landscaping. **[7]**

c) Compare and contrast between Regional Plan and Development Plan. **[6]**

OR

Q2) a) Explain the role of an urban planner and an architect in planning and designing. **[6]**

b) What is sustainable architecture? Mention its importance in todays context. **[7]**

c) What are the goals and objectives of town planning? Elaborate by giving an example. **[7]**

Q3) a) Explain in depth: Organization and purpose for MHADA. **[8]**

b) By discussing hierarchy of roads, elaborate is significance in traffic management. Draw an explanatory sketch. **[9]**

OR

Q4) a) Enlist and explain the different civic surveys carried out for development plan and its application. **[8]**

b) In what way, "Intelligent Transport System" is responsible for traffic management? **[9]**

P.T.O.

Q5) a) What are the objectives of LARR Act? **[8]**

b) What are URDPFI Guidelines? Elaborate in relation with, "land use, infrastructure"? **[8]**

OR

Q6) a) What are the applications of URDPFI Guidelines? **[8]**

b) Write a note on, "Real Estate (Regulation and Development) Act 2016". **[8]**

Q7) a) Explain in depth : Application of GIS, GPS, remote sensing in planning. **[9]**

b) Write notes on : Smart City and AMRUT **[8]**

OR

Q8) a) "Planning in early days without special techniques", comment on it. **[9]**

b) Write notes on : SEZ and CRZ. **[8]**

Total No. of Questions : 12]

SEAT No. :

P-2887

[Total No. of Pages : 2

[6004]-767

B.E. (Civil)

INTEGRATED WATER RESOURCES PLANNING AND MANAGEMENT

(2015 Pattern) (Elective - II) (Semester - I) (401005B)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer any one from questions 1 or 2, 3 or 4,5 or 6, 7 or 8, 9 or 10, 11 or 12.***
2) ***Neat diagrams must be drawn whenever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary and mention it clearly.***
5) ***Use of non-programmable calculators is allowed.***

Q1) a) What is meant by Groundwater ownership? **[3]**

b) How is the use of rights for water made? **[3]**

OR

Q2) a) What is meant by the permit system? **[3]**

b) Which are the water infrastructure-problems? **[3]**

Q3) a) Write a note on : Water as an economic good. **[3]**

b) What is meant by riparian rights? **[3]**

OR

Q4) a) How is the benefit cost analysis carried out in IWRP explained? **[3]**

b) What are the Global perspectives of the water crisis? **[3]**

Q5) a) Write a note on: Estimation of ground water draft. **[4]**

b) What is the use of geo-informatics for drought management? **[4]**

OR

Q6) a) How to do the assessment of flood damage? **[4]**

b) How can the Recycling and reuse of water be done? **[4]**

P.T.O.

Q7) a) What are consumptive and non-consumptive demands? Explain in detail. **[8]**

b) Explain in detail the necessity of water management in the irrigation sector. **[8]**

OR

Q8) a) Explain in detail the necessity of water management in the urban sector. **[8]**

b) How is the irrigation demand estimated? What is meant by irrigation efficiency? **[8]**

Q9) a) Write a note on water quality management for various uses. **[8]**

b) Social impact of water resources development on industrial growth to enhance living Standards. **[8]**

OR

Q10)a) Explain Direct/Indirect benefits of water resource development on employment generation. **[8]**

b) Write a note on Aquaculture. **[8]**

Q11)a) How the management of IWRM is carried out by use of data driven techniques like Genetic programming is done. **[8]**

b) Write a note on : **[10]**

i) Contour Bunding

ii) Strip Cropping

iii) Bench Terracing

iv) Check Dams

OR

Q12)a) Define RS & GIS. Write a role of RS & GIS in watershed management. **[8]**

b) Define Watershed. How are the watersheds classified? Explain integrated approach for watershed management. **[10]**

Total No. of Questions : 10]

SEAT No. :

P-2888

[Total No. of Pages : 2

[6004]-768

B.E. (Civil)

TQM & MIS in Civil Engineering

(2015 Pattern) (Semester - I) (401005C) (Elective - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q. 7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***

Q1) a) Explain the contribution of Juran in quality management. **[5]**

b) Differentiate between QC & QA. **[5]**

OR

Q2) a) Discuss the advantages of TQM In Construction company. **[5]**

b) Discuss the necessity of SIX sigma in organisation. **[5]**

Q3) a) Give brief introduction of ISO. Explain any one principles of ISO. **[5]**

b) Develop checklist for concreting activity. **[5]**

OR

Q4) a) Explain check sheet method in detail with suitable example. **[5]**

b) Develop a checklist for steel activity. **[5]**

Q5) a) Explain in detail benchmarking process. **[8]**

b) Explain the concept of Quality circle, Discuss the advantages of quality circle team. **[10]**

OR

Q6) a) What do you mean by cost of quality. Explain any two categories in detail. **[8]**

b) Write Short note on : **[10]**

i) CONQUAS

ii) CIDC-CQRA

P.T.O.

Q7) a) Explain in detail Sieso & Seiketsu. **[8]**

b) Write short note on : **[8]**

i) Rajiv Gandhi award

ii) Golden Peacock award

OR

Q8) a) What do you mean by Kaizen. Discuss the necessity of Kaizen in construction secor. **[8]**

b) Elaborate the concept of Zero defects with suitable example. **[8]**

Q9) a) Differentiate between data & information. **[4]**

b) Comment on: MIS is essential tool in decision making. **[8]**

c) What are the objectives of MIS. **[4]**

OR

Q10) a) Explain in detail application of MIS in infrastructure projects. **[8]**

b) Write Short Note on : **[8]**

i) Operating support system

ii) Management support system

⌘⌘⌘

Total No. of Questions : 12]

SEAT No. :

P-2889

[Total No. of Pages : 2

[6004]-769

B.E. (Civil)

EARTHQUAKE ENGINEERING (Elective - II)

(2015 Pattern) (Semester - I) (401005D)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.***
2) ***Use IS 456-2000, IS 1893 and electronic pocket calculator is allowed.***
3) ***Neat sketches must draw wherever necessary.***
4) ***Figures to right indicate full marks.***
5) ***Assume suitable data if necessary.***

Q1) a) Explain the various causes of earthquake? **[3]**

b) Explain in details the classification of earthquake seismic zoning in India? **[3]**

OR

Q2) a) What is mean earthquakes? **[3]**

b) Explain types of wave generated during earthquake. **[3]**

Q3) Derive the equation of motion for a damped free vibration of a SDOF system. **[6]**

OR

Q4) Determine the Natural Circular frequency, Natural Period of vibration and Natural Frequency of a weight of 30 kN suspended and having Spring Constant K = 3.23 kN/m. **[6]**

Q5) Explain step by step procedure to calculate base shear? **[8]**

OR

Q6) Discuss the detailed procedure of seismic coefficient method and summarized philosophy of seismic design. **[8]**

P.T.O.

Q7) a) Explain the procedure of estimation of storey shear for symmetrical building. **[8]**

b) Explain the concept of shear wall and its behaviour. **[8]**

OR

Q8) a) Explain the following terms : **[8]**

i) Torsion irregularity.

ii) Weak storey.

b) Explain the effects of unsymmetrical geometry and masses of the structure. **[8]**

Q9) a) What are the various methods available to control the lateral forces acting on a structure? Explain in details. **[10]**

b) Explain with neat sketches concept of Ductile detailing of column beam joint. **[8]**

OR

Q10) a) Write short note on : **[8]**

i) Response Spectra

ii) Effect of shear wall

b) Explain the procedure for estimation of combined effect of lateral forces and vertical loading on multistory frame. **[10]**

Q11) a) Explain any three retrofitting techniques used for traditional buildings. **[8]**

b) Explain the techniques used for strengthening RCC beams and Columns. **[8]**

OR

Q12) a) Explain Base isolation. Write different types of the passive control system and explain any one example. **[8]**

b) What is disaster management? Explain various phases of disaster Management? **[8]**

Total No. of Questions : 12]

SEAT No. :

P-2890

Total No. of Pages : 4

[6004]-771

B.E. (CIVIL)

DAMS AND HYDRAULIC STRUCTURES

(2015 Pattern) (Semester - II) (401007)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10, Q11 or Q12.***

2) ***Neat diagrams must be drawn wherever necessary.***

3) ***Figures to the right side indicate full marks.***

4) ***Assume Suitable data if necessary.***

UNIT - I

Q1) a) Briefly explain following issues related to Dams **[4]**

i) Social issues,

ii) Climate/Environmental issues.

b) Explain factors considered for selecting a site for dam. **[2]**

OR

Q2) a) Explain objective of dam safety and instrumentation. **[4]**

b) Difference between Large Dam and Small Dam. **[2]**

P.T.O.

UNIT - II

Q3) a) Enlist different forces acting on gravity Dam and specify magnitude and direction of any three forces with neat sketch. **[4]**

b) What is Arch Dam? What are the factors affecting selection of arch dam? **[4]**

OR

Q4) a) Following data were obtain from the stability analysis of concrete gravity dam **[6]**

i) Total overturning moment about toe = 1×10^5 Nm

ii) Total resisting moment about toe = 2×10^5 Nm

iii) Total vertical force above base = 5000 N

iv) Base width of dam 50m

v) Slope of D/s Face = 0.8 (H): 1(V)

Calculate the maximum and minimum vertical stress to which the foundation will be subjected to. What is Maximum principal stress at toe? Assume No tail water.

b) List different Load Combinations considered for design of gravity dam. **[2]**

UNIT - III

Q5) a) Explain Syphon Spillway neat sketch. **[3]**

b) What is Spillway? Enlist different types of spillway based on features. **[3]**

OR

Q6) a) Brief about Stilling basin and explain USBR stilling basin in detail with neat sketch. **[3]**

b) Enlist types of spillway gates and explain anyone. **[3]**

UNIT - IV

Q7) a) State different causes of failure of earthen Dam. **[6]**

b) Determine the factors of safety of downstream slope of an earth dam of homogenous section to a scale of 1: 500 **[6]**

i) Length of slip circle are = 15 cm

ii) Total area of N – Rectangles = 16.5 cm^2

iii) Total area of T rectangles = 7 cm^2

iv) Total area of U – Rectangles = 5 cm^2

v) Angle of Internal friction = 26°

vi) Cohesion = 0.2 kg/cm^2

vii) Specific weight of soil = 1.8 kg/cm^3

c) Explain Swedish Slip Circle method of stability analysis of Earthen dam with neat sketch. **[6]**

OR

Q8) a) State the corrections suggested by Khosla. Explain in detail the correction for mutual interference of piles. **[6]**

b) Define weir and classify according to the material of construction. **[6]**

c) Explain measures adopted for safe drainage of seepage water in earthen dam. **[6]**

UNIT - V

Q9) a) Classify canals based on discharge. Explains their types. **[6]**

b) Design an unlined alluvial trapezoidal canal section to carry a discharge of 8m^3/s. The longitudinal slope is 1 in 3500 and the side slope is 0.5 H : 1 V. Use Lacey's theory and take silt factor f = 0.9 **[8]**

c) Explain merits and demerits of Canal lining. **[2]**

OR

Q10)a) Write a note on losses in canals. **[6]**

b) What do you mean by 'Canal Fall'? Explain any one type of canal fall. **[4]**

c) Write a short Note on : **[6]**

i) Canal Escape

ii) Ogee Fall

UNIT - VI

Q11)a) Explain necessity of Cross drainage work and its types. Explain Syphon Aqueduct in detail with neat sketch. **[6]**

b) Enlist methods of river training and explain Guide Banks in detail. **[6]**

c) Explain classification of river based on topography. **[4]**

OR

Q12)a) Write a short Note on : **[6]**

i) Super passage

ii) Level crossing

b) Explain in brief **[6]**

i) attraction groyne

ii) deflection groyne

c) Explain objectives of River training. **[4]**

Total No. of Questions : 12]

SEAT No. :

P-2891

[Total No. of Pages : 5

[6004]-772

B.E. (Civil)

QUANTITY SURVEYING CONTRACTS AND TENDERS

(2015 Pattern) (Semester - II) (401008)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of logaritmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Why should a approximate estimate and detailed estimate be prepared? **[3]**

b) Explain the utility of DSR and the contents of DSR and explain how "lead and lift" affect the rates of some item of work. **[3]**

OR

Q2) a) Explain the service unit and bay method of' approximate estimating giving examples. **[2]**

b) It is proposed to construct an additional block to the existing college building. This block should accommodate 1000 students with a carpet area of 1.5 sq-m should be provided for each student. The space for circulation area, toilets block is assumed to have 30% and 20% of the plinth area. In addition the following provisions for expenditure is required to be made. **[4]**

i) Water supply 10% and electrification 7.5%

ii) Architectural finish 1% of cost of building

iii) Contingences and work charge establishment 2% and 3%.

Assuming a plinth area rate of 2500/sq-m, work out the approximate cost of construction.

P.T.O.

Q3) Work out the quantity of following items for the plan and sectional elevation given in fig 1 & 2 using centre line method.

a) Earth work excavation for foundation in soft soil **[2]**

b) Stone masonry in CM 1:6 for footing **[4]**

c) DPC **[2]**

OR

Q4) A simply supported beam resting on two wall supports of 300mm thick with clear distance between supports 4500mm. The reinforcement provided in the beam is as follows. Calculate quantity of steel in beam. All-round cover is 25mm **[8]**

Top bar	Bottom bar	Bent up bar	Stirrup
2Nos-10 ϕ	3Nos-12 ϕ	2Nos-16 ϕ	8ϕ @150 c/c

Q5) Calculate the quantity of cement and sand for following : **[6]**

a) 25 cum. of P.C.C. in 1:3:6

b) 150 sqm of cement plaster 12mm thick in C.M. 1:6

OR

Q6) Write briefly the specification for cement used for cement concrete. **[6]**

Q7) a) What are the purpose for valuation of property and various methods of valuation of land and building, explain any two method in detail? **[6]**

b) Briefly explain the difference between depreciation and obsolescence and why are they due to. What are the different methods to calculate depreciation? **[6]**

c) What are the various methods of valuation of land, explain any one method in detail? **[6]**

OR

Q8) a) Define the following terms : **[6]**

i) Scrap Value

ii) Salvage Value

iii) Capitalised Value

b) How does the depreciation affect the value of property? What are the different method of calculating depreciation and explain any two method of calculating depreciation. **[6]**

c) A machine was purchased for Rs. 1,00,000/-Assuming a salvage value of Rs. 25000/- after 5 years, calculate the depreciation by **[6]**

i) Straight line method & ii) Constant percentage method

Q9) a) Prepare a tender notice to be published in an national level newspaper for construction of government office building at an estimated cost of Rs 5 crore. Also Draft detailed Schedule for Tendering Activity and brief instructions to the bidder. **[10]**

b) Explain : **[6]**

i) Open tender

ii) Negotiated tender

iii) Selected or limited tender

OR

Q10) a) Explain in detail the need and necessity of : **[6]**

i) Earnest money deposit

ii) Security deposit

iii) Retention money

b) A construction project is proposed, explain the need of administrative approval and technical sanction for this project. **[6]**

c) Explain in detail the classification of PWD works based of nature of work and nature of cost. **[4]**

Q11) a) Define the terms "Contract" and accepting a tender is accepting a contract, justify. What are the different types of contract. **[6]**

b) Explain : **[6]**

i) Free consent

ii) Valid consideration

iii) Legally competent parties as an essential requirement of valid contract

c) Can a contract be terminated, if so, what are the different ways by which a contract be terminated. **[4]**

OR

Q12) a) Explain any 3 method of contracts. **[6]**

b) Differentiate between liquidated and unliquidated damages. **[4]**

c) Under what circumstances an Arbitration is required and what is sole arbitrator and Joint arbitrator, What are the powers of an arbitrator? **[6]**

Q No. 3

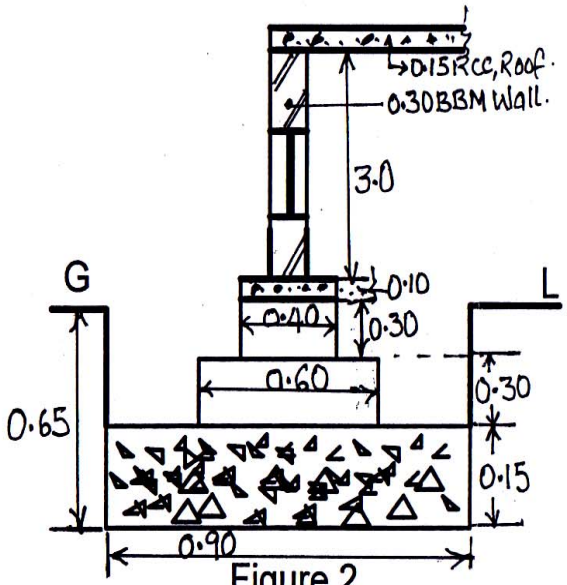
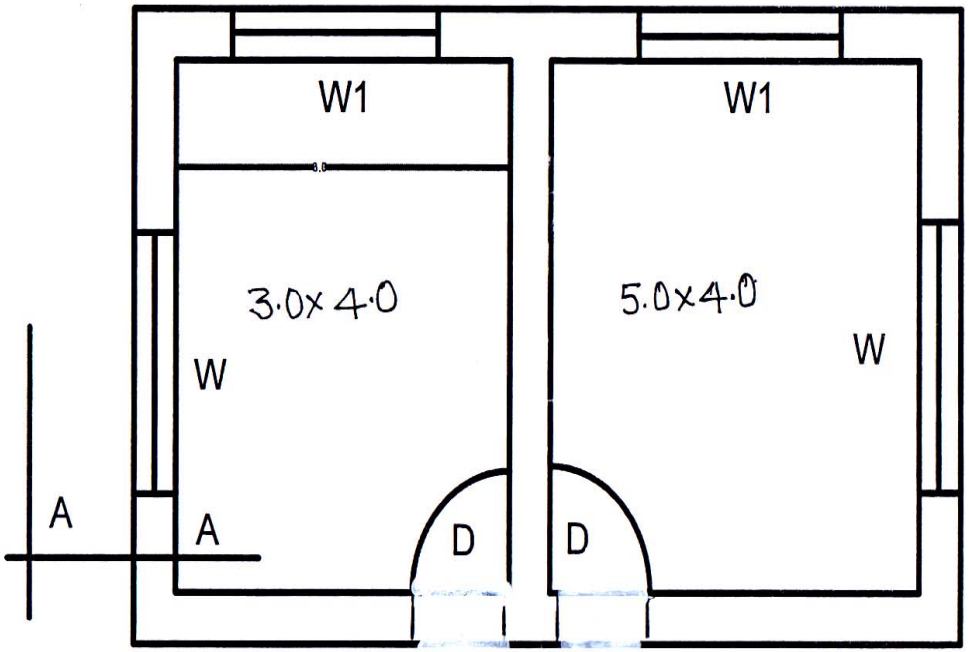


Figure 2

Section On AA



PLAN

Figure 1

Schedule of Opening

D = 0.90 x 2.10

W = 1.20 x 1.50

W1 = 0.90 x 1.20

All Dimensions in metre.

Total No. of Questions : 12]

SEAT No. :

P2892

[Total No. of Pages : 3

[6004]-775
B.E. (Civil)
HYDROPOWER ENGINEERING
(2015 Pattern) (Semester - II) (401009 C) (Elective - III)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q8, Q.9 or Q.10, Q11 or Q12.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicates full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) What are the different sources of energy? Differentiate between renewable and non renewable energy sources. **[4]**

b) What are the opportunities in hydropower development in India. **[2]**

OR

Q2) a) Differentiate between hydropower and thermal power. **[4]**

b) What is hydropower development. **[2]**

Q3) a) Explain in detail classification of hydropower plants. **[4]**

b) What are the principle components of hydroelectric plants? Draw the typical sketch and discuss the utility. **[4]**

OR

Q4) a) Write notes on Pumped Storage Plant. **[6]**

b) Differentiate between micro hydro power and storage hydro power plants. **[2]**

Q5) a) Define and state the equations for (Any two): **[4]**

i) Load Factor

ii) Capacity Factor

iii) Plant Factor

b) Define capacity factor and load factor **[2]**

OR

P.T.O.

Q6) a) What is load duration curve explain with the help of graph, even its applications. **[4]**

b) Explain prediction of load. **[2]**

Q7) a) Sketch the details of typical power house and show all components. State functions of all components. **[6]**

b) State advantages and disadvantages of underground power house. **[6]**

c) What are the types of underground power stations? Explain any one type with neat sketch. **[6]**

OR

Q8) a) What are the safety requirements of power house? **[6]**

b) What is instrumentation in power house? How instrumentation and control is achieved in case of powerhouse? **[6]**

c) Explain different methods of air cooling of generators. **[6]**

Q9) a) Write short notes on **[6]**

i) Governing of Turbines

ii) Water hammer in turbines

b) A Pelton wheel works under a head of 300m and the total discharge available throug the jets is 5 m^3/s. Turbine uses two runner and two jets of equal diameter per runner. The coefficient of velocity of each jet is 0.98. Hydraulic efficiency of each runner is 92%. Find the diameter of each jet power developed of each jet and power by turbine. **[6]**

c) Differentiate between Impulse turbine and Reaction turbine. **[4]**

OR

Q10)a) What is draft tube? What are the functions of draft tube? Explain different types with figures and draft tube theory? **[6]**

b) What is Cavitation. Explain effects of cavitation. **[4]**

c) A turbine is to operate under 30m head at 250rpm. The discharge is $9m^3/s$. If the efficiency of the turbine is 85% Determine **[6]**

i) Power generated

ii) Specific Speed

iii) Type of turbine

Q11)a) Explain the concept of carbon credit? Give its significance. **[6]**

b) What are the factors governing the pricing of electricity. **[6]**

c) What are the fixed and running charges in economic analysis of a hydropower plant. **[4]**

OR

Q12)a) What are the provisions related to safety and electricity supply as per electricity act 2003? **[6]**

b) What are the duties of electricity generation companies? **[6]**

c) Explain types of tariffs for hydropower plants. **[4]**

Total No. of Questions : 10]

SEAT No. :

P2893

[Total No. of Pages : 2

[6004]-776
B.E. (Civil)
AIR POLLUTION AND CONTROL
(2015 Pattern) (Semester - II) (Eelctive - III) (401009 D)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q8, Q.9 or Q.10.***
2) ***Figures to the right indicates full marks.***
3) ***Draw neat figures wherever necessary.***

Q1) a) Explain the primary and secondary Meteorological parameters. **[6]**

b) Explain the purpose of ambient air sampling and stack gas sampling. **[4]**

OR

Q2) a) Explain the Ambient air quality monitoring as per the procedure laid down by CPCB. **[6]**

b) Explain with sketch various layers of atmosphere. **[4]**

Q3) a) Define air pollution and enlist various sources of air pollution. **[6]**

b) State various air pollutants and their sources. State the ill effect of air pollution. **[4]**

OR

Q4) a) What is Sick Building Syndrome of indoor air pollution? **[6]**

b) Explain with a neat sketch location of sampling ports and traverse points. **[4]**

Q5) a) What do you understand by wet gas scrubbing and where is it used? Name widely used scrubbers in industries. Explain in detail about any one type. **[10]**

b) With a neat sketch explain the principle, construction and working of Electrostatic Precipitator. **[6]**

OR

P.T.O.

Q6) a) Explain in brief Control of air pollution by **[10]**

i) Process modification

ii) Change of raw materils

b) With a neat sketch explain the principle, construction and working of a gravitational settling chamber. **[6]**

Q7) a) Explain economics of air pollution control with an example. **[10]**

b) Discuss principle of land use planning as a method of control of air pollution. **[6]**

OR

Q8) a) Explain in brief Cost-benefit analysis method for assessing air pollution control programs in urban environments. **[10]**

b) State the Emission standards for stationary sources. **[6]**

Q9) a) Explain Components of EIA with the help of flow chart. **[8]**

b) Explain methodology for preparing environmental impact assessment report. **[10]**

OR

Q10)a) Explain in details the Role of regulatory agencies and control boards in obtaining environmental clearance for project. **[9]**

b) Explain Environmental impacts of sugar industry. **[9]**

Total No. of Questions : 10]

SEAT No. :

P2894

[Total No. of Pages : 2

[6004]-778
B.E. (Civil)
AIRPORT AND BRIDGE ENGINEERING
(2015 Pattern) (Semester - II) (Elective - III) (401009 F)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q8, Q.9 or Q.10.***
2) ***Figures to the right indicates full marks.***
3) ***Draw neat figures wherever necessary.***
4) ***Assume necessary data.***
5) ***Use of scientific calculators is allowed.***

Q1) a) Give note on data to be collected for an Airport planning. **[5]**

b) Discuss the Landing Aids available to any aircraft. **[5]**

OR

Q2) a) Discuss the method of plotting wind rose diagram showing direction, duration and Intensity of wind to fix the orientation of runway in an Airport. **[6]**

b) Discuss the characteristics of Aircraft? **[4]**

Q3) a) Give note on roles and responsibilities of ICAO and FAA. **[6]**

b) Discuss the Normal Approach and Landing. **[4]**

OR

Q4) a) The length of the runway under the Standard condition is 1622 m. The airport site has an Elevation of 270 m. And the reference temperature of the airport is 32°C. It is decoded to construct the runway with can effective Gradient of 0.20%. Determine the Corrected length of the Runway. **[6]**

b) Discuss the location of terminal buildings. **[4]**

Q5) a) Discuss the benefits of heliport facility. **[6]**

b) Give note on Aiming Point Lights. **[4]**

c) Give note on the following -

i) Touchdown and Lift-off (TLOF) Lights. **[3]**

ii) Final Approach and Take-off (FATO) Lights. **[3]**

OR

P.T.O.

Q6) a) Discuss the necessary steps involved in development of heliport. **[5]**

b) Draw a suitable sketch and explain the Approach Lighting System of heliport. **[6]**

c) Draw a suitable sketch and discuss the Tie-down Configuration. **[5]**

Q7) a) Discuss the stages involved in bridge site investigation. **[6]**

b) Discuss the criteria for selection of the location of piers and abutment. **[5]**

c) Calculate linear waterway required for a bridge to be constructed across the river by using following data- **[5]**

i) Catchement Area = 610 hectares

ii) Maximum intensity of rainfall = 1 cm per hour

iii) Runoff Coefficient = 61%

iv) Permissibe velocity = 120 cm per second

v) Average depth of flow = 180 cm

OR

Q8) a) The catchment area of a stream is of sandy soil with ligth vegetation cover and the area of the catchment is 12000 hectare. The lenght of the catchment is 25 km and the fall in level from critial point to the bridge site is 182 m. Determine the peak runoff for designing the bridge. The rainfall in 4hours is recorded 18 cm. Area factor = 0.70 and coefficient to account for losses due to absorption = 0.21. **[6]**

b) What are the forces acting on abutment? **[4]**

c) Distinguish the followings- **[6]**

i) U-abutment and T-abutment

ii) Pile bent and trestle bent

Q9) a) Distinguish the followings- **[6]**

i) Arch culvert and box culvert

ii) Low level causeway and high level cause way

b) Discuss the advantages and disadvantages of the arch bridges. **[6]**

c) Define briefly the followings- **[6]**

i) Roller bearings

ii) Sliding bearing

OR

Q10)a) Give note on the functions of bearing in bridges. **[6]**

b) Discuss the causeway and describe its types. **[6]**

c) Why the cantilever bridges are more suitable for long spans and deep valleys? **[6]**

♦ ♦ ♦

Total No. of Questions : 10]

SEAT No. :

P-2895

[Total No. of Pages : 2

[6004]-779

B.E. (Civil)

Elective - IV : CONSTRUCTION MANAGEMENT

(2015 Pattern) (Semester - II) (401010 A)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Figures to the right indicate side full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain the role of Infrastructure development in employment generation. **[5]**

b) Explain WBS along with suitable example. **[5]**

OR

Q2) a) What are the objectives of work study **[5]**

b) Write short note on Interstate migrant act. **[5]**

Q3) a) Explain Workmen compensation Act 1923. **[5]**

b) Explain String diagram and activity charts. **[5]**

OR

Q4) a) Write short note on profit loss statement. **[5]**

b) Explain LOB technique. **[5]**

Q5) a) Write short note on energy cost escalation. **[8]**

b) Explain Value engineering along with suitable example. **[8]**

OR

Q6) a) Explain Sensitivity analysis and decision tree analysis. **[8]**

b) Explain the role of insurance in risk management. **[8]**

P.T.O.

Q7) a) Explain the role of material manager. **[8]**

b) Explain the Human resource development process. **[8]**

OR

Q8) a) Explain the concept of logistics and supply chain management. **[8]**

b) Write short note on Codification of material. **[8]**

Q9) a) Explain: Genetic algorithm? **[10]**

b) Explain Biological neural network and its application. **[8]**

OR

Q10) a) What are the applications of ANN. **[10]**

b) Explain fuzzy logic in detail. **[8]**

▽▽▽▽

Total No. of Questions : 10]

SEAT No. :

P2896

[Total No. of Pages : 3

[6004]-780
B.E. (Civil Engineering)
ADVANCED TRANSPORTATION ENGINEERING
(2015 Pattern) (Semester - II) (Elective - IV) (401010B)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.No.1 or Q.No.2, Q.No.3 or Q.No.4, Q.No.5 or Q.No.6, Q.No.7 or Q.No.8, Q.No.9 or Q.No10.***
2) ***Figures to the right indicate the full marks.***
3) ***Neat diagrams must be drawn wherever necessray.***
4) ***Assume suitable data, if necessary.***
5) ***Use of drawing instruments, electronic pocket calculators is allowed.***

Q1) a) Discuss the followings- **[6]**

i) Travel demand forecasting

ii) Trip generation

iii) Modal spilt analysis

b) What is the difference between Metro rail and Bullet train? **[4]**

OR

Q2) a) Discuss the following: **[6]**

i) Medium transit system

ii) Mass transit system

iii) Rapid transit system

b) Discuss in details about Comprehensive Mobility Plan (CMP)? **[4]**

Q3) a) Write note on Transportation planning process. **[6]**

b) Why consideration of road damage cost is important? **[4]**

OR

P.T.O.

