Total No. of Questions : 8]

SEAT No. : ____

PE-2109

[Total No. of Pages : 3

[6584]-1

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 jf necessary.***
2) ***Answer FOUR questions from the following (Que. 1 or Que. 2, Que. 3 or Que. 4, Que. 5 or Que. 6, and Que. 7 or Que8,).***

Q1) a) Explain with neat sketch the working of BLDC Motor. **[8]**

b) What is the meaning of magnetic torque and reluctance torque in EV motor? **[9]**

OR

Q2) a) A motor delivers 5kW power at 3500 rpm. Its efficiency is 90%. Half the losses are due to steel and rest due to copper. It is coupled to a constant load. **[4]**

i) How much heat does it generate?

ii) How much power does it consume?

b) If the speed of the motor is reduced to 1000 rpm, then what will be the efficiency of Motor now? **[4]**

c) If the motor is coupled to a gear box of gear ratio 80%, then what will be the output torque? **[4]**

d) If motor is running at 3500 rpm and above gearbox (mentioned in (c)) is used, then how much will be the vehicle speed in kmph? Take wheel rolling radius 0.3m. **[5]**

Q3) a) Draw and explain 'Discharge Characteristics' of Li-Ion battery. **[10]**

b) Why slow charging is preferred (or fast charging is avoided) in Li-Ion battery. **[8]**

OR

P.T.O.

Q4) a) What are the requirements of energy storage device of electric vehicle? **[10]**

b) Following two batteries are used for two 4-wheeler electric vehicle for city operation (Average driving is 30km per day). Which battery needs first replacement? **[8]**

Vehicle	Range	Cycle Life
Alpha	600 km	500 cycle
Beta	150 km	1500 cycle

Q5) a) What are the primary functions of Battery Management System (BMS)? **[8]**

b) What are the components of Battery Management System? **[9]**

OR

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

b) State different methods used in Battery Thermal Management System. Explain any one method with neat sketch. **[9]**

Q7) It is decided to design an E-2Wheeler with following specifications :- **[18]**

a) Gross Vehicle Weight (GVW) = 180 kg,

b) Maximum Speed = 90 kmph,

c) Acceleration = 0 to 90 kmph in 20 seconds,

d) Grade = 5^0,

e) Radius of wheel = 0.292m,

f) Coe. Of Drag = 0.90,

g) Gear Ratio = 9:1,

h) Air Density = 1.225kg/m^3,

i) Front Area = 0.50 m^2,

j) Coe. of rolling resistance = 0.013,

k) Speed on grade road = 45 kmph,

l) 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) Actual Max. Vehicle Speed in kmph and

v) EV range (in km) for plane road at constant speed of 60kmph.

OR

Q8) It is decided to design an E-Scooter with following specifications:- **[18]**

a) Gross Vehicle Weight (GVW) = 191 kg,
b) Maximum Speed = 80 kmph,
c) Acceleration = 0 to 40 kmph in 4 seconds,
d) Grade 0°,
e) Radius of wheel = 0.1524 m,
f) Coe. Of Drag = 0.22,
g) Gear Ratio = 7.8:1,
h) Air Density = $1.225 kg/m^3$,
i) Front Area = $0.875 m^2$,
j) Coe. of rolling resistance = 0.015,
k) 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) Actual Max. Vehicle Speed in kmph and
v) EV range (in km) for plane road at constant speed of 60 kmph.

♦ ♦ ♦

Total No. of Questions : 8]

SEAT No. : ____

PE-2110

[Total No. of Pages : 3

[6584]-2
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) ***Figure to the right indicate full marks.***
3) ***Assume suitable data f necessary.***

Q1) a) Explain the theory of torsion for propeller shaft design with expression. **[8]**

b) An engine develops 29.5 kW at 2000 rpm when the torque developed is maximum. The bottom gear ratio is 3:1 and the back axle reduction is 4.5:1. The load on each driving axle is 7357.5 N when the car is fully loaded. Diameter of road wheel over the tyres is 0.71 m and the coefficient of adhesion between tyre and road is 0.6. If the permissible stress in the material of the shaft is not allowed to exceed 22072.5×10^4 Pa, find the diameter of the axle shaft, maximum vertical & horizontal shear stress. **[9]**

OR

Q2) a) Explain the following **[10]**

i) Propeller Shafts

ii) Drive shafts

iii) Universal joint

iv) Rear axle final drive

v) Dead axle

b) Two shafts with inclined angle of 160° are connected by a Hook's Joint. The driving shaft runs at a uniform speed of 1500 rpm. The driven shaft carries a flywheel of 12 kg and 100 mm radius of gyration. Find the maximum angular torque required. **[7]**

P.T.O.

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

Q4) 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.

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) Explain the working principle of 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. Assume Factor of Safety of 2.0. **[18]**

Material	Mass density (Kg/m^3)	Yield strength (MPa)	Material cost Rs/N
Steel	3000	16	130
AI 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 optimum and adequate design? **[8]**

b) Write note on : **[10]**

i) Design for natural tolerances.

ii) Statistical considerations in design.



Total No. of Questions : 8]

SEAT No. :

PE-2111

[Total No. of Pages : 2

[6584]-3

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 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.***

Q1) a) What are the Various vegetable oils and write their important properties. **[8]**

b) Explain the Nano fluids, additives and certain improvers for performance improvement of vegetable oils? **[9]**

OR

Q2) a) What are the different methods of using vegetable oils for engines? **[8]**

b) Write a short on Blending, preheating and emulsification of Vegetable oils. **[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? **[9]**

b) Performance and emission characteristics of Biogas, NG and LPG in SI and CI engines? **[9]**

OR

Q4) a) What are the Properties Natural gas, CNG and LPG? **[9]**

b) What do mean by CO_2 and H_2S scrubbing in Biogas. Why biogas Modification required to use in SI and CI Engines **[9]**

P.T.O.

Q5) a) Explain the construction and working of NDIR. **[9]**

b) Discuss the effects of pollutants on environment human beings. **[9]**

OR

Q6) a) Explain the construction and working of FID. **[9]**

b) Describe the SHED Test with the help of a neat sketch. **[9]**

Q7) a) Explain the remedies for engine emission. **[9]**

b) List the negative effects of CO emission on human health, what is treatment to CO intoxicated person? **[8]**

OR

Q8) a) Write a short note on following : **[9]**

i) EGR

ii) Particulate Traps,

iii) HCCI

b) Write a note on Selective Catalytic Reduction (SCR). **[8]**

♦ ♦ ♦

Total No. of Questions : 8]

SEAT No. :

PE-2112

[Total No. of Pages : 2

[6584]-4
B.E. (Automobile Engineering)
RENEWABLE ENERGY
(2019 Pattern) (Semester - VIII) (416491B) (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 side indicate full marks.***

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

b) Draw and explain the working of Solar-wind hybrid sytem. **[9]**

OR

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

b) C1assify wind -turbines used to Extract wind energy. Explain the different types in brief. **[9]**

Q3) a) Describe a Hybrid conventional and geothermal power plant with neat sketch. **[9]**

b) Classify prime movers for Geothermal energy Conversion. Explain. any one with neat diagram. **[8]**

OR

Q4) a) Describe a binary cycle liquid dominated geothermal power plant. **[9]**

b) Explain- Hydrothermal resources and Geothermal Resources. **[8]**

P.T.O.

Q5) a) List the different sources of Biomass. Explain any four. **[9]**

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

OR

Q6) a) What are the different factors affecting the generation of biogas? **[9]**

b) How MHD systems are classified? Describe them in brief. **[9]**

Q7) a) What are advantages and limitations of Ocean Energy? **[9]**

b) Write a note on Off shore and on-Shore ocean energy Conversion Technologies. **[8]**

OR

Q8) a) Write a note on Small hydel power Plant. **[9]**

b) What are different types of ocean thermal energy conversion system (OTEC) and Explain Open cycle OTEC System with neat sketch. **[8]**

♦ ♦ ♦

Total No. of Questions : 8]

SEAT No. :

PE-2113

[Total No. of Pages : 2

[6584]-5
B. E. (Automobile Engineering)
TRANSPORT MANAGEMENT AND AUTOMOBILE INDUSTRY
(2019 Pattern) (Semester - VIII) (416492 A) (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) ***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]**

♦ ♦ ♦

Total No. of Questions : 8]

SEAT No. :

PE-2114

[Total No. of Pages : 2

[6584]-6
B.E. (Automobile Engineering)
AUTOMOTIVE SAFETY
(2019 Pattern) (Semester - VIII) (416492 B) (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) ***Figures to the right indicate full marks.***

Q1) a) Compare the rear testing with side impact testing in a vehicle. **[8]**

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

OR

Q2) a) Describe the component testing for a sports car. **[8]**

b) Explain the injury tolerance and deceleration curves in crashworthiness. **[9]**

Q3) a) Discuss the vehicle seating configuration for a multi utility vehicle as per SAE norms. **[10]**

b) Describe the ergonomic development of a vehicle with human modelling predictions with the help of neat sketches. **[8]**

OR

Q4) a) Explain the role of occupant packaging in vehicle design. **[9]**

b) Describe the ergonomic development of a vehicle with human modelling predictions with the help of neat sketches. **[9]**

Q5) a) Design a CRABI Infant Dummy for testing a vehicle. **[9]**

b) Discuss the simulation with pedestrian simulation tests. **[8]**

OR

P.T.O.

Q6) a) Design a Hybrid III Dummy as per percentile statures. **[9]**

b) Write a short note on energy absorbing systems. **[8]**

Q7) a) Explain the surround view camera system. **[9]**

b) Describe the working of lane departure warning system. **[9]**

OR

Q8) a) Explain the working of adaptive noise control. **[9]**

b) Discuss the working of anti-lock brake system. **[9]**

♦ ♦ ♦

Total No. of Questions : 8]

SEAT No. :

PE-2115

[Total No. of Pages : 2

[6584]-8
B. E. Automobile Engineering
AUTOMOTIVE TESTING AND CERTIFICATION
(2019 Pattern) (Semester - VII) (416481)

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 the test procedure of Coast Down Test. Why coast down test is performed on the vehicle? **[9]**

b) Explain the concept of a free acceleration test in vehicle testing. What parameters are evaluated during this test, and how are they measured? **[9]**

OR

Q2) a) Explain the test procedure of Pass by noise test and noise limits for various vehicle categories. **[9]**

b) Describe the function of a gradient track in vehicle testing. How does testing on a gradient track assess a vehicle's ability to climb slopes and maintain speed? **[9]**

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

b) Describe the concept of virtual testing and its role in vehicle development. **[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 World harmonized Test Procedures? What are its different types? Explain WLTP. **[9]**

P.T.O.

Q5) a) Explain mechanism of noise generation? What are the different sources of noise and vibration in vehicle? **[8]**

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

OR

Q6) a) Define and differentiate Sound Pressure, Sound Intensity & Sound Power levels and write the relationship between them. **[8]**

b) How do you minimize unwanted vibrations? Explain with examples. **[9]**

Q7) a) Explain Demist and Defrost Test. **[9]**

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

OR

Q8) a) Explain Steering Impact test **[9]**

b) Explain Seat anchorages & head restraints test. **[9]**

♦ ♦ ♦

Total No. of Questions : 8]

SEAT No. : ____

PE-2116

[Total No. of Pages : 3

[6584] - 9

B.E. (Automobile)

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

Q1) a) Derive an expression of magnification factors in case of steady state forced vibrations. **[7]**

b) A machine weighting 1670 N is mounted on spring having stiffness k = 10790 N/cm. A piston within the machine weighting 20 N has a reciprocating motion with a stroke of 7.5 cm and a speed of 6000 rpm. Assuming the motion to be simple harmonic, determine (a) the amplitude of vibration of the machine and (b) the transmissibility and the force transmitted to the ground. Take C = 0.2. **[10]**

OR

Q2) a) Explain the free vibration of 2-DOF system with an example and mode shape of 2-DOF System. **[7]**

b) A 54 N weight is suspended by a spring with a stiffness of 1100 N/m. It is forced to vibrate by a harmonic force of 5 N. Assuming a viscous damping of c = 77 N-s/m, Determine. **[10]**

i) Resonance Frequency

ii) Amplitude at resonance

iii) Phase angle at resonance

iv) Damped Frequency

v) Frequency corresponding to peak amplitude.

P.T.O.

Q3) a) Write in brief about Various external forces acting on vehicle. **[6]**

b) Explain the following terms

i) Lumped Mass **[3]**

ii) Vehicle fixed Coordinate System **[3]**

iii) Earth Fixed Coordinate System **[3]**

iv) Dynamic Axle Loads **[3]**

OR

Q4) a) What is Draw Bar pull and explain its relation with Engine power. **[6]**

b) With axle load diagram explain wheel load at, **[12]**

i) Level ground

ii) Low speed acceleration

iii) On gradient

Q5) a) What are the basic components of power limited acceleration system?**[6]**

b) Consider a light truck weighing 1648.808 kg, performing a full stop from 60 mph on a level surface with a brake application that develops a steady brake force of 907.1847 kg. determine the deceleration, stopping distance, time to stop, energy dissipated and the brake horsepower at initial application and averaged over the stop. Neglect aerodynamic and rolling resistance forces. **[12]**

OR

Q6) a) Derive the expression for stopping distance and time. **[8]**

b) Calculate the minimum stopping distance for a vehicle has wheel base L = 3 h. travelling at 60 kmph with deceleration equal to acceleration due to gravity. If brake is applied on all 4-wheels over a road whose adhesion factor is 0.6, determine the percentage of weight transferred from rear to front wheels. **[10]**

Q7) a) Write a brief note on

i) Neutral steer, under steer, and over steer. **[4]**

ii) Constant radius method for under gradient measurement. **[5]**

iii) Mathematical model of handling. **[4]**

iv) Effects of damping the vibration. **[4]**

OR

Q8) a) Write a brief note on

i) Explain yaw velocity response / gain **[4]**

ii) Constant speed method for under steer gradient measurement. **[5]**

iii) Excitation sources for vehicle ride. **[4]**

iv) Active and semi active suspension **[4]**



Total No. of Questions : 8]

SEAT No. :

PE-2117

[Total No. of Pages : 2

[6584]-10
B. E. Automobile Engineering
INDUSTRIAL ENGINEERING
(2019 Pattern) (Semester - VII) (416483)

Time : 2 Hours] ***[Max. Marks : 50***

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 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

Q4) a) What is Allowance? Explain any two types of Allowance **[6]**

b) Write short note on MOST(Maynard Operation Sequence technique)**[6]**

P.T.O.

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 plant 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. :

PE-2118

[Total No. of Pages : 2

[6584]-11

B.E. (Automobile/Mechanical Engineering)

INTERNET OF THINGS

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

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

Instructions to the candidates :

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 and Q7 or Q8.***
2) ***Draw suitable neat diagrams, whenever necessary.***
3) ***Figure to the right indicate full marks.***
4) ***Assume suitable data if required.***

Q1) a) Explain the basics of Embedded C programming. **[9]**

b) Describe Arduino Software with respect to Source Code, Compile Code and Upload Machine Code. **[9]**

OR

Q2) a) Explain the Motion Sensor interfacing with any board. **[9]**

b) Describe IoT Architecture Outline. **[9]**

Q3) a) What are the advantages and disadvantages of Cloud Computing? **[8]**

b) What is the role and function of input and output interfaces in IoT systems? **[9]**

OR

Q4) a) Explain Radio-Frequency Identification (RFID) communication. **[9]**

b) What are the different key elements and entities in M2M value chains **[8]**

P.T.O.

Q5) a) What benefits does JSON offer in comparison to other data interchange formats or languages? **[9]**

b) Explain the three components of HTTP Response made by a server to a client. **[9]**

OR

Q6) a) What are the Security issues to be addressed during development of IoT? **[9]**

b) What is the key difference between MongoDB and SQL databases? **[9]**

Q7) a) What challenges or limitations should be considered when implementing IoT-based surveillance systems? **[8]**

b) Describe the security, privacy and trust issues in IoT-Data-Platforms when used for Smart Cities. **[9]**

OR

Q8) a) Explain use of IoT in Healthcare applications. **[8]**

b) What are some essential applications of IoT technology in connected vehicles? **[9]**

Total No. of Questions : 8]

SEAT No. :

PE-2119

[Total No. of Pages : 2

[6584]-12

B.E. (Automobile Engineering)

Artificial Intelligence & Machine Learning

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

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

Instructions to the candidates :

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 and 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) How does random forest algorithm used for classification problem. **[6]**

b) What are the advantages and disadvantages of decision tree algorithm? **[6]**

c) Differentiate between classification and regression algorithm. **[6]**

OR

Q2) a) Describe the Naive bayes algorithm with its features. **[6]**

b) Explain the working of decion tree algorithm. **[6]**

c) Differentiate between KNN and K-means algorithm. **[6]**

Q3) a) Explain the following terms: **[8]**

i) Precision ii) Accuracy

iii) F-1 Score iv) Recall

b) List and explain the various steps in development of machine learning model. **[9]**

OR

P.T.O.