Q4) a) Answer the followings in detail : **[6]**

i) What is Vehicle operations cost?

ii) What is value of travel time?

b) Give note on Bus Rapid Transit (BRT) **[4]**

Q5) a) What will be theoretical maximum capacity (to nearest 10 units) for a single lane of highways given that the speed of the traffic stream is 40 km/hr. **[6]**

b) What are the steps involved in the process of traffic study? **[4]**

c) With suitable sketches discuss the followings. **[6]**

i) Rotary Intersection

ii) Cloverleaf Interchange (Any one)

OR

Q6) a) Discuss the provisions made in bicycle and pedestrian facilities? **[6]**

b) Enlist the principles on which traffic studies should be conducted? **[4]**

c) Calculate the theoretical capacity (C) of a traffic lane with one-way traffic flow for the given data. **[6]**

i) Traffic flow at a stream speed = 41 kmph

ii) Average center to center spacing of vehicles = 12.8 mtrs

Q7) a) What are the factors to be considered for the design of flexible pavements? Discuss significance of each? **[6]**

b) What are the different maintenance strategy to be carried out for flexible pavements? **[4]**

c) Explain with suitable sketches types of distresses occurring in flexible pavements. **[6]**

OR

Q8) a) Systematically enlist the steps involved in the design of flexible pavements? (Assume suitable data if necessary) **[6]**

b) Draw a typical cross-section for flexible pavement. **[4]**

c) Explain the correction made for pavement temperature and correction for seasonal variation in subgrade moisture content. (as per Benkelman beam deflection study) **[6]**

Q9) a) Explain the serverity levels and extent level of distress in rigid pavements with the help of an example. **[6]**

b) Determine the stresses at interior, edge and corner regions of a cement concrete pavement using Westergaard's stress equations. Use the following data: **[6]**

Wheel load, P = 5300 kg

Modulus of elasticity of cement concrete, E = 3.0 × 105 kg/cm^2

Pavement thickness, h = 17 cm

Poisson's ratio of concrete. μ = 0. 15

Modulus of subgrade reaction, K = 6.0 kg/cm^2

Radius of contact area, a = 15cm

c) Compare with the limitations of Flexible Pavement and Rigid Pavement.**[6]**

OR

Q10)a) A cement concrete pavement of thickness 18 cm, has two lanes of 7.0 m with a joint. Design the tie bars by using following Data:

Thickness - h=18 cm, Allowable Tensile Stress - Ss - 1700 kg/cm^2,

Unit weight of Concrete - W - 2400 kg/cm^2, Allowable Bond Stress - Sb - 24.6 kg/cm^2, Coefficinet of Friction - f =1.6, width of Panel - b = 7.2/2 = 3.6 m. **[6]**

b) Discuss the failure criteria of rigid pavements? **[6]**

c) How the rigid pavements are more suitable than flexible pavements. Give an example. **[6]**

Total No. of Questions : 8]

SEAT No. : ____

P-2897

[Total No. of Pages : 2

[6004]-789

B.E. (Computer Engineering)

HIGH PERFORMANCE COMPUTING

(2015 Pattern) (Semester - I) (410241)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates :

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7or Q8.***
2) ***Neat diagrams must be drawn whenever necessary.***

Q1) a) Explain one-to-all Broadcast operation with suitable diagram. **[5]**

b) How to improve speed of communication operation? Explain in details. **[9]**

c) Explain scatter & gather operation. **[6]**

OR

Q2) a) Explain All-to-All broadcast operation on 8 node Ring with example & its cost analysis. **[9]**

b) Explain the circular shift operation on mesh & hyper cube network. **[8]**

c) Explain Mapping Technique. **[3]**

Q3) a) Explain the sources of overhead in parallel program. **[8]**

b) Explain the performance Metrics for parallel system. **[8]**

OR

Q4) a) Explain parallel Matrix-vector Multiplication Algorithm with example. **[8]**

b) Write a short note on minimum & cost optimal execution time. **[8]**

P.T.O.

Q5) a) Modify BFS for parallel Execution & analyze its complexity. **[8]**

b) What are the issues in sorting on parallel computers with example. **[8]**

OR

Q6) a) Explain Dijkastra algorithm in parallel formulation. **[8]**

b) Explain communication strategies for parallel DFS. **[8]**

Q7) a) Explain different kind of CUDA memory. **[5]**

b) List of APF for dealing with CUDA device memory. **[5]**

c) Draw & explain CUDA architecture in details. **[8]**

OR

Q8) a) Explain how the CUDA C program executes at kernel level with example. **[8]**

b) How synchronization manage in CUDA with example. **[5]**

c) Give 5 applications of CUDA. **[5]**

Total No. of Questions : 10]

SEAT No. :

P-2898

[Total No. of Pages : 3

[6004]-790

B.E. (Computer Engineering)

ARTIFICIAL INTELLIGENCE & ROBOTICS

(2015 Pattern) (Semester - I) (410242)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Draw neat diagram whenever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain A* algorithm with suitable example Does A* algorithm avoid cycle? **[5]**

b) Differentiate between artificial intelligence & robot. Give examples by explaining challenges & risks with AI. **[5]**

OR

Q2) a) Explain iterative deepening depth first search (IDDFS) & justify its parameters based on time complexity, space complexity. **[5]**

b) Solve the following problem using GPS method, “3 missionaries & 3 cannibals find themselves on one bank of the river. But the missionaries are not sure what else the cannibals have agreed to. So the missionaries want to manage the trip across the river in such a way that the number of missionaries on either bank of river is never less than the number of cannibals who are on the same bank. The only boat available holds only two people at a time”. How can everyone get across the river without the missionaries risking being eaten. **[5]**

P.T.O.

Q3) a) The problem solving search can proceed either forward or backward. What factors determine the choice of direction for a particular problem? **[5]**

b) Consider the facts: **[5]**

- The members of the Elm St. Bridge Club are Joe, Sally, Bill & Ellen
- Joe is married to Sally
- Bill is Ellen's brother
- The spouse of every married person in the club is also in the club
- The last meeting of the club was at Joe's house

Represent these facts in predicate logic.

OR

Q4) a) Describe PEAS for WUMPUS world problem. **[5]**

b) Discuss the history of Expert System. Discuss the role of knowledge in Expert Systems. **[5]**

Q5) a) Explain all stages in natural language processing with examples. **[8]**

b) With the help of Set theory & mathematical modeling on $y = f(x)$ explain the following : **[8]**

- Supervised learning with example
- Non–supervised learning with example
- Re–enforcement learning with example

Explain using necessary mathematics Boltzmann Machine

OR

Q6) a) Explain the following statement by conceptual dependency CD: **[8]**

- I gave sanitizer to Ram
- I heard a lion in woods
- While going home I saw a horse

b) What is ANN? Explain feed forward & feedback ANN. **[8]**

Q7) a) Define the robotics & its applications. What are the hardware requirements in mobile robot? **[8]**

b) Explain path planning & map representation in mobile robot. **[8]**

OR

Q8) a) Explain Sensing & mapping for Point Robot. **[8]**

b) With the help of Drone Bots explain four robot pose maintenance & localization methods. **[8]**

Q9) a) Explain in details laser Rangefinders & Biological Sensing. **[9]**

b) Comment on the fundamental problems in Robotics. How robotics can be used to design intelligent vehicles & autonomous aircraft. **[9]**

OR

Q10) a) Explain use of robots in agriculture & forestry. **[9]**

b) What is mobile robot localization? Why it is important? How the landmark is measured in robot localization? **[9]**

▽▽▽▽

Total No. of Questions : 10]

SEAT No. :

P-2899

[Total No. Of Pages : 2

[6004]-791
B.E. (Computer Engineering)
DATA ANALYTICS
(2015 Pattern) (Semester-I) (410243)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right side indicate full marks.***
3) ***Use of calculator is allowed.***
4) ***Assume suitable data if necessary.***

Q1) a) Explain the major characteristics of Big Data. **[5]**

b) What is the hypothesis? Explain with a suitable example the term hypothesis testing? **[5]**

OR

Q2) a) Explain each phase in the data analytics life cycle? **[5]**

b) What is an analytic sandbox and why is it important? **[5]**

Q3) a) Explain Student's t-test method with an example. In which condition will you select Student's t-test? **[5]**

b) What are the problems with the Apriori algorithm? How do we improve the efficiency of the Apriori algorithm? **[5]**

OR

Q4) a) What is ANOVA stands for? Explain the term ANOVA with a suitable example? **[5]**

b) Explain support, confidence, Lift and Leverage and explain their importance in the association rule? **[5]**

P. T. O

Q5) a) Explain the Decision tree algorithm with an example? **[7]**

b) What is data smoothing? Explain the steps involved in the data smoothing process? **[8]**

OR

Q6) a) What is Gini Index? Explain in brief the CART algorithm? **[7]**

b) Write the mathematical equation for the Bayes theorem and explain it with a suitable example? **[8]**

Q7) a) What is meant by machine learning? Explain supervised- unsupervised learning algorithms. **[7]**

b) Explain in brief, different conventional data visualization tools? **[8]**

OR

Q8) a) What are the major applications of the association rule algorithm? Explain the reason for applying the association rule to the mentioned applications? **[7]**

b) Explain in brief, different conventional data visualization tools? What is data visualization? Explain the five main products of Tableau **[8]**

Q9) a) Explain the major features of HBase? Discuss the applications where HBase was used? **[5]**

b) Explain Apache Hadoop & HDFS with a neat diagram. **[7]**

c) Expalin how Apache Pig can be used to analyze large sets of data? **[8]**

OR

Q10)a) Differentiate between SQL & NoSQL **[5]**

b) Explain the Storage Mechanism in HBase **[7]**

c) Expalin the component diagram which depicts the architecture of Hive?**[8]**

Total No. of Questions : 8] **SEAT No. :**

P2900 **[Total No. of Pages : 3**

[6004]-795
B.E. (Computer Engineering)
DATA MINING & WAREHOUSING
(2015 Pattern) (Semester - I) (Elective - I) (410244 D)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicates full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) For the given attribute SALARY values (in thousands of dollars): 30, 36, 47, 50, 52, 52, 56, 60, 63, 70, 70, 110. Apply following central tendency measures for data preprocessing. **[6]**

i) Mean

ii) Median

iii) Mode

b) What is Star schema? Apply the star schema data model on Sales Department. Assume that Sales are considered along four dimensions: time, item, branch, and location. **[6]**

c) Suppose that a patient record table contains the attributes name, gender, fever, cough, test-1, test-2, test-3 and test-4, where name is an object identifier, gender is a symmetric attribute, and the remaining attributes are asymmetric binary. Calculate the Jaccard coefficient between. **[8]**

i) Jack and Jim

ii) Jack and Mary

iii) Jim and Mary

Name	gender	fever	cough	test-1	test-2	test-3	test-4
Jack	M(1)	Y(1)	N(0)	P(1)	N(0)	N(0)	N(0)
Jim	M(1)	Y(1)	Y(1)	N(0)	N(0)	N(0)	N(0)
Mary	F(0)	Y(1)	N(0)	P(1)	N(0)	P(1)	N(0)

OR

P.T.O.

Q2) a) What is Chi-square test? How it is used to find correlation analysis. Explain with one example. **[6]**

b) Describe a three-tier data warehousing architecture. **[6]**

c) Define Data Matrix and Dissimilarity Matrix. How do you calculate the dissimilarity between nominal attributes? Explain with one example. **[8]**

Q3) a) Describe Market Basket Analysis example for frequent itemset mining. **[4]**

b) Explain Apriori algorithm. How do you find frequent itemsets on Transactional Data. Explain with one example. **[6]**

c) Explain the working of FP-growth algorithm with suitable example. **[8]**

OR

Q4) a) Explain following measures used in association Rule mining **[4]**

i) Minimum Support

ii) Minimum Confidence

iii) Support

iv) Confidence

b) Explain with example Multi level and Constraint based association Rule mining. **[6]**

c) Consider the Market basket transactions shown below. Assuming the minimum support = 50% and Minimum confidence = 80% **[8]**

i) Find all frequent item sets using Apriori algorithm

ii) Find all association rules using Apriori algorithm

Transaction_id	Items_bought
T1	{Mango, Apple, Banana, Dates}
T2	{Apple, Dates, Coconut, Banana, Fig}
T3	{Apple, Coconut, Banana, Fig}
T4	{Apple, Banana, Dates}

Q5) a) What is classification? Explain decision tree algorithm with suitable application. **[6]**

b) Explain K-nearest neighbor classifier algorithm with suitable application. **[6]**

c) Differentiate between classification and regression with example. **[4]**

OR

Q6) a) Explain Rule-Based classification. How to calculate Rule accuracy and coverage? **[6]**

b) Write Basic sequential covering algorithm. How are rules learned? **[6]**

c) Write a note on Case-Based Reasoning. **[4]**

Q7) a) Differentiate between binary classification and multiclass classification with suitable examples. **[6]**

b) A confusion matrix for medical data where the class values are yes and no for a class label attribute, cancer is given below: **[6]**

Classes	Yes	No	Total
Yes	90	210	300
No	140	9560	9700
Total	230	9770	10000

Calculate accuracy, error_rate, sensitivity and specificity.

c) Write a note on Wholistic learning and multi-perspective learning. **[4]**

OR

Q8) a) Explain following cross validation methods with suitable examples **[6]**

i) Hold-out method

ii) Random sub sampling

b) Define the following terms with respect to confusion matrix **[6]**

i) Accuracy

ii) TP rate

iii) FP rate

iv) Precision

v) Recall

vi) F1 score

c) Write a note on Semi-Supervised Classification. **[4]**

Total No. of Questions : 12]

SEAT No. :

P2901

[Total No. of Pages : 2

[6004]-797
B.E. (Computer Engineering)
SOFTWARE TESTING AND QUALITY ASSURANCE
(2015 Pattern) (Semester - I) (Elective - II) (410245 B)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Assume suitable data, if necessary. Mention your assumptions.***
2) ***Right indicates the full marks and Bifurcation for sub questions.***
3) ***Draw suitable diagrams and tables if necessary.***

Q1) a) Explain the term "Why Software has Defects?"
b) What is error, fault & failure?

[3+3=6]

OR

Q2) a) What is impact of defect in different phases of software development?
b) What is bug tracking, bug fixing & bug verification in software testing.

[3+3=6]

Q3) a) What are the challenges faced by testers.
b) Write short note on Requirement Traceability Matrix.

[3+4=7]

Q4) a) Which skills are expected in a good tester.
b) Write short note on Mutation Testing.

[3+4=7]

Q5) a) Explain features of JUnit.
b) Discuss the different challenges in test automation.

[3+4=7]

OR

Q6) a) Differentiate between automation testing and Manual testing.
b) What is test automation? How test automation can help in addressing several problems in manual testing.

[3+4=7]

P.T.O.

Q7) a) What is Selenium? What are different features of Selenium IDE?
b) List automation tools for software testing. Describe QTP in detail.
c) What are selenium test design considerations?

[6+5+5=16]

OR

Q8) a) State & explain the components of Selenium tool.
b) Write short note on Selenium Grid.
c) Differentiate between Selenium WebDriver and Selenium RC.

[6+5+5=16]

Q9) a) What does SQA ensure? What are the goals of SQA?
b) State & explain Principles of Quality management.
c) What is ISO standard? What are its advantages?

[6+6+5=17]

OR

Q10)a) What is Six Sigma? Explain the terms DMAIC & DMADV.
b) Define Software Quality & Software Quality Assurance. List the various objectives of SQA.
c) How cost and risk factors are affecting software quality.

[6+6+5=17]

Q11)a) Enumerate Ishikawa's seven basic quality tools. Explain any two in detail.
b) Describe key elements of Total Quality Management.
c) Explain with example Product Quality Metric.

[6+6+5=17]

OR

Q12)a) Write short note on Total Quality Management (TQM).
b) Explain following terms (any two)
Pareto Chart
Scatter Diagrms
Cause and effect diagrams
c) Describe in detail Defect Removal Effectiveness

[6+6+5=17]

Total No. of Questions : 8]

SEAT No. :

P-2902

[Total No. of Pages : 3

[6004]-800

B.E. (Computer Engineering)

MACHINE LEARNING

(2015 Pattern) (Semester - II) (410250)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Discuss the process of **[6]**

i) Creating training and test sets

ii) Managing categorical data

How is scikit- learn library used to manage categorical data?

b) With the reference to machine learning explain the concept of adaptive machine. What is the difference between classic and adaptive machines? **[6]**

c) Explain principal component analysis. Support your answer with suitable example. **[8]**

OR

Q2) a) Discuss the role of Machine Learning in the following applications: **[6]**

i) Virtual Personal Assistants

ii) Predictions while Commuting

b) Differentiate with an example label encoder and one hot encoder for managing categorical data. **[6]**

c) Explain Logistic regression with suitable example. What is the difference between Logistic regression and Linear regression? **[8]**

P.T.O.

Q3) a) What is *Naive Bayes* classifier? What are the different types of *Naive Bayes* classifier? **[4]**

b) Describe support vector machine and its implementation in scikit-learn.**[6]**

c) Explain Decision tree classification with suitable example? How it is useful for feature extraction. Elaborate. **[8]**

OR

Q4) a) Explain stochastic gradient descent technique with suitable example. **[4]**

b) Write a short note on the following : **[6]**

i) Controlled Support Vector Machines

ii) Support Vector Regression.

c) What are the different ways for measuring classification performance? Explain AUC-ROC curve in detail. **[8]**

Q5) a) What is the difference between DBSCAN and K-Means algorithm? **[8]**

b) Write short note on the following : **[8]**

i) Bagging and boosting techniques in Machine Learning.

ii) AdaBoost and Gradient Tree Boosting.

OR

Q6) a) With the reference to clustering, explain the issue of "optimization of clusters". Explain evaluation method for clustering algorithms. **[8]**

b) List Applications, Advantages and Disadvantages of Random Forest.**[8]**

Q7) a) Classify the filter techniques in recommender system. Explain content-based filtering technique with suitable example. **[8]**

b) Describe building blocks of a Deep Learning Neural Network. Explain working of Deep Learning. **[8]**

OR

Q8) a) Write short notes on : **[8]**

i) Content based Systems.

ii) Naïve User based systems.

b) Explain Hierarchical clustering? Elaborate on advantages of using hierarchical clustering over K-means clustering? **[8]**

Total No. of Questions : 10]

SEAT No. :

P2903

[Total No. of Pages : 2

[6004]-801
B.E. (Computer Engineering)
INFORMATION AND CYBER SECURITY
(2015 Pattern) (Semester - II) (410251)

Time :2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.No. 1 or Q. No. 2, Q.No. 3 or Q.No. 4, Q.No. 5 or Q.No. 6, Q.No.7 or Q.No.8, Q.No.9 or Q.No.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain operational model of Security with neat diagram. **[5]**

b) Use transposition cipher to encrypt message "WE ARE THE BE" use key "HEAVEN". **[5]**

OR

Q2) a) Using Hill cipher encrypt plain text "COE" Key is "ANOTHERBZ". **[5]**

b) Compare between symmetric key encryption and asymmetric key encryption. **[5]**

Q3) a) Discuss Diffie-Hellman Key exchange algorithm with the help of suitable example. **[5]**

b) Explain operation of DES algorithm in detail. **[5]**

OR

Q4) a) What is authentication? Explain various methods of authentication. **[5]**

b) What is block cipher? Explain counter mode of block cipher. **[5]**

Q5) a) Discuss the working of IPSec. What are the benefits of IPsec? **[7]**

b) What is VPN? Explain types of VPN. **[7]**

c) Write short note on E-mail Security. **[4]**

OR

P.T.O.

Q6) a) Explain working of PGP in detail. What is backdoors and Key Escrow in PGP? **[7]**

b) Explain Secure Electronic Transaction in detail. **[7]**

c) Differentiate between IP-V4 and IP V6. **[4]**

Q7) a) What are the various types of firewall? Discuss packet filtering firewall. **[6]**

b) Explain any two password management practices. **[6]**

c) Explain need and challenges of intrusion detection systems. **[4]**

OR

Q8) a) What is intrusion detection system? Enlist and explain different types of IDS. **[6]**

b) Explain access control security services. **[6]**

c) Explain characteristics of Firewall. **[4]**

Q9) a) Explain personally identifiable information PII. Describe PII impact levels with examples. **[8]**

b) What is cyber stalking? How to identify and detect cyber stalking. **[8]**

OR

Q10)a) What is Cyber crime? Explain with suitable example. Discuss various types of cyber crime. **[8]**

b) Discuss PII confidentiality safeguards **[8]**

Total No. of Questions : 8]

SEAT No. :

P2904

[Total No. of Pages : 2

[6004]-803
B.E. (Computer Engineering)
COMPILERS
(2015 Pattern) (Semester - II) (Elective - III) (410252 (B))

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicates full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Define Pattern, Token and lexeme along with an example. **[6]**

b) Explain the process of elimination of left recursion along with an example. **[6]**

c) What is mean by attributed grammar? Explain S-attribute and L-attribute grammar along with suitable example. **[8]**

OR

Q2) a) What is mean by BACK End of Compiler? Explain any two phases in it. **[6]**

b) Explain the working of Non Recursive Predictive parser in detail. **[6]**

c) Write and explain the syntax translation scheme for generating three address codes for assignment statement. **[8]**

Q3) a) List the parameter passing methods? Explain any two in detail. **[8]**

b) What is mean by Scope of a variable? Explain static and dynamic scope along with suitable example. **[8]**

OR

Q4) a) What is mean by activation record? Explain Saved Machine Status, Temporaries and local data along with suitable example. **[8]**

b) Write and explain syntax translation scheme for WHILE & DO WHILE Statement. **[8]**

P.T.O.

Q5) a) What is the need of labelling algorithm? What that label indicates? Draw the labelling tree for following example. (A + B) * (C+ D). **[8]**

b) Explain the role of DAG in Code Generation. Also Draw a DAG for following expression C = (A+B) + (C*D) + (A+ B). **[8]**

OR

Q6) a) What is mean by Register and Address descriptors? How they managed **[8]**

b) Describe Basic Block and Flow Graph along with an example. **[8]**

Q7) a) What are loop transformations? What are its types? **[6]**

b) Write a Short Note on Data Flow Analysis. **[6]**

c) Write short note: Peephole Optimization. **[6]**

OR

Q8) a) Describe Available Expressions, Reaching Definitions. **[6]**

b) Explain Reduction in strength and Code Motion along with suitable example. **[6]**

c) Differentiate Machine Depended Optimization and Independent Optimization. **[6]**

♦ ♦ ♦

Total No. of Questions : 8]

SEAT No. :

P2905

[Total No. of Pages : 2

[6004]-804
B.E. (Computer Engineering)
EMBEDDED AND REAL TIME OPERATING SYSTEMS
(2015 Pattern) (Semester - II) (Elective - III) (410252 (C))

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve questions Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicates full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain block diagram of Embedded Systems. **[6]**

b) Explain in detail ARM Processor Architecture with core architectural block diagram. **[6]**

c) Write short note on ISA and PCI. **[8]**

OR

Q2) a) Explain Hardware Components of an Embedded System. **[6]**

b) How does ARM micro-controller differ from SHARC processor? Justify your answer. **[6]**

c) Describe and Compare RS232C and SDIO Devices. **[8]**

Q3) a) How to represent precedence constraint and data dependency among real time tasks? Explain with diagram. **[8]**

b) What is RTOS? Explain hard versus soft real time systems and their timing constraints. **[8]**

OR

Q4) a) Explain least slack time first scheduling and latest release time scheduling in real time systems. **[8]**

b) Differentiate between fixed priority and dynamic priority scheduling algorithms in real time systems. Give one example of each. **[8]**

P.T.O.

Q5) a) What is priority inversion problem in real time systems? How this problem can be solved? Give details. **[8]**

b) Explain message queues with suitable diagram. **[8]**

OR

Q6) a) What is Semaphore? How does it help in resource sharing in RTOS kernel? **[8]**

b) Explain with example interrupts enabling and disabling in embedded system. **[8]**

Q7) a) Explain with example Validation and Debugging in an embedded system. **[6]**

b) What are issue in resource reservation? Explain resource reservation protocol with diagram. **[6]**

c) Write short notes on MicroC/OS-II, Windows CE? **[6]**

OR

Q8) a) Explain priority based service disciplines for switched networks. **[6]**

b) Explain Medium access control (MAC) protocol for broadcast networks. **[6]**

c) Write Short Notes on RT Linux, VxWorks? **[6]**

Total No. of Questions : 8]

SEAT No. :

P2906

[Total No. of Pages : 2

[6004]-805
B.E. (Computer Engineering)
SOFT COMPUTING AND OPTIMIZATION ALGORITHMS
(2015 Pattern) (Semester - II) (Elective - III) (410252 D)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q8.***
2) ***Net diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data. if necessary.***

Q1) a) What is the role of activation function? Explain various activation functions used in neural networks. **[8]**

b) Define the following for membership fuctions: **[8]**

i) Core

ii) Support

iii) Boundary

iv) Fuzzy singleton

c) What is meant by linguistic hedges? What are characteristics of a linguistic variable? **[4]**

OR

Q2) a) What is hard computing and soft computing? Differentiate them with respect to various problem solving technologies. **[8]**

b) Explain supervised learning, unsupervised, semisupervised learning and reinforecement learning with suitable example. **[8]**

c) Consider two fuzzy sets: **[4]**

A = {{1, 2.0}, {0.65, 4.0}, {0.5, 6.0}, {0.35, 8.0}, {0, 10.0}}

B = {{0, 2.0}, {0.35, 4.0}, {0.5, 6.0}, {0.65, 8.0}, {1, 10.0}}

Find

i) $A \cup B$

ii) $A \cap B$

iii) $\sim (A \cup B)$

iv) $\sim (A \cap B)$

P.T.O.

Q3) a) Expalin in brief function maximization and symbolic regression in evolutionary computing. **[8]**

b) What are the components of evolutionary algorithms? What is the role of fitness function and population in evolutionary algorithms? **[8]**

OR

Q4) a) What is Darwinian Evolution. Write advantages and disadvantages of evolutionary computing. **[8]**

b) Describe Evolutionary programming and evolutionary strategies in detail. **[8]**

Q5) a) Write short notes on Roulette wheel Selection, Random selection, Tournament Selection, Boltzman Selection? **[9]**

b) Discuss different encoding techniques used for Genetic Algorithms? **[9]**

OR

Q6) a) Describe the behaviour of genetic algorithms using schema theorem in terms of optimal allocation of trials and implicit parallelism. **[9]**

b) Explain global parallelization and different types of Parallel genetic algorithms. **[9]**

Q7) a) Explain characteristics of Ant Colony Optimization. **[8]**

b) Explain similarites and differences between Real Ants and aritificial Ants. **[8]**

OR

Q8) a) Explain basic flow of Particle Swarm Optimization. Compare PSO and Genetic Algorithms. **[8]**

b) Write a short note applications of **[8]**

i) Particle swarm optimization

ii) Ant Colony Optimization

Total No. of Questions : 8]

SEAT No. :

P2907

[Total No. of Pages : 2

[6004]-807
B.E. (Computer Engineering)
HUMAN COMPUTER INTERFACE
(2015 Pattern) (Semester - II) (Elective - IV) (410253 B)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.No.1 or Q.No.2, Q.No.3 or Q.No.4, Q.No.5 or Q.No.6, Q.No.7 or Q.No.8.***
2) ***Figures to right indicate the marks to the question.***
3) ***Assume suitable data, whenever necessary.***

Q1) a) What is HCI? What is role of Psychology, Ergonomics, and Understanding in HCI? **[6]**

b) Discuss about software life cycle in HCI? **[8]**

c) What is GOMS model? Explain stage-wise use of GOMS is HCI Patterns. **[6]**

OR

Q2) a) What is the role of Java and AWT in designing and developing HCI Application? **[6]**

b) What are the basic human and computer abilities required for HCI? Explain any three of each in detail. **[8]**

c) Which are the various Technologies and Designing Techniques used for the Web Applications along with HCI? **[6]**

Q3) a) Discuss about Evaluation through user participation in details. **[6]**

b) Write down various Issues arises in Design, Evaluation and Implementation of Mobile Devices. **[6]**

c) Explain Web Browsers by Considering following Terms: **[6]**

i) Fonts
ii) Color Pallet
iii) Color Depth
iv) Resolution
v) Layout
vi) Size

OR

P.T.O.

Q4) a) Explain mobile devices applied in HCI using following terms: (any Two) **[6]**

i) Design

ii) Limitations

iii) future enhancements

b) Which are the different approaches to user modeling in knowledge representation in adaptive help sytem of user support. **[6]**

c) What are the goals of evaluation process? Elaborate Evaluation through Expert analysis and Evaluation through User Participation. **[6]**

Q5) a) What are the differences and Similarities between Predictive Models and Cognitive Models? **[8]**

b) Discuss about CUSTOM and OSTA in context with social-technical models in capturing requirements in an organization. **[8]**

OR

Q6) a) Discuss about Cognitive model in detail. **[8]**

b) What is the role of Evaluation applied for cognitive Models along with Users. **[8]**

Q7) a) What do you mean by Task Analysis? Which are three different approaches to task analysis? Explain each with suitable example. **[8]**

b) What is importance of Design of Every Day Thigns (DOET) in HCI? **[8]**

OR

Q8) a) What is role of the Hieratclical Model representation in designing task and structure? Explain in detail. **[8]**

b) Write short note on any two following Testing: **[8]**

i) User Testing

ii) Usability Testing

iii) User Acceptance Testing

Total No. of Questions : 8]

SEAT No. :

P2908

[Total No. of Pages : 2

[6004]-808
B.E. (Computer)
CLOUD COMPUTING
(2015 Pattern) (Semester - II) (Elective - IV) (Theory) (410253 C)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q.No.1 or Q.No.2, Q.No.3 or Q.No.4, Q.No.5 or Q.No.6, Q.No.7 or Q.No.8.***
2) ***Assume suitable data, wherever necessary.***

Q1) a) Describe cloud deployment models. **[5]**

b) Describe platform as a service (Paas), who are the subscribers for Paas environments. **[5]**

c) Describe data organization in Big Table. **[5]**

d) List advantages and disadvantages to hosting applications and data within cloud. **[5]**

OR

Q2) a) Describe five essential characteristics of cloud computing. **[5]**

b) Compare and contrast public, private, community, hybrid clouds. **[5]**

c) Describe components of HDFS. **[5]**

d) What are the roles performed by hypervisor. **[5]**

Q3) a) What is amazon EC2? Explain EC2 instances. **[9]**

b) Explain amazon elastic block storage services. **[8]**

OR

Q4) a) Describe the following in brief **[9]**

i) Amazon S3 bucket

ii) EBS volumes

b) Explain amazon elastic load balancing service. **[8]**

P.T.O.

Q5) a) Describe in brief enabling technologies for internet of things. **[8]**

b) Describe the use of internet of things for cyber physical system. **[9]**

OR

Q6) a) Describe cloud computing trends in supporting ubiquitous computing. **[8]**

b) Describe the use of internet of things in smart power grid. **[9]**

Q7) a) Describe the following in brief. **[8]**

i) Mobile cloud

ii) Autonomic cloud engine

b) Write note on Docker **[8]**

OR

Q8) a) Describe energy aware cloud computing. **[8]**

b) What is docker? Explain its architecture. **[8]**

Total No. of Questions : 10]

SEAT No. :

P-2909

[Total No. of Pages : 3

[6004]-812

B.E. (Electrical Engineering)

POWER SYSTEM OPERATION & CONTROL

(2015 Pattern) (Semester - I) (403141)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of electronic pocket calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Define critical clearing angle and critical clearing time and explain the effect of clearing time on stability of power system. **[4]**

b) Explain the working of TCSC with its characteristics **[6]**

OR

Q2) a) Describe sub synchronous resonance. Explain its causes and effects. **[4]**

b) Discuss the methods of improving the steady state and transient stability. **[6]**

Q3) a) Explain the working of synchronous condenser as a reactive power compensator. **[4]**

b) Derive the swing equation of synchronous machine. **[6]**

OR

Q4) a) Explain the problems associated with series compensation. **[4]**

b) Discuss various ways of providing shunt compensation. **[6]**

P.T.O.