Q4) a) List and explain various hyper tuning parameter in random forest. **[8]**

b) Discuss in detail, how you will apply the linear regression for car price prediction in Automobile engineering. **[9]**

Q5) a) What is deep learning? Explain characteristics of deep learning with its application. **[8]**

b) Differentiate between positive and negative Reinforced Learning **[6]**

c) List the application of Deep Learning in automobile Engineering. **[3]**

OR

Q6) a) Explain the working of artificial neural network with its neat architecture. **[8]**

b) Differentiate between machine learning and deep learning. **[6]**

c) List the application of Reinforced Learning in automobile Engineering. **[3]**

Q7) a) Explain the role of AIML in electric vehicle. **[6]**

b) How works the machine learning in Vehicle Health Diagnostics? Discuss in detail. **[6]**

c) Describe in detail AIML based rout optimization. **[6]**

OR

Q8) a) Discuss the role of AIML in motorsports vehicle. **[6]**

b) Discuss the role of AIML in enhancing manufacturing system of automobile vehicle. **[6]**

c) How can predict the preventative maintenance of vehicle by using AIML? Discuss in detail. **[6]**

Total No. of Questions : 8]

SEAT No. :

PE-2120

[Total No. of Pages : 3

[6584]-14

B.E. (Automobile)

FINITE ELEMENTS ANALYSIS

(2019 Pattern) (Semester - VII) (416485 A) (Elective - IV)

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 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) A constant Strain triangle is defined by three nodes 1 (1,1), 2(6,3) and 3 (4,5). Point P located inside the element Evaluate the shape function N1, N3 and N3 for interior point P (3.85, 4.8). **[8]**

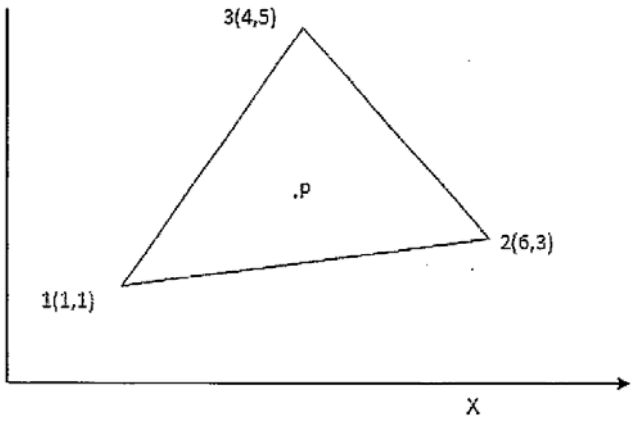


Fig. 1

b) Explain with neat sketch Plane Stress and Plane Strain condition and how it is used? **[10]**

OR

P.T.O.

Q2) a) Determine the Cartesian Coordinate of Point P ($\xi = 0.5$, $\eta = 0.6$), shown in Fig. 2. **[10]**

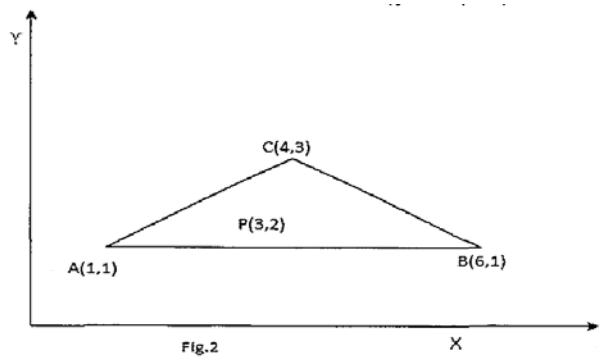


Fig.2

b) Explain the different types of 2D element with diagrams and examples. **[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) Warp angle

OR

Q4) a) Write a note on element quality is cheek 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) Jacobian

ii) Stretch

Q5) a) Compare the linear and non-linear FEA analysis with respective its characteristic and feature. **[10]**

b) Explain Geometric Nonlinearity and Material Nonlinearity related to nonlinear problems. **[7]**

OR

Q6) a) Why is material modelling critical in nonlinear analysis? Explain any type of material model in nonlinear analysis. **[10]**

b) Write the general procedure for non-liner analysis solid mechanics. **[7]**

Q7) a) A composite wall consists of three materials, the outer temperature is 20° C the convection heat transfer on the inner surface of the wall with temperature is 800° C, h=25 W/ m^2 ° C. Determine the temperature distribution the T_∞ Ambient wall. Take the values k_1=20 W/m° C, k_2=30 W/m° C, k_3=50 W/m° C and L_1=0.3m L_2=0.15m L_3= 0.15, T_0= 20° C. **[12]**

b) What are the different types of boundary conditions. **[6]**

OR

Q8) a) Find the un-damped natural frequencies of longitudinal vibration of stepped bar shown fig.3 with following data using consistent mass matrices. L_1= L_2 L_3=0.2m, E=2.1×10^{11} N/m^2 and ρ=7.8×10^3 Kg/m^3 A=2 A_2=3 A_3=0.4×10^{-3} m^2. **[12]**

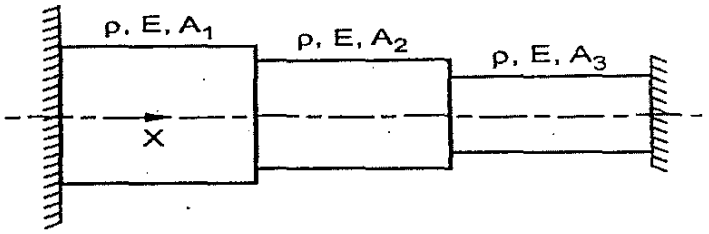


Fig. 3

b) Derive an expression for mass matrix of bar element. **[6]**

❖❖❖

Total No. of Questions : 8]

SEAT No. :

PE-2121

[Total No. of Pages : 2

[6584]-16
B.E. (Biotechnology)
BIO PROCESS MODELING AND SIMULATION
(2019 Pattern) (Semester - VIII) (415471)

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 the right side indicate full marks.***
4) ***Use of Calculator is allowed.***
5) ***Assume Suitable data if necessary***

Q1) Discuss in detail how mathematical models are classified based on variation of various independent variables. **[18]**

OR

Q2) Write short notes on the following terms along with examples: **[18]**

i) Independent variables

ii) Dependent variables

iii) Parameters

Q3) Model a Chemostat operated as a continuous fermenter by applying steady state mass balances on biomass and substrate accompanied by a needs sketch and proper assumptions wherever required. **[17]**

OR

Q4) What is a Fed batch reactor. Write the equations for microbial kinetics for a fed batch reactor. **[17]**

P.T.O.

Q5) Write short notes on Agitated and Sparged bioreactor list out their applications in biotech industries. **[18]**

OR

Q6) Explain in detail the biological treatment of wastewater by using biological film systems. **[18]**

Q7) Model a two phase CSTR with heat removal. Take proper assumptions wherever necessary. **[17]**

OR

Q8) Model an ideal binary distillation column accompanied by a neat sketch. Take proper assumptions wherever necessary. **[17]**



Total No. of Questions : 8]

SEAT No. :

PE-2122

[Total No. of Pages : 2

[6584]-17

Final Year B.Tech. (Biotechnology)

PLANT ENGINEERING AND PROJECT COSTING

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

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 indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Name any six codes used for Process flow diagram and piping and instrumentation diagram. **[6]**

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

c) Explain the different steps used in process piping design. **[6]**

OR

Q2) a) Draw any six basic actuator symbol used in piping and instrumentation diagram. **[6]**

b) Enlist general practice followed in preparation of piping and instrumentation diagram of bioprocess plant. **[6]**

c) Discuss the concept isometric of piping with example. **[6]**

Q3) a) Give the importance of corrective/breakdown maintenance in detail in process insustry. **[6]**

b) Which factors factor consider for process selection? Explain detail. **[6]**

c) Write objectives of plant maintenance. **[5]**

OR

Q4) a) Enlist the advantages and disadvantages of preventive and corrective maintenance. **[8]**

b) Explain importance of process utilities used in process industry. **[5]**

c) Explain the plant start up and commissioning procedure. **[4]**

P.T.O.

Q5) a) Comment on : Taxes and insurance. **[6]**

b) Discuss one method in brief for raising finance to set a process industry. **[6]**

c) Which are the practical factors involved in alternative investment? Discuss. **[6]**

OR

Q6) a) Explain any two methods used for determining depreciation. **[8]**

b) Define : **[6]**

i) Current value

ii) Book value

iii) Market value

c) Draw the tree diagrams showing cash flow for industrial process. **[4]**

Q7) a) State the methods used for profitability evaluation. Explain any one. **[10]**

b) What is effect of inflation on profitability analysis? Discuss. **[7]**

OR

Q8) a) A company manufacturing a plant and equipment for Covid-19 vaccine is quoting a tender. The delivery date is fixed. The project manager has listed down the activities in project as under: **[10]**

Sr.No.	Activity	Immediate Precedence Activity	Activity time in week
1	A	-	1
2	B	-	4
3	C	A	5
4	D	A	6
5	E	C	7
6	F	D	8
7	G	B	9
8	H	E,F,G	2
Develop the network. Calculate time estimates. Identify the critical path.			

b) Discuss in detail about CPM and PERT technique. **[7]**

Total No. of Questions : 8]

SEAT No. : ____

PE-2123

[Total No. of Pages : 2

[6584]-19
Final Year B.Tech Biotechnology
MOLECULAR DIAGNOSTICS
(2019 Pattern) (Semester - VIII) (415473-B) (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, Q.7 or Q.8.***
2) ***Figures to right indicate full marks.***
3) ***Assume suitable data if necessary.***

Q1) a) Outline the Principle of Ouchterlony Double Diffusion Immunoassay (ODD) and examine its significance in diagnosis of diseases. **[9]**

b) Describe the method of Human Leukocyte Antigen (HLA) typing with its applications in transplantation medicine. **[9]**

OR

Q2) a) Give schematic presentation of basic types of ELISA. **[9]**

b) Write a short note on Monoclonal Antibodies applications in diagnostics. **[9]**

Q3) a) Create molecular diagnostics tool for detection of bacterial pathogens with examples. **[9]**

b) Write short note on Detection of **[8]**

i) Food pathogens ii) Plant Pathogens

P.T.O.