Q5) a) Explain automatic generation control, its necessity. What is free governor mode operation and why is this mode preferred. **[8]**

b) Sketch and explain the steady state response of frequency as a function of load for load frequency control of single area case. **[10]**

OR

Q6) a) Develop schematic diagram and explain speed governor system of turbo generator. **[8]**

b) Obtain the generator model, turbine model and power system model of load frequency control single area case. Draw the complete block diagram of proportional plus integral load frequency control of single area case. **[10]**

Q7) a) Discuss the use of Lagrange multiplier technique to solve economic load dispatch problem without including transmission loss and with no generator limits. **[8]**

b) Discuss procedure of load dispatch at state load dispatch centre and regional load dispatch centre. **[8]**

OR

Q8) a) Explain the dynamic programming method used for unit commitment. **[8]**

b) With illustration explain the priority list method. **[8]**

Q9) a) What are the criteria of applying capacity interchange, diversity interchange, inadvertent interchange between interconnected utilities. **[8]**

b) Discuss the Reliability evaluation of Generation system with **[8]**

i) Generation model

ii) Load Model used and

iii) The Risk Model

OR

Q10) a) Explain the following : **[8]**

i) Energy banking.

ii) Emergency power interchange.

b) Describe the following reliability Indices. **[8]**

i) Loss of load probability (LOLP)

ii) Expected Energy Not Supplied (EENS)

Total No. of Questions : 8]

SEAT No. : ____

P2910

[Total No. of Pages : 2

[6004]-813

B.E. (Electrical Engineering)

PLC AND SCADA APPLICATIONS

(2015 Pattern) (Semester - I) (403142)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Assume suitable data, if necessary.***

Q1) a) Draw & explain overall PLC system. **[7]**

b) Explain input analog devices. **[7]**

c) Explain retentive timer in detail. **[8]**

OR

Q2) a) Write a short note on necessity of PLC. **[7]**

b) Explain level measurement by using level sensor. **[7]**

c) Draw a Ladder diagram for the annunciation for the flasher lights ciruits two lights flashed after every 5 seconds in alternate manner. **[8]**

Q3) a) Explain the effect of change of integral gain K_i & derivative gain K_d of PID controller on response of system. **[8]**

b) How liquid level of the tank is measured by using float type switches, explain in detail. **[8]**

OR

Q4) a) Explain AC motor overload protection. **[8]**

b) Explain speed control of DC motor using PLC. **[8]**

P.T.O.

Q5) a) Draw and explain SCADA architecture in details. **[8]**

b) State advantages & disadvantages of SCADA system. **[8]**

OR

Q6) a) Explain application of SCADA system in Petroleum Refining Process. **[8]**

b) State the desirable properties of SCADA systeem. **[8]**

Q7) a) Draw & explain OSI model. **[8]**

b) Write a short note on TCP/IP protocol. **[8]**

OR

Q8) a) Explain IEC61850 architecture. **[8]**

b) Write a short note on Flexible Function Block process (FFB). **[8]**

Total No. of Questions : 8]

SEAT No. :

P2911

[Total No. of Pages : 2

[6004]-814

B. E. (Electrical)
CONTROL SYSTEM - II
(2015 Pattern) (Semester - I) (403145)

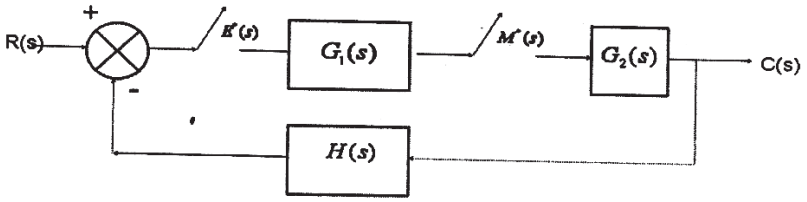
Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.*
2) *Figures to right indicate full marks.*

Q1) a) Explain first data Hold and Show that transfer function of zero order Hold is $G_h o(S) = \frac{1 - e^{-TS}}{s}$. **[6]**

b) Obtain Pulse transfer of closed loop system shown in figure C(z)/R(z). **[7]**



c) Determine stability of system using Jury's Test whose characteristic polynomial is $2z^4 + 8z^3 + 12z^2 + 5z + 1 = 0$ **[7]**

OR

Q2) a) Explain in detail basic building blocks of discrete time control system. **[7]**

b) Determine inverse Z transform of the following function using partial fraction

$$F(z) = \frac{1}{1 - 1.5z^{-1} + 0.5z^2}.$$ **[7]**

c) Show how a mapping of left half of the S-plane is done into the Z-plane. **[6]**

Q3) a) $\frac{Y(s)}{U(s)} = \frac{s+1}{s^2 + 1.3s + 0.4}$ Given system represent in **[8]**

i) Controllable canonical form
ii) Observable canonical form

b) Define the terms : **[8]**

i) State
ii) State variables
iii) State vector
iv) State space

OR

P.T.O.

Q4) a) Derive the state model of armature control DC motor with block diagram. **[8]**

b) Evaluate the transfer function $\frac{Y(s)}{U(s)}$ from the state variable model of a discrete time system with usual notation $X = \begin{pmatrix} 0.8 & 1 \\ 0 & 0.5 \end{pmatrix} x + \begin{pmatrix} 1 \\ 0.5 \end{pmatrix} u$. **[8]**

$Y = [10]x$

Q5) a) Obtain the solution for homogeneous state equation & state properties of STM. **[8]**

b) For a given system $A = \begin{pmatrix} -3 & 1 \\ 0 & -1 \end{pmatrix}, x(0) = [10]^T$. Obtain STM & find its solution. **[8]**

OR

Q6) a) Diagonalized the plant matrix using similarity Transform method $A = \begin{pmatrix} 2 & 1 & 4 \\ 0 & 2 & 0 \\ 0 & 3 & 1 \end{pmatrix}$ **[10]**

b) Explain Vander monde's matrix & its application. **[6]**

Q7) a) What is principle of duality? Explain the effect of pole-zero cancellation on controllability & Observability. **[8]**

b) Consider system defined by $x(t) = \begin{pmatrix} 0 & 1 \\ -0.16 & -1 \end{pmatrix} x + \begin{pmatrix} 0 \\ 1 \end{pmatrix} u$.

Determine the suitable state feedback gain matrix K such that system will have the close loop poles at S1 = 0.5 + j0.5, S2 = 0.5–j0.5. **[10]**

OR

Q8) a) A system is described by $x(t) = \begin{pmatrix} 0 & 1 \\ -12 & -7 \end{pmatrix} x + \begin{pmatrix} 1 \\ 1 \end{pmatrix} u$. **[8]**

$y(t) = [1 \; -1]x$, verify its duality theorem.

b) For a given system $A = \begin{pmatrix} 0 & 15 \\ 1 & 0 \end{pmatrix} B = \begin{pmatrix} 0 \\ 1 \end{pmatrix} C = (0 \; 2)$.

Determine observer gain matrix Ke such that S_1, $S_2 = -2 \pm j3$ are eigen values of observer gain matrix. **[10]**

Total No. of Questions : 10]

SEAT No. : ____

P2912

[Total No. of Pages : 2

[6004]-816
B.E. (Electrical)
POWER QUALITY
(2015 Pattern) (Semester - I) (Elective - I) (403143 B)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q8, Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicates full marks.***
4) ***Use of Calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Write various sources of voltage sag and explain any one in details. **[5]**

b) Describe how power quality is affected due to grounding problems. **[5]**

OR

Q2) a) Define power quality terms. **[5]**

i) Transients

ii) Harmonic

b) List various sources of transient over voltages and explain any one in detail. **[5]**

Q3) a) State voltage sag mitigation techniques and expalin any one in detail. **[5]**

b) Explain phenomenon of Flicker and list its sources. **[5]**

OR

Q4) a) Explain various grounding practices as per IEEE standards. **[5]**

b) Draw and explain area of vulnerability. **[5]**

Q5) a) Explain Effects of Harmonics on various power system equipment. **[8]**

b) Explain following terms. **[8]**

i) Waveform distortion

ii) Triplen harmonics

iii) Interharmonics

iv) Harmonic phase sequence

OR

P.T.O.

Q6) a) Explain Harmonic indices in detail. **[8]**

b) Discuss in details various sources of harmonics. **[8]**

Q7) a) Explain point of common coupling and its use in harmonic study. **[8]**

b) Explain passive filter design procedure for harmonics reduction. **[8]**

OR

Q8) a) Explain various principles of controlling harmonic distortion. **[8]**

b) Explain in detail Harmonic distortion study procedure. **[8]**

Q9) a) State equipments used for power quality monitoring and explain any three equipments in details. **[10]**

b) Explain instrument setup and various guidelines to be followed in power quality monitoring. **[8]**

OR

Q10)Write short notes on the following **[18]**

a) Flicker meter

b) True RMS meters

c) Harmonic Analysers

Total No. of Questions : 8]

SEAT No. :

P2913

[Total No. of Pages : 2

[6004]-819
B.E. (Electrical Engineering)
RESTRUCTURING AND DEREGULATION
(2015 Pattern) (Semester - I) (Elective - II) (403144A)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.No.1 or Q.No.2, Q.No.3 or Q.No.4, Q.No.5 or Q.No.6, Q.No.7 or Q.No.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Why the reformation has taken place in Electrical Power System? **[6]**

b) Explain how socio economic aspects are considered in power sector regulation. **[6]**

c) Elaborate the key indices for assessment of performance of distribution utility. **[8]**

OR

Q2) a) Write down the functions of CERC and SERC in Indian power sector. **[8]**

b) Explain the key features of National Energy policy. **[6]**

c) Explain the regulator process in India. **[6]**

Q3) a) How trading of carbon credits is carried out in energy markets. **[8]**

b) Briefly explain DAM and TAM. **[10]**

Q4) a) With a neat sketch explain following structural models. **[10]**

i) Wholesale Competition

ii) Retail Competition

b) How do the pool and multilateral models based on contractual arrangement work? What are their key features. **[8]**

P.T.O.

Q5) a) Write short note on: **[8]**

i) Reserve market

ii) Ancillary service market

b) What do you understand by Market Clearing Price (MCP) What are the factors affecting MCP. **[8]**

OR

Q6) a) Distinguish between spot market and forward market with examples. **[8]**

b) What are the peculiarities of electricity as a commodity? How does it differ than any other commodity List down the rules that govern the electricity markets. **[8]**

Q7) a) Explain in detail the term open access. **[8]**

b) List down the roles of state load dispatch center and regional load dispatch centers. **[8]**

OR

Q8) a) What is congestion in power transmission network What are the reasons for congestion? **[8]**

b) What are various transmission pricing methods? Explain any two in detail. **[8]**

Total No. of Questions : 8]

SEAT No. :

P-2914

[Total No. Of Pages : 3

[6004]-824
B.E.(Electrical)
SWITCHGEAR AND PROTECTION
(2015 Pattern) (403147) (Semester - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***
5) ***Use of non-programmble scientific calculator is allowed.***

Q1) a) Explain the need of protective system. What are different causes of fault? Expalin the effects of fault. **[6]**

b) Derive the expression for restriking voltage and calculate the value of $RRRV_{max}$ **[7]**

c) Draw neat diagram and explain the construction and working principle of vacuum circuit breaker. **[7]**

OR

Q2) a) The current rating of an overcurrent relay is 5 A. The relay hac an plug setting of 150% and time multiplier setting (TMS) of 0.4. the CT ratio is 400/5. Determine the operating time of relay for a fault current of 6000 A. at TMS=1, operating time at various PSM are given table below. **[6]**

PSM	2	4	5	8	10	20
Operating time in second	10	5	4	3	2.8	2.4

b) What is resistance switching? Derive the equation for switching resistance. **[7]**

c) Draw neat diagram and explain the construction and working principle of puffer type SF_6 circuit breaker. **[7]**

P. T. O

Q3) a) With neat block diagram explain Numerical relays. Also state its advantages and disadvantages. **[10]**

b) Explain with neat diagram single phase preventer in case of three phase induction motor. **[8]**

OR

Q4) a) Explain Phasor Monitoring Unit (PMU) with neat diagram. **[8]**

b) State and explain the Sampling theorem, Also explain anti-aliasing filter. **[10]**

Q5) a) Explain the protection of alternator against: **[8]**

i) Unbalanced loading

ii) Loss of prime mover

b) A three phase, 220/11000V, Star/Delta connected power transformer is protected by differential protection. The CTs on the LV side have a current ratio of 600/5. What must be the current ratios of CTs on the HV side and how they should be connected? **[8]**

OR

Q6) a) Explain the 'magnetic inrush current' phenomenon in transformer. Suggest suitable protection for the same. **[8]**

b) A star connected 3 phase, 100 MVA, 6.6 kV alternator is protected by Mertz price circulating current circulating principle using 1000/5 ampere CT. the star point of the alternator is earthed through the resistance of 7.5 ohm. If the minimum operating current of relay is 0.5 A, calculate the percentage of each phase of stator winding which is unprotected against earth fault when machine is operating at normal voltage. **[8]**

Q7) a) What do you mean by power swings and arc resistance? Explain the effect of power swings and are resistance on the performance of the distance relay. **[8]**

b) Explain the three stepped distance protection for transmission line with neat diagram. **[8]**

OR

Q8) a) Draw block diagram and explain components of power line carrier communication (PLCC) for long transmission lines. **[8]**

b) Write a short note on Wide Area Measurement System (WAMS) **[8]**

Total No. of Questions : 10]

SEAT No. :

P2915

[Total No. of Pages : 2

[6004]-825
B.E. (Electrical)
POWER ELECTRONICS CONTROLLED DRIVES
(2015 Pattern) (Semester - II) (403148)

Time :2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q1, or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9, or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of Calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) What are different components of load torque? Explain in detail. **[5]**

b) Explain closed loop control of a separately excited DC motor with suitable block diagram. **[5]**

OR

Q2) a) A drive has the following parameters : J = 15 kg-m^2, T=150 - 0.2N, N-m and passive load torque TI=0.025N, Nm; where N is the speed in rpm. Initially the drive is operating in steady state. Now it is to be reversed. For this moor characteristics is altered such that, T= -150 - 0.2N, N -m. Calculate the reversal time. **[5]**

b) Explain Plugging braking of induction motor. What precautions are to be taken during plugging operation of induction motor? **[5]**

Q3) a) What are the advantages of electrical drives? Also explain the selection of drive for a particular application. **[5]**

b) Compare and comment on relative merits and demerits of VSI and CSI fed induction motor drive. **[5]**

OR

Q4) a) What is the V/f control strategy? Explain with necessary diagram V/f control method using power control devices. **[5]**

b) A 220 V, 970 rpm, 100 A DC separately excited motor has an armature resistance of 0.05 Ω. It is braked by plugging from an initial speed of 1000 rpm. Calculate **[5]**

P.T.O.

i) Resistance to be placed in armature circuit to limit braking current to twice the fault load value.

ii) Braking torque.

iii) Torque when the speed has fallen to zero.

Q5) a) Explain the principal of vector control of Induction motor. **[8]**

b) Write a short note on AC servo motor drives. **[8]**

OR

Q6) a) How Induction Motor is converted to Characteristics of DC motor. **[8]**

b) With the help of block diagram explain vector control of induction motor. **[8]**

Q7) a) Draw neat diagram and explain vector control of PM synchronous motor. **[8]**

b) Explain operation of BLDC drives with the help of block diagram. Draw speed torque characteristics. **[8]**

OR

Q8) a) With the help of neat block diagram, explain the closed loop speed control of self controlled synchronous motor drives fed from VSI. **[8]**

b) Comment on use of sensor less control in PM BLDC drives. **[8]**

Q9) Write a short note on any three. **[18]**

a) Solar and battery powered drives

b) Selection of drives for textile mill

c) Selection of drives for hoist

d) Selection of drives in Sugar Mill

OR

Q10)a) Write a short note on Drives used in Electric Traction. Also mention the load requirements like power ratings, speed, duty cycle etc. **[10]**

b) What are the specifications of the drives used in machine tool and how these drives are selected? **[8]**

Total No. of Questions : 8]

SEAT No. :

P2916

[Total No. of Pages : 2

[6004]-826
B.E. (Electrical)
HIGH VOLTAGE ENGINEERING
(2015 Pattern) (Semester - II) (Elective - III) (403149 (A))

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q8 ,***
2) ***Figures to the right indicates full marks.***

Q1) a) In an experiment in a certain gas, it was found that the steady state current is 6.5×10^{-7} A at 10kV at a distance of 0.4 cm between the plane electrodes keeping the field constant and reducing the distance to 0.1 cm results in a current of 6.5×10^{-9}A. Calculate Townsend's primary ionization coefficient. If the breakdown occurred when gap distance was increased to 0.9 cm what is the value of secondary ionization coefficient. **[6]**

b) Compare Cavitation and Bubble theory of liquid dielectric with Thermal Breakdown theory of solid dielectric. **[7]**

c) Explain Trigatron method of tripping and control for multistage impulse generator. **[7]**

OR

Q2) a) Derive Townsend's current growth equation in presence of primary and secondary ionization processes. State limitations of Townsend's theory.**[7]**

b) Compare treeing and tracking phenomenon in solid dielectrics. **[6]**

c) Explain the genration of High Impulse Current with a suitable diagram. Also describe its main parts. **[7]**

Q3) a) What is partial discharge? Explain the straight detection method of partial discharge measurement. **[8]**

b) Describe the genearting voltmeter used for measuring high dc voltages. How does it compare with a potential divider for measuring high dc voltages? **[8]**

OR

P.T.O.

Q4) a) What is dielectric loss and dielectric constant? Explain the method of meaurement of dielectric constant and loss factor. **[8]**

b) Give the basic circuit for measuring the peack voltage fo **[8]**

i) Ac voltage and

ii) Impulse voltage

What is the difference in measurement technique in the above two cases?

Q5) a) Explain main causes of overvoltage due to swithching surges. Discuss various methods to overcome problems of switching surges in power system. **[9]**

b) Explain clearly the process of "Cloud to earth" and "Return" lightning stroke. State the characteristics of such stroke and their effect when they strike EHV AC installations or lines. **[9]**

OR

Q6) a) What is insulation coordination? Explain statistical method of insulation coordination. **[9]**

b) State the different charge formation theories in clouds. Compare Wilsons Theory with Reynolds and Masons theory of charge formation. **[9]**

Q7) a) What are the significances of power factor tests and partial discharge tests on bushings? How are they conducted in laboratory? **[8]**

b) Classify the different High voltage laboratories and give salient features of each of them. **[8]**

OR

Q8) a) Explain the following terms as referred to high voltage testing: **[8]**

i) Withstand voltage

ii) Flashover voltage

iii) 50% flashover voltage

iv) Wet and dry power frequency tests

b) Why is grounding very important in a HV laboratory? Describe a typical grounding system used. **[8]**

♦ ♦ ♦

Total No. of Questions : 11] **SEAT No. :**

P2917 **[Total No. of Pages : 2**

[6004]-827
B.E. (Electrical Engineering)
HVDC & FACTS
(2015 Pattern) (Semester - II) (Elective - III) (403149 (B))

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right indicates full marks.***
3) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculattor and steam tables is allowed.***
4) ***Assume suitable data, if necessary.***

Q1) Explain rectifier operation in HVDC systems with ignition delay angle and commutation overlap angle. **[7]**

OR

Q2) What are the technical limitations of HVDC systems? **[7]**

Q3) With suitable diagrams discuss the 12 pulse converter operation in HVDC system. **[7]**

OR

Q4) What are different types of multi-terminal HVDC systems? **[7]**

Q5) Explain VSC based HVDC system and its detailed operation. **[6]**

OR

Q6) Explain different applications of VSC based HVDC systems. **[6]**

Q7) Solve any two. **[16]**

a) With suitable diagrams explain dc link converter topologies. Which is the most commonly used converter topology? Why?

b) Explain converter control schemes for controlling output of converters and harmonic generation.

c) Discuss the static Power converter structures.

P.T.O.

Q8) a) Explain different configurations of SVC and explain with suitable characteristics compensation done by SVC. **[10]**

b) Discuss different operating modes of the STATCOM. **[8]**

OR

Q9) a) With the schematic diagram explain construction and operation of STATCOM. Also explain VI Characteristics of the STATCOM. **[10]**

b) Discuss the applications of SVC. **[8]**

Q10)a) Explain different operating modes of UPFC by using generalised power flow controllers. **[8]**

b) With detailed diagram explain internal control structure of UPFC. **[8]**

OR

Q11)a) Discuss the applications of UPFC in power systems. **[8]**

b) What are the different operating constraints of UPFC? **[8]**

♦ ♦ ♦

Total No. of Questions : 8]

SEAT No. : ____

P-2918

[Total No. of Pages : 2

[6004]-831
B.E. (Electrical Engineering)
SMART GRID
(2015 Pattern) (Semester - II) (Elective - IV) (403150A)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable data, if necessary.***

Q1) a) Describe smart grid concept and explain its necessity. **[6]**

b) List different smart storage techniques and explain anyone in detail. **[6]**

c) What do you mean by OMS? How outage management can be improved by OMS? **[8]**

OR

Q2) a) State and explain challenges of smart grid. **[6]**

b) Explain the function of IED & their application. **[6]**

c) Highlight on role of geographic information system in smart grid and also give its function. **[8]**

Q3) a) Compare Microgrid and Smart Grid. **[8]**

b) Explain issues of Microgrid when connected. **[8]**

OR

Q4) a) Explain about protection and control of microgrid. **[8]**

b) Explain the concept of Microgrid, its need and applications. **[8]**

Q5) a) Highlight the issues related to Power Quality in Smart Grid. **[8]**

b) Write a short note on Web based Power Quality Monitoring. **[8]**

OR

P.T.O.

Q6) a) Explain the concept of Power Quality and EMC in Smart Grid. **[8]**

b) Describe the concept of Power Quality conditioners related to Smart Grid. **[8]**

Q7) a) Write a note on Broadband Over a power line. **[9]**

b) Explain the concept of WAN related to smart grid. **[9]**

OR

Q8) a) Explain cloud computing and its need. **[9]**

b) Why cyber security is of prime importance in smart grid? How it can be achieved. **[9]**

Total No. of Questions : 10]

SEAT No. :

P-2919

[Total No. of Pages : 2

[6004]-833

B.E. (Electrical)

ILLUMINATION ENGINEERING

(2015 Pattern) (Semester - II) (403150C) (Elective - IV)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) State five advantages of electrically produced light. **[5]**

b) With a neat diagram explain working of electronic ballast. **[5]**

OR

Q2) a) Explain working of compact flourocent lamp with a neat diagram. **[5]**

b) Describe zonal cavity method for finding average illumination. **[5]**

Q3) a) What is polar curve? Describe its types. **[5]**

b) State the types of lighting systems. Explain anyone with a neat diagram. **[5]**

OR

Q4) a) What are the bad effects on health due to exposure to optical hazards. **[5]**

b) With a suitable diagram explain construction and working of salt water dimmer. **[5]**

P.T.O.

Q5) a) Explain following terms : **[8]**

i) Candle power

ii) Mean spherical candle power (MSCP)

iii) Reduction factor

iv) Maintenance factor

b) A room of length 20 m and width 10 m is to be illuminated by using 8 lamps. Average illumination is expected to be 50 lumens/m^2 i.e. 50 lux. Taking depreciation factor 1.2 and utilization factor 0.48, calculate MSCP of each lamp. **[8]**

OR

Q6) a) What is meant by glare? Explain types of glare and remedies for the same. **[8]**

b) Explain components of industrial lighting. **[8]**

Q7) a) State and explain factors to be considered for flood lighting. **[8]**

b) Give classification of electric signs used for advertising. **[8]**

OR

Q8) a) Explain following terms related to street lighting **[8]**

i) Visual comfort

ii) Glare

iii) Contrast

iv) Uniformity ratio

b) State and explain various arrangements of projector mounting for flood lighting. **[8]**

Q9) a) Give detail description about design consideration and constructional details of LED. **[9]**

b) Give comparison between LED and flourocent lamps on any nine points. **[9]**

OR

Q10)a) With suitable diagrams explain any two methods of natural light conducting. **[9]**

b) With suitable diagram explain working of OLED. **[9]**

Total No. of Questions : 8]

SEAT No. : ____

P-2920

[Total No. Of Pages : 2

[6004]-835
B.E.(Electronics)
VLSI DESIGN
(404201) (2015 Pattern) (Semester - I)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates :

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Why is device sizing is so important? Prove that $W_p = 2.5W_n$. **[9]**

b) Design 4:1 Multiplexer using transmission gate. **[8]**

OR

Q2) a) Explain Body effect and channel length modulation in detail **[8]**

b) Design CMOS logic for Y = (ABC+D). Calculate area needed on chip. **[9]**

Q3) a) Differentiate between SRAM and DRAM technologies. **[9]**

b) Give the classification of memory with application of each. **[9]**

OR

Q4) a) Differentiate between FPGA & CPLD. **[9]**

b) List down signal integrity issues. **[9]**

P.T.O

Q5) a) What is clock skew and clock jitter? Explain clock distribution techniques. **[9]**

b) Draw block diagram of FPGA and list its specifications. **[9]**

OR

Q6) a) Explain in detail stuck at fault model. **[9]**

b) What are the challenges in routing? Explain global routing. **[9]**

Q7) a) What is Design rule check? Draw stick rute diagram for a CMOS Inverter. **[9]**

b) Explain with block diagrams Full and partial scan path arrangements. **[8]**

OR

Q8) a) Explain IEEE 1149.1 architecture in detail. **[9]**

b) Explain power distribution and optimisation in VLSI Design **[8]**

Total No. of Questions :8]

SEAT No. :

P2921

[Total No. of Pages :2

[6004]-836
B.E. (Electronics)
ADVANCED POWER ELECTRONICS
(2015 Pattern) (Semester-I) (404202)

Time : 2 ½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right indicate full marks.*
4) *Assume suitable data, if necessary.*

Q1) a) Explain in detail the operation of 3 phase dual converter with circulating current with circuit diagram & waveforms. **[8]**

b) Discuss operation of single phase bridge Diode clamped multilevel inverter with neat circuit diagram & waveforms. **[6]**

c) Explain & draw the curve torque & power versus speed for separately excited D.C. motor. **[6]**

OR

Q2) a) Explain Extinction Angle control power factor Improvement technique for single phase converters with circuit diagram & waveforms. **[6]**

b) Discuss 3phase to 1phase cycloconverter with circuite diagram & waveforms. **[8]**

c) With neat diagram explain Microprocessor based control of D.C. drive. **[6]**

Q3) a) Draw block diagram for closed loop control of Induction motor and explain in detail. **[8]**

b) Explain torque-slip characteristics of 3phase induction motor with neat curve stating various regions & their working mechanisms. **[8]**

OR

Q4) a) What is basic principle of operation of vector control? Explain direct vector control in detail. **[8]**

b) Draw block diagram of v/f control for 3phase Induction motor & explain its working in detail. **[8]**

P.T.O.

Q5) a) Draw & briefly explain the torque speed chracteristics of synchronous reluctance motor of constant voltage & frequency. **[8]**

b) Explain the operation of servo motor drive with suitable block diagram state the applications where servo motor drives are preferred. **[8]**

OR

Q6) a) With the help of a neat circuit diagram & waveforms explain the operation of 3phase Brushless DCmotor drive. State the applications of 3phase brushless DC motor drive. **[8]**

b) Draw & explain various power converter configurations for switched Reluctance motor. **[8]**

Q7) a) With neat diagram explain grid connected wind Energy system. **[8]**

b) State & describe various steps in solar system design. **[6]**

c) Discuss metering of solar based system in detail with diagram. **[4]**

OR

Q8) a) What are advantages of vertical axis over horizontal axis type wind Energy conversion system. **[4]**

b) Discuss Grid connected solar Energy system with diagram. **[8]**

c) State different types of PV cells. Describe Mono Crystalline solar cell with its merits & Demerits. **[6]**

Total No. of Questions : 10]

SEAT No. :

P2922

[Total No. of Pages : 2

[6004]-837

B.E. (Electronics)

ELECTRONICS SYSTEM DESIGN

(2015 Pattern) (Semester - I) (404203)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***
5) ***Use of pocket calculator is allowed.***

Q1) a) Why it is important to consider the product specs & market surveys, while designing/developing a product. **[6]**

b) What is reliability & quality of product? **[4]**

OR

Q2) a) What specifications are considered for selection of DAC. **[5]**

b) Explain gain & offset error in ADC. **[5]**

Q3) a) State and explain the factors which affect the choice of op amp. **[4]**

b) State applications of Instrumentation Amplifier Explain one of them in detail. **[6]**

OR

Q4) a) Explain how will you interface relays with Microcontrollers. **[4]**

b) Compare 8, 16 bit micro controller on the basis ; **[6]**

i) I/o pins,

ii) Counter

Q5) a) Write short notes on : **[8]**

i) Simulators

ii) Assemblers

b) State and explain approaches used while designing software for Electronic products. **[8]**

OR

P.T.O.

Q6) a) Explain different constructs of regular programming using neat diagram. **[8]**

b) What is ICE? Explain how it is useful in debugging. **[8]**

Q7) a) Illustrate the design rules used in PCB design of mixed signal circuits. **[5]**

b) Explain different design considerations while designing PCB for high speed digital circuits? **[5]**

c) Why compliance of various standards is important in PCB design, What can be the consequences if regulatory standards are not complied with for electronic products having operating frequency more than 9 kHz. **[6]**

OR

Q8) a) Explain rules of PCB design for Shielding & Guarding in precision circuits. **[6]**

b) What are the different types of grounding? Explain one of them in detail. **[5]**

c) What is Signal Integrity? Discuss the methodology used to address it in P.C.B. **[5]**

Q9) a) Explain how you can make use of DC and AC analysis in trouble shooting Electronic circuits. **[6]**

b) What is environmental testing ? Why it is necessary? **[6]**

c) Explain the method used to carry out EMI testing for electronic products? **[6]**

OR

Q10) a) Explain how vibration and shock test is conducted for electronic products''? **[6]**

b) Explain Monte Carlo analysis? **[4]**

c) Write short notes on : **[8]**

i) Spectrum Analyzer

ii) MSO

Total No. of Questions : 8]

SEAT No. :

P-2923

[Total No. Of Pages : 2

[6004]-848
B.E.(Electronics Engineering)
COMPUTER NETWOKS & SECURITY
(404209) (2015 Pattern) (Semester-II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***
5) ***Use of pocket calculator is allowed.***

Q1) a) Draw TCP-IP Reference model. List & explain functions of Each Layer. **[6]**

b) Explain the Connection less & Connection oriented Services **[6]**

c) Explain various connecting devices- Hub, Router Bridges & Gateways **[8]**

OR

Q2) a) Comare circuit switching Vs packet switching **[6]**

b) Explain in brief physical address, network address & port number **[6]**

c) State & explain four basic network topologies and write advantages of each type **[8]**

Q3) a) Explain TCP & UDP in detail. **[6]**

b) What is routing? Explain shortest path routing algorithm. **[6]**

c) Explain Classfull addressing in Computer Network **[4]**

OR

Q4) a) What are various Network layer design issues? **[6]**

b) What is traffic shaping? Explain Token bucket algorithm **[6]**

c) Explain the ARP & RAPP protocol. **[4]**

P.T.O

Q5) a) Explain telnet & FTP in detail with respect to client server communication. **[10]**

b) Explain Socket address. **[8]**

OR

Q6) Write short notes

a) Telnet **[6]**

b) DNS **[6]**

c) FTP **[6]**

Q7) a) Compare public key & private key security algorithm. Explain RSA algorithm in detail. **[10]**

b) Explain the various network security attacks. **[6]**

OR

Q8) a) What is symmetric key cryptography? Explain the substitution cipher. **[10]**

b) Explain Network cable tester. **[6]**

Total No. of Questions :8]

SEAT No. :

P2924

[Total No. of Pages :2

[6004]-849
B.E. (Electronics)
PROCESS INSTRUMENTATION
(2015 Pattern) (Semester-II) (404210)

Time : 2½Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain interacting and non interacting process. **[6]**

b) Differentiate between PI control and PD control. **[6]**

c) Explain in detail Hydraulic controllers. **[8]**

OR

Q2) a) Explain single and multi capacity process. **[6]**

b) Explain the following terms **[6]**

i) Control lag.

ii) Dead time

c) Compare Hydraulic, Pneumatic & Electronic controllers. **[8]**

Q3) a) What is cascade control? Explain it's typical characteristics using an example. **[8]**

b) Explain with suitable example feed forward control system. **[8]**

OR

Q4) a) Explain the Ratio control schemes with examples. **[8]**

b) Write short note on Selective control. **[8]**

Q5) a) What are the characteristics of Discrete state process control. **[8]**

b) Explain Batch processing with appropriate example. **[8]**

OR

P.T.O.

Q6) a) Explain Batch Drying process in detail. **[8]**

b) Explain Event sequencing with appropriate example. **[8]**

Q7) a) Explain sequence of design steps. **[9]**

b) What are various safety layers? Explain in detail. **[9]**

OR

Q8) a) Explain all points of process operability in short. **[9]**

b) What are different measurements considered during the selection of variable and sensors? **[9]**

Total No. of Questions : 12] **SEAT No. :**

P2925 **[Total No. of Pages : 2**

[6004]-851
B.E. (Electronics)
ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING
(2015 Pattern) (Semester - II) (Elective - III) (404211 B)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q8 ,Q9 or Q10, Q11 or Q12.***
2) ***Figures to the right indicates full marks.***

Q1) Define Artificial Intelligence. List the fields that form the basis for AI. **[6]**

OR

Q2) Explain model-based, goal based agent with the help of a neat diagram and its pseudocode. Give an example for the same. **[6]**

Q3) Explain Alpha-Beta Tree search and cutoff procedure in detail with an example. **[7]**

OR

Q4) What is Greedy Best first search? Explain with an example the different stages of Greedy best first search. **[7]**

Q5) What is Knowledge representation using propositional logic? Compare propositional and first order logic. **[7]**

OR

Q6) Explain the working of Unification Algorithm with suitable example. **[7]**

Q7) a) What is a Bayesian Belief Network and explain how it can be used for building models. **[10]**

b) How to represent AND Gate using linear classifiers. **[7]**

OR

P.T.O.

Q8) Explain types of machine learning. Discuss machine learning applications in detail. **[17]**

Q9) a) What do you mean by Perceptron? What are the different types of Perceptrons? What is the use of the Loss functions? What is the role of the Activation functions in Neural Networks? **[8]**

b) Explain back propagation algorithm with an example. **[8]**

OR

Q10)a) What is CNN? **[8]**

Explain the following:

i) Pooling

ii) ReLU

iii) Flattening

iv) Full connection

b) Explain Radial basis function network with suitable example. **[8]**

Q11)a) What are different types of Machine learning methods? Explain any one in detail. **[9]**

b) Explain about hard margin SVM and soft margin SVM. **[8]**

OR

Q12)a) What are the applications of decision tree? State its advantages and disadvantages. **[9]**

b) Explain advantages and disadvantages of K means clustering. How time complexity of this algorithm is computed? **[8]**

Total No. of Questions : 8]

SEAT No. :

P-2926

[Total No. of Pages : 2

[6004]-852

B.E. (Electronics)

OPTICAL & MICROWARE COMMUNICATION

(2015 Pattern) (Semester - II) (404211 C) (Elective - III)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Assume suitable data, if necessary.***
3) ***Figures to the right indicate full marks.***

Q1) a) List merits and demerits of photodiode. **[6]**

b) Describe SOA (Semiconductor Optical Amplifier) with the help of following terms, **[6]**

i) External pumping ii) Amplifier gain

c) List advantages of Optical fiber Communication and with a neat schematic diagram describe different elements present in Optical link. **[8]**

OR

Q2) a) A 2 × 2 biconical tapered fiber coupler has an input optical power level of P_0 = 200μW. The output powers at the other three parts are P_1 = 90W, P_2 = 85μW and P_3 = 6.3nW. Find out the coupling ratio, excess loss, insertion losses and return loss for this coupler. **[8]**

b) With the help of three key transition processes explain working principle of LASER. **[6]**

c) List different losses occurring in Optical fiber and describe material dispersion in detail. **[6]**

Q3) a) Describe 'S' matrix formulation of two part network and list properties of 'S' matrix. **[8]**

b) Write properties of waveguides and explain rectangular in a waveguide with plane wave reflected in a waveguide. **[8]**

OR

P.T.O.

Q4) a) With a neat schematic diagram, explain Microwave Isolator. **[8]**

b) List advantages and applications of Microwave. **[8]**

Q5) a) With the neat sketch describe construction and working of Reflex Klystron. **[8]**

b) A Reflex Klystron operates under the following conditions :

V_0 = 600 V, L = 1mm, Rsh = 15kΩ, Fr = gGHz

$\frac{e}{m} = 1.759 \times 10^{11}$ (MKS System)

The tube is oscillating at Fr at the peak of the n = 2 mode or 1 ¾ mode. Assume that the transit time through the gap beam loading can be neglected.

Find,

i) the value of the repeller voltage, V_r.

ii) the direct current necessary to give a microwave gap voltage of 200V.

iii) electronic efficiency under this condition.

[8]

OR

Q6) a) Draw and describe helix TWT schematic diagram and simplified circuit. **[8]**

b) Describe Linear Magnetron. **[8]**

Q7) a) Explain Gunn Effect. Also describe current fluctuations and drift velocity related to it. **[6]**

b) Describe Ampere - Voltage characteristics of Tunnel diode. **[6]**

c) Describe construction and working principle of TRAPATT Diode. **[6]**

OR

Q8) Write short note on : **[18]**

a) Varactor Diode

b) IMPATT Diode

c) PIN Diode

▽▽▽▽

Total No. of Questions : 8]

SEAT No. :

P-2927

[Total No. of Pages : 3

[6004]-856

B.E. (Electronics Engineering)

WIRELESS SENSOR NETWORKS (Elective - IV)

(2015 Pattern) (Semester - II) (404212B)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8.***
2) ***Figures to the right side indicate full marks.***
3) ***Assume suitable data, if necessary.***

Q1) a) Explain following performance metrics in WSN. **[6]**

i) Network Lifetime

ii) Data accuracy

iii) Latency

iv) Energy Efficiency

v) Signal Strength

vi) Bandwidth

b) Explain radio waves and modulation/demodulation in Wireless Sensor Networks. **[6]**

c) Draw the structure of Wireless Sensor Network Protocol Stack. Explain the functions of different layer. **[8]**

OR

Q2) a) Draw and explain architecture of Wireless Sensor Network. **[6]**

b) Explain hidden terminal and exposed terminal problem in Wireless Sensor Networks. **[6]**

c) Write short note on : **[8]**

i) Zigbee Protocol/Standard

ii) Insteon Standard/Protocol

P.T.O.

Q3) a) Define localization in Wireless Sensor Networks. Explain types of location information of node in WSN. Explain proximity Schemes for localization in WSN. **[8]**

b) Explain various metrics for routing protocol in WSN. Why routing protocols are required in WSN? Explain directed diffusion routing algorithm used in WSN. **[8]**

OR

Q4) a) Explain single hop and multi hop wireless Sensor Networks with the help of diagram. Compare single and multi-hop Wireless Sensor Networks. **[8]**

b) With the help of flow diagram explain geographic/location-Based routing algorithm. **[8]**

Q5) a) Explain the following perimeters of the clustering in WSN. **[6]**

i) Cluster count/Number of clusters

ii) Cluster size uniformity

iii) Inter-clustering routing

iv) Intra-clustering routing

b) What is compression process in WSN? Explain Huffman codes compression. **[6]**

c) Explain threat model in Wireless Sensor Networks. **[6]**

OR

Q6) a) Explain nearest sink clustering and geographic clustering in WSN. **[6]**

b) Explain goal oriented attacks and layer oriented attacks in Wireless Sensor Networks. **[6]**

c) Explain the different constraints regarding security issues in Wireless Sensor Networks. **[6]**

Q7) a) What is meant by deployment of WSN? List different problems of deployment in WSN. Explain any two problems in detail. **[8]**

b) Explain the requirements analysis in details in Wireless Sensor Networks. **[8]**

OR

Q8) a) Explain the bottom-up implementation process of deployment of WSN. Compare top-down and bottom-up implementation process of deployment of WSN. **[8]**

b) With the help of flow diagram explain the general testing and validation of Wireless Sensor Networks. **[8]**

□□□

Total No. of Questions : 8]

SEAT No. :

P-2928

[Total No. of Pages : 2

[6004]-857

B.E. (Electronics)

RENEWABLE ENERGY SYSTEMS & DSM

(2015 Pattern) (Semester - II) (404212C) (Elective - IV)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Figures to the right side indicates full marks.***
3) ***Draw neat diagram wherever necessary.***
4) ***Assume suitable data, if necessary.***

Q1) a) What are the different types of PV cells? Explain any two briefly. **[8]**

b) What are the different types of wind turbines? Explain Wind generators. **[6]**

c) Write a note on Biomass Resources and their Energy Potential. **[6]**

OR

Q2) a) Write a note on Solar Thermal Conversion Devices and Storage. **[8]**

b) Explain installation of wind power plant with neat diagram. **[6]**

c) Define the biomass gasification. What are the different factor affecting Biogas Production. **[6]**

Q3) a) Explain in detail about the different techniques of DSM with necessary examples. **[10]**

b) Define DSM and explain the benefits of DSM. **[6]**

OR

Q4) a) Explain briefly about Energy efficient equipments. **[6]**

b) Explain concept and features of DSM. **[6]**

c) What is Load management? Explain its importance. **[4]**

P.T.O.

Q5) a) Classification of various Demand Response options in energy systems. **[8]**

b) Explain the energy management system. **[4]**

c) Explain the roll of communication infrastructure in energy system. **[4]**

OR

Q6) a) Explain the Demand Response strategies for various load categories. **[8]**

b) Explain Demand Response as an apart of smart grid initiative. **[8]**

Q7) a) Discuss understanding variation in demand and supply of electricity. **[8]**

b) Explain in details load forecasting. **[6]**

c) Discuss the need of energy audits. **[4]**

OR

Q8) a) Explain different types of audit and procedures to follow during, energy audit. **[8]**

b) Discuss outcome of energy audit and energy saving potential. **[6]**

c) Explain the energy consumption in detail. **[4]**

▽▽▽▽

Total No. of Questions : 8] **SEAT No. :**

P2929 **[Total No. of Pages : 2**

[6004]-863
B.E. E&TC
VLSI Design & TECHNOLOGY
(2015 Pattern) (Semester - I) (404181)

Time : 2½ Hours] ***[Max. Marks :70***

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2 and Attempt A.3 or Q.4 and Attempt Q.5 or Q.6 and Atempt Q.7 or Q.8.***
2) ***Figures to the right side indicate full marks.***

Q1) a) Differentiate signals and variables. **[4]**

b) Write VHDL code for 4:1 Multiplexer (MUX). **[4]**

c) How logic gets implemented in FPGA? Explain with example. **[6]**

d) Explain clock skew and clock jitter issues in SOC design. **[6]**

OR

Q2) a) Write a VHDL Code for Half adder with VHDL Test bench. **[4]**

b) Explain function used of VHDL code with example. **[4]**

c) Compare the features of CPLD with FPGA. **[6]**

d) Explain different Interconnect routing techniques. **[6]**

Q3) a) Explain Voltage transfer characteristics (VTC) for CMOS inverter. **[8]**

b) Give the details of Power dissipations in CMOS. **[4]**

c) Explain channel length modulation of MOSFET in detail. **[4]**

OR

P.T.O.

Q4) a) With the structure, explain theory of n-channel MOS transistor. **[8]**

b) With neat diagrams explain MOS parasitic. **[8]**

Q5) a) Explain design Flow of Application specific Integrated Circuit. **[8]**

b) Explain different Lambda rules and Design rule check in ASIC Design. **[8]**

OR

Q6) a) With example of circuit explain different analysis of AC and DC analysis, Transfer Characteristics, Transient responses and Noise analysis. **[8]**

b) Enlist different issues in ASIC design and explain any one in detail. **[8]**

Q7) a) Explain different types of fault in detail. **[4]**

b) With is Built In Self-Test (BIST) and JTAG. Explain in detail. **[8]**

c) Explain in detail, Need of design for testability. **[6]**

OR

Q8) a) Explain stuck at 0 and stuck at 1 fault. **[4]**

b) What is full scan and partial scan? Explain in details? **[6]**

c) With suitable schematic, explain the operation of TAP controller. **[8]**

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Total No. of Questions :10]

SEAT No.

P2930

[Total No. of Pages :2

[6004]-864
B.E. (E&TC Engineering)
COMPUTER NETWORKS AND SECURITY
(2015 Pattern) (Semester-I) (404182)

Time : 2 ½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Compare basic service set and Extended service set in WLAN. **[6]**

b) Write short note on Gigabit Ethernet. **[4]**

OR

Q2) a) Draw Bluetooth architecture explain function of different layer in Bluetooth. **[6]**

b) Write short note on congestion control. **[4]**

Q3) a) Give general format of ICMP and explain different types of error reporting messages used in ICMP. **[6]**

b) Compare IPV4 and IPV6. **[4]**

OR

Q4) a) Draw and explain IPV6 format. **[6]**

b) What is IGMP? How does it used? **[4]**

Q5) a) Enlist various Transport Layer protocols and compare any two of them. **[7]**

b) What are differences in IP address and Port number? **[4]**

c) Which layer is responsible for process to process delivery? Which address plays important role in process to process delivery? Why TCP is called process processing delivery protocol? **[6]**

OR

P.T.O.

Q6) a) Enlist and Explain SCTP services? **[7]**

b) Draw and explain UDP header in details. **[4]**

c) Draw TCP header and Explain function of each field. **[6]**

Q7) a) How does DNS work? How do I find my DNS? **[5]**

b) How do I find my URL? Is Google a URL? What is an HTTP COOKIE and is it bad? **[6]**

c) Explain types of Web Documents in detail? Is web development same as website? **[6]**

OR

Q8) a) Explain basic functions of Electronic mail. What are the types of Electronic Mail? **[5]**

b) Write short note on **[6]**

i) FTP

ii) SNMP

c) Enlist the functions of Network Management System? How the network management system works? **[6]**

Q9) a) Define cryptography and explain all types of Ciphers? **[8]**

b) Generate the Public Key and Secret Key for following prime number using RSA algorithm? P = 3, Q = 11, take E = 5 **[8]**

OR

*Q10)*a) What is SSL? How does it provide security at Transport Layer? **[8]**

b) Write short note on **[8]**

i) PGP

ii) Firewalls

Total No. of Questions : 8]

SEAT No. :

P2931

[Total No. of Pages : 2

[6004]-865

B.E. (Electronics & Telecommunication)

RADIATION AND MICROWAVE TECHNIQUES

(2015 Pattern) (Semester - I) (404183)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***

Q1) a) Define following antenna performance parameters **[6]**

i) Radiation pattern

ii) HPBW

iii) Radiation sphere

b) Compare broadside array with end fire array (any 4 points). **[8]**

c) Explain why TE_{10} and TM_{11} are called as dominant modes in rectangular waveguides. **[6]**

OR

Q2) a) Derive fundamental equation for free space propagation. **[6]**

b) Explain the construction & principle of operation for Yagi-Uda Antenna. **[6]**

c) For an air filled rectangular wave guide of dimensions 6 × 3 cms, calculate cutoff wavelength for TE_{10} & TM_{11} mode. Also calculate guide wavelength at 10GHz. **[8]**

Q3) a) State & Explain the properties of S-matrix. **[6]**

b) Explain Faraday's rotation principle. Draw the diagram for a two part isolator. **[6]**

c) With the help of diagram explain why H-plane tee is called as a 3-dB splitter. **[6]**

OR

P.T.O.

Q4) a) Draw and explain working of a Directional coupler enlist its characteristics. **[6]**

b) Illustrate the constructions & operation of a Gyrator. **[6]**

c) With the help of diagram explain the application of a magic tee as a mixer. **[6]**

Q5) a) State & explain high frequency limitations of conventional tubes. **[6]**

b) Explain the construction & Working principle of Tunnel diode state its two applications. **[6]**

c) Compare TWTA with two cavity Klystron amplifier. (any 4 points) **[4]**

OR

Q6) a) With the help of applegate diagram explain the bunching process in Reflex Klystron. **[8]**

b) Explain the construction & working principle of SBD. Draw its typical V-I characteristics. **[8]**

Q7) a) With the help of neat diagram explain the microwave power measurement technique. **[8]**

b) What are the various industrial applications of microwave signals? Explain any one in details. **[8]**

OR

Q8) a) Explain microwave frequency measurement technique. Draw neat diagram for the microwave test bench setup for the same. **[8]**

b) What is SAR value? Explain in details the microwave radiation Hazards. **[8]**

Total No. of Questions : 10] **SEAT No. :**

P-2932 **[Total No. of Pages : 2**

[6004]-868

B.E. (E & TC)

EMBEDDED SYSTEM & RTOS

(2015 Pattern) (Semester - I) (404184C) (Elective - I)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Figures to right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable data, if necessary.***

Q1) a) Define following Terms:- **[5]**

i) Time to market,
ii) Latency,
iii) NRE Cost,
iv) Unit Cost,
v) Flexibility

b) Explain Typical process for Embedded System development. **[5]**

OR

Q2) a) Comment on commercial RTOS. **[5]**

b) Explain V-shaped model. State its merits and demerits. **[5]**

Q3) a) Explain real time scheduling algorithm **[5]**

b) Explain any 03 queue functions **[5]**

OR

Q4) a) Explain RTOS services **[5]**

b) Comment on significance of lnterprocess communication **[5]**

Q5) a) Explain different ARM processor series, its versions and features. **[8]**

b) Explain CMSIS standard in detail. **[8]**

OR

P.T.O.

Q6) a) How interrupt structure of cortex is different from ARM7. **[8]**

b) Draw interfacing diagram of motor control using PWM with LPC1768. Write down program or algorithm for the same **[8]**

Q7) a) Explain the role of boot loader in Embedded linux system? What are the characteristics of the same. **[9]**

b) Explain Linux Kernel architecture and its configuration **[9]**

OR

Q8) a) Explain Linux file system. What is journaling flash file system? What are advantages of the same **[9]**

b) Explain the following tool utilities Minicomp, BusyBox, Red Boot **[9]**

Q9) a) Write a program for Arduino board to read analog input and convert it into digital. **[8]**

b) Explain with the help of case study, the application development using Arduino board. **[8]**

OR

Q10) a) What is Arduino Uno? Explain standard libraries in Arduino. **[8]**

b) Draw an interfacing diagram of 4 LEDs with Arduino board, write a program for the same **[8]**

Total No. of Questions : 8]

SEAT No. :

P-2933

[Total No. of Pages : 2

[6004]-871
B.E. (E & TC)
ELECTRONIC PRODUCT DESIGN
(2015 Pattern) (Semester - I) (412185B) (Elective - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Explain the energy coupling Mechanisms. **[8]**

b) Explain the importance of test cases & test procedures. **[6]**

c) Explain models, metrics and software limitations. **[6]**

OR

Q2) a) Explain the following **[6]**

i) Cognition ii) Ergonomics

iii) Reliability iv) Quality

b) Explain the concept of Black, White & Gray box test with appropriate diagrams. **[8]**

c) Write a short note on Good Programming practices. **[6]**

Q3) a) Explain functional partitioning of and concept of critical frequency. **[10]**

b) Explain the techniques of ESD protection. **[8]**

OR

Q4) a) What are Grounding methodologies. Explain with neat diagrams. **[8]**

b) Explain in brief Routing topologies with suitable diagrams. **[10]**

Q5) a) Differentiate between Active components & Passive components. **[8]**

b) Define debugging process and explain steps of debugging. **[8]**

OR

P.T.O.

Q6) a) What are Electromechanical components. Explain any two. **[8]**

b) What is Integration, verification, validation in electronic product. **[8]**

Q7) a) Write a short note on the following : **[8]**

i) Liability ii) Accountability

b) Define documentation & explain the need of documentation. **[8]**

OR

Q8) a) What is the importance of Bill of Material. Explain with a suitable example. **[8]**

b) Write a short note on the following. **[8]**

i) Engineering Note Book

ii) Records.

Total No. of Questions : 10]

SEAT No. :

P-2934

[Total No. of Pages : 3

[6004]-875

B.E. (E&TC)

MOBILE COMMUNICATION

(2015 Pattern) (Semester - II) (404189)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) State and explain switching functions of the switching system. **[6]**

b) Consider a group of 1200 subscribers which generate 600 calls during the busy hour. The average holding time is 2.2 minutes. What is the offered traffic in Erlangs, CCS & CM? **[4]**

OR

Q2) a) Compare in channel and common channel signalling related with following parameters : **[4]**

i) Integrity speech

ii) Trunks

iii) Signalling information

iv) Signalling equipment

v) Transfer of information

b) Draw the explain output controlled time division time switch. **[6]**

P.T.O.

Q3) a) State and explain lost system with assumptions. **[6]**

b) Total channel capacity for cellular telephone are comprised of 12 clusters with 4 cells in each clusters & 20 channels in each cell. How much channels are occupied? **[4]**

OR

Q4) a) Explain - **[6]**

i) Progressive grading

ii) Skipped grading

iii) Homogeneous grading

b) Compare voice traffic and data traffic with following parameters. **[4]**

i) Signal type

ii) Bandwidth

iii) Line utilization

iv) Loss & error

Q5) a) Explain the following terms related with GSM system architecture. **[8]**

i) MSC

ii) BTS

iii) BSC

iv) GMSC

b) Explain the following services related to GSM system. **[4]**

i) Tele services

ii) Bearer services

c) Compare GSM 900 with DCS 1800 related with following parameters **[4]**

i) wavelength

ii) carrier spacing

iii) bandwidth

iv) uplink & downlink frequency

OR

Q6) a) Discuss various functional entitites used in GSM architecture. **[8]**

b) List out GSM interfaces and write functions of each. **[8]**

Q7) a) Draw & explain the following terms : **[8]**

i) Inter BSC handover

ii) Intra BSC handover

b) Draw & explain the following terms : **[9]**

i) TDMA

ii) FDMA

iii) CDMA

OR

Q8) a) Compare GPRS with EDGE with following parameters : **[8]**

i) Modulation

ii) Bit rate

iii) Data rate (user)

iv) Radio data rate

b) Draw & Explain architecture of HSCSD. **[9]**

Q9) a) Compare following points from 1G to 5G. **[10]**

i) Standards

ii) Technologies

iii) Multiple access

iv) Data rate

v) Services

b) Draw & explain architecture of LTE. **[7]**

OR

Q10)a) Discuss the disruptive technologies of 5G mobile communication. **[9]**

b) Discuss different LTE design parameter. **[8]**

Total No. of Questions :8]

SEAT No. :

P2935

[Total No. of Pages :2

[6004]-876
B.E. (E&TC)
BROAD BAND COMMUNICATION SYSTEMS
(2015 Pattern) (Semester-II) (404190)

Time : 2 ½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data, if necessary.***
5) ***use of logarithmic tables slide rule,mollier charts electronic pocket cslculater and steam tables is allowed.***

Q1) a) Describe the following terms with respect to optical fiber. **[8]**

i) Attenuation

ii) Absorption

iii) Scattering

iv) Dispersion

b) Compare PIN photo diode and APD as optical detector in optical fiber commn. **[6]**

c) What is link budget? Explain performance objective for Digital link. Derive the equation for received power 'P_r' **[6]**

OR

Q2) a) A multimode step index fiber with core diameter of 80 μm and relative index difference of 1.5% is operating at a wavelength of 0.85 μm. If the core refractive index is 1.48 estimate the normalized frequency for the fiber and the number of modes guided. **[8]**

b) Explain operational principle of WDM with a suitable schematic diagram. **[6]**

c) Compare LED and ILD as light source in optical fiber commn. **[6]**

Q3) a) Explain briefly various look angles for satelite earth station. **[8]**

b) Describe the launch sequence used to inject satelite. **[8]**

OR

Q4) a) Explain elements of satellite common. **[8]**

b) Compare LEO, MEO & GEO satellite orbits with its applicat

P.T.O.

Q5) a) Expalin various losses in downlink analysis. **[8]**

b) What is the need of satellite communication? Explain with diagram basic structure of satellite common. **[8]**

OR

Q6) a) What are the various orbital effects in common system performance? **[8]**

b) Explain any two **[8]**

i) Altitude control system

ii) Orbital Control System

iii) Tracking, Telemetry and Command System

Q7) a) State and explain kepler's three laws of planetary motion. **[9]**

b) Explain system noise temperature & G/T ratio. **[9]**

OR

Q8) a) Write short notes on equivalent. **[7]**
Isotropic Radiated Power (EIRP)

b) Derive the expression for total carrier to noise ratio (Uplink + Downlink). **[11]**

Total No. of Questions : 8]

SEAT No. :

P2936

[Total No. of Pages : 2

[6004]-877

B.E. (Electronics and Telecommunication Engineering)

MACHINE LEARNING

(2015 Pattern) (Semester - II) (Elective - III) (404191A)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Figures to the right indicate full marks.***
3) ***Draw neat figures wherever necessary.***
4) ***Assume any missing data, if necessary.***

Q1) a) Describe parametric and nonparametric learning with their advantages and limitations. **[6]**

b) Write short note on Multidimensional Scaling. **[6]**

c) Explain least square model for linear regression **[5]**

OR

Q2) a) How Factor analysis is used for dimensionality reduction? Explain with suitable example/application. **[7]**

b) What is regularization? Explain the concept with suitable example? **[6]**

c) What are the applications of K means clustering algorithm? **[4]**

Q3) a) Compare and contrast the biological neurons with an artificial neuron model. **[8]**

b) State the algorithm for self Organized feature Map network. **[5]**

c) Describe how a neuron is trained using Hebb's learning rule? **[4]**

OR

Q4) a) Compare perceptron with McCulloch-Pitts (M.P.) neuron. **[7]**

b) Design a Hebb net to implement logical AND function (Use Bipolar inputs and targets). **[5]**

c) Design a Hebb net to implement logical OR function (Use Bipolar inputs and targets). **[5]**

P.T.O.

Q5) a) What is radial basis function network? Explain with architecture. **[9]**

b) What is the significance of bias in perceptron networks? With suitable example, elaborate effect of bias on training time and testing accuracy. **[9]**

OR

Q6) a) Describe the Back propagation algorithm with the help of suitable example. **[9]**

b) Compare RBFN with MLP. State four applications of RBFN. **[9]**

Q7) a) What are the challenges in conventional machine learning? How they are overcome in deep machine learning techniques? **[9]**

b) With reference to convolution layer of CNN explain **[9]**

i) Padding

ii) Stride

And give the relation of stride, padding and filter size with width and height of convolution layer output.

OR

Q8) a) Why pooling layer is used in CNN architecture? Explain with suitable example, **[9]**

i) Max

ii) Min and

iii) Average pooling technique

b) What is convolution? Explain 2D convolution process with suitable example? How 2D convolution is used in 3D filtering in Convolution Neural networks? **[9]**

Total No. of Questions : 10]

SEAT No. : ____

P2937

[Total No. of Pages : 2

[6004]-878

B.E. (E & TC)

PLCS & AUTOMATION

(2015 Pattern) (Semester-II) (Elective-III) (404191 B) (Theory)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Figures to the right indicate full marks.***

Q1) a) Explain the servomechanism in detail. **[5]**

b) Explain the DPT with it's applications. **[5]**

OR

Q2) a) Discuss about the effect of modern developments in automation on global competitiveness. **[5]**

b) Write short note on control system stability. **[5]**

Q3) a) Explain cascade control in detail. **[5]**

b) Explain electrical signal transmission system along with advantages. **[5]**

OR

Q4) a) Explain with neat diagram stepper motor as an actuator. **[5]**

b) Explain PID control along with suitable ckt diagram. **[5]**

Q5) a) Explain the following terms with respect to PLC **[8]**

i) Input scan time

ii) Output scan time

iii) Timers

iv) Counters

P.T.O.

b) Draw a ladder diagram for a two-motor system having the following conditions. **[10]**

The START push button starts motor 1;10 sec later motor 2 will start, the STOP push button stops motor; 15 secs later motor 2 stops.

OR

Q6) a) Explain the selection criteria of PLC **[8]**

b) Explain 4:1 multiplexer using ladder diagram. Assume the inputs are connected to I_1, I_2, I_3, and I_4; control signls are connected to I_5 & I_6 and the output terminal is 01. **[10]**

Q7) a) Explain MTU and RTU along with their functions. **[8]**

b) Explain the architecture of DCS in detail. **[8]**

OR

Q8) a) Explain the elements of SCADA. **[8]**

b) Compare PLC & SCADA. **[8]**

Q9) a) Explain CNC machine along with the advantages and applications. **[8]**

b) Write short note on **[8]**

i) CAN bus

ii) Ethernet

OR

Q10)a) What is the role of panel Engineering in automation? **[8]**

b) Write short note on **[8]**

i) Foundation field bus

ii) TCP/IP protocol

❖ ❖ ❖

Total No. of Questions : 8]

SEAT No. :

P2938

[Total No. of Pages : 2

[6004]-879

B.E. (E & TC)

AUDIO AND SPEECH PROCESSING

(2015 Pattern) (Semester-II) (Elective-III) (404191C)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data, if necessary.***

Q1) a) Explain vowel perception and consonant perception in detail. **[8]**

b) Explain the functions of outer ear, middle ear and inner ear in brief. **[6]**

c) Explain the Autocorrelation method to estimate the Pitch of speech of the signal. **[6]**

OR

Q2) a) Write the expression to compute short time energy and Zero crossing rate? How these parameters are used for classification of voiced, unvoiced and silence speech segments. **[8]**

b) What is the difference between stops, affricates and fricatives (with speech production perspective). Give suitable example. **[6]**

c) Explain the terms: **[6]**

i) Spectral flux,

ii) Spectral roll-off and

iii) Spectral centroid

Q3) a) Explain the algorithm for the computation of MFCC. **[8]**

b) Explain Durbin's recursive solution for the computation of LPC coefficients with suitable example. **[8]**

OR

Q4) a) Explain the method of computation of pitch and formants using cepstral analysis. **[8]**

b) What is the difference between autocorrelation method and covariance method for the computation of LPC parameters. How to select number of formants? **[8]**

P.T.O.

Q5) a) Explain with block diagram channel vocoder and phase vocoder. **[8]**

b) Compare PCM, DPCM and DM. Comment on data rate and SNR. **[8]**

OR

Q6) a) Explain Adaptive Transform Coding (ATC). **[8]**

b) Explain Filter bank analysis of speech signal and further explain sub-band speech coding. **[8]**

Q7) a) Explain various features used for speaker recognition. Explain how these features are suitable for speaker recognition. **[9]**

b) Explain GMM based statistical acoustic modelling of speech signal. Explain with example how this statistical framework is used for ASR. **[9]**

OR

Q8) a) Explain phoneme based text to speech synthesis. What are the different aspects those should be considered to make synthesized speech close to natural speech? **[9]**

b) Explain in detail various temporal and spectral features used for musical instruments classification. **[9]**

❖ ❖ ❖

Total No. of Questions : 10]

SEAT No. :

P2939

[Total No. of Pages : 2

[6004]-881
B.E. (Electronics & Telecommunication)
AUDIO VIDEO ENGINEERING
(2015 Pattern) (Semester - II) (Elective - III) (404191E)

Time : 2 Hour] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q8 ,Q9 or Q10.***
2) ***Draw neat diagrams wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Draw the block diagram of NTSC encoder and explain function of eachblock. **[5]**

b) Compare PAL, NTSC and SECAM colour TV systems. **[5]**

OR

Q2) a) Draw a detailed composite video signal with all details. **[5]**

b) Explain CCIR - B standard in detail. **[5]**

Q3) a) Draw and explain a digital TV colour receiver. **[5]**

b) Draw a neat block diagram of HDTV transmitter & explain the function of each block. **[5]**

OR

Q4) a) Write a short note on LED and LCD display devices. **[5]**

b) Explain lossy and lossless compression. Which compression is preferred for video and why? **[5]**

Q5) a) Explain wi - fi TV with relevant block diagram. **[8]**

b) With the suitable block diagram explain IPTV system. List its applications. **[8]**

OR

P.T.O.