Q4) a) Write principle, applications and examples of PCR based detection of pathogens for human diseases. **[9]**

b) Write short note on microbiological methods for diagnosis of pathogens. **[8]**

Q5) a) Describe diagnostic methods for detection of single gene genetic disorders with examples. **[10]**

b) Write a short note on Sex-linked inherited disorders with examples.**[8]**

Q6) a) Write principle of Karyotyping methods for detection of genetic disorders. **[10]**

b) Write diagnostic tools for detection of Trisomy 21. **[8]**

Q7) a) Justify High-Throughput NGS Approaches as emerging technologies in molecular diagnostics. **[8]**

b) Write advantages of POC Technology with its examples. **[9]**

Q8) a) Describe working principle of Enzyme-based biosensors and its applications. **[8]**

b) Write short note on Lab on Chip Technology. **[9]**

Total No. of Questions : 8]

SEAT No. :

PE-2124

[Total No. of Pages : 2

[6584]-20
B.Tech. (Biotechnology)
BIO-THERAPEUTICS TECHNOLOGY
(2019 Pattern) (Semester - VIII) (415473-C) (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) ***Assume suitable data if necessary.***

Q1) a) What are monoclonal antibodies (MAb)? How are they used as Biotherapeutics? With the help of labeled diagram show the steps in production of MAb. **[16]**

b) Plasma therapy in COVID- 19 treatment represents: **[2]**

i) Polyclonal antibody therapy

OR

ii) Monoclonal antibody therapy

OR

Q2) a) What are transgenic animals? Giving examples discuss how are they used for production of biotherapeutics **[14]**

b) Write on Gene Gun **[4]**

Q3) a) Illustrate with the help of flowchart WFI manufacturing design **[14]**

b) How do you test presence of endotoxins in final product? **[3]**

OR

P.T.O.

Q4) a) Write short notes on (ANY TWO) **[14]**

i) Clean room design,

ii) CIP,

iii) cell banking

b) How do you minimize protein degradation in downstream processing? **[3]**

Q5) Write notes on- (ANY THREE) **[18]**

a) Transdermal drug delivery,

b) Routs of drug administration,

c) Types of formulations,

d) Accelerated Stability,

OR

Q6) a) Giving examples describe various types of novel drug delivery systems **[14]**

b) Labeling of Biopharmaceuticals **[4]**

Q7) a) Write notes on (ANY TWO) :

i) IPR in Biotechnology,

ii) FDA responsibilities,

iii) Hierchy in Biotechnology industry **[14]**

b) What is the goal of pharmacovigilence? **[3]**

OR

Q8) a) Write in detail on different phases of clinical trials. **[12]**

b) Write a note on : **[5]**

i) trademark or ii) RCT

Total No. of Questions : 8]

SEAT No. :

PE-2125

[Total No. of Pages : 2

[6584]-21
B.Tech (BIOTECHNOLOGY)
MANAGEMENT AND ENTREPRENEURSHIP
(2019 Pattern) (Semester - VIII) (415474 A) (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) ***Figures to the right indicate full marks.***
4) ***Assume Suitable data if necessary.***

Q1) a) How does effective coordination contribute to improved organizational performance and success? Discuss. **[9]**

b) With the example explain different techniques used for coordinating activities within an organization? **[9]**

OR

Q2) a) What is Directing? Discuss in detail in term of entrepreneurship. **[6]**

b) Explain the concept of communication in an organizational setting. **[6]**

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

Q3) a) What is the role of entrepreneurs in economic development? Discuss.**[7]**

b) Give some of the examples of achievements of women as entrepreneurs? **[6]**

c) What are the challenges faced by women in Entrepreneurship? **[4]**

OR

Q4) a) Write a detail note on : Ancillary Industry **[7]**

b) Define Entrepreneurship? Also Discuss an entrepreneur. **[5]**

c) How to identify a business opportunity? Discuss. **[5]**

P.T.O.

Q5) a) What is the role of small scale industry in Economic Development? **[6]**

b) What are the advantages and disadvantages of small scale industry? **[6]**

c) Write objectives and scope of small scale industries. **[6]**

OR

Q6) a) Discuss the characteristics of small scale industry in detail. **[6]**

b) Explain the need of support for small scale industry. **[4]**

c) Discuss in detail the functions of the government policy towards small scale industry. **[8]**

Q7) a) Which are the common mistakes done by entrepreneur during project formulation? Discuss. **[8]**

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

OR

Q8) a) What are the contents of a project report for small scale industry? Explain. **[8]**

b) List down the necessities for a project selection and preparation. Discuss any one in detail. **[9]**



Total No. of Questions : 8]

SEAT No. :

PE-2126

[Total No. of Pages : 2

[6584]-22
F.Y. B.E. (BIOTECHNOLOGY)
IPR, INTELLECTUAL PROPERTY RIGHTS
(2019 Pattern) (Semester - VIII) (415474B) (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) ***Figures to the right indicate full marks.***
4) ***Use of Calculator is allowecd.***
5) ***Assume Suitable data if necessary.***

Q1) **Answer the following** **[18]**

a) What is the purpose of a trademark? What are the requirements for registering a trademark?

b) What are the remedies for trademark infringement? What are the consequences of not renewing a trademark?

OR

Q2) **Answer the following** **[18]**

a) What are the risks of not registering trademark and benefits of registering trademark?

b) Enlist nine protectable matter under trademark

Q3) **Answer the following** **[17]**

a) How can one assess if a company's proprietary knowledge meets the stringent standards of trade secret classification?

b) What are the legal remedies for trade secret misappropriation? What is unfair competition?

OR

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

a) What is the right of publicity? How is the right of publicity protected?

b) What are the different ways that trade secrets can be misappropriated? What causes a business to lose Trade Secret protection?

P.T.O.

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

a) What guidelines govern the registration process, including for mobile applications? Finally, how can computer software or programs be formally registered for copyright protection?

b) How can one ensure effective copyright protection and what are the standard terms of coverage?

OR

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

a) What does copyright encompass under the Copyright Act, 1957 and what scope of protection does it offer?

b) What key rights does copyright confer and what is the procedure for registering a work under the Copyright Act? Is such registration mandatory?

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

a) Define the responsibilities and rights of a registered proprietor of a geographical indication and examine their role in upholding GI integrity.

b) Identify the categories of subject matter that are ineligible for registration under the Geographical Indications Act, providing justifications for these exclusions.

OR

Q8) **Answer the following** **[17]**

a) Under what circumstances is a registered geographical indication considered infringed and who is legally empowered to initiate an infringement action? Discuss the procedural aspects and potential remedies.

b) What are the different ways to register a GI? What are the penalties for using a GI without permission?



Total No. of Questions : 8]

SEAT No. :

PE-2127

[Total No. of Pages : 2

[6584]-23
B. E. (BIOTECHNOLOGY)
INDUSTRIAL ORGANIZATION AND MANAGEMENT
(2019 Pattern) (Semester - VIII) (415474 C) (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) ***Figures to the right indicate full marks.***
4) ***Assume Suitable data if necessary.***

Q1) a) What is economic order quality? Discuss. **[6]**

b) What is safety stock? Why is safety stock necessary? **[6]**

c) Write short note on; **[6]**

i) Bin card

ii) Store ledger account

OR

Q2) a) Differentiate between inspection and quality control. **[6]**

b) What are the important requirements of store keeping? Discuss. **[6]**

c) State the methods of purchasing. Explain any two methods. **[6]**

Q3) a) Explain, "Advertising as a promotional Tool". **[5]**

b) State the different methods of market research? Discuss each in detail. **[12]**

OR

Q4) a) Discuss various functions of marketing management. **[4]**

b) Define market research. State and explain the any two methods of market research. **[8]**

c) Differentiate between marketing and selling. **[5]**

P.T.O.

Q5) a) Explain in detail various factors affecting international trade. **[9]**

b) Write Notes on: **[8]**

i) Antidumping Duty

ii) International Trade

OR

Q6) a) Explain the role of Quality Circles for Quality Management of a process industry. **[8]**

b) State the different International trade models and explain any two models. **[9]**

Q7) a) Explain the various employee benefits under Employees state Insurance Act. **[6]**

b) What is the safety precautions mentioned in the Indian Electricity Rules 1956? **[6]**

c) State the duties of Inspector related of boiler. **[6]**

OR

Q8) a) Explain in detail on the payment of gratuity Act 1972. **[8]**

b) Write a details note on Monopolies Restrictive Trade Practices (MRTP) **[7]**

c) State the essential elements of valid contract. **[3]**

♦ ♦ ♦

Total No. of Questions : 8]

SEAT No. :

PE-2128

[Total No. of Pages : 2

[6584]-24
B.E. (Biotechnology)
BIOÇH EMICAL ENGINEERING
(2019 Pattern) (Semester - VII) (415461)

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) How dissolved oxygen is measured and controlled in the fermenter? **[9]**

b) Draw a neat sketch and explain various types of impellers based on viscosity of fermentation media. Give advantages and limitations if any. **[9]**

OR

Q2) a) Give detailed note on type of filters used to maintain sterile air inside the fermenter. **[9]**

b) Draw a neat sketch of a fermenter and write functions and importance of any two fittings and auxiliaries. **[9]**

Q3) a) Why adequate mixing is the important factor in aeration and agitation? **[9]**

b) Write short notes or: Static and dynamic gassing out technique. **[8]**

OR

Q4) a) What are different types of spargers? Draw neat diagrams and explain. **[8]**

b) Explain in detail a case study on Production of amino acids by using B.flavin. **[9]**

P.T.O.

Q5) a) Write steps involved in scale up approach. When this approach is utilized in industries? **[9]**

b) Write a short note with one example a. Process evaluation and validation Compatibility of the equipment **[9]**

OR

Q6) a) Give checklist for GMP considerations. Describe need of cGMP in bioprocess industry. **[9]**

b) Give one example and describe a complete scale up from upstream to downstream processing of bioproduct. **[9]**

Q7) a) Explain in detail how sodium alginate molecules bind enzyme molecules? **[9]**

b) Write a short note on disposable reactors with one case study. **[8]**

OR

Q8) a) Give one detailed case study on plant cell reactor. **[9]**

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

♦ ♦ ♦

Total No. of Questions : 8]

SEAT No. :

PE-2129

[Total No. of Pages : 2

[6584]-25
B.E. (Biotechnology)
BIOINFORMATICS
(2019 Pattern) (Semester - VII) (415462)

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.***

Q1) a) Explain the terms includes Hydrophobicity, Disulphide bonds, Active Sites **[6]**

b) Discuss in detail about Primary protein Databases UNIPROT - PIR, SWISS-PROT **[6]**

c) Write about Description of the entries and Sequence Data File **[6]**

OR

Q2) a) Describe about Secondary structure composition and backbone flexibility **[6]**

b) Write note on Uniqueness of Polypeptide sequence and properties **[6]**

c) Explain Primary, Secondary, Tertiary & Quaternary structure of protein **[6]**

Q3) a) Write in detail about Motifs and Profiles databases like PROSITE, PRINTS **[9]**

b) Explain Protein fold classification including SCOP, CATH, and FSSP. **[8]**

OR

Q4) a) Explain about Basic Molecular Docking concept **[9]**

b) Discuss the Various tools for protein Structure Visualization **[8]**

P.T.O.

Q5) a) Write about Scoring Matrices such as PAM and BLOSUM. **[8]**

b) Explain about Sequence alignment, similarity, identity, homology **[10]**

OR

Q6) a) Discuss in detail about Needleman-Wunsch & Smith-Waterman Algorithm **[10]**

b) Describe in detail about Multiple Sequence.Alignment - Clustal W. **[8]**

Q7) a) Explain the Elements of phylogenetic models in detail. **[8]**

b) Write note on Phylogenetics on the web in detail. **[9]**

OR

Q8) a) Describe about phylogenetic tree includes evolutionary tree construction and tree building methods **[8]**

b) Write note on data phylogenetic software like PHYLIP, CLUSTAL W. **[9]**



Total No. of Questions : 8]

SEAT No. :

PE-2130

[Total No. of Pages : 2

[6584]-27
B.E. (Biotechnology)
Environmental Biotechnology
(2019 Pattern) (Semester - VII) (415463 B) (Elective III)

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

Instructions to the candidates :

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 and 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) Answer the following : **[18]**

a) Differentiate between biological and chemical treatment strategies for industrial effluents

b) Discuss the role of neutralization in treating industrial effluents

OR

Q2) Answer the following : **[18]**

a) What are the general analytical methods used in characterizing industrial effluents

b) Differentiate between biological and chemical treatment strategies applied for industrial effluents

Q3) Answer the following : **[17]**

a) How do emissions from transportation sources differ from those of industrial processes in terms of air pollution?

b) How do the air pollutants, such as fine particulate matter (PM2.5) and ground- level ozone, adversely affect human health

P.T.O.

OR

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

a) Differentiate between cyclone separators and fabric filters in the context of industrial particulate control.

b) Discuss the concept of carbon dioxide (Co_2) sequestration using algae

Q5) Answer the following : **[18]**

a) What are the various sources of hazardous wastes in an urban environment?

b) Write in detail about landfilling and incineration for the disposal of solid waste

OR

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

a) Discuss the role of microbial consortia in the biodegradation of complex hazardous chemicals

b) Discuss the different categories of hospital waste

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

a) Differentiate between biostimulation and bioaugmentation

b) Explain the role of biofilms in liquid phase bioremediation processes

OR

Q8) Answer the following : **[17]**

a) What are the main limitations and obstacles in using bioremediation as a method for waste cleanup?

b) Compare the design and operation of suspended bioreactors and fixed biofilm reactors in liquid phase bioremediation

Total No. of Questions : 8]

SEAT No. :

PE-2131

[Total No. of Pages : 2

[6584]-28
B.E. (Biotechnology)
GENOMICS
(2019 Pattern) (Semester - VII) (415463-C) (Elective III)

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

Instructions to the candidates :

1) ***Solve Q1 or Q2, Q3 or Q4, Q5 or Q6 and Q7 or Q8.***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data, if necessary.***

Q1) a) With the help of a diagram explain the Eukaryotic gene structure. **[6]**

b) Write a note on Microarray **[6]**

c) Explain the role of Drosha and Dicer in miRNA maturation. **[6]**

OR

Q2) a) Give a flow chart indicating various steps for comparison of a gene expression in normal and hypoxic tissue **[8]**

b) Write a short note on Northern Blottting **[5]**

c) Write a note on miRNA functions **[5]**

Q3) a) Discuss Histone modifications as epigenetic mechanism. **[9]**

b) How Model organisms are used in Epigenetics studies **[8]**

OR

Q4) a) Discuss Gene environment interactions are reflected in Epigenetics **[10]**

b) Write shàrt notes on (ANY ONE) **[7]**

a) hetetochromatin,

b) methyiation specific PCR

P.T.O.

Q5) a) Giving examples discuss the advantages of Pharmacogenomics **[10]**

b) A single dose of Omeprazol is given to patients. There are two groups of patients with SNP variations as fast and poor metabolizers. With graphical representation show the prediction of blood levels of Omeprazol in the two groups of patients? **[8]**

OR

Q6) a) Discuss DME Gene polymorphism and drug response. **[10]**

b) Write a note on techniques used in detecting genetic variations in patients samples. **[8]**

Q7) a) Diet, genes and diseases is a triad of of Nutrigenomics- Explain **[9]**

b) Design a study to show Resveratral a dietary anti-oxidant prevents Alzeimers **[8]**

OR

Q8) a) Discuss Genomic technologies in Nutrigenomics research. **[9]**

b) Write a note on Personalized nutrition. **[8]**

Total No. of Questions : 8]

SEAT No. :

PE-2132

[Total No. of Pages : 2

[6584]-30
B.E. (Biotechnology)
NANOTECHNOLOGY
(2019 Pattern) (Semester - VII) (415464 B) (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) Discuss the requirements for a successful targeted drug delivery system? **[6]**

b) Explain in detail the application of nanotechnology in the field of cardiac therapy. **[6]**

c) Discuss the advantages of nanotechnology in drug delivery. **[6]**

OR

Q2) a) Explain in detail about drug targeting and drug delivery system in to eye. **[6]**

b) Explain in detail the application of nanotechnology in the field of nanomolecular Diagnostics. **[6]**

c) Discuss the application of nanodiagnostics as a imaging agent. **[6]**

Q3) a) Which type of nanodevices can be utilized for the improvement of biomedical field? Discuss. **[7]**

b) Explain with sketch the principal components of biosensors in details.**[10]**

OR

Q4) a) What are the polymers based sensor and electrochemical nanosensors which is used for biomedical application. Discuss. **[10]**

b) Discuss the functioning of sensing substrates in nanodevices. **[7]**

P.T.O.

Q5) a) What are the different types of biochip? Explain any two in details. **[10]**

b) Explain in details the concept of Electron transfer of biomolecules with reference to DNA biosensor. **[8]**

OR

Q6) a) What is biochip? Discuss in details. **[8]**

b) Explain working principles and applications of biosensors. **[10]**

Q7) a) Give the classification of biosensors based on biological receptor. Explain any two. **[10]**

b) What is fuel cell? Also discuss its potential risks. **[7]**

OR

Q8) a) Explain in details mass based biosensors with its application. **[9]**

b) Discuss in detail about the ethical consideration and its analysis about biosensors. **[8]**

♦ ♦ ♦

Total No. of Questions : 8]

SEAT No. :

PE-2133

[Total No. of Pages : 2

[6584]-31
B. E. (Biotechnology)
STEM CELL BIOLOGY AND REGENERATIVE MEDICINE
(2019 Pattern) (Semester - VII) (415464 C) (Elective - IV)

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 right indicate full marks.***
3) ***Assume Suitable data if necessary.***

Q1) a) Discuss the method involved in isolation and culturing of somatic stem cells. **[6]**

b) Explain the concept of tissue regenerative capacity of adult stem cells. **[6]**

c) Write detail note on characterization protocols of stem cells. **[6]**

OR

Q2) a) Explain about facultative stem cells. **[6]**

b) Write about the process of regeneration of stem cells in planaria. **[6]**

c) Write about stem cells differentiation and plasticity. **[6]**

Q3) a) Write detail note on Ethics involved in Gene editing. **[9]**

b) Explain in detail about Embryo Ethics and Egg donation Ethics. **[8]**

OR

Q4) a) Explain the guidelines for stem cells therapy and clinical trials in India. **[9]**

b) Discuss about stem cells interventions. **[8]**

P.T.O.