Q6) a) Compare IP TV and internet TV. **[8]**

b) Select the suitable cameras and their placements for the Digital broadcasting of Cricket match. **[8]**

Q7) a) Write short note on MPEG 2 standard. **[8]**

b) Explain Principles of DVR. How it is differing from VCR. Compare DVR and VCR. **[10]**

OR

Q8) a) Draw the block diagram fo disc recording and reproducing system and expalin the function of each block. **[10]**

b) Write short note on Blue Ray DVD player. **[8]**

Q9) a) Define Absorption coefficient & studio acoustics? What are the factors on which reverberation time depends? **[8]**

b) Explain the requirement for a good auditorium for pleasant listening. Discuss salient features of acoustical design for an auditorium. **[8]**

OR

Q10)a) Discuss acoustic chamber in detail. **[8]**

b) Draw the block diagram of PA system and explain. **[8]**

Total No. of Questions: 10]

SEAT No. : ____

P2940

[Total No. of Pages : 3

[6004]-882
B.E. (Electronics & Telecommunication)
ROBOTICS
(2015 Pattern) (Semester-II) (Elective-IV) (404192A)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain the following terms with respect to robots: **[5]**

i) Degree of Freedom

ii) Work envelop

iii) Payload

iv) Repeatability

v) precision.

b) Discuss in detail any two industrial applications of the robots. **[5]**

OR

Q2) a) Darw and Explain basic building blocks of a robotic system. **[6]**

b) Write in detail the role of actuator in a robot. **[4]**

Q3) a) Explain the importance of gripper and explain following types of gripers. **[4]**

i) vacuum type

ii) Magnetic type

b) List types of end effector. Explain the selection criterion for each type for various applications? **[6]**

OR

Q4) a) Explain the Pneumatically controlled prismatic joint with help of neat sketch. **[6]**

b) Compare different drive systems used in robotics? **[4]**

P.T.O.

Q5) a) Write note on direct kinematics and inverse kinematics problems. **[8]**

b) Explain following terms with neat sketch neat Joint & link:

i) Joint angle

ii) Joint distance

iii) Link length

iv) Link twist angle

Name the variable parameters for the revolute and prismatic joints. **[8]**

OR

Q6) a) Define following terms: **[8]**

i) Static force

ii) Moment Transformation

iii) Solvability

iv) Stiffness

b) What do you understand by link inertia tensor and manipulator inertia tensor? **[8]**

Q7) a) Write note on Different feedback sensors used in robotics. **[8]**

b) How does line follower robot works. Write any one line following algorithm detail.? **[8]**

OR

Q8) a) What are the recent advances in the field of robotics? What are the challenges in this field? **[8]**

b) Explain and compare different methods of Robot Programming? **[8]**

Q9) a) Draw & Explain the Role of Robots in material handling and assembly? **[8]**

b) Explain the term Work envelop & Work Volume Draw Work envelop For the following types of robot **[6]**

i) Cartesian robot

ii) Cylindrical robot?

c) Write short notes on Human Robot Interaction? **[4]**

OR

Q10)a) Write short note on applications of vision controlled robotics system? **[8]**

b) Draw & Describe giving appropriate examples how robots can be used for material handling and assembly? **[10]**

Total No. of Questions: 8]

SEAT No. : ____

P2941

[Total No. of Pages : 2

[6004]-884
B.E. (E&TC)
WIRELESS SENSOR NETWORKS
(2015 Pattern) (Semester-II) (Elective-IV) (404192C)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right side indicate full marks.***

Q1) a) What are the design constraints and challenges of WSN? Explain in brief. **[6]**

b) What are the challenges faced by 6 LOWPAN protocol and how they can be overcome? **[6]**

c) Explain the role of MAC protocol state and explain the design criteria for MAC Protocols. **[8]**

OR

Q2) a) Explain backward error control and forward error control with the help of neat diagrams. **[8]**

b) Explain various properties of wireless links. **[6]**

c) Compare Zigbee with Bluetooth protocol. **[6]**

Q3) a) What are the challenges in localization? **[6]**

b) Write a short note on Geographical clustering and random clustering. **[6]**

c) What is meant by full network broadcost? **[4]**

OR

Q4) a) Explain directed diffusion in WSN. **[6]**

b) What is meant by “hop based” rounting? what are its advantages? **[6]**

c) What are routing challenges in WSN? **[4]**

P.T.O.

Q5) a) What is data aggregation in WSN? What are its advantages? **[10]**

b) Explain compressive sampling in detail. **[8]**

OR

Q6) a) List various attacks that are possible in WSN. Explain any two of them in detail. **[10]**

b) Explain security issues in WSN. **[8]**

Q7) a) What are general problems for deploying WSN applications? **[8]**

b) Write a short note on Early WSN deployments. **[8]**

OR

Q8) a) Explain top down design approach in design of WSN. **[8]**

b) What is tasting and validation in WSN application? **[8]**

Total No. of Questions: 10]

SEAT No. : ____

P2942

[Total No. of Pages : 2

[6004]-885
B.E. (E&TC)
RENEWABLE ENERGY SYSTEMS
(2015 Pattern) (Semester-II) (Elective-IV) (404192 D)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, & Q.3 or Q.4, & Q.5 or Q.6, & Q.7 or Q.8, & Q.9 or Q.10.***
2) ***Figures to the right side indicate full marks.***
3) ***Draw neat diagram wherver necessary.***
4) ***Assume suitable data, if necessary.***

Q1) a) Briefly write about different forms of energy. **[6]**

b) Explain spectral distribution of extra-terrestrial radiation and terrestrial Solar Radiation with schematics. **[4]**

OR

Q2) a) Define Co-generation and explain how it deals with topping and bottoming cycle. **[6]**

b) Write note on biofuels and fuel cells. **[4]**

Q3) a) Explain different types of photovoltaic cells. **[6]**

b) Explain with diagram operation of solar cooker. **[4]**

OR

Q4) a) Explain types of Solar Thermal collector and compare them. **[6]**

b) Explain current voltage characteristics of solar cell. Also define Fill factor. **[4]**

Q5) a) List different modes of wind power generation and explain any one in detail. **[8]**

b) Explain following: **[4]**

i) Camber

ii) Nacelle

ii) Chord line

iv) Yaw control

c) Write a note on wind energy extraction. **[4]**

OR

P.T.O.

Q6) a) How much energy can be extracted from the wind? Give the detailed analysis with power coefficient and available efficiency. **[8]**

b) Explain power density duration curve. **[4]**

c) With the help of neat sketch, explain different types of rotors used in wind turbines. **[4]**

Q7) a) List the types of Geothermal Energy resources and explain any 2 in detail. **[8]**

b) What are the main applications of Geothermal Energy? **[4]**

c) Explain the basic principle of Ocean thermal energy conversion. **[4]**

OR

Q8) a) Write short notes on Tidal Energy and Ocean Energy **[8]**

b) What are the advantages of Geothermal Energy? **[4]**

c) Explain tidal characteristic which helps to generate tidal energy? **[4]**

Q9) a) List different types of fuel cell. Explain any two in detail. **[8]**

b) List different types of fuel cell. Explain any one in detail. **[6]**

c) Write a note on fuel processor. **[4]**

OR

Q10)a) Define Fuel Cell. Explain Principle of operation of acidic fuel cell. **[8]**

b) Compare acidic and alkaline Hydrogen-Oxygen fuel cells. **[6]**

c) Explain efficiency and emf of fuel cell with equation. **[4]**

Total No. of Questions: 10]

SEAT No. : ____

P2943

[Total No. of Pages : 2

[6004]-889
B.E. (E & TC)
DATA SCIENCE AND ANALYTICS
(2015 Pattern) (Semester-II) (Open Elective) (404192DD)

Time : 2½ Hours] ***[Max. Marks : 70***

Q1) a) What is use of views in data base? Explain when view becomes updatable. **[6]**

b) Explain assertion in data base with suitable example. **[4]**

OR

Q2) a) Enlist and explain business drivers used for analytics. **[6]**

b) Compare SQL and NOSQL with suitable examples. **[4]**

Q3) a) Discuss different types of cursors Explain at least two in detail. **[6]**

b) Enlist and explain different application of by data. **[4]**

OR

Q4) a) Describe the architecture of Business intelligence. **[6]**

b) Enlist data models types Explain any two in detail. **[4]**

Q5) a) Discuss key roles for succesful Analytic Projects. **[9]**

b) Discuss model buildings & Planning with suitable diagram. **[9]**

OR

Q6) a) What are different phases of data Analytic life cycle. **[9]**

b) What is operationalization? Explain in deteil. **[9]**

P.T.O.

Q7) a) Discuss GuI of R-Programming. **[8]**

b) What are different Generic function available in R-Programming? Discuss atleast two functions in detail. **[8]**

OR

Q8) a) Which basic operations can do on data using R-programming? Explain any two operations. **[8]**

b) Explain data oisualization in details with suitable code. **[8]**

Q9) a) What Linear regression? Explain with sutable example. **[8]**

b) Explain maive Bayesian classifier with example. **[8]**

OR

Q10)a) Discuss data visualisation in detail with example. **[8]**

b) Enlist types of data in R-programming Explain any one. **[8]**

Total No. of Questions : 10]

SEAT No. :

P-2944

[Total No. of Pages : 2

[6004]-890

B.E. (Information Technology)

INFORMATION AND CYBER SECURITY

(2015 Pattern) (Semester - I) (414453)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Differentiate active and passive attacks and briefly explain the examples of each. **[4]**

b) With a neat diagram explain encryption using DES algorithm. **[6]**

OR

Q2) a) What are the three requirements to be satisfied by cryptographic hash function? **[6]**

b) How does Intrusion detection system provide Security? What are types of IDS? **[4]**

Q3) a) Explain encryption using AES algorithm with neat diagram. **[7]**

b) Which Security goals are achieved with Digital signatures? **[3]**

OR

Q4) a) Discuss modes of IPSec Protocol AH and ESP. **[6]**

b) What is S/MIME and how does it work? **[4]**

P.T.O.

Q5) a) What are the objectives, Pros and Cons of Qualitative and Quantitative risk assessment? **[8]**

b) What are the four-risk control strategies in Information security? **[8]**

OR

Q6) a) What are the steps in the Risk management cycle? **[8]**

b) State the ten commandments of computer ethics. **[8]**

Q7) a) What are important points to ensure cloud security? **[8]**

b) Discuss cyber terrorism as a cyber-threat. What is the motivation for Cyber Terrorism? **[8]**

OR

Q8) a) Classify Cybercrimes and explain each with examples. **[8]**

b) Write a short note on Indian Legal Perspective on cybercrime. **[8]**

Q9) a) What are viruses and worms? State types of viruses. **[10]**

b) State advantage of Proxy servers and disadvantage of anonymiser. **[8]**

OR

Q10)a) Explain types of DoS attacks. What is difference between DoS and DDoS attack. **[10]**

b) Write a note on Digital Signatures as per Indian IT Act. **[8]**

Total No. of Questions: 10]

SEAT No. : ____

P2945

[Total No. of Pages : 2

[6004]-900
B.E. (Informatin Technology)
SOFTWARE TESTING & QUALITY ASSURANCE
(2019 Pattern) (Semester-I) (Elective-II) (414457 C)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherevr Necessary.***
3) ***Figures to the righr side indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) What are various tesing principles? **[6]**

b) Explain the difference between errors, faults & failures **[4]**

OR

Q2) a) Explain the difference between random testing & testing using error guessing. **[6]**

b) Discuss Defect removal effectiveness. **[4]**

Q3) a) Explain role of process in software quality. **[5]**

b) Write a short note on Test case design using white box. **[5]**

OR

Q4) a) Explain Total quality Management. **[5]**

b) What is test automation? Explain scope of automation **[5]**

Q5) a) Explain planning for software quality assurance w.r.t. to your final year project. **[8]**

b) Define SQA & Explain SQA Components **[8]**

OR

P.T.O.

Q6) a) Explain Product Quality Models **[8]**

i) McCall's model

ii) Dromey's Model

b) Explain various components of the software quality assurance system. **[8]**

Q7) a) Explain 7 Quality management Principles of ISO 9000 series in detail. **[8]**

b) Explain the model for process management? What are it uses? **[8]**

OR

Q8) a) Write a note on P-CMM. **[8]**

b) What is TMM? Explain various levels & benefits of TMM. **[8]**

Q9) a) Explain Case Tools, Also explain their effect on Softare Quality. **[8]**

b) Explain other techniques for defect preventioin. **[10]**

OR

Q10)a) Explain in detail walk through as a type of formal technical review. **[10]**

b) Consider online banking system, state and inject 5 defect in the system which will cause flaw in the system and suggest it's preventive measures. **[8]**

Total No. of Questions : 10]

SEAT No. :

P-2946

[Total No. of Pages : 3

[6004]-903

B.E. (Semester - II)

INFORMATION TECHNOLOGY

Distributed Computing System

(2015 Pattern) (414462)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

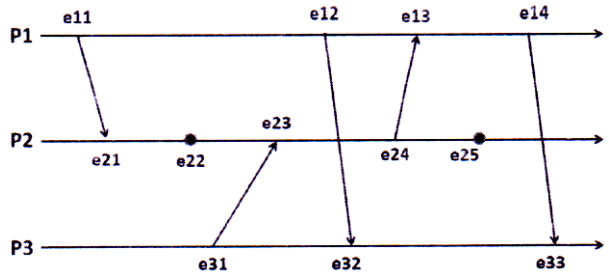
1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data wherever necessary.***

Q1) a) Illustrate with an example how distributed applications are organized in logical layers. **[6]**

b) Define Distributed System. Discuss the characteristic features of Distributed Systems. **[4]**

OR

Q2) a) Consider the following event diagram for processes P1, P2, and P3 executing in a distributed system. Compute the vector clock that is carried on each message. **[6]**



b) List the assumptions and describe the working of the Ring algorithm for coordinator election. **[4]**

P.T.O.

Q3) a) Using finite state diagrams for the coordinator and the participant, describe the two- phase commit protocol. **[6]**

b) Define Orphan Computation. Discuss any two solutions to handle orphan computations in RPC. **[4]**

OR

Q4) a) Illustrate with a diagram the sequence of operations at the server and client during the establishment of a communication channel using TCP/IP. **[6]**

b) Discuss any two types of leases used for propagating update operations to the replicas. **[4]**

Q5) a) Explain how NFS accomplished the following design goals: **[8]**

i) Access transparency

ii) Location transparency

iii) Mobility transparency

iv) File replication

b) Explain the 3 types of synchronization required by distributed multimedia applications: i) synchronous distributed state ii) media synchronization & iii) external synchronization. Also, briefly describe two examples of multimedia applications deployed in a modern environment. **[8]**

OR

Q6) a) What is the quality-of-service management in multimedia applications? Describe the QoS manager's two main subtasks in brief. **[8]**

b) Outline the architecture of X.500 application-level directory service standard. Discuss the reasons behind the popularity of LDAP specification over X.500? **[8]**

Q7) a) Describe diagrammatically the general organization of the Apache web server. **[8]**

b) What is the standard communication protocol for Web services? Explain the building blocks of XML-based SOAP message with an example.**[8]**

OR

Q8) a) What are Web Server Clusters? Explain the content-aware cluster of web servers with a neat diagram. **[8]**

b) What is the standard communication protocol for Traditional Web applications? Explain the following with respect to HTTP : **[8]**

i) HTTP Connection

ii) HTTP Methods.

Q9) a) What is Cryptography? Write a short note on the Asymmetric algorithms. **[9]**

b) What do you mean by public-key Cryptography? Explain Digital Signatures with public keys. **[9]**

OR

Q10)a) Explain in detail the process architecture of KERBEROS with a diagram. **[9]**

b) Explain in brief, the use of Cryptography in the implementation of : **[9]**

i) Secrecy and integrity

ii) Authentication

iii) Digital Signature.

Total No. of Questions :10]

SEAT No.

P-2947

[Total No. of Pages :2

[6004]-904
B.E. (Information Technology)
UBIQUITOUS COMPUTING
(2015 Pattern) (Semester-II) (414463)

Time : 2 ½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) List and describe the features of ubiquitous computing. **[5]**

b) What is pervasive computing? Discuss its properties. **[5]**

OR

Q2) a) Explain the types of environment context associated with UbiComp. **[5]**

b) What is micro-actuation and sensing (MEMS)? **[5]**

Q3) a) With the context of CPI and CCI explain smart devices. **[5]**

b) Explain Mobile Transparent Computing (MTC) and its role in UbiComp. **[5]**

OR

Q4) a) What is proxy-based service access and write its limitations? **[5]**

b) Classify and explain any three types of robots. **[5]**

Q5) a) Explain with diagram the human entered design lifecycle. **[8]**

b) List out all handling limited key input and explain it in detail. **[8]**

OR

P.T.O.

Q6) a) Write short note on **[9]**

i) Multi-modal visual interface

ii) Gesture interface

iii) Tangible interface

b) Describe user models and its acquisition and representation. **[7]**

Q7) a) What are different ways of addressing privacy in ubiquitous system? **[8]**

b) Explain solov's taxonomy of privacy with diagram. **[8]**

OR

Q8) a) Describe all privacy difficulties and challenges of RFID tag. **[8]**

b) Describe all challenges to privacy for ubiquitous computing. **[8]**

Q9) a) Write short note on **[12]**

i) Network protocol suits

ii) Routing and inter-networking

iii) PSTN voice network

iv) Configuration management

b) Describe service oriented network with its types? **[6]**

OR

Q10)a) Write short note on **[12]**

i) Personal area network

ii) Body area network

iii) Context Awareness

b) Explain mesh network and overlay network with diagram. **[6]**

Total No. of Questions : 10]

SEAT No. :

P-2948

[Total No. of Pages : 2

[6004]-905

B.E. (Information Technology)

INTERNET OF THINGS (IOT)

(2015 Pattern) (Semester - II) (Elective - III) (414464A)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) List various communication model. Explain Publish - Subscribe Model in detail. **[5]**

b) Which different Sensors are used in a Smart Phone? Explain their use. **[5]**

OR

Q2) a) What is sensor? How sensors are classified? Explain active and passive sensors? **[5]**

b) Explain Network Function Virtualization (NFV) with its diagram. **[5]**

Q3) a) What is M2M? Explain M2M Gateway. **[5]**

b) Which components are involved in Smart Object? Explain smart object in detail. **[5]**

OR

Q4) a) What kind of services Service Layer will provide in M2M IoT Standardized Architecture? **[5]**

b) List various IoT Access Technologies. Explain IEEE 802.15.4g and IEEE 802.15.4e. **[5]**

P.T.O.

Q5) a) Compare IPv4 and IPv6 addresses. Also explain IPv6 address space. **[8]**

b) Explain IPv6 Tunneling in details. **[8]**

OR

Q6) a) List and explain various IPv6 protocols with current version. **[8]**

b) Explain in detail Quality of Service in IPv6. **[8]**

Q7) a) Write a python code for measuring environmental parameters with the help of interfacing diagram. **[8]**

b) What is an IoT Device? Explain using block diagram. **[8]**

OR

Q8) a) Write a python code for traffic signal light controlling with the help of interfacing diagram. **[8]**

b) What are the different IoT Devices other than Rapsberry Pi? List various OS used on Raspberry Pi. **[8]**

Q9) a) What is WAMP - AutoBahn for IoT? Explain sub-protocols of web socket with its components in detail. **[10]**

b) Justify how SkyNet IoT Messaging Platform is different from other. **[8]**

OR

Q10)a) Explain Amazon S3, RDS and DynamoDB w.r.t. Home Automation. **[10]**

b) How smart city application can be divided in various small IoT application? Explain them shortly. **[8]**

Total No. of Questions : 10]

SEAT No. :

P-2949

[Total No. of Pages : 2

[6004]-906

B.E. (Information Technology)

Information Storage and Retrieval

(2015 Pattern) (Semester - II) (414464B) (Elective - III)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right side indicate full marks.***
3) ***Assume Suitable data if necessary***

Q1) a) Explain steps in conflation algorithm using a suitable example. **[6]**

b) Draw and explain IR system block diagram. **[4]**

OR

Q2) a) Differentiate between data retrieval and information retrieval. **[6]**

b) Explain the terms Harmonic mean, E measure. **[4]**

Q3) a) Explain single pass algorithm with example. **[6]**

b) Define and explain following terms - Precision & Recall. **[4]**

OR

Q4) a) Compare Neural network-based retrieval and Fuzzy set retrieval methods. **[6]**

b) Define and explain following terms : **[4]**

i) MRR ii) NDCG

Q5) a) Describe the architecture of distributed IR. **[9]**

b) What do you understand by multimedia query language? Explain various query predictors. **[9]**

OR

Q6) a) Describe multimedia, data support in commercial DBMS. **[9]**

b) What do you mean by source selection and collection partition in distributed IR.? **[9]**

P.T.O.

Q7) a) Explain centralized and distributed architecture of a search engine. **[8]**

b) What is page ranking? Explain with example how to calculate page rank of web page. **[8]**

OR

Q8) a) Discuss challenges involved in web searching. **[8]**

b) Write short note on web data mining. **[8]**

Q9) a) Write a note on 'Ontology languages for semantic web'. **[8]**

b) Define Recommender system? Explain in brief collaborative filtering. **[8]**

OR

Q10) a) What is collaborative filtering? Discuss its advantages and disadvantages. **[8]**

b) Explain the methods for extracting data from text. **[8]**

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Total No. of Questions : 10]

SEAT No. :

P-2950

[Total No. of Pages : 2

[6004]-908

B.E. (Information Technology)

INTERNET AND WEB PROGRAMMING (Elective - III)

(2015 Pattern) (Semester - II) (414464D)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Answers: Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Draw and explain Servlet life cycle. **[6]**

b) List and explain CSS Selector with example. **[4]**

OR

Q2) a) Explain GET and POST method variable in PHP. **[6]**

b) Explain working of AJAX with diagram. **[4]**

Q3) a) What are different selectors in jQuery? Explain them. **[6]**

b) What is the difference between JavaScript and jQuery? **[4]**

OR

Q4) a) How to create array in java script? Explain with example. **[6]**

b) How to embed audio and video tag in HTML5 explain with example? **[4]**

Q5) a) What is Joomla? Explain in detail Joomla Control Panel. **[8]**

b) What is Spring technology? List and explain the advantages of Spring. **[8]**

OR

P.T.O.

Q6) a) What is Java Server Faces (JSF) Technology? Explain steps to create a simple JSF Application. **[8]**

b) What is loop in WordPress and how it works? Explain with an example. **[8]**

Q7) a) What is jQuery Mobile? How to implement jQuery mobile. **[8]**

b) Explain how to write headers and footers in jQuery Mobile. **[8]**

OR

Q8) a) List and explain limitations of Mobile Web. **[8]**

b) List and explain different Events in jQuery Mobile. **[8]**

Q9) a) What is SQL Injection? How to mitigate the SQL Injection risks? **[6]**

b) List and explain the methods used to make information on the web more secure? **[6]**

c) Differentiate user level security with server level security. **[6]**

OR

Q10)a) Explain helper applications in browser. Give the steps of configuring helper application for Netscape. **[6]**

b) What are the cyber ethics? List and explain in detail issues in cyber ethics. **[6]**

c) What are the most important steps you would recommend for securing a new web server and web application? **[6]**

Total No. of Questions : 10]

SEAT No. :

P-2951

[Total No. of Pages : 2

[6004]-913

B.E. (Information Technology)

SOCIAL MEDIA ANALYTICS

(2015 Pattern) (Semester - II) (414465-D) (Elective - IV)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of calculator is allowed***
5) ***Assume Suitable data if necessary***

Q1) a) Explain any two methods to gather social media data. **[5]**

b) Explain Estimated Data sources and Factual Data Sources. **[5]**

OR

Q2) a) Explain semantic and temporal visualization. **[5]**

b) Write a short note on Ontology based visualization. **[5]**

Q3) a) What do you mean by Sampling for Social Networks data? What is the need for sampling? **[5]**

b) What is visualization? State its importance in social media. **[5]**

OR

Q4) a) Explain k-means clustering Algorithm with example. **[5]**

b) Explain any two text mining tools. **[5]**

Q5) a) Explain Social Balance Theory and Social Status Theory. **[8]**

b) Explain Structural Equivalence and Regular Equivalence with example. **[8]**

P.T.O.

OR

Q6) a) What is Similarity? Explain network and content Similarity. **[8]**

b) Explain Transitivity and Reciprocity with example. **[8]**

Q7) a) Explain in short (i) user activity on one site, (ii) user network size and (iii) user rank. **[8]**

b) What is User Migration in Social Media? Explain types of Migration. **[8]**

OR

Q8) a) Explain the four real-world behaviors that are commonly difficult to observe in social media like your daily schedule or where you eat lunch are rarely available in social media. **[8]**

b) What is Individual Behavior Modeling? Explain Threshold models and Cascade Models. **[8]**

Q9) a) Explain Visualizing Frequency Data with Histograms in Twitter. **[9]**

b) Explain Analyzing mutual friendships with directed graphs in Facebook. **[9]**

OR

Q10)a) Explain an Analyzing the 140 Characters in Twitter. **[9]**

b) Explain Analyzing Social Graph Connections in Facebook with example. **[9]**

Total No. of Questions : 8]

SEAT No. :

P-2952

[Total No. of Pages : 2

[6004]-927

B.E. (Instrumentation & Control)

PROCESS INSTRUMENTATION

(2015 Pattern) (Semester - II) (406268)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3,Q4,Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***
5) ***Use of calculator is allowed.***

Q1) Design Feed-forward control strategy for Steam heater. Also, suggest solution to improve the performance. **[10]**

OR

Q2) Suggest and develop suitable control strategy to overcome inverse response in boiler level control. **[10]**

Q3) State importance of reflux ratio in distillation column. Develop cascade control strategy for composition control of bottoms product. **[10]**

OR

Q4) a) Determine DOF for Liquid to liquid heat exchanger and steam heater. **[6]**

b) State and justify fail safe action of control valve for heating and cooling application. **[4]**

Q5) a) Develop feedback control strategy for composition control of product in single effect evaporators. **[8]**

b) What are objectives of dryers? Comment on characteristics of dryers. **[8]**

OR

P.T.O.

Q6) a) Develop feedback control strategy for density control of products in multi-effect evaporators. **[8]**

b) Develop feedback control strategy for temperature control in rotory dryers. **[8]**

Q7) a) Develop selective control strategy for reactors. **[10]**

b) Develop end point detection control strategy for Batch Reactor. **[8]**

OR

Q8) a) Design cascade control strategy for maintaining product composition in reactors. **[10]**

b) Develop feedback control strategy for composition and temperature control in endothermic reactors. **[8]**

Q9) a) Develop ON-OFF control for reciprocating compressor. **[8]**

b) Comment on start/stop sequence in pumps. **[8]**

OR

Q10)a) Develop override control in compressors considering the protection of the equipment. **[10]**

b) Explain in detail basic controls used in pump. **[6]**

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Total No. of Questions :10]

SEAT No.

P-2953

[Total No. of Pages :2

[6004]-928

B.E. (Instrumentation &Control)

INDUSTRIA LAUTOMATION

(2015 Pattern) (Semester-II) (406269)

Time : 2 ½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.*
2) *Figures to the right side indicate full marks.*

Q1) a) Explain the need of automation in society. **[6]**

b) Explain various types of automation with examples. **[4]**

OR

Q2) a) Explain various types of action qualifier in SFC. **[4]**

b) Explain the SFC programming language with real time example. **[6]**

Q3) a) Discuss the frame structure of HART protocol. **[5]**

b) Explain the architecture of PLC. **[5]**

OR

Q4) a) How PLC intertaces in SCADA/DCS using Rs 232/485. **[5]**

b) Explain H1 field bus. **[5]**

Q5) a) Assume suitable data & develop a SCADA system for any process. **[10]**

b) Explain the functions of SCADA using example for each. **[6]**

OR

Q6) a) Discuss role of protocols in SCADA system. **[8]**

b) List & Explain the objectives of SCADA. **[8]**

P.T.O.

Q7) a) List & explain minimum eight specification of DCS of any make. **[8]**

b) Explain the evolution of DCS. **[10]**

OR

Q8) a) Explain the concept of database management system. **[8]**

b) Explain the general architecture of DCS. **[10]**

Q9) a) Discuss procedure for developing PHA documents. **[6]**

b) Explain different protection layers as per IEC 61511. **[10]**

OR

Q10)Write notes on (any two) **[16]**

a) Safety instrumented system.

b) Consequence & Risk.

c) Safety life cycle.

Total No. of Questions : 10]

SEAT No. :

P-2954

[Total No. of Pages : 2

[6004]-929

B.E. (Instrumentation and Control)

BUILDING AUTOMATION

(2015 Pattern) (Semester - II) (406270 A) (Elective - III)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume suitable data, if necessary.***

Q1) a) Define Intelligent Building. Discuss the architecture of IBMS. **[5]**

b) Describe heating, cooling, humidification and dehumidification related to comfort environment. **[5]**

OR

Q2) a) Why building automation needed? Justify your answer. **[5]**

b) Compare BAC net with Modbus. **[5]**

Q3) a) Justify the functions of each component in the AHU. **[5]**

b) Describe Run Around Coil and Thermal wheel in AHU? **[5]**

OR

Q4) a) Discuss the benefits of having IBMS. **[5]**

b) Discuss sensible heat, latent heat, enthalpy, dry bulb and wet-bulb temperature. **[5]**

Q5) a) Describe concept and absorption chillers. **[8]**

b) Describe concept of heat pump with example. **[8]**

OR

Q6) a) Discuss working of different components of chilled water system such as decoupler line, bypass line, primary circuit, secondary circuit, and condenser pumps. **[8]**

b) Illustrate working and design of different types of heat exchanger. **[8]**

P.T.O.

Q7) a) Discuss important codes like as NFPA72, IS 2189, BS 5839 in FAS. **[8]**

b) Describe the concept of addressable fire alarm systems. **[10]**

OR

Q8) a) Discuss the concepts of VESDA. **[8]**

b) Describe various components of fire detection system. **[10]**

Q9) a) What is ACS? Describe its benefits. **[8]**

b) Explain architecture of CCTV system with components and importance. **[8]**

OR

Q10) a) Discuss secure and nonsecure concept. **[8]**

b) Explain Antipass back, Forgiveness, Two-man rule, time & attendance, guard tour, elevator control in ACS. **[8]**

▽▽▽▽

Total No. of Questions : 10]

SEAT No. :

P-2955

[Total No. of Pages : 2

[6004]-935

B.E. (Instrumentation & Control)

RENEWABLE ENERGY SYSTEM (Elective - IV)

(2015 Pattern) (Semester - II) (406271B)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Answers Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Elaborate on the working of wind renewable system with diagram. **[6]**

b) Compare renewable and nonrenewable energy system. **[4]**

OR

Q2) a) Explain the Structure of Solar panel with diagram. **[6]**

b) Define the following terms related to the battery: Battery Voltage, Charge Storage Capacity. List the various parameters of battery. **[4]**

Q3) a) Draw and explain the working of Lithium Ion battery. **[6]**

b) Define the following terms related to Photo voltaic cell: Short circuit current, Open circuit Voltage. Draw I-V curve of Solar cell. **[4]**

OR

Q4) a) Explain the working of Fly wheel with neat diagram. **[6]**

b) Elaborate on the charging technique for batteries. **[4]**

Q5) a) What is MPPT Tracker? With the help of neat diagram, Elaborate the working of MPPT Equipment. **[10]**

b) Draw and explain the working of Series and Parallel operation of Solar Panels. State the advantage of Series and Parallel connection of Solar Panel. **[8]**

P.T.O.