Q5) a) Discuss the computational tools involved to dissect stem cells, describe in detail. **[8]**

b) What are leveraging tools are used to study stem cell biology explain it in detail. **[10]**

OR

Q6) a) Write note on synthetic and 3D polymeric scaffolds. **[10]**

b) Elaborate about natural and synthetic scaffolds for tissue engineering. **[8]**

Q7) a) Discuss the cell replacement therapies from Pluripotent cells considering dopaminergic neurons. **[8]**

b) Describe in detail about in-vivo transdifferentiation in cardiac fibroblasts into cardiomyocytes. **[9]**

OR

Q8) a) Discuss on disease modeling and drug screening. **[8]**

b) Explain in detail about cell replacement therapies from Pluripotent stem cells. **[9]**

♦ ♦ ♦

Total No. of Questions : 8]

SEAT No. : ____

PE-2134

[Total No. of Pages : 2

[6584]-32
B.E. (Chemical Engg.)
PROCESS MODELLING AND SIMULATION
(2019 Pattern) (Semester - VIII) (409349)

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) ***Assume suitable data, if necessary.***

Q1) Developed the Mathematical model for two heated tank. Draw neat labeled diagram and also state the assumption. **[17]**

OR

Q2) Developed the Mathematical model for Double Pipe Heat Exchanger. **[17]**

Q3) Developed the Mathematical model for absorber and Stripper. Draw Neat Labeled Diagram and also state the assumption. **[18]**

OR

Q4) Develop a mathematical model for Continuous Counter Current liquid-liquid Extraction. **[18]**

P.T.O.

Q5) Developed the Mathematical Model for CSTR where a Consecutive reactions are occurring. Draw Diagram and state the assumption completely. **[18]**

OR

Q6) Develop a mathematical model for Packed Column Reactor. **[18]**

Q7) Develop a mathematical model for Effluent Treatment Plant. **[17]**

OR

Q8) Describe in Detailed about Application of Mathematical Modeling in Distillation Column. **[17]**

Total No. of Questions : 8]

SEAT No. :

PE-5090

[Total No. of Pages : 3

[6584]-33
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 2, Q.3 or 4, Q.5 or 6, Q.7. or 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 in brief fixed capital investment and working capital. **[6]**

b) A proposed manufacturing plant requires an initial fixed capital investment of Rs. 10 lacs and Rs. 1.5 lacs as a working capital investment. It is estimated that the annual income will be Rs. 8.5 lacs and annual expenses will be Rs. 5.5 lacs before income taxes. A minimum annual return of 15% before income taxes is required before the investment will be worth while. Income taxes amounts to 48% of all pretax profits. Determine the following. **[8]**

i) The amount of % return on total initial investment before income taxes.

ii) The annual % return of the total initial investment after taxes.

iii) The annual % return on annual initial investment before income taxes based on capital recovery with minimum profit.

c) State the importance of Cost Indexes. **[4]**

OR

Q2) a) Explain in brief following two methods for estimating Capital Investment **[8]**

i) Unit Cost Estimate

ii) Percentage of Delivered Equipement Cost

P.T.O.

b) Estimate the manufacturing cost per 100 Kg of product under the following conditions : **[10]**

Fixed capital investment = $4 million

Annual production output = 9 million kg of product

Raw materials cost = $ 0.25/kg of product utilities :

800 KPa steam = 50 kg/kg of product

Purchased electric power = 0.9KWh/kg of product

Filtered & Softened water = 0.083 m^3/kg of product

Operating labor = 12 persons per shift at $ 25.00 per employee hour

Plant Operates three hundred 24 hr days per year. (300 days for 24 hrs per day per year)

Corrosive liquids are involved.

Shipments are in bulk car load lots.

A large amount of direct supervision is required.

There are no patent, royalty, interest or rent charges.

Plant overhead costs amount to 50% of the operating labor, supervision and maintenance.

Q3) a) Explain in brief : Lagrange multiplier method of optimization. **[8]**

b) Explain break even chart for production with its significance. **[9]**

OR

Q4) A plant produces refrigerators at the rate of P units per day. The variable costs per refrigerator have been found to be Rs. (47.73 + 0.1P1.2). The total daily fixed charges are Rs. 1750 & all other expenses are constant at Rs. 7325 / day. The profit is selling price per refrigerator minus total cost per refrigerator. Total cost of refrigerators is given as **[17]**

$$C_T = 47.73 + 0.1P^{0.2} + \frac{1750 + 7325}{P}$$

Determine

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

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

c) The production schedule at breakeven point.

Q5) Explain composite curves for following heat recovery system. **[18]**

Stream	Type	Supply Temperature T_S °C	Target Temperature T_T °C	ΔH MW	Heat Capacity CP MW/K
R_1	Cold	20	180	32	0.2
R_2	Hot	250	40	–31.5	0.15
R_3	Cold	140	230	27	0.3
R_4	Hot	200	80	–30	0.25

OR

Q6) a) Explain in brief parameters to be optimized in optimal design of Sieve plate distillation column operating at minimum reflux ratio. **[10]**

b) Describe in brief preparation of techno-economic feasibility report of sugar refining plant. **[8]**

Q7) a) Differentiate between CPM and PERT. Illustrate the same with suitable examples. **[8]**

b) Draw a network diagram for the construction of bungalow with following activities : **[9]**

Activity	Event	Sub Event
A	1	2
B	1	3
C	3	4
D	2, 4	5
E	4	6
F	5	7
G	7	8
H	6	9
I	5	10
J	8	11
K	10, 11	12
L	9, 12	13
M	13	14
N	14	15

OR

Q8) a) Describe in brief factors to be considered in preparation of plot plan regarding any chemicals manufacturing plant. **[8]**

b) Explain in brief Stepwise procedure for start up and Shutdown of a chemical process. **[9]**

Total No. of Questions : 8]

SEAT No. :

PE-2135

[Total No. of Pages : 2

[6584]-34
B.E. (Chemical)
ENERGY AUDIT AND CONSERVATION
(2019 Pattern) (Semester - VIII) (409351-A) (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 side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) List any six key instruments used by Energy auditor. Elaborate each of the instruments with proper usage example. **[18]**

OR

Q2) 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]**

Q3) a) Define Forecasting with suitable example. **[5]**

b) Explain in detail four major types of forecasting methods frequently used as quantitative tool in any industries. **[12]**

OR

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

P.T.O.

Q5) How can Chemical engineers in corporate climate change projectors into the planning and design of infrastructure projects to ensure long term resilience. **[18]**

OR

Q6) What is Carbon Footprint? Explain in detail the measures taken to reduce the Carbon Footprint. **[18]**

Q7) Define Boiler Efficiency. Distinguish between Direct and Indirect methods of finding Boiler efficiency with proper flow diagram. **[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	:	8 TPH
Steam pressure (gauge/temp)	:	10 kg/cm^2 (g) / 180°C
Quantity of coal consumed	:	1.8 TPH
Feed water temperature	:	85°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

Total No. of Questions : 8]

SEAT No. :

PE-2136

[Total No. of Pages : 2

[6584]-35
B.E. (Chemical)
CHEMICAL PROCESS SAFETY
(2019 Pattern) (Semester - VIII) (409351-B) (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 indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable data, if necessary***

Q1) a) Describe Technology and process selection **[9]**

b) Define and explain Minimum Oxygen Concentration (MOC) and inerting **[9]**

OR

Q2) a) Describe various steps of Vapor Cloud Explosions **[9]**

b) Distinguish between fire and explosion **[9]**

Q3) a) Explain the various safety devices used for relieving pressure **[9]**

b) What are the preventive and protective measures to prevent fire in chemical industry **[8]**

OR

P.T.O.

Q4) a) Explain pressure versus time curves for Runway reactions **[9]**

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

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) Describe in details revealed and unrevealed failure. **[9]**

b) Discuss in detail hazard and operability studies (HAZOP). **[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) What are the basic preventive and protection measures to Hazards **[8]**

Total No. of Questions : 8]

SEAT No. : ____

PE-2137

[Total No. of Pages : 2

[6584]-36

B.E. (Chemical)

COMPUTATIONAL FLUID DYNAMICS

(2019 Pattern) (Semester - VIII) (409351-C) (Elcctive-V)

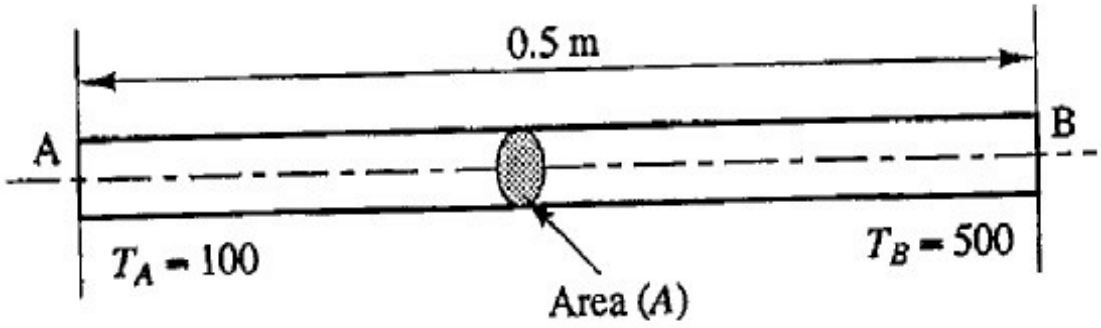
Time : 2½ Hours] ***[Max. Marks : 70***

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 side indicate full marks.***
4) ***Use of Calculator is allowed.***
5) ***Assume Suitable data if necessary***

Q1) a) Consider the problem of source-free heat conduction in an insulated rod whose ends are maintained at constant temperatures of 100 °C and 500 °C respectively. The one- dimensional problem sketched in following figure is governed by **[9]**

$$\frac{d}{dx}\left(k\frac{dT}{dx}\right)=0$$



Calculate the steady state temperature distribution in the rod using Finite Volume Method. Thermal conductivity k equals 1000 W/m/K, cross-sectional area A is $10 \times 10^{-3} m^2$.

b) Explain FVM solution methodology for steady state convection-diffusion equation. **[9]**

P.T.O.