OR

Q6) a) What is solar panel? How solar panel is manufactured from solar cell? Elaborate on the Solar Panel selection and array design. **[10]**

b) With a block diagram, explain the working of Isolated Solar Photovoltaic system. **[8]**

Q7) a) Explain the working of Solar cooker with neat diagram. **[8]**

b) Draw and explain the working of solar electric vehicles with neat diagram **[8]**

OR

Q8) a) Explain the working of Solar street lamp with neat diagram. **[8]**

b) Elaborate on the working of solar water heater system with neat diagram. **[8]**

Q9) a) Describe the wind energy conversion technology with neat diagram brief. **[8]**

b) Draw and explain the working of Wind plus conventional hybrid wind energy system. **[8]**

OR

Q10)a) Describe the concept of Wind farm. **[8]**

b) Elaborate on the Wind Resource Assessment. **[8]**

Total No. of Questions : 10]

SEAT No. :

P-2956

[Total No. of Pages : 2

[6004]-936

B.E. (Instrumentation and Control)

INSTRUMENTATION IN AGRICULTURE AND FOOD INDUSTRIES

(2015 Pattern) (Semester - II) (406271C) (Elective - IV)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Figures to right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Use of calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Which sensors are available for Humidity measurement? Explain the working of dry bulb and wet bulb type Hygrometer. **[5]**

b) What is Hair Hygrometer? Draw a suitable diagram of it and explain the working? **[5]**

OR

Q2) a) Represent a typical dairy plant with flow diagram? Enlist the parts/ components used in it? Explain in short? **[5]**

b) Represent a Juice extraction plant with a process flow diagram? **[5]**

Q3) a) We have to develop agro metrological parameters monitoring at a weather station. Suggest and list the suitable sensors. Draw a block diagram of it and explain its working? **[5]**

b) Differentiate between Overhead and Micro Irrigation systems? **[5]**

OR

Q4) a) Enlist the selection criteria of pumps used in agriculture? List out the types of Pumps available? **[5]**

b) Suggest how the Ventilation in Green house is maintained? Draw and explain? **[5]**

P.T.O.

Q5) a) Describe a typical Hydraulic Control system used in agriculture? **[8]**

b) What is mean by Agro Meteorology? And how it is different from other Meteorology? List out the sensors used in it? Give typical specifications of sensors used in it? Draw a block diagram of the system? **[8]**

OR

Q6) a) List out the parts of the hydraulic system? Explain the working and operation with suitable diagram? Comment on the operation of hydraulic system used for tractor? **[8]**

b) Write down the well type and matching type characteristics of pumps? Comment on it? **[8]**

Q7) a) Write a detailed note on the Food Quality measurement techniques? **[8]**

b) Describe the concept of AGMARK. Compare and Contrast between the FSSAI and AGMARK? **[10]**

OR

Q8) a) Write a detailed note on food safety standards and its need? **[8]**

b) Define and explain the International code of hygiene for various products in food processing industry? What is importance? **[10]**

Q9) a) Construct the ladder diagram for PLC application in packaging industry. Say bottle filling plant or milk sachet or pouch making plant? Assume suitable data for conveyor control. Also draw the diagram for above system. **[8]**

b) Analyze equipment for creating and maintaining controlled atmosphere used in agriculture purpose? **[8]**

OR

Q10) a) The given task is to sort apples according to the size and color. Suggest the suitable sensors and mechanism for it? Develop and draw a block diagram and explain its working? **[8]**

b) Elaborate Trends in Modern Food Processing. List out them and explain with suitable examples? **[8]**

▽▽▽▽

Total No. of Questions : 10]

SEAT No. :

P-2957

[Total No. of Pages : 5

[6004]-938

B.E. (Mechanical Engineering)

REFRIGERATION AND AIR CONDITIONING

(2015 Pattern) (Semester - I) (302049)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right side indicate full marks.***
3) ***Assume Suitable data if necessary and mention it clearly.***
4) ***Use of steam table is allowed.***

Q1) a) Explain with neat sketch Bell-Coleman Cycle. Also represent the cycle on P-V and T-s diagram. **[6]**

b) Explain the working of Electrolux refrigeration system with neat sketch. **[4]**

OR

Q2) a) Classify refrigerant? State few desirable properties of a good refrigerant. **[4]**

b) A vapour compression system having capacity of 4 TR and uses R12 as a refrigerant works on simple saturated cycle with dry compression between evaporator temperature of –15°C & condenser temperature of 30°C. Take specific heat of vapour refrigerant as 0.62 kJ/kgK. Represent the cycle on p-h and T-s diagram and Calculate : **[6]**

i) Mass flow rate of refrigerant circulated through the system.

ii) Power required to drive the compressor.

iii) COP of the system.

iv) Heat rejected in condenser.

Properties of R12 are :

T (°C)	h_f (kJ/kg)	h_g (kJ/kg)	S_f (kJ/kgK)	S_g (kJ/kgK)
–15	22.33	180.98	0.0906	0.7052
30	64.59	199.62	0.24	0.6853

P.T.O.

Q3) a) Explain Ice Plant with neat sketch. **[4]**

b) Explain with neat sketch the working of two stage compression with water intercooler and liquid subcooler employed for vapour compression system. Represent the cycle on p-h diagram. **[6]**

OR

Q4) A 40 TR two stage compression ammonia refrigeration system uses. water intercooler between two stages and liquid subcooler for undercooling of refrigerant leaving the condenser. The system is working between the evaporator temperature of –20°C and condenser temperature of 40°C. The intercooler pressure is 6 bar. The ammonia is cooled to 30°C in water intercooler and subcooled as liquid to 30°C. Find : (i) The mass flow rate of ammonia circulation, (ii) Power required to drive the system and (iii) COP of the system. Also represent the cycle on p-h diagram. [Use Ammonia (R717) refrigerant chart]. **[10]**

Q5) a) Define specific humidity, relative humidity, dew point temperature and degree of saturation. **[8]**

b) Without using psychrometric chart, calculate specific humidity, relative humidity, humid specific heat and enthalpy of moist air when DBT is 30°C, DPT is 15°C and total barometric pressure is 101.325 kPa. **[8]**

OR

Q6) a) Moist air at 27°C and 80% RH is adiabatically dehumidified by passing through a drier so that its final relative humidity is 30%. The air is then cooled by passing through cooler until its temperature reaches to 25°C without change in specific humidity. Show the process on psychrometric Chart and Determine : **[10]**

[Use of Psychrometric Chart is allowed]

i) Temperature of air leaving the drier.

ii) DPT of the air leaving the drier.

iii) Heat rejected during the cooling process.

iv) Relative humidity at the end of cooling process.

v) The moisture removed during dehumidification process.

b) Explain Adiabatic Mixing of Two Air Streams. **[6]**

Q7) a) Give the classification of refrigerant compressors. **[2]**

b) Explain DX type Evaporator with neat sketch. **[8]**

c) Explain all year air conditioning system with neat sketch. **[8]**

OR

Q8) a) Enlist the different expansion devices used in refrigeration and air conditioning systems. **[2]**

b) Classify the condensers and explain evaporative condenser with neat sketch. **[8]**

c) Explain Thermostatic Expansion Valve with neat sketch. **[8]**

Q9) a) What are the different methods of duct design? Explain any one method in detail. **[8]**

b) A rectangular duct 0.8 m × 0.5 m size carries 4 m^3/s of air having density of 1.2 kg/m^3. Determine the equivalent diameter of the circular duct if **[8]**

i) the quantity of air carried is same.

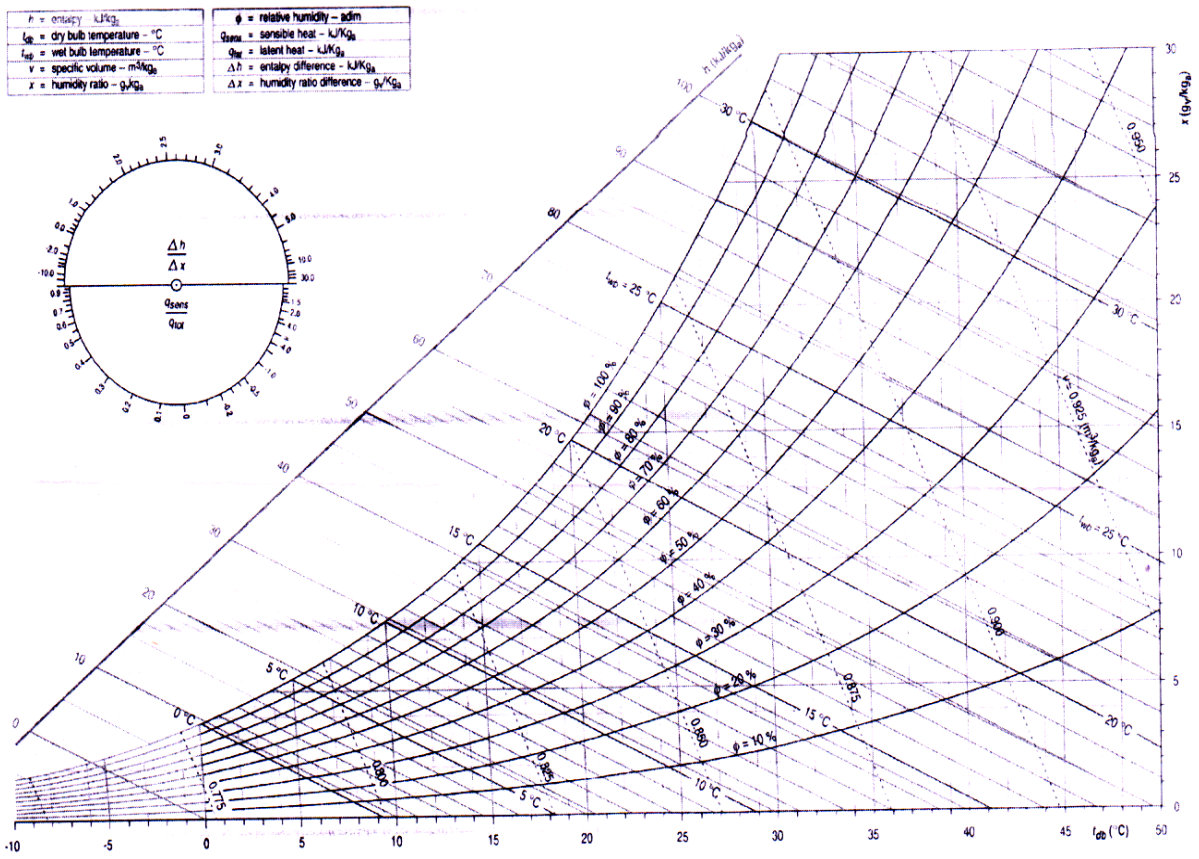
ii) velocity of air is same.

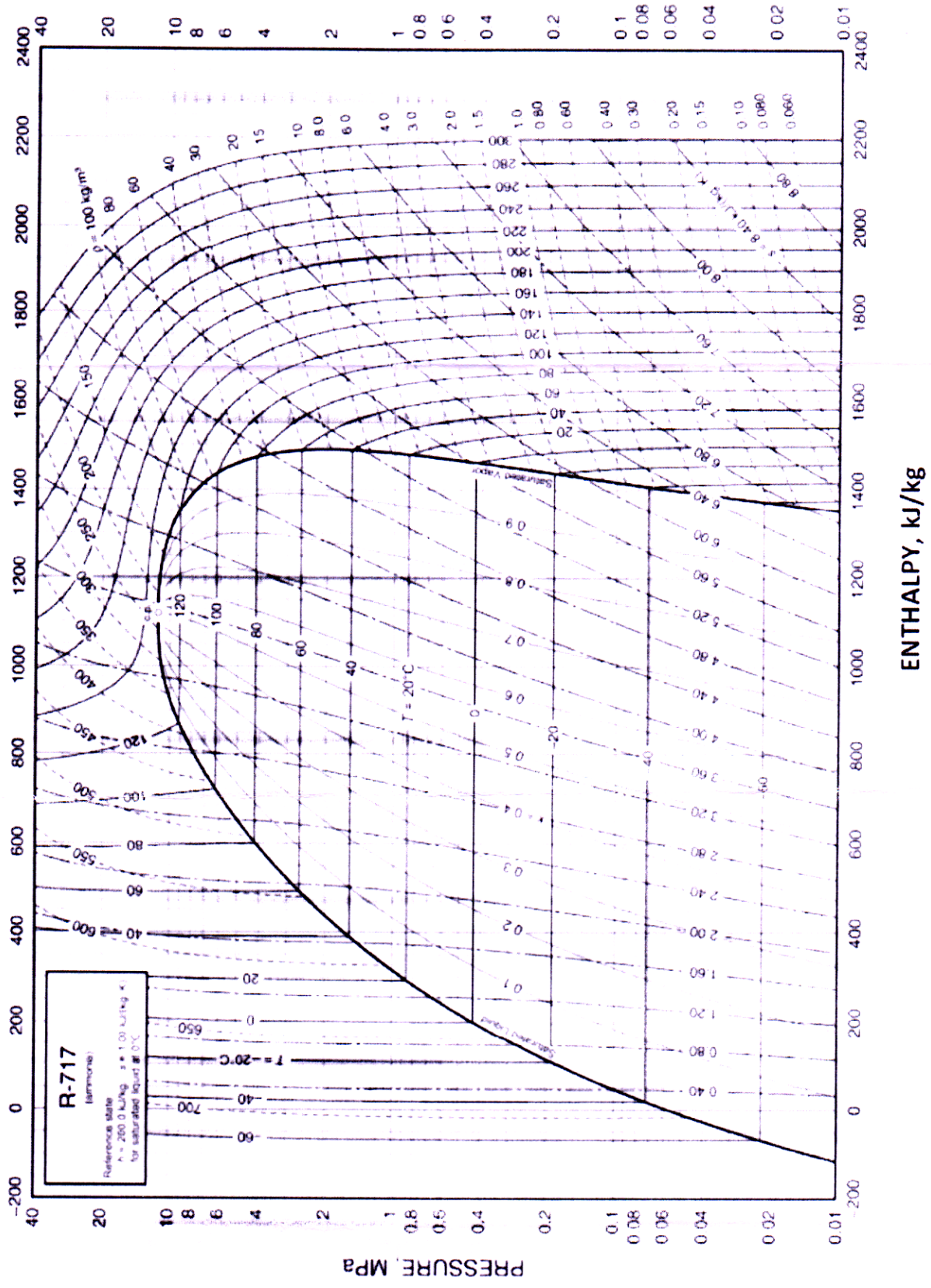
If friction factor $f = 0.001$, Find the pressure loss per 100 m length of duct.

OR

Q10)a) Derive the expression for equivalent diameter of circular duct corresponding to a rectangular duct of sides 'a' and 'b' for the same pressure loss per unit length, when the discharge is same and when the velocity of air flowing through both ducts is same. **[10]**

b) A rectangular duct 400 mm × 200 mm is 20 m long and carries 30 $m^3/min.$ of air having density 1.2 kg/m^3. Find the total pressure required at the inlet to the duct and air power required. Take friction factor $f = 0.005$. **[6]**


h = entalpy kJ/Kg
t_db = dry bulb temperature - °C
t_wb = wet bulb temperature - °C
v = specific volume - m³/Kg
x = humidity ratio - g/Kg
φ = relative humidity - adim
q_sens = sensible heat - kJ/Kg
q_lat = latent heat - kJ/Kg
Δh = entalpy difference - kJ/Kg
Δx = humidity ratio difference - g/Kg
Δh/Δx
q_sens/q_lat
h (kJ/Kg)
x (g_v/Kg_a)
t_db (°C)
t_wb = 25 °C
φ = 100 %
φ = 90 %
φ = 80 %
φ = 70 %
φ = 60 %
φ = 50 %
φ = 40 %
φ = 30 %
φ = 20 %
φ = 10 %
v = 0.925 (m³/Kg_a)
0.950
0.900
0.875
0.850
0.825
0.775
30 °C
20 °C
15 °C
10 °C
5 °C
0 °C


R-717
PRESSURE, MPa
ENTHALPY, kJ/kg

Total No. of Questions : 10]

SEAT No. :

P-2958

[Total No. of Pages : 3

[6004]-939

B.E. (Mechanical Engineering)

HYDRAULICS AND PNEUMATICS

(2015 Pattern) (Semester - I) (402041)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Use of non-programmable scientific calculator is allowed.***
3) ***Assume data wherever necessary and mention it.***
4) ***Draw neat and suitable figure wherever necessary.***
5) ***Figures to the right indicate full marks.***
6) ***Use of steam table is permitted.***

Q1) a) What are the advantages and limitations of fluid power systems? **[5]**

b) What are the classifications of hydraulic pumps? **[5]**

OR

Q2) a) Discuss the types of hydraulics actuators? **[4]**

b) Sketch and explain external gear pump. **[6]**

Q3) a) What is the function of reservoir? **[4]**

b) Explain with neat sketch the working of pressure compensated flow control valve. **[6]**

OR

Q4) a) Name the different types of cylinder mountings. **[4]**

b) Write a short note on unloading valve, how does an unloading valve differ from a sequence valve in mechanical construction. **[6]**

Q5) a) Draw and explain regenerative circuits used in hydraulic system. **[8]**

b) What are different sources of contamination? How to control Contamination explain in details? **[8]**

P.T.O.

OR

Q6) a) Draw traverse and feed circuits and explain its working. **[8]**

b) Draw and Explain Fail safe Circuits? **[8]**

Q7) a) Differentiate between hydraulics system and Pneumatics system. **[4]**

b) With the help of neat sketch explain a typical compressed air generation and distribution system. **[8]**

c) What are the advantages of an air motor over electric motor and hydraulic motor? **[6]**

OR

Q8) a) What is the purpose of providing filter, lubricator, muffler and driers in pneumatic systems? **[6]**

b) Why is pneumatics control system termed as low cost Automation? **[6]**

c) Describe the difference between meter-in and meter-out flow control. Which is preferred for pneumatics? Why? **[6]**

Q9) A machine tool slide is to be moved by means of hydraulics cylinder as follow : **[16]**

a) Initially it moves through a distance of 250 mm against a load of 10 kN in 5 seconds.

b) It then follows a working stroke of 120 mm against an effective load of 40 kN. The feed rate required is between 0.5 to 1m/min.

c) The return stroke is as fast as possible.

A meter out circuit is used for speed control. Draw the circuit and select different components used in circuit.

OR

Q10) A machine slide is moved by means of hydraulics cylinder. The motion of the cylinder is as follow : **[16]**

a) Initially it moves through a distance of 200 mm against a load of 12 kN in 3 seconds.

b) It is followed by a working stroke of 100 mm against an effective load of 35 kN. The feed rate required is between 0.5 to 1m/min.

c) The return stroke is as fast as possible.

A meter out circuit is used for speed control. Draw the circuit and select different components used in circuit.

(a) Suction strainer:

Model	Flow Capacity (lpm)
S_1	38
S_2	76
S_3	152

(b) Pressure gauge:

Model	Range (bar)
PG_1	0 – 25
PG_2	0 – 40
PG_3	0 – 100
PG_4	0 – 160

(c) Vane pump:

Model	Delivery in lpm		
	At 0 bar	At 35 bar	At 70 bar
P_1	8.5	7.1	5.3
P_2	12.9	11.4	9.5
P_3	17.6	16.1	14.3
P_4	25.1	23.8	22.4
P_5	39.0	37.5	35.6

(d) Relief valve:

Model	Flow capacity (lpm)	Max. working pressure & bar
R_1	11.4	70
R_2	19.0	210
R_3	30.4	70
R_4	57.0	105

(e) Flow control valve:

Model	Working pressure (bar)	Flow range (lpm)
F_1	70	0 - 4.1
F_2	105	0 - 4.9
F_3	105	0 - 16.3
F_4	70	0 - 24.6

(f) Directional control valve:

Model	Max. working pressure & bar	Flow capacity (lpm)
D_1	350	19
D_2	210	38
D_3	210	76

(g) Check valve:

Model	Max. working Pressure & bar	Flow capacity (/pm)
C_1	210	15.2
C_2	210	30.4
C_3	210	76

(h) Pilot operated check valve:

Model	Max. working Pressure (bar)	Flow capacity (lpm)
PO_1	210	19
PO_2	210	38
PO_3	210	76

(i) Cylinder (Max. working pressure 210 bar)

Model	Bore diameter (nm)	Rod diameter (mm)
A_1	25	12.5
A_2	40	16
A_3	50	35
A_4	75	45
A_5	100	50

(j) Oil reservoirs:

Model	Capacity (litres)
T_1	40
T_2	100
T_3	250
T_4	400
T_5	600

□□□

Total No. of Questions : 10]

SEAT No. : ____

P2959

[Total No. of Pages : 3

[6004]-940

B.E. (Mechanical)

CAD/CAM & AUTOMATION

(2015 Pattern) (Semester - I) (402042)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Figures to the right side indicates full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Use of scientic calculator allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) A triangle ABC has its veritces at A(0,0), B(10, 20) C(10, 0) is rotated about point A in 90º in CCW direction. Calculate concatenated transformation matrix and determine final position of triangle. **[6]**

b) Write parametric equations of **[4]**

i) Line,

ii) Ellipse

OR

Q2) a) Differentiate between Orthogonal and Perspective Projections. **[6]**

b) Explain B-spline curve with neat sketch. **[4]**

Q3) a) Distinguish between ‘h’ & ‘p’ formulations. **[5]**

b) Explain shape function with neat sketch. **[5]**

OR

Q4) An axial stepped bar as shown in Figure 1, is axially loaded by force F_1 = 20k N and F_2 = 15kN. Assuming $E_1 = E_2$ = 210N/mm^2, A_1 = 150mm^2, A_2 = 100 mm^2 and $L_1 = L_2$ = 300mm, determine deflection, stresses in elements and reactions at nodes. **[10]**

P.T.O.

Q5) a) Write steps in FEA with neat sketch. **[6]**

b) Write CNC part programming for Milling for component as shown in figure 2 using concept of sub-programming with 1 mm step. Assume suitable cutting data. **[12]**

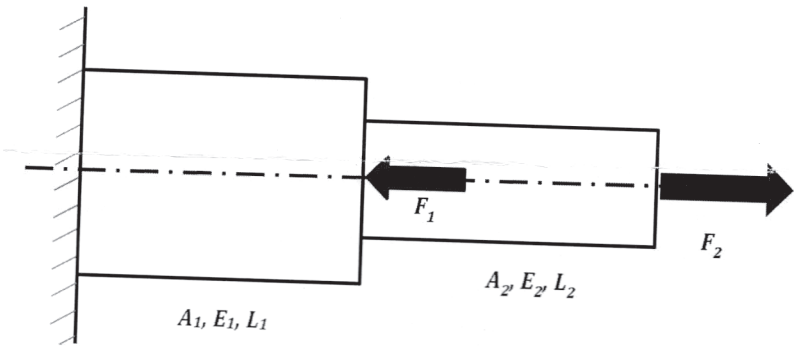


Figure 1: Qu 4

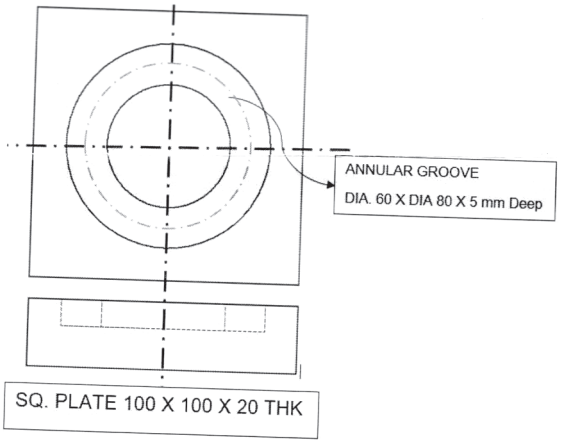


Figure 2: Qu 5(b)

OR

Q6) a) Explain difference between canned cycle for roughing and finishing operations in CNC turning with neat skech **[6]**

b) Write CNC part program for turned component as shown in figure 3 using canned cycles. Assume suitable cutting data. **[12]**

Q7) a) Write short note on Components of Product Life Cycle (PLM). **[8]**

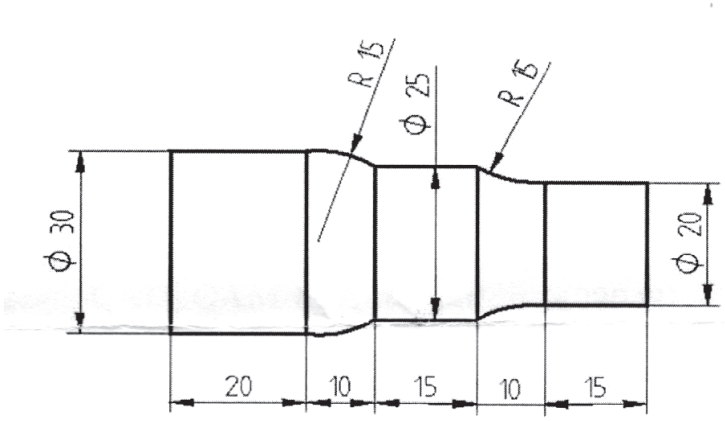


Figure 3: Qu 6(b)

b) Explain FDM with neat sketch. **[8]**

OR

Q8) a) Enlist advantages and dis-advantages of Rapid Prototyping over conventional manufacturing processes. **[8]**

b) What is Collaborative Engineering and briefly discuss role of Collaborative Engineering in current industry. **[8]**

Q9) a) Discuss various coding methods used in Group Technology. **[8]**

b) State 'Laws of Robotics'. **[8]**

OR

Q10) a) Write short note o Flexible Manufacturing Systems (FMS). **[8]**

b) Discuss briefly: Group Technology. **[8]**

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Total No. of Questions : 10]

SEAT No. : [ ]

P2960

[Total No. of Pages : 3

[6004]-941

B.E. (Mechanical Engineering)

DYNAMICS OF MACHINERY

(2015 Pattern) (Semester-I) (402043)

Time : 2½ Hours] ***[Max. Marks : 70***

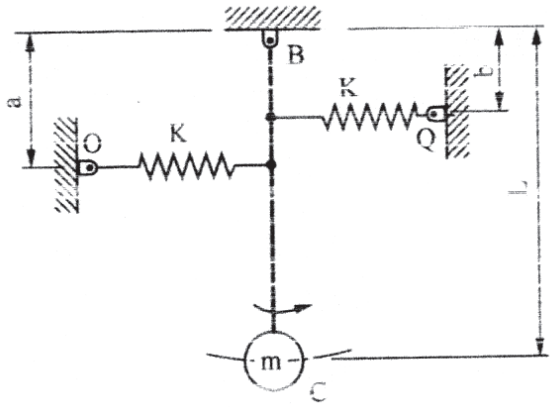
Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Figures to the right indicate full marks.***
3) ***Draw Neat diagrams wherever necessary.***
4) ***Assume suitable data, if necessary.***
5) ***Use of scientific calculator is allowed.***

Q1) a) What is damping factor?

Draw and explain displacement-time curves for over damped system, critically damped and under damped vibratory system. **[4]**

b) Determine the natural frequecy of vibration for the system shown in following fig. **[6]**



OR

Q2) a) What is the physical significance of the node in a 2 rotor system? **[4]**

b) Explain the method to determine the critical speed of shaft carrying single rotor. **[6]**

P.T.O.

Q3) a) Write down the expression of equivalent length of a torsionally equivalent shaft and explain its concept. **[4]**

b) Derive an expression for magnification factor for the forced vibrations due to external forcing function from the vector representation of forced vibrations. **[6]**

OR

Q4) a) Explain with neat diagram mathematical model of a quarter car. **[4]**

b) A body of mass 5 kg is supported on a spring of stiffness 1960 N/m and has dashpot connected to it which produces a resistance of 1.96 N at a velocity of 1 m/s. In what ratio will the amplitude of vibration be reduced after 5 cycles? **[6]**

Q5) The cranks of a four cylinder marine oil engine are arranged at angular intervals of 90º. The engine speed is 70 rpm and the reciprocating mass per cylinder is 800 kg. The inner cranks are 1 m apart and are symmetrically arranged between the outer cranks which are 2.6 m apart. Each crank is 400 mm long. Determine the firing order of the cylinders for the best balancing of reciprocating masses and also the magnitude of unbalanced primary couple for that arrangement.**[16]**

OR

Q6) a) Explain the need of balancing. State and explain condition for static and dynamic balancing. **[8]**

b) With the help of a neat sketch, explain static balancing machine. **[8]**

Q7) a) Explain time domain and frequency domain analysis. **[6]**

b) What are vibration exciters? Explain any one exciter. **[6]**

c) A seismic instrument is used to find the magnitude of vibration of a machine tool structure. It gives a reading of relative displacement of 0.4 μm. The natural frequency of the seismic instrument is 5 Hz. The machine tool structure is subjected to a kinematic excitation at a frequency of 2 Hz. Find the magnitude of acceleration of vibrating machine tool structure. Assume that the damping of seismic instrument is negligible. **[6]**

OR

Q8) a) Explain working of Magneto-Rheological dampers with neat sketch and application. **[6]**

b) Explain acceptable vibration standards used in vibration measurement. **[6]**

c) A vibrometer has a period of free vibration of 2 seconds. It is attached to a machine with a vertical harmonic frequency of 1 Hz. If the vibrometer mass has an amplitude of 2.5 mm relative to the vibrometer frame, what is the amplitude of vibration of machine? **[6]**

Q9) a) Explain the working of sound level meter with neat diagram. **[6]**

b) The sound pressure level measured at a machine floor with a noisy machine operating nearby is 88.0 dB. When the machine is turned off, the sound pressure level measured at the same location 80. dB. What is the sound pressure level due to machine alone? **[4]**

c) Explain following terms. **[6]**

i) Sound power level

ii) Sound pressure level

iii) White Noise

OR

Q10)a) Explain acoustic material & its characteristics **[6]**

b) Show that if the sound power is doubled, then the sound power level increases by approximately 3 dB. **[4]**

c) Explain following terms. **[6]**

i) Sound reflection coefficient

ii) Sound absorption coefficient

iii) Sound transmission coefficient

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Total No. of Questions : 10]

SEAT No. :

P-2961

[Total No. of Pages : 4

[6004]-942
B.E. (Mechanical Engineering)
FINITE ELEMENT ANALYSIS
(2015 Pattern) (Semester - I) (Elective-I) (402044A)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates :

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume Suitable data if necessary.***

Q1) a) Explain mesh generation and model building in finite element analysis. **[4]**

b) Illustrate the dynamic and fatigue finite element analysis. **[6]**

OR

Q2) a) Elaborate the different steps to be followed for solving one-dimensional (1-D) problem using FEA. **[6]**

b) Explain the penalty approach with significance. **[4]**

Q3) a) An axial load P = 300 kN is applied on a stepped steel bar as shown Figure 1. **[6]**

A_1= 250 mm^2; A_2= 400 mm^2; E = 200 GPa

Formulate:

i) Element stiffness matrix [k_1, [k_2], [k_3]

ii) Global stiffness matrix [K]

Determine using elimination approach:

i) Nodal displacement vectors [u_1], [$u_2$1, [u_3], [u_4].

ii) Element Stresses [σ_1, [σ_2], [σ_3]

P.T.O.