OR

Q2) a) Explain the Conservativeness and transportive ness in FVM analysis **[9]**

b) Explain FVM solution methodology for unsteady diffusion equation. **[9]**

Q3) a) What are Reynold's stresses? Derive equation for the Reynold's stresses for Turbulence flow. **[9]**

b) Describe k-ω model for turbulence flow **[8]**

OR

Q4) a) What is turbulence? Explain in detail any four characteristics features. **[9]**

b) Derive Reynold's averaged continuity equation. **[8]**

Q5) a) Draw a Sketch and explain different flow patterns observed in multiphase flows? Describe in detail the separated flow modeling with assumptions and relevant equations. **[9]**

b) Explain in detail Homogeneous and Heterogeneous models for Multiphase flows. **[9]**

OR

Q6) a) Differentiate with reasoning between discrete phase modeling, continuous phase modeling. **[9]**

b) Explain in detail, Euler-Euler, Euler-Lagrangean Models for multiphase flows **[9]**

Q7) a) Differentiate between advantages and limitations of CFD Analysis. **[8]**

b) Write short notes on: **[9]**

i) Applications of CFD

ii) Preprocessing in CFD Simulation

OR

Q8) a) Write short notes on **[8]**

i) mesh generation

ii) CFD solvers

b) List different models for CFD simulation. Explain any one. **[9]**

Total No. of Questions : 8]

SEAT No. : ____

PE-2138

[Total No. of Pages : 2

[6584]-37
B.E. (Chemical)
ADVANCED MATERIALS
(2019 Pattern) (Semester - VIII) (409351-D) (Elective - V)

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

Instructions to the candidates :

1) ***Answer Q1or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume suitable data, if necessary***

Q1) a) Give advantages and disadvantages of ceramic materials? Explain in details with suitable example any one advanced ceramic material **[10]**

b) Explain in details about the property's enhancement of ceramic materials. **[7]**

OR

Q2) a) Explain in details advanced processing methods of ceramic materials.**[10]**

b) Short notes on micro structural design and grain boundary engineering **[7]**

Q3) a) Explain in details about importance of composite materials with suitable examples **[9]**

b) What is polymerisation? Explain in details about condensation polymerisation. **[8]**

OR

P.T.O.

Q4) a) Give advantages and disadvantages of ceramic composite? And Explain in details about reinforcing mechanisms **[9]**

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

i) prepregs.

ii) fiber winding techniques.

Q5) a) What is metal composite? Explain in details its anyone fabrication methods **[10]**

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

OR

Q6) a) Explain in details about chemical compatibility of metal composite **[10]**

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

i) Reinforce ceramics

ii) Matrices and reinforcement.

Q7) a) What is carbon composite? Explain in details about its applications **[10]**

b) Explain in details fabrication methods of carbon composite **[8]**

OR

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

b) Explain in short properties of nanomaterials **[8]**

Total No. of Questions : 8]

SEAT No. :

PE-2139

[Total No. of Pages : 2

[6584]-38
B. E. (Chemical)
CATALYSIS
(2019 Pattern) (Semester - VIII) (409352 A) (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, Q.7or Q.8.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagram 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) Mass transfer in the catalyst.

b) Langmuir Hinshelwood approach.

OR

Q2) Write short notes on the following **[16]**

a) Adsorption theories and concept of active site.

b) Gas - solid catalytic reactions.

Q3) a) Explain selectivity and effectiveness of catalyst. **[09]**

b) Derive the BET equation for determination of catalyst surface area. **[09]**

OR

Q4) a) Explain the mechanism of solid - catalyzed reaction in detail. **[09]**

b) Explain the deactivation of the catalysis. **[09]**

Q5) Give the industrial applications of the zeolites. **[18]**

OR

P.T.O.

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

b) Explain the molecular sieves with industrial application. **[9]**

Q7) a) Explain mechanism of participation of enzymes in few reactions. **[9]**

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

OR

Q8) a) Derive the M-M kinetics of the enzyme catalyzed reaction. **[9]**

b) Explain the method to determine the M-M kinetics constants using the data taken in mixed flow reactor. **[9]**



Total No. of Questions : 8]

SEAT No. :

PE-2140

[Total No. of Pages : 2

[6584]-39
B.E. (Chemical)
NANOTECHNOLOGY
(2019 Pattern) (Semester - VIII) (409352B) (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 side indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) write note on optical microscopy. **[12]**

b) What will be the limit of resolution of a microscope if its numerical aperture is 0.12 and the wavelength of the light used is 6000 A° **[5]**

OR

Q2) Explain with neat diagram, construction and working any one electronic microscope **[17]**

Q3) a) write note on Quantum dot & Quantum well? **[10]**

b) Explain Heisenberg uncertainty principle and its application **[7]**

OR

Q4) Explain in detail Extrinsic semiconductors and intrinsic semiconductors. **[17]**

Q5) a) Discuss the various nanostructured materials for Photocatalysis along with their properties. **[10]**

b) Enlist and explain colloidal properites of nanoparticles. **[8]**

OR

P.T.O.

Q6) Write note on **[18]**

a) Surface tension.

b) Colloidal stability.

c) Vander Waals forces

Q7) a) Discuss Nano-biotechnology and explain how nanostructure mediated drug delivery helps for treatment of various diseases? **[10]**

b) Write briefly on the commercial process of nanotechnology and its application in chemical engineering. **[8]**

OR

Q8) Dicuss applications of nanotechnology in: **[18]**

a) Wastewater treatment

b) Drug delivery

c) Biotechnology

♦ ♦ ♦

Total No. of Questions : 8]

SEAT No. :

PE-2141

[Total No. of Pages : 2

[6584]-40
B.E. (Chemical)
FUEL CELL TECHNOLOGY
(2019 Pattern) (Semester - VIII) (409352 C) (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) ***Figures to the right indicate full marks.***
3) ***Neat diagrams 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) What are the criteria for selecting anodic materials of a proton exchange membrane fuel cell system **[9]**

b) Describe H_2 production from renewable sources and its storage techniques **[9]**

Q3) a) Discuss various hydrocarbon-based fuel cells with typical examples **[9]**

b) Write a detailed note on steam reforming needed in a hydrogen fuel cell along with its disadvantages **[8]**

OR

Q4) a) Write a detailed note on steam reforming needed in a hydrogen fuel cell along with its advantages **[9]**

b) Describe procedure of modeling electrochemical potential **[8]**

P.T.O.

Q5) a) Describe heat recovery and fuel cell networking **[9]**

b) Describe with the help of a diagram oxidation reaction on the TPB of an anode made of Ni-YSZ **[8]**

OR

Q6) a) Describe the treatment of electrolyte interface for SOFC with a typical schematic diagram **[9]**

b) Describe the life cycle analysis of the fuel cell with a neat schematic diagram **[8]**

Q7) a) Describe enzymatic fuel cells with their advantages and limitations **[12]**

b) Write a detailed note on partial oxidation needed in fuel processing **[6]**

OR

Q8) Write a note on **[3 × 6 = 18]**

a) Recent development in harnessing hydrogen

b) Fuel cell Networking

c) Fuel cell System

♦ ♦ ♦

Total No. of Questions : 8]

SEAT No. :

PE-2142

[Total No. of Pages : 2

[6584]-41
B.E. (Chemical)
PETROCHEMICAL ENGINEERING
(2019 Pattern) (Semester - VIII) (409352 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 diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) Describe the production of low Molecular weight olefins by hydrocarbon cracking **[17]**

OR

Q2) Describe the various furnaces used in the petrochemical industry. Explain any 3 in detail with suitable diagram. **[17]**

Q3) Describe the manufacturing process of Amine by a suitable diagram **[18]**

OR

Q4) Describe the manufacturing process of Hydrochloric Acid by suitable diagram **[18]**

Q5) Describe the Manufacturing process of polyester with Suitable application **[17]**

OR

Q6) Write a short note on bulk, emulsion and suspension with example **[17]**

P.T.O.