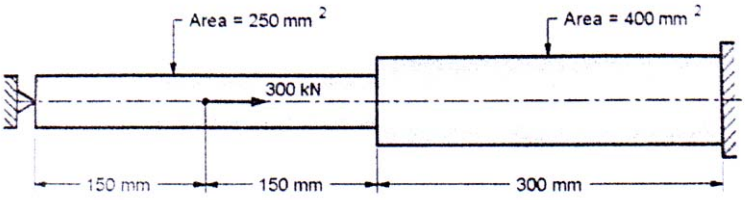

Figure 1

b) Explain the plane stress and plane strain condition with matrix formulation. **[4]**

OR

Q4) a) An axial load of 400 KN is applied at 20 °C to the rod. The temperature is then raised to 50°C. (Refer Figure 2). **[6]**

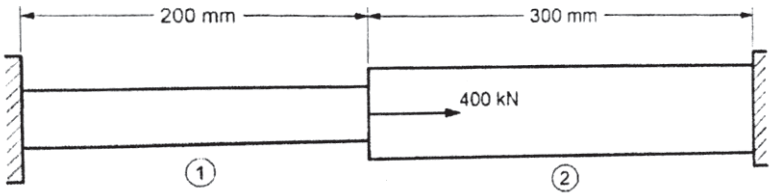

Figure 2

Property	Element 1	Element 2
Material	Aluminium	Steel
Modulus of Elasticity	70 GPa	200 GPa
Area	900 mm^2	1200 mm^2
Coefficient of Thermal Expansion	2.3× 10^{-6} per °C	11.7 × 10^{-6} per °C

Formulate:

i) Element stiffness matrix [k_1, [k_2], [k_3]

ii) Global stiffness matrix [K]

iii) Global load vector [F]

Determine using elimination approach:

i) Nodal displacement vectors [u_1], [$u_2$1, [u_3].

ii) Element Stresses [σ_1, [σ_2]

b) Explain the elimination approach with bar problem example. **[4]**

Q5) a) Explain the terms: isoparametric, subparametric and superparametric elements. **[6]**

b) Explain the uniqueness of mapping of isoparametric elements. **[4]**

c) The coordinates and function values at the three nodes of a triangular linear element are given in Figure 3. Calculate the function value at (20,6). **[8]**

Node 1 Coordinates (13,1) Function value 190

Node 2 Coordinates (25,6) Function value 160

Node 3 Coordinates (13,13) Function value 185

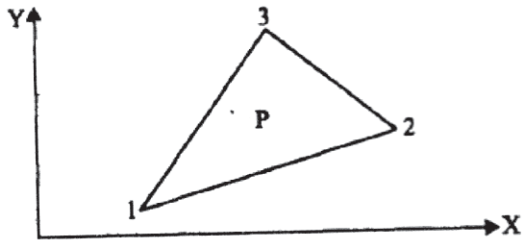

Figure 3

OR

Q6) a) Elaborate the following terms: **[6]**

i) Sub-modeling

ii) Substructuring

b) Illustrate the convergence criteria for isoparametric elements. **[6]**

c) Differentiate between mesh refinement and higher order elements. **[6]**

Q7) a) Heat is generated in a large plate (K = 0.4 W/m °C) at the rate of 5000 W/m^3. The plate is 20 cm thick. Outside surface of the plate is exposed to ambient air at 30°C with a convective heat transfer coefficient of 20 W/m^2 °C. Determine the temperature distribution in the wall. **[10]**

b) Illustrate the governing equation of steady state heat transfer and also write down elemental stiffness matrix and compare with Bar element. **[6]**

OR

Q8) a) A metallic fin, with thermal conductivity 360 W/m °K, 0.1 cm thick and 10 cm long extends from a plane wall whose temperature is 235°C. Determine the temperature distribution along the fin if heat is transferred to ambient air at 20°C with heat transfer coefficient of 9 W/m^2 °K. Take width of the fin as 1 m. **[10]**

b) Write a short note on point sources in heat transfer problems. **[6]**

Q9) a) Find the natural frequencies of longitudinal vibrations of the stepped bar of areas A and 2A. The two stepped bar having equal lengths L. The bar is constrained at one end as shown in Figure 4. **[10]**

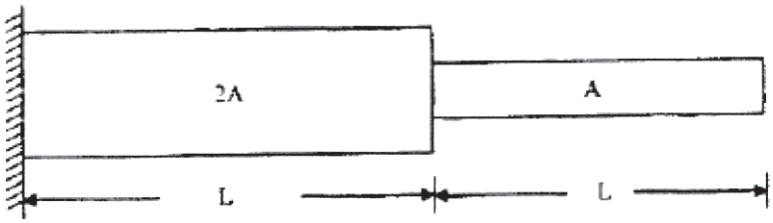

Figure 4

b) Illustrate the Eigen Values and Eigen Vectors and how it is related to modal analysis of structures? **[6]**

OR

Q10)a) Find the natural frequencies of longitudinal vibrations of the constrained stepped shaft of areas A and 2A and of equal lengths (L), as shown below. Compare the results obtained using lumped mass matrix approach and consistent mass matrix approach. **[10]**

b) Formulate the Consistent mass and Lumped Mass Matrix for **[6]**

i) Bar element

ii) Truss element

❍❍❍❍

Total No. of Questions : 10]

SEAT No. :

P-2962

[Total No. of Pages : 2

[6004]-944

B.E. (Mechanical)

HEATING, VENTILATION & AIR CONDITIONING AND REFRIGERATION ENGINEERING

(2015 Pattern) (Semester - I) (Elective - I) (402044C)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Assume suitable data wherever necessary. Use of refrigeration table is permitted.***
3) ***Use of non-programmable pocket calculator is allowed.***
4) ***Draw neat diagrams wherever necessary.***
5) ***Figures to the right indicate full marks.***

Q1) a) Explain with neat sketch working of Ejector Refrigeration System with an additional Jet Pump. **[3]**

b) Explain Trans-Critical Vapor Compression Cycle with TS & PH diagram. **[7]**

OR

Q2) a) Explain with neat sketch working of Multi-Stage Ejector Refrigeration System. **[3]**

b) Write advantages and Disadvantages of transcritical cycle. **[7]**

Q3) a) Write significance of characteristic curves of compressors. **[3]**

b) Explain with neat sketch, what is hunting of thermostatic valve and how it can be prevented? **[7]**

OR

Q4) a) Explain with neat sketch, working of Evaporative Condensers. **[5]**

b) How capacity control of reciprocation compressor is done? Explain with neat sketch. **[5]**

P.T.O.

Q5) a) What are the basic parameters which affect the thermal comforts? Draw thermal comfort chart. **[8]**

b) Write a short note on decrement factor & time lag. **[8]**

OR

Q6) a) Explain the causes of Indoor air pollution. **[8]**

b) Explain the use of outdoor air weather data in design. Weather characteristic and it influence. **[8]**

Q7) a) Write a short note on components of cooling load. **[8]**

b) What is CLTD? Explain CLTD method in detail. **[8]**

OR

Q8) a) Discuss various techniques of Energy efficient and cost effective measures for building envelope. **[10]**

b) What do you understand by space load characteristics? **[6]**

Q9) a) What are sorbents and desiccants? How sorbents and desiccants are useful? **[8]**

b) What are thermal storage cooling air conditioning systems? **[10]**

OR

Q10)a) What are Clean-Room Air Conditioning Systems? **[8]**

b) Explain heat pump cycle with neat sketch. **[10]**

Total No. of Questions : 10]

SEAT No. : ____

P-2963

[Total No. of Pages : 2

[6004]-945

B.E. (Mechanical)

AUTOMOBILE ENGINEERING

(2015 Pattern) (Semester - I) (402045A) (Elective - II)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, wherever necessary and mention the same clearly.***

Q1) a) Write about vehicle specifications. **[5]**

b) Explain concept of wheel balancing. **[5]**

OR

Q2) a) Explain collapsible steering. **[5]**

b) Write about necessity of transmission system. **[5]**

Q3) a) Name the various types of suspension springs. **[5]**

b) Explain the function of overdrive. **[5]**

OR

Q4) a) Explain rubber type of suspension system. **[5]**

b) Explain Hydraulic brakes. **[5]**

Q5) For a Car, the road resistance if given by 23N per 1000N, the air resistance is $0.0827V^2$ transmission efficiency is 88 percent in top speed, Car weight 19934N when fully loaded, calculate. **[8]**

i) The engine power required for a top speed of 144km/hr,

ii) The acceleration in m/s^2 at 48km/h assuming the torque at 48km/hr in the top gear 25% more than at 144 km/hr.

P.T.O.

iii) The power required to drive the car up to gradient of 1 in 5 at 48 km/hr transmission efficiency 80% in bottom gear. Consider $9 = 9.81 m/s^2$. **[8]**

OR

Q6) a) Describe the types of active and passive safety. **[8]**

b) Explain the vehicle testing on chasis dynamometer. **[8]**

Q7) a) Explain the principle and construction of lead acid battery. **[8]**

b) Write a note on lithium batteries. **[8]**

OR

Q8) a) Explain the working of electrical fuel pump. **[8]**

b) Explain the automotive sensors and actuators. **[8]**

Q9) a) Explain the construction and working of electrical vehicles. **[8]**

b) Describe hybrid electrical vehicles. **[10]**

OR

Q10) a) How use of electrical vehicles and hybrid electrical vehicles will affect environment and pollution issues in near future. **[12]**

b) Explain the concept of environmental importance of solar vehicle. **[6]**

Total No. of Questions: 10]

SEAT No. : ____

P2964

[Total No. of Pages : 3

[6004]-947
B.E. (Mechanical)
ENERGY AUDIT & MANAGEMENT
(2015 Pattern) (Semester-I) (Elective-II) (402045C)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Answers should be written in same answer book.***
3) ***Neat diagrams must be drawn whenerver necessary.***
4) ***Figures to the right side indicate full marks.***
5) ***Use of log tables, slide rules, mollier charts, electronic calculator and steam table is allowed.***
6) ***Assume suitable data, if necessary.***

Q1) a) Write a note on principles of energy conservation **[6]**

b) What are the different types of Energy Audits? **[4]**

OR

Q2) a) What are the need of managerial skills in energy Management? **[6]**

b) Which information is to be collected during detailed energy audit? **[4]**

Q3) a) What are the advantages and limitations of simple payback period? **[4]**

b) Differentiate between ROI and IRR **[6]**

OR

Q4) a) Explain the terms with example **[6]**

i) Salvage value

ii) Depreciation

iii) Profitability index

b) A sum of rupees 4,00,000 is deposited in a bank at the beginning of a year. The bank pays 5% interest annually. How much money is in the bank account at the end of the seventh year. If no money is withdrawn? **[4]**

P.T.O.

Q5) a) What is steam distribution system? Explain with neat sketch. **[8]**

b) Explain the energy saving opportunities in comprressed air system **[10]**

OR

Q6) a) What are the different types of fans? Draw system and fan curve and show operating point. Explain different flow control strategies of fan. **[8]**

b) Compute the heat loss in percentage, due to unburnt in fly ash and bottom ash, for an AFBC Boiler, using Indian coal, with: **[10]**

i) GCV = 4200 kcal/kg.

ii) % Ash in coal = 38.8

iii) Ratio of bottom ash to fly ash = 15 : 85

iv) GCV of fly ash = 452.5 kcal/kg

v) GCV of bottom ash = 800 kcal/kg

Q7) a) What is standard labelling program? List the equipment and appliances covered under Standards and Labelling program. **[8]**

b) What is power factor in power distribution system? List the benefits of power factor improvement in an industrial power distribution system. **[8]**

OR

Q8) a) What are the types of lamps used in lighting system? Write down their featurs with typical applications. **[8]**

b) Write a note on Electricity Act 2003. **[8]**

Q9) a) Explain the following: **[8]**

i) Regenerator

ii) Gas Turbine cogeneration system

b) With respect to Cogeneration wirte its need, applications and advantages. **[8]**

OR

Q10)a) Write a note on CDM projects and Carbon credit calculations. **[8]**

b) Write a note on Shell-Tube heat exchanger and plate heat exchanger. **[8]**

Total No. of Questions : 10]

SEAT No. :

P-2965

[Total No. of Pages : 3

[6004]-948

B.E. (Mechanical/Mechanical SW)

ENERGY ENGINEERING

(2015 Pattern) (Semester - II) (402047)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right of each question indicate full marks.***
4) ***Assume suitable data wherever necessary and mention the same clearly.***
5) ***Use of steam tables. Mollier chart and calculator is allowed.***

Q1) a) What do you mean by cascade efficiency? Explain in brief. **[5]**

b) What are the sources of air leakage in condenser and Explain its effects on condenser performance. **[5]**

OR

Q2) a) Draw layout of pulverized fuel handling systems. List its advantages and disadvantage. **[5]**

b) What are the different pollutants from thermal power plants? Explain their effects on human health. **[5]**

Q3) a) Write a short note on hydrograph and unit hydrograph. **[5]**

b) Explain with a neat diagram the process of coal beneficiation. **[5]**

OR

Q4) a) What do you mean by cladding in nuclear power plant? Which materials are used for cladding? What are the purposes of cladding? **[5]**

b) Explain the necessity of steam condenser in steam power plants. **[5]**

P.T.O.

Q5) a) An open cycle gas turbine power plant works on Brayton cycle. The maximum pressure and temperature of the cycle are limited to 5 bar and 900K. The pressure and temperature of the gas entering into the compressor are 1 bar and 27°C. Reheating is used at a pressure of 2.5 bar where the temperature of the gases is increased to its original turbine inlet temperature. The air flow per second through the plant is 10 kg/sec. Determine the thermal efficiency and plant capacity in MW. The exhaust pressure of the turbine is also 1bar.

Assume the compression and expansion is isentropic.

Take $\gamma = 1.4$ for air and gases, CP = 1 kJ/kg-K for air and gases C.V of fuel = 40,000 kJ/kg.

Neglect the pressure losses in the system. Do not neglect fuel quantity. **[8]**

b) Draw diesel power plant layout and explain the working. **[8]**

OR

Q6) a) Discuss the effect of Gas Turbine Cycle with **[8]**

i) Regeneration

ii) Intercooling

b) Discuss following for Diesel power plant **[8]**

i) Fuel and Fuel Injection System

ii) Engine Cooling

iii) Lubricating System

Q7) a) Write short note on flash steam Geothermal power plant. **[6]**

b) Discuss the working principle of solar pond based power plant with diagram. **[6]**

c) Discuss the environmental impacts of non-conventional power plant. **[6]**

OR

Q8) a) Elaborate working of Fuel cell. What are the different types of fuel cells? **[6]**

b) Explain classification of wind turbines. Elaborate operating characteristics of Wind Power Plant. **[6]**

c) Write short note on Close cycle MHD generators. **[6]**

Q9) a) State the various protective equipment and explain the working of switchgear in power plant. **[8]**

b) A 60 MW power station has an annual peak load of 50MW. The power station supplies loads having maximum demand of 20 MW, 17MW, 10MW and 9MW. The annual load factor is 0.45. **[8]**

Find :

i) Average load

ii) Energy supplied per year

iii) Diversity factor

iv) Demand factor

OR

Q10)a) Write short notes on : **[8]**

i) Circuit breaker

ii) Power transformers

b) Define and write significance of the following terms : **[8]**

i) Load duration curve

ii) Demand factor

iii) Load factor

iv) Group diversity factor

□□□

Total No. of Questions : 8]

SEAT No. :

P2966

[Total No. of Pages : 5

[6004]-949
B.E. (Mechanical /Mechanical SW)
MECHANICAL SYSTEM DESIGN
(2015 Pattern) (Semester - II) (402048)

Time :3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve, Q.1,Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Figures to the right indicate ful marks.***
3) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and tables is allowed.***
4) ***Neat diarams must be drawn wherever necessary.***
5) ***Assume suitable data, if necessary.***

Q1) a) A Six speed multispeed gearbox is to be designed for spindle speed varying from 63 rpm to 630 rpm. If the geometric progression ratio as per R5 series **[6]**

i) Draw structural Diagram (for any one Structural Formula)

ii) Draw Speed Diagram, if the gear box is to be driven by 720 rpm 3-phase AC motor through belt drive

iii) Draw gearing diagram

b) Explain the following terms used in Statistical Analysis, **[4]**

i) Mean

ii) Variance

iii) Standard Deviation Median

OR

Q2) a) Compare different laws of regulation of speeds in multispeed Gear box.**[6]**

b) The Tensile strength of a population of 700 connecting rods are normally distributed with a mean of 450 N/mm^2 and standard deviation of 50 N/mm^2 , Determine the number of connecting rods having strentgth less than 395 N/mm^2 **[4]**

Z	1	1.1	2.8	2.9
Area	0.3413	0.3643	0.4974	0.4981

P.T.O.

Q3) A Triple ply belt conveyor is required to transport 2 tons of iron ore per hour 1000m and a height of 300 m The permissible belt speed is 90 m/ min. If the mass density of iron ore is 2.5 tons per cubic meter. **[10]**

Determine

i) The bale width

ii) The diameter of drive Pulley

iii) Ratio of gear reducer if electric motor speed is 1440 rpm Use following data Flowability factor 'k'

Belt Inclination (α)	10º-15º	16º-20º	21º-25º	26º-30º	31º-35º
Flowability factor 'k'	2.65×10^{-4}	2.5×10^{-4}	2.35×10^{-4}	2.20×10^{-4}	2.05×10^{-4}

Standard belt widths :

400,450,500,600,650,750,800,900,1000,1200,1400,1600,1800,2000mm.

OR

Q4) a) The following data refers to a flat belt conveyor for transporting crushed rock: **[6]**

Mass density: 2 Tons/m^3

Belt Speed: 1.75 m/s

Belt Width: 0.8 m

Surcharge angle : 25º

Effective width of the, material carried bt the belt safely, b = (0.9 B - 0.05).

Determine the capacity of conveyor in tons/hr

b) Describe with sketch the procedure to calculate the power requirement of belt conveyors. **[4]**

Q5) a) What is auto-frettage? Describe any one method of pre-stressing the cylinders with neat sketch. **[8]**

b) A high pressure compound cylinder consists of an inner and outer diameter of 300 mm and 400 mm OD respectively. It is jacketed by an outer cylinder of 500 mm outside diameter. The tubes are assembled by a shrinking process in such a way that the maximum principal stress induced in any tube is limited to 100 N/mm^2. Calculate the shrinkage pressure and original dimensions of the tube assuming E = 210 GPa. **[10]**

OR

Q6) a) i) What are the types of end closures for cylindrical vessel. Explain the design procedure of hemispherical head. **[4]**

ii) Explain various categories of the welded joints used in unfired pressure vessel. **[4]**

b) The cylindrical pressure vessel made of steel (S_{yt} = 270 N/mm^2) is subjected to operating pressure of 2 MPa. The thickness of the shell and torispherical heads of vessel are 12 mm and 16 mm respectively. If the weld efficiency is 0.7 and corrosion allowance is 2 mm, determine **[10]**

i) Inside diameter of shell

ii) Crown radius of torispherical head

Q7) a) Explain the stresses developed in the cylinder wall **[6]**

b) The cylinder of 4 stroke diesel engine has the following specifications:**[10]**

Brake Power = 7.5 kW,

Speed = 1400 rpm,

Indicated mean effective pressure = 0.35 MPa

Mechanical Efficiency = 80% and

Maximum gas pressure = 3.5 Mpa.

The liner and cylinder head are made of gray cast iron FG250 (S_{ut} = 250 MPa and v = 0.25). If the factor of safety for all parts is 6,

calculate:

i) the bore and length of cylinder liner;

ii) the thickness of cylinder liner;

iii) the thickness of cylinder head.

OR

Q8) The following data refers to a single cylinder four stroke diesel engine:**[16]**

a) Cylinder bore = 100 mm,

b) Piston stroke = 125 mm,

c) Speed = 2000 rpm,

d) Brake mean effective pressure = 0.65 N/mm^2,

e) Maximum gas pressure = 5 N/mm^2,

f) Brake specific fuel consumption = 0.25kg/kW-h

g) Higher calorific value of fuel = 42,000 kj/kg

h) Thermal conductivity of cast iron piston = 46.5 W/m^oC,

i) Allowable temperature difference for piston = 220^oC,

j) Heat conducted through piston crown = 5% of heat generated during combustion,

k) Radial pressure between piston ring and cylinder wall = 0.04 N/mm^2,

l) Permissible bearing pressure between piston skirt and cylinder wall = 0.04 N/mm^2,

m) Permissible bearing pressure between alloy steel piston pin and bronze bush in connecting rod = 25 N/mm^2,

n) Allowable tensile stress for C.I. Piston = 37.5 N/mm^2,

o) Allowable bending stress for C.I.alloy piston rings = 100 N/mm^2,

p) Allowable shear stress alloy steel piston pin = 80 N/mm^2,

q) Allowable bending stress for alloy steel piston pin = 160 N/mm^2.

Design:

i) Piston Head

ii) Piston barrel

iii) Piston rings

iv) Piston Skirt

v) Reinforcing ribs

vi) Piston pin

Q9) a) What is optimum design? Explain with examples **[6]**

b) A Helical compression spring to be used in exhaust valve mechanism is initially compressed with a preload of 500 N and the valve lift is 40 mm. Design the spring with modulus of rigidity 90 GPa and Wahl's shear stress factor as 1.14 such that the torsional shear stress in spring will not exceed 700 MPa. The spring would weight minimum with the condition that outside diameter fixed at 60 mm when optimized. std Wire dia: 4,4.5,5,5.6,6,6.5,7,8,8.5,9,9.5,10 mm **[10]**

OR

Q10) A shaft is to be used to transmit a torque of 900 N-m. The required torsional stiffness is 90 N-m / degree while the factor of safety based on yield strength is 1.5. Using maximum shear stress theroty, design the shaft with the objective of minimizing the weight. What will be the change in design for minimum cost? **[16]**

Materia I	Mass Density ρ,kg/mm^3	Modulus of rigidity G,(GPa)	Yield Strength S_{yt},MPa	Material Cost, C (Rs/N)
MAT 1	8500	80	130	16
MAT 2	3000	26.5	50	32
MAT 3	4800	40	90	480
MAT 4	2100	16	20	32

Total No. of Questions : 10]

SEAT No. : ____

P-2967

[Total No. of Pages : 3

[6004]-950

B.E. (Mechanical)

Tribology

(2015 Pattern) (Semester - II) (402049A) (Elective - III)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Write Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Neat diagrams must be drawn whenever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of electronic pocket calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) What are the various modes of lubrication? Explain with neat sketches. **[6]**

b) Explain the methods of recycling of used oil. **[4]**

OR

Q2) a) List the different factors affecting the wear rates. **[4]**

b) Write short note on: Types and uses of greases. **[6]**

Q3) a) Explain the causes of friction. **[4]**

b) Explain : **[6]**

i) Surface Fatigue Wear

ii) Corrosive Wear

iii) Cavitation Erosion

OR

P.T.O.

Q4) The following data is given for 360° hydrodynamic bearing : **[10]**

Radial load = 6.5 kN,

Journal speed = 1200 rpm

Journal diameter 60mm

Bearing length = 60mm

Minimum oil film thickness 0.009 mm

The fit between journal and bearing is H7e7 for which

Hole diameter = $60^{+0.00}_{+0.03}$ mm

Shaft diameter = $60^{+0.06}_{+0.09}$ mm

Specify the viscosity of lubricating oil for given hydrodynamic bearing :

$\frac{L}{d}$	$\frac{h_o}{c}$	S	$\left(\frac{r}{c}\right) f$	$\frac{Q}{r c n_s L}$	$\frac{Q_s}{Q}$
I	0.8	0.631	12.8	3.59	0.280
	0.6	0.264	5.79	3.99	0.497
	0.4	0.121	3.22	4.33	0.680
	0.2	0.0446	1.70	4.62	0.842

Q5) a) Explain in brief the working principle of hydrostatic bearing with figure. State the advantages and limitations of hydrostatic bearing. **[10]**

b) State and explain power losses in hydrostatic step bearing. Also explain temperature rise in hydrostatic step bearing. **[8]**

OR

Q6) a) Explain the phenomenon of squeeze film lubrication and its four practical examples. **[8]**

b) The following data is given for hydrostatic step bearing : **[10]**

Thrust load = 450 kN,

Shaft speed = 750 rpm

Shaft diameter = 400 mm,

Recess diameter = 250 mm

Viscosity of lubricant = 30 cP

Calculate :

i) The optimum oil film thickness for power loss

ii) Frictional power loss

iii) Pumping power loss

Show the variation of power loss against oil film thickness.

Q7) a) Explain Hertz theory of contact stress with example. Explain in brief contact stresses between two cylinder. **[8]**

b) Compare the gas lubrication bearing with oil lubricated bearings. **[8]**

OR

Q8) a) Explain in brief about the active and passive magnetic bearing. What are its advantages over conventional bearing? **[8]**

b) Explain the significance of the Hertz theory in Elasto-hydrodynamic lubrication. Write Ertel-Grubin equation with all specific terms and also write the limitation of this equation. **[8]**

Q9) a) Explain surface topography phenomenon. **[8]**

b) Explain with sketches the methods used for corrosion resistance. **[8]**

OR

Q10) a) Explain in details the techniques used for the surface measurement. **[8]**

b) Differentiate between apparent and real area of contact and explain any two parameters used for the measurement of surface roughness. **[8]**

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Total No. of Questions : 12]

SEAT No. :

P-2968

[Total No. of Pages : 3

[6004]-951

B.E. (Mechanical Engineering)

INDUSTRIAL ENGINEERING

(2015 Pattern) (Semester - II) (Elective - III) (402049B)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of programmable calculator is not permitted.***
5) ***Assume suitable data, if necessary.***

Q1) Define Industrial Engineering. Explain in brief various function of industrial Engineering. **[8]**

OR

Q2) What is productivity? Explain any four productivity improvement techniques. **[8]**

Q3) Explain Multiple activity chart and two handed process chart. **[8]**

OR

Q4) What is operational process chart? Explain with example, Method Study symbols for recording facts. **[8]**

Q5) What are the various allowances used. Why allowances are considered in the time study? **[8]**

OR

P.T.O.

Q6) Following are the element times of machine operation. The corresponding rating and relaxation allowances are given in following table **[8]**

Element	Observed time (min)	Performance rating (%)	Relaxation allowance (%)
1	0.15	80	13
2	0.05	85	13
3	0.55	90	10
4	1.00	95	12
5	0.1	90	13

Q7) a) Explain the functions of PPC. **[8]**

b) Write note on MRP, MRP-II. **[8]**

OR

Q8) a) Write a note on forecasting methods. **[8]**

b) Explain Concept of ERP with block diagram. **[8]**

Q9) a) Explain in detail factors affecting on selection of location for the industrial plant. **[7]**

b) Write a short note on : **[8]**

i) ABC analysis

ii) Assembly Line Balancing

OR

Q10) a) Estimate the sales forecast for the year 2000, using three month moving average and exponential smoothing forecast. Take $\alpha = 0.5$. **[8]**

Year	1995	1996	1997	1998	1999
Sale Rs. ($x10^5$)	180	168	159	170	188

b) What are different principles of material handling? Describe any four material handling equipment commonly used in industries. **[7]**

Q11) a) Write short note on : **[7]**

i) Break even Analysis

ii) Push and Pull systems

b) A company has given following information **[8]**

Data	Rs.
Selling price	10 / unit
Variable cost	2 / unit
Fixed cost	40,000/-

Determine :

i) Profit when sales are Rs. 1,00,000/-

ii) BEP

iii) Sales when it is desirable to earn profit of Rs. 20,000/-

OR

Q12) a) Write a short note on (any two) : **[8]**

i) KRA

ii) Cost Accounting

iii) Net present value (NPV)

b) Explain in brief different functions of human resource department. Comment on Key Result Area and Performance appraisal of employee. **[7]**

Total No. of Questions : 10]

SEAT No. :

P-2969

[Total No. of Pages : 2

[6004]-952

B.E. (Mechanical)

ROBOTICS

(2015 Pattern) (Semester - II) (402049 C) (Elective - III)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Figures to the right side indicates full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Use of scientific calculator allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) What is significance of angular velocity vector? **[5]**

b) Suggest suitable gripper for following applications : **[5]**

i) Car wind shields

ii) Glass jar

iii) Cylindrical metal pins

iv) Spherical metal jobs

v) Razor blade

OR

Q2) a) Distinguish between forward and inverse kinematics. **[5]**

b) State characteristics of velocity ellipse for planar 2R manipulator. **[5]**

Q3) a) Compare the resolution, accuracy and repeatability of a robotic system. **[5]**

b) Explain the working principle of the Tactile sensor with a neat sketch. **[5]**

OR

Q4) a) Give different robot configurations based on coordinate system. **[5]**

b) Write short note on robot anatomy with neat sketch. **[5]**

P.T.O.

Q5) a) Compare L-E formulation and N-E formulation **[8]**

b) Write a note on recursive forward dynamics algorithm. **[8]**

OR

Q6) a) Derive an expression for velocity of end effector of a Cartesian configuration. **[8]**

b) Explain in details, Euler-Lagrange formulation for dynamics. **[8]**

Q7) a) Explain the different steps involved in Image Segmentatio. **[8]**

b) Discuss the following commands for programming a robot: **[8]**

i) WAIT

ii) SIGNAL

iii) DELAY

OR

Q8) a) Explain with a neat block diagram the Machine Vision System for a Robot. **[8]**

b) Discuss different types of Robot Programming languages. **[8]**

Q9) a) What is image processing? State image processing techniques used in robot. **[8]**

b) Write a short note on (i) Genetic algorithm, (ii) Artificial neural network. **[10]**

OR

Q10) a) Write short note on machine vision. Write two applications of machine vision in Robotics. **[8]**

b) Explain the forward & backward search technique in problem solving for AI. **[10]**

▽▽▽▽

Total No. of Questions: 10]

SEAT No. : ____

P2970

[Total No. of Pages : 2

[6004]-953
B.E. (Mechanical Engineering)
ADVANCED MANUFACTURING PROCESSES
(2015 Pattern) (Semester-II) (Elective-IV) (402050A)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, & Q.3 or Q.4, & Q.5 or Q.6, & Q.7 or Q.8, & Q.9 or Q.10.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the righr side indicate full marks.***

Q1) a) Examine with neat sketch, stretch forming and list their applications. **[6]**

b) Explain the construction and working of Ultrasonic welding. **[4]**

OR

Q2) a) Explain with neat sketch, Magnetic pulse forming and list their applications. **[6]**

b) List applications of adhesive bonding. **[4]**

Q3) a) Explain with sketch working principle of Abrasive Water Jet machining with the process parameters. **[6]**

b) Examine the process of underwater welding. **[4]**

OR

Q4) a) Examine working principle of Wire-EDM with the process parameter. **[6]**

b) Write short note on welding of plastics and composites. **[4]**

Q5) a) Examine the process of Focused Ion Beam Machining. **[6]**

b) Explain the challenges in micro and nano fabrication process. **[6]**

c) Write short note on Diamond micro machining. **[4]**

OR

P.T.O.

Q6) a) Write in detail the need of micro machining. **[6]**

b) Examine the process of photochemical machining. **[6]**

c) Write short note on Lithography. **[4]**

Q7) a) Give classification of additive manufacturing processes. **[6]**

b) Write note on post processing of parts manufactured by additive manufacturing processes. **[6]**

c) Write applications of additive manufacturing processes in medical technology. **[4]**

OR

Q8) a) What are factors which play important role while designing the object which is manufactured by additive manufacturing? **[6]**

b) Explain any one Additive Manufacturing process with its details. **[6]**

c) Write application of additive manufacturing processes in aerospace industry. **[4]**

Q9) a) Examine operating principal of Scanning Electron Microscopes with neat sketch. **[6]**

b) Explain in details, the importance of material characterization. **[6]**

c) Describe in details. the applications of microscopes. **[6]**

OR

Q10)a) Examine operating principal of Energy-dispersive X-ray spectroscopy. **[6]**

b) Describe in details, the applications of spectroscope. **[6]**

c) Write short note on material characterization. **[6]**

Total No. of Questions: 7]

SEAT No. : ____

P2971

[Total No. of Pages : 2

[6004]-954
B.E. (Mechanical Engineering)
SOLAR AND WIND ENERGY
(2015 Pattern) (Semester-II) (402050B) (Elective-IV)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 & Q.7.***
2) ***Figures to the right indicate full marks.***

Q1) a) Define the following terms (any four) **[8]**

i) Zenith angle

ii) Solar azimuth angle

iii) Sun shine hours

iv) Altitude angle

v) Incident angle

vi) Angle of inclination

b) Explain the present solar energy potential in India and government role to support the renewable energy program. **[7]**

OR

Q2) a) Define beam, diffused & Global/Total radiation and derive an expression for total radiation falling on plane/horizontal surface. **[8]**

b) Explain the necessity to measure the solar radiation. Draw solar pyranometer sketch and explain its working in short. **[7]**

Q3) a) Name different types of solar concentrated collectors. Draw and explain the working of solar flat plate collector used for water heating **[8]**

b) Draw and explain parabolic trough solar collector **[7]**

OR

P.T.O.

Q4) a) List different types of solar non concentrating collectors used for water heating. Draw & Explain solar parabolic dish collector. **[8]**

b) Explain working of solar PV system with PN junction sketch. List advantages & Limitations of it. **[7]**

Q5) Design a 100 Liter solar water heating system by using Evaluated tube collector with following data. **[20]**

a) Solar radiation available 750 W_p / m^2

b) Effective daily sunshine hr. 6 Hrs.

c) Inlet and outlet temp. of water 25°C & 55°C calculate the efficiency of System.

OR

Q6) Design a solar PV system for "On gride" type with following data.

Load	Std. watt (W)	Number
LED bulbs/Tubes	18	10
Fan	60	05
T.V.	300	01
Computer	250	02

The system should be used only in sunshine hours consider the monoperk PV panels with efficiency 20% avg. solar daily radiation 680 W_p / m^2 **[20]**

Q7) a) Define wind energy. Derive the energy posses by the wind. **[10]**

b) Explain the various design considerations for horizontal & vertical wind will. List their advantages & limitations. **[10]**

Total No. of Questions: 10]

SEAT No. : ____

P2972

[Total No. of Pages : 2

[6004]-955
B.E. (Mechanical)
PRODUCT DESING AND DEVELOPMENT
(2015 Pattern) (Semester-II) (402050-C) (Elective-IV)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Neat diagram must be drawn wherever necessary.***
2) ***Figures to the right indicate full marks.***
3) ***Use of Calculators is allowed***
4) ***Assume Suitable data if necessary.***

Q1) a) Explain how you will carry out analysis of gathered information **[5]**

b) Explain Pugh's concept **[5]**

OR

Q2) a) Differentiate between product development and product design **[5]**

b) Explain customer need with suitable example **[5]**

Q3) a) Explain, morphological analysis with suitable example **[5]**

b) Explain market segmentation with suitable example **[5]**

OR

Q4) a) Explain the concept of brainstorming with suitable example **[5]**

b) How standardization, simplification and specializaiton are related to product design? Explain **[5]**

Q5) a) What is force flow diagram? Apply and explain for paper punching machine. **[8]**

b) Explain following tools in benchmarking **[8]**

i) Intended Assembly Cost Analysis

ii) Trend Analysis

OR

P.T.O.

Q6) a) Define benchmarking. What are objective of benchmarking? **[8]**

b) Explain function form diagram with suitable example **[8]**

Q7) a) Discuss guideline desing for casting and forging in detail **[8]**

b) Discuss in detail manufacturing cost analysis **[8]**

OR

Q8) a) Discuss various regional and global issue of environmental pollution **[8]**

b) Discuss guideline for desing for environment and materials **[8]**

Q9) a) Explain different elements of product life cycle management in detail **[10]**

b) Explain the elements of PLM in detail **[8]**

OR

Q10)a) Explain the role of customers and vendors in implementation of PLM **[10]**

b) Explain the components of PDM in detail **[8]**

Total No. of Questions : 10]

SEAT No. : ____

P2973

[Total No. of Pages : 4

[6004]-960

B.E. (Mechanical-Sandwich)

MECHANICAL VIBRATIONS

(2015 Pattern) (Semester-II) (402066)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Figures to the right indicate full marks.***
3) ***Draw Neat diagrams wherever necessary.***
4) ***Assume suitable data, wherever necessary.***
5) ***Use of scientific calculator is allowed.***

Q1) a) Classify mechanical vibrations. Give at least one engineering example of each type. **[4]**

b) A single-dof mass-spring system of mass 'm' and stiffness 'k' is subjected to the initial displacement of x_0 and initial velocity of v_0 and then allowed it to oscillate freely. Obtain an expression for displacement of the mass and hence find the amplitude in terms of x_0 and v_0. **[6]**

OR

Q2) a) Draw the time-displacement graph of free vibration of 1-dof viscously damped system for different damping conditions. **[4]**

i) zero damping

ii) under damping

iii) critical damping and

iv) over damping.

b) A block of mass 10 kg is placed on a horizontal surface and attached to a horizontal spring of stiffness 5000 N/m. The coefficient of sliding friction between the block and surface is 0.2. When the mass is given an initial displacement of 80 mm, calculate. **[6]**

i) the frequency of free oscillations.

ii) the number of cycles corresponding to 50% reduction in the initial amplitude

P.T.O.

Q3) a) Explain with neat sketch the transient state and steady state of vibration related to forced vibration. **[4]**

b) A single DOF mass-spring-damper oscillator is excited by a harmonic force. $f(t) = 3 \sin(15t)$ N. The oscillator has a mass of 10 kg, stiffness 1000 N/m and damping coefficient 50 N-s/m. Determine. **[6]**

i) Steady state amplitude of vibration of mass and

ii) Maximum force transmitted to the support.

OR

Q4) a) Define the following terms in relation to forced vibration. **[4]**

i) Magnification factor

ii) Quality factor

iii) Force transmissibility

iv) Motion transmissibility

b) A rotor of 10 kg mass is mounted midway on a horizontal shaft of diameter 3 cm which is simply supported with a span of 1.2 m in bearings at both the ends. The center of gravity of the rotor is 0.2 mm offset from its axis of rotation. The modulus of elasticity of shaft material is 200 GPa. Determine. **[6]**

i) Static deflection of rotor

ii) Critical speed of shaft

iii) Amplitude of steady state vibrations of rotor at a speed of 3000 rpm

Q5) a) Explain two degree of freedom system with any two practical examples. **[6]**

b) For the system of spring and masses shown in the figure, derive differential equations of motion in terms of displacement x_1 and x_2 of masses. Determine natural frequencies and corresponding mode shapes. Describe the mode shapes graphically. **[10]**

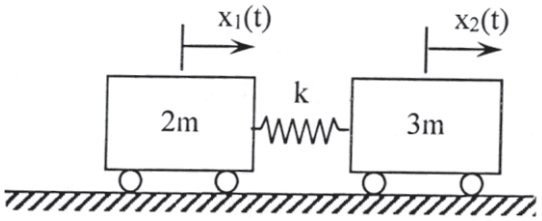


Figure: Q 5 b)

OR

Q6) a) Explain the concept of 'Torsionally Equivalent Shaft'. **[6]**

b) Two equal masses of magnitude 'm' are attached to a light string of length 3L which is stretched with static tension 'T' between two supports as shown in figure. Assuming that the static tension 'T' is so high that the dynamic change in it is negligible due to small vertical displacements of masses. Derive differential equations of motion for small vertical displacements x_1 and x_2 of masses and determine natural frequencies and mode shapes. Describe the mode shapes graphically. **[10]**

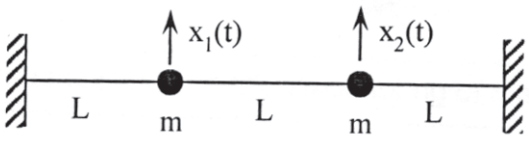


Figure: Q No 6 b)

Q7) a) Differentiate between static and dynamic balancing. Why there is a need of accurate dynamic balancing of high speed machines? **[4]**

b) Four masses A, B (10 kg), C (5.5 kg) and D (3.6 kg) are attached to a shaft at radii 0.1, 0.225, 0.15 and 0.15 m respectively. The planes in which the masses revolve are spaced 0.6 m apart. Determine the magnitude of mass A and relative angular position of all masses with respect to mass B to achieve the complete dynamic balance. **[12]**

OR

Q8) a) Explain the concept of partial balancing in single cylinder IC engine. **[4]**

b) A four stroke four cylinder inline engine has firing order of 1-4-2-3. The length of crank and connecting rod are 80 mm and 320 mm respectively. The angular position of cranks is at equal angles and engine cylinders are at 180 mm apart. The mass of reciprocating parts of each cylinder is 3 kg. Determine unbalanced primary and secondary forces and couples at a speed of 2000 rpm. **[12]**

Q9) a) Explain in brief various methods and techniques for vibration control.**[6]**

b) Explain with neat sketches the working principle of seismic sensor for vibration measurement. **[6]**

c) The static deflection of the vibrometer mass is 20 mm. The instrument when attached to machine vibrating with a frequency of 125 Hz, records the relative amplitude of 0.3 mm. Find the amplitude of displacement, velocity and acceleration of the machine vibration. **[6]**

OR

Q10)a) Explain with neat labeled sketches a typical arrangement of vibration measurement system. **[6]**

b) What is Dynamic vibration absorber? Explain working principle of undamped dynamic vibration absorber. **[6]**

c) Explain the method of vibration based condition monitoring of machines. **[6]**

❖ ❖ ❖

Total No. of Questions : 10]

SEAT No. : ____

P-2974

[Total No. of Pages : 4

[6004]-963
B.E. (Mechanical S/W)
FINITE ELEMENT ANALYSIS
(2015 Pattern) (Semester - II) (Elective-I) (402068C)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates :

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume Suitable data if necessary.***

Q1) a) Explain advantages and disadvantages of finite element analysis. **[4]**

b) Illustrate the following boundary conditions used in finite element analysis:**[6]**

i) Essential and natural boundary conditions

ii) Symmetric boundary conditions

OR

Q2) a) Derive the stiffness matrix in brief using the principle of minimum potential energy approach. **[6]**

b) Differentiate between linear and non-linear analysis. **[4]**

Q3) a) An axial load P = 300 kN is applied on a stepped steel bar as shown Figure 1. **[6]**

Take E = 200 GPa

Formulate:

i) Element stiffness matrix $[k_1]$, $[k_2]$, $[k_3]$

ii) Global stiffness matrix $[K]$

Determine using elimination approach:

i) Nodal displacement vectors $[u_1]$, $[u_2 1$, $[u_3]$, $[u_4]$.

ii) Element Stresses $[\sigma_1]$, $[\sigma_2]$

P.T.O.

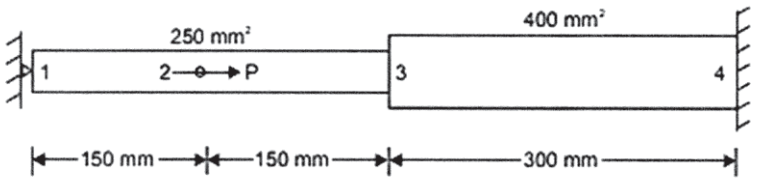
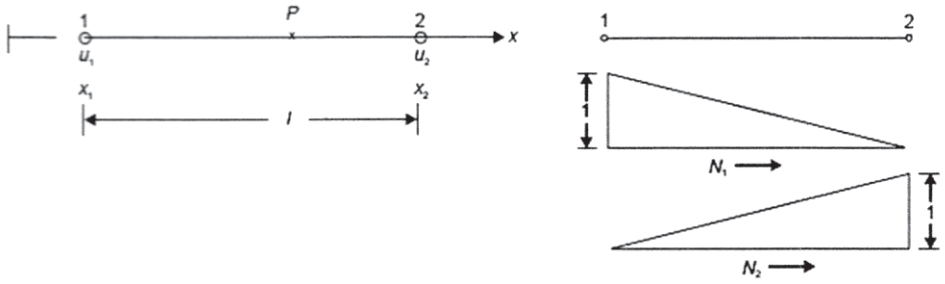


Figure 1

b) Using generalized coordinate approach, find shape functions for two noded bar element. **[4]**



OR

Q4) a) For the two-bar truss shown in Figure 2 below. All the elements have E = 200 GPa and A = 1000 mm^2. Point 1 and 3 are fixed. **[6]**

Formulate:

i) Element stiffness matrix [k_1], [k_2]

ii) Global stiffness matrix [K]

Determine using elimination approach:

i) Nodal displacement vectors at node 2 [u_3].

ii) Element Stresses in element 1 [σ_1]

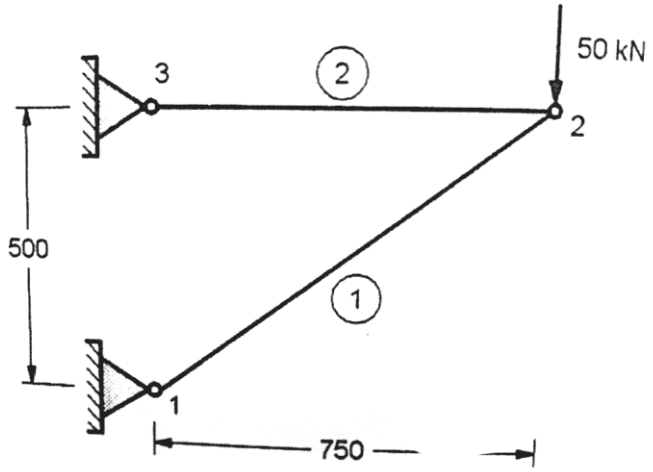


Figure 2

b) Differentiate between a bar element and a truss element. **[4]**

Q5) a) Explain the terms: isoparametric, subparametric and superparametric elements. **[6]**

b) Elaborate the quality checked used in evaluation of quality of FEA mesh checking. **[4]**

c) The nodal coordinates of the triangular element are (1, 2), (5, 3) and (4, 6). At the interior point P, the x-coordinate is 3.3 and the shape function at node 1 is 0.3. Determine the shape functions at nodes 2 and 3 and also the y-coordinate at the point P. **[8]**

OR

Q6) a) Elaborate the concept of p and h formulation and how it is used for improving accuracy in FEA simulations. **[6]**

b) Explain what is meant by Plane Stress and how it is used for conversion of 3D problem in 2D problem. Give practical examples. **[6]**

c) Explain the terms: **[6]**

i) Constant strain triangle (CST)

ii) Linear strain triangle (LST)

Q7) a) A composite slab consists of three materials with thermal conductivities of 20 W/m °K, 30 W/m °K, 50 W/m °K and thicknesses 0.3 m, 0.15 m, and 0.15 m respectively. The outer surface is at 20 °C and the inner surface is exposed to the convective heat transfer coefficient of 25 W/m^2 °K and a medium at 800 °C. Determine the temperature distribution within the wall. **[10]**

b) Illustrate the difference between bar element and heat transfer element. Write down elemental matrices for conduction element and convection element. **[6]**

OR

Q8) a) A metallic fin, with thermal conductivity 70 W/m °K, 1cm radius and 5 cm long extend from a plane wall whose temperature is 140°C. Determine the temperature distribution along the fin if heat is transferred to ambient air at 20°C with heat transfer coefficient of 5 W/m °K. Take two elements along the fin. **[10]**

b) Formulate the one - dimensional heat transfer equations. **[6]**

Q9) a) Formulate stiffness and mass matrix for Consistent and Lumped Mass System for following elements: **[10]**

i) Bar element

ii) Truss element

b) Write down dynamic equation of motion for axial vibration of the bar. **[6]**

OR

Q10)a) Find the natural frequencies of longitudinal vibrations of the constrained stepped shaft of areas A and 2A and of equal lengths (L), as shown below. Compare the results obtained using lumped mass matrix approach and consistent mass matrix approach. **[10]**

b) Explain each term of Dynamic given below and explain importance of eigen values and Eigen vectors. **[6]**

$$m\ddot{x} + c\dot{x} + kx = f$$

Total No. of Questions : 8]

SEAT No. :

P-2975

[Total No. of Pages : 3

[6004]-964

B.E. (Mechanical Sandwich)

HYDRAULICS AND PNEUMATICS

(2015 Pattern) (Semester - II) (402068D) (Elective - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Figures to the right indicate full marks.***
2) ***Use of non-programmable scientific calculator is allowed.***
3) ***Assume data wherever necessary and mention it.***
4) ***Draw neat and suitable figure wherever necessary.***
5) ***Answer Q.1 'OR' Q.2, Q. 3 'OR' Q.4, Q.5 'OR' Q.6, Q.7 'OR' Q.8.***
6) ***Use of steam table is permitted.***

Q1) a) Draw the symbols of Pressure Relief valve, Pilot operated check valve, Limited rotation hydraulic motor, Pneumatic 5/3 DC Valve. **[4]**

b) Draw any 4 mountings of cylinders. **[8]**

c) Draw labeled circuit diagram explaining Servo Valve. **[8]**

OR

Q2) a) Explain with diagram working of Axial Piston Pump. **[6]**

b) Explain with labeled diagram the working of Vane type hydraulic motor. **[8]**

c) Explain the labeled diagram working of hydraulic motor breaking circuit. **[6]**

Q3) a) Explain the working of Meter-In and Meter-out circuit. **[8]**

b) What is Synchronization circuit? Explain with labeled diagram. **[8]**

OR

Q4) a) Explain with labeled circuit diagram the application of Pilot operated Check valves. **[8]**

b) What are sources of Contamination in hydraulic systems? How to minimize it? **[8]**

P.T.O.

Q5) a) Explain the use of Pneumatic Quick Exhaust valve. Draw suitable labeled circuit. **[5]**

b) Draw Electro Pneumatic sequencing circuit for A+B+B-A- sequence. **[12]**

OR

Q6) a) Draw labeled pneumatic circuit diagram for showing use of Twin Pressure valve. **[5]**

b) Explain the Meter-In and Meter-Out Pneumatic circuits. State applications. State in which conditions each circuit is suitable. **[12]**

Q7) A pneumatic circuit is to be designed for Clamping and Drilling application. Decide the sequence and sizes of the cylinders. Clamping force required in lkN, Drilling force required is 500N. Operating pressure is 5.5 bar. Assume suitable data if any. Draw circuit with labels and explain its working. Do not use sequencing valve. **[17]**

OR

Q8) Two identical cylinders A & B are to be operated simultaneously. The cylinder A moves again a load of 25 kN, while the cylinder B moves against a load of 20 kN. Both the cylinders have stroke of 1m. the working stroke has to be completed in 15 seconds. The return stroke of cylinder B is to start only after the cylinder A. is completely retracted. The return speeds are to be fast as possible Draw a circuit which full fill these requirements Select the different components you have used in the circuit from the given data. **[17]**

(a) Suction strainer:

Model	Flow Capacity (lpm)
S_1	38
S_2	76
S_3	152

(b) Pressure gauge:

Model	Range (bar)
PG_1	0 – 25
PG_2	0 – 40
PG_3	0 – 100
PG_4	0 – 160

(c) Vane pump:

Model	Delivery in lpm		
	At 0 bar	At 35 bar	At 70 bar
P_1	8.5	7.1	5.3
P_2	12.9	11.4	9.5
P_3	17.6	16.1	14.3
P_4	25.1	23.8	22.4
P_5	39.0	37.5	35.6

(d) Relief valve:

Model	Flow capacity (lpm)	Max. working pressure & bar
R_1	11.4	70
R_2	19.0	210
R_3	30.4	70
R_4	57.0	105

(e) Flow control valve:

Model	Working pressure (bar)	Flow range (lpm)
F_1	70	0 - 4.1
F_2	105	0 - 4.9
F_3	105	0 - 16.3
F_4	70	0 - 24.6

(f) Directional control valve:

Model	Max. working pressure & bar	Flow capacity (lpm)
D_1	350	19
D_2	210	38
D_3	210	76

(g) Check valve:

Model	Max. working Pressure & bar	Flow capacity (/pm)
C_1	210	15.2
C_2	210	30.4
C_3	210	76

(h) Pilot operated check valve:

Model	Max. working Pressure (bar)	Flow capacity (lpm)
PO_1	210	19
PO_2	210	38
PO_3	210	76

(i) Cylinder (Max. working pressure 210 bar)

Model	Bore diameter (mm)	Rod diameter (mm)
A_1	25	12.5
A_2	40	16
A_3	50	35
A_4	75	45
A_5	100	50

(j) Oil reservoirs:

Model	Capacity (litres)
T_1	40
T_2	100
T_3	250
T_4	400
T_5	600

Total No. of Questions: 10]

SEAT No. : ____

P2976

[Total No. of Pages : 2

[6004]-965
B.E. (Mechanical Sandwich Engg.)
ENERGY AUDIT AND MANAGEMENT
(2015 Pattern) (Semester-II) (Elective-II) (402069A)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q.7 or Q.8 Q.9 or Q.10.***
2) ***Draw a neat diagram wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***
5) ***Use of scientific calculators is allowed.***

Q1) a) Write down the responsibility of energy auditor **[5]**

b) Write a short note **[5]**

i) Commercial energy and Noncommercial energy

ii) Renewable and Nonrenewable energy

OR

Q2) a) Explain current energy scenario in India **[5]**

b) Discuss the environmental impact due to convectional energy use **[5]**

Q3) a) Describe energy conservation opportunities in Boiler system **[5]**

b) Define energy audit? Explain walk through or preliminary energy report **[5]**

OR

Q4) a) Explain need of energy audit **[5]**

b) Explain the NPV financial analysis techniques **[5]**

Q5) a) Explain the merits and demerits of direct and indirect methods used for calculating boiler efficiency **[8]**

b) What are different types of fans **[8]**

OR

P.T.O.

Q6) a) Write down various energy conservation opportunities in HVAC System and DG set **[8]**

b) What are advantages of condensate and flash steam recovery system in process industry **[8]**

Q7) a) Explain the terms **[8]**

i) Copper Loss

ii) Luminous efficiency

iii) Ballast

iv) Power factor

b) Descrie the factors included in tariff structure of electric billing **[8]**

OR

Q8) a) Explain step by step approach for maximum demand control **[8]**

b) List types of motors and explain the different losses occuring in electric motor **[8]**

Q9) a) Classify the waste heat recovery with example. Write down benefits **[10]**

b) Compare topping cycle and bottoming cycle of cogeneration with example **[8]**

OR

Q10) Write notes on: **[18]**

a) Heat Wheel

b) Heat Pipe

c) Carbon credits

Total No. of Questions : 8]

SEAT No. :

P-2977

[Total No. Of Pages : 2

[6004]-972
B.E. (Honours)
Soft Computing and Deep Learning
(2015 Pattern) (Semester-II) (410303)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates :

1) ***Solve Q.1 or Q.2 Q.3 or Q.4 Q.5 or Q.6 Q.7 or Q.8.***
2) ***Assume suitable data if necessary.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right side indicate full marks.***

Q1) a) Define the basic framework of a genetic algorithm (GA), and how does it work? **[3]**

b) What is a perceptron and what are its main components in terms of learning rules and activation functions? **[6]**

OR

Q2) a) Discuss the example of encoding methods used in genetic algorithms and how they are applied in solving optimization problems? **[3]**

b) What is convergence in the context of genetic algorithms and how does it impact the optimization process? **[6]**

Q3) a) What is a self-organizing map (SOM), and how does it work in unsupervised learning tasks? **[3]**

b) What is associative memory in the context of neural networks and how does it function? **[6]**

OR

Q4) a) List the different types of artificial neural networks (ANNs) and what are their specific applications and characteristics. **[3]**

b) Write Short note on adoptive resonance. **[6]**

P. T. O

Q5) a) Explain the concepts of feed forward and back propagation networks in the context of Artificial Neural Networks (ANNs). **[6]**

b) Describe the architecture of a back Propagation (BP) network, including the number of layers and nodes involved. **[6]**

c) How is the fitness function used in a genetic algorithm and why is it important? **[4]**

OR

Q6) a) Explain the architectural characteristics of a deep network and how it differs from traditional shallow networks. **[6]**

b) What is TensorFlow and how does it contribute to deep learning? **[6]**

c) What are Restricted Boltzmann Machines (RBMs), and how are they used in deep learning architectures? **[4]**

Q7) a) What is deep learning and why has it gained significant attention in recent years? **[8]**

b) Write short note on Recurrent Neural Network (RNN). **[6]**

c) How does deep learning differ from traditional machine learning approaches and what are the benefits and limitations of deep learning? **[4]**

OR

Q8) a) What are a Convolutional Neural Network (CNN) and how is it different from other types of neural networks? **[8]**

b) Explain the concept of scattering networks and how they capture multi-scale information in signals. **[6]**

c) What is Recurrent Neural Network (RNN), and how does it differ from feed forward neural networks? **[4]**

Total No. of Questions : 8]

SEAT No. :

P-2978

[Total No. Of Pages : 2

[6004]-973
B.E. (Computer)
Honors in Cyber Security
Information Systems Management
(2015 Pattern) (Semester-II) (410403)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Solve Q.1 or Q.2 Q.3 or Q.4 Q.5 or Q.6 Q.7 or Q.8.***
2) ***Figures to the right side indicate full marks***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable data if necessary.***

Q1) a) How Information Systems Impact Organizations and Business Firms? **[7]**

b) Explain Five Moral Dimensions of the Information Age? **[7]**

c) Explain Contemporary Hardware Platform Trends in detail **[6]**

OR

Q2) a) What is an Organization? Enlist and explain the features of an organizations? **[7]**

b) What are the Ethical and Social Issues in Information Systems? **[7]**

c) Discuss IT Infrastructure and Emerging Technologies for information system management? **[6]**

Q3) a) Explain the Decision-Making Process in detail? **[8]**

b) What is Business Intelligence? Discuss its environments? **[9]**

OR

Q4) a) What are the Important Dimensions of Knowledge? **[8]**

b) Explain the Knowledge Management Value Chain? **[9]**

P. T. O

Q5) a) Explain Overview of Systems Development? **[8]**

b) Discuss the Importance of Project Management? **[9]**

OR

Q6) a) What are the Objectives of Project Management? **[8]**

b) Explain in details the Management Structure for Information Systems Projects? **[9]**

Q7) a) Explain Mobile Security? **[8]**

b) Discuss Personal Information Security? **[8]**

OR

Q8) a) Explain in details the Information Security Triad? **[8]**

b) Explain any two tools for Information Security? **[8]**

Total No. of Questions : 8]

SEAT No. :

P-2979

[Total No. Of Pages : 2

[6004]-974
B.E. (Computer Engineering) (Honors)
Artificial Intelligence for Big Data Analytics
(2015 Pattern) (Semester-II) (410503)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Answer Q.1 or Q.2 Q.3 or Q.4 Q.5 or Q.6 Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Explain in brief general steps image pre-processing. **[6]**

b) Explain difference between OLTP and OLAP **[6]**

c) Explain the NLP application-Sentiment Analysis with a case study? **[8]**

OR

Q2) a) Explain feed forward Neural Network. **[6]**

b) Explain a note on Python And Hadoop streaming. **[6]**

c) Let's consider the example of a regression problem where we have two input variables and one output or dependent variable and illustrate the use of ANN for creating a model that can predict the value of the output variable for a set of input variables:

X1	X2	Y
5	7	10
3	1	7
8	9	12
4	6	9
2	3	5
6	10	?

[8]

P. T. O

Q3) a) What is Data Ingestion? Why is Data Ingestion so important? How does Data Ingestion works? **[4]**

b) What is POS tagging? Explain using example **[6]**

c) How to Apply basic statistical calculations using the Apache Spark RDD API in order to experience how parallelization in Apache Spark works? **[8]**

OR

Q4) a) Explain Hadoop Ecosystem with a use case? **[6]**

b) Explain in brief general steps image pre-processing. **[4]**

c) Explain feature extraction in Natural Language Processing. **[8]**

Q5) a) Explain feature extraction in image in Computer Vision. **[6]**

b) Explain Features of Spark MLIib Library **[6]**

c) Explain Data Warehousing and Mining. **[4]**

OR

Q6) a) Explain Data Analysis using Hive with a example. **[6]**

b) Explain Lemmatization in NLP. **[6]**

c) Explain OLAP with example. **[4]**

Q7) a) How would you prevent Overfitting when designing an Artificial Neural Network? **[6]**

b) Does Gradient Descent always converge to an optimum? How do Gradient Descent Algorithms deal with the flat regions with desired poinsts? **[6]**

c) Classify and discuss Supervised and unsupervised Machine Learning. **[4]**

OR

Q8) a) Demonstrate the Regression analysis using suitable example **[6]**

b) Explain different Hadoop Configuration files? What are the three modes in which Hadoop can run? **[6]**

c) Explain the Computer Vision application-Object Detection? **[4]**

Total No. of Questions : 8]

SEAT No. :

P-2980

[Total No. Of Pages : 2

[6004]-975
B.E. (Honors) Computer Engineering
Internet of Things Security
(2015 Pattern) (Semester-II) (410603)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates :

1) ***Answer Q.1 or Q.2 Q.3 or Q.4 Q.5 or Q.6 Q.7 or Q.8.***
2) ***Draw neat diagrams wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Explain different attack techniques in IoT environment. **[6]**

b) Can we use AES to secure IoT node? How? **[5]**

c) Explain the two commonly used identity authentication protocols for IoT devices. **[6]**

OR

Q2) a) Explain different trust models and privacy preservation in IoT. **[6]**

b) Why RSA is not a good choice for node authentication in IoT compared to ECC? Justify. **[5]**

c) Explain mutual certificate-based handshake procedure in detail. **[6]**

Q3) a) Explain data life cycle in IoT. How can we protect data in IoT? **[6]**

b) List and explain different security threats and vulnerabilities at IoT end node. **[6]**

c) Explain the security requirements at the network layer of IoT. **[6]**

OR

Q4) a) List and explain the application-interface layer security threats in IoT. **[6]**

b) Elaborate the security concerns, threats and protection at sensing layer. **[6]**

c) Write a short note on IoT security for machine learning applications. **[6]**

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Q5) a) Identify the security issues in integration of RFID and WSNs. Describe in detail. **[6]**

b) Discuss security protocols and privacy issues in 6LoWPAN stack. **[6]**

c) Explain the key management approached and security properties to consider in IoT. **[6]**

OR

Q6) a) List and explain different security schemes to protect information in WSNs. **[10]**

b) How do we maintain confidentiality and security for IoT based health care applications. **[8]**

Q7) a) Explain different characteristics of Smart City. Provide IoT-based solution for smart city. **[10]**

b) Draw and explain the system model for Intelligent traffic system. **[7]**

OR

Q8) a) Describe the challenges associated with secure IoT deployment and blockchain in IoT. **[6]**

b) Comment on IoT in Food supply chain traceability system. **[5]**

c) Provide IoT-based solution for "Smart Electric Vehicle Scheduling" use case. **[6]**