Q7) Explain in details petrochemical plants with power generation in India **[18]**

OR

Q8) Describe in details various pollution control norms and method of elimination **[18]**

♦ ♦ ♦

Total No. of Questions : 8]

SEAT No. :

PE-2143

[Total No. of Pages : 2

[6584]-42
B.E. (Chemical)
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 Q.6 and Q.7or Q.8.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Use of Logarithmic tables slide rule, electronic Pocket Claculator and steam tables is allowed***
4) ***Assume suitable data, necessary.***

Q1) Write short note on **[18]**

Time integral performance criteria by

a) ISE

b) ISAE

c) ITAE

OR

Q2) a) What are on off controller's? Give its characteristics, merits and demerits **[9]**

b) How appropriate feedback controller for given process is selected explain **[9]**

Q3) a) Draw Bode plot for First order system **[8]**

b) Draw Bode plot for Second order system **[9]**

OR

Q4) a) Explain Ziegler Nicholas tuning technique **[8]**

b) Draw Bode diagram for pure capacitive systems **[9]**

P.T.O.

Q5) a) What is split range control? Explain with suitable diagram and example **[9]**

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

OR

Q6) a) Differentiate between feedforward and feedback control system **[6]**

b) Write short note design of controller for inverse response system **[6]**

c) Explain Inferential control system with neat diagram and example **[5]**

Q7) Differentiate between **[18]**

a) Digital and computer based control system and conventional control system.

b) Continuous and discrete time signals

c) Sampler and hold elements

OR

Q8) a) Explain SCADA and PLC with neat diagram **[10]**

b) What is Plant wide control system? Explain with suitable examples **[8]**

♦ ♦ ♦

Total No. of Questions : 8]

SEAT No. :

PE-2144

[Total No. of Pages : 2

[6584]-43
B.E. (Chemical)
CHEMICAL REACTION ENGINEERING - II
(2019 Pattern) (Semester - VII) (409342)

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) ***Use of logarithmic tables slide rules, Mollier charts, electronic pocket calculator and steam tables is allowed.***
4) ***Assume suitable data, if necessary.***

Q1) a) What is void volume and pore density in case of solid catalyst? Give suitable equations for determination of this parameters. **[9]**

b) Give the methods of determination of catalyst pore volume in detail. **[9]**

OR

Q2) a) What is the "Promoters" and "Inhibitors" used in the catalytic reaction? **[9]**

b) Explain Langmuir adsorption isotherm with suitable assumptions. **[9]**

Q3) a) Derive an expression for diffusion of gaseous in single cylindrical pore of catalyst. **[9]**

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

OR

Q4) a) Explain Thiele modulus and give the significance of the Thiele modulus. **[9]**

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

P.T.O.

Q5) The kinetics of the reaction is as follows: **[18]**

$A \rightarrow 4R$, $-r_A = 96\ C_A$, mol/hr kg cat.

The feed rate is 2000 mol/hr of pure A at 3.2 atm and 117 ºC temperature. The conversion in the packed bed reactor is 35% of A to R. Determines the amount of catalyst needed in a packed bed reactor with

i) Very large recycle rate and

ii) No recycle rate

OR

Q6) a) For the following reaction occurring on the catalyst; derive the rate expression for surface reaction to be rate controlling and dual site mechanism. S1 are the site occupied by H_2O and CH_3OH and S2 are occupied by O2. **[9]**

$CH_3OH + ½\ O_2 \text{ ----------} \rightarrow CH_2O + H_2O$

$A+½B \text{ ----------} \rightarrow C + D$

$A\ (g) + S1 \text{ ----------} \rightarrow A.S1$

$B\ (g) + S2 \text{ ----------} \rightarrow B.S2$

$A.S1+B.S2\text{----------} \rightarrow C(g)+D.S1+S2$

$D.S1 \text{ ----------} \rightarrow D\ (g) + S1$

b) Explain the experimental method for finding rates of gas-solid catalyzed reaction. **[9]**

Q7) a) Explain the slurry reactor in detail **[8]**

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

OR

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

b) Explain the procedure for determining the M-M kinetic constants in mixed flow reactor. **[8]**

❖❖❖

Total No. of Questions : 8]

SEAT No. :

PE-2145

[Total No. of Pages : 2

[6584]-44
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 indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable data, if necessary.***

Q1) a) Discuss on fluid allocation on tube side and shell side in shell and tube Exchanger. **[9]**

b) Discuss on baffles in shell and tube Exchanger. **[9]**

OR

Q2) 1.2 kg/sec of an organic liquid is to be cooled from 45°C to 20°C The organic liquid is cooled by chilled water supplied from a refrigeration unit at a temperature of 5°C and can be heated upto 10°C. Use tubes of 12 mm ID and 2 mm wall thickness. Length of tubes is 1:5 in. Properties of organic liquid and water are : **[18]**

Properties	Organic liquid	Water
Specific heat, J/Kg K	2150	4180
Viscosity, Ns/m^2	0.25×10^{-3}	0.8×10^{-3}
Density, kg/m^3	716	1000
Thermal conductivity, W/m.K	0.133	0.61

Fouling resistance for organic liquid = 0.0002 m^2 K/W. Fouling resistance for water = 0.0004 m^2 K/W, Correction factor for LMTD = 0.86. Steel tubes are to be used. Thermal conductivity of steel tube = 45W/mK. Design a suitable heat exchanger.

P.T.O.

Q3) a) Give comparison of plate contactor used in plate distillation column. **[7]**

b) A mixture of benzene and toluene containing 50 mol% benzene is to be continuously distilled in a plate column, to give distillate containing 90 mol% benzene and bottom product containing 90 mol% toluene. The feed enters the column @10,000 kg/day. The relative volatility is 2.28 and the reflux ratio is 3.0 per mole of product. Calculate the actual number of plates required. **[10]**

OR

Q4) a) Describe in brief internal components of packed absorption column with neat diagrams. **[7]**

b) Explain down comer backup and its effect with relevant equations. **[10]**

Q5) Estimate H_{OG} using Cornell's Method. **[18]**

Data : $D_L = 1.9 \times 10^{-9}$ m^2/s; $D_V = 1.6 \times 10^{-5} m^2/s$

$\mu_V = 0.015 \times 10^{-3}$ Ns/m^2, $\mu_1 = 1 \times 10^{-3} Ns/m^2$ $L_w^* = 16$ $kg/s.m^2$; K_3(60% flooding) = 0.85

$\psi_h = 80$, $\varphi_h = 0.1$ $N_{OG} = 8$; $\rho v = 1.3$ kg/m^3, $M_{avg} = 29$,

$\rho_L = 998$ kg/m^3, $D_C = 1.5$.

The liquid phase is assumed to have water - like properties

OR

Q6) a) Explain Cornell's method for prediction of height of transfer units in details. **[9]**

b) Explain the characteristics & functioning of i) Liquid distributors. ii) Liquid redistributors. iii) Supports for packing's. **[9]**

Q7) a) Give the design considerations in condensate pipeline. **[7]**

b) What are the various types of supports used for piping? Ns/m^2. **[10]**

OR

Q8) a) What are codes and standards and their importance in piping design. **[7]**

b) Explain the pipeline design for transportation of crude oil. **[10]**

Total No. of Questions : 8]

SEAT No. :

PE-2146

[Total No. of Pages : 2

[6584]-45

B.E. (Chemical)

Environmental Engineering

(2019 Pattern) (Semester - VII) (409344 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.***
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 with a neat sketch spray tower. **[9]**

b) Explain the different methods of removing SOx and NOx. **[9]**

OR

Q2) a) Explain with a neat sketch Construction and working of Cyclone separator. **[9]**

b) Explain with a neat sketch any one type of electrostatic precipitator. **[9]**

Q3) a) Write note on following water pollutants. **[12]**

i) Inorganic chemicals and minerals

ii) Radioactive substances

iii) Oil

iv) Pesticides

b) What is Chemical Oxygen Demand? How it is determined. **[5]**

OR

P.T.O.

Q4) A large stream has a rate of reaeration K2=0.55 and a rate of deoxygenation K1=0.23 per day. The DO deficit of the mixing of stream water and waste water at the point of reference. DO is 4.0 mg/lit and the ultimate BOD of the waste Lu is 75 mg/Lit. **[17]**

Calculate:

a) The DO deficit at a point one day distant from the point of reference.

b) The critical deficit and the critical time.

Q5) Explain activated sludge process with neat diagram. **[18]**

OR

Q6) Explain with a neat sketch. **[18]**

i) Dissloved air floatation system without recycle.

ii) Dissolved air floatation system with recycle.

Q7) State the need of Nitrogen removal. Explain in detail two methods of nitrogen removal. **[17]**

OR

Q8) Explain in detail recovery of materials from process effluents. **[17]**



Total No. of Questions : 8]

SEAT No. :

PE-2147

[Total No. of Pages : 2

[6584]-46

B.E. (Chemical)

MEMBRANE TECHNOLOGY

(2019 Pattern) (Semester - VII) (Elective - III) (409344B)

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) ***Assume suitable data, if necessary.***

Q1) a) What is pervaporation? Explain in detials with its suitable sketches. **[10]**

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

OR

Q2) a) Explain in details solution diffusion theory for dialysis. **[10]**

b) What is reverse osmosis? Explain in details with its suitable diagram. **[7]**

Q3) a) What is concentration polarisation? Explain in details about concentration polarisation in liquid separation. **[9]**

b) Explain in details about membrane fouling and method for reducing fouling.**[8]**

OR

Q4) a) Explain in details methods for reducing concentration polarisation. **[9]**

b) Explain in details gel layer model for concentration polarisation. **[8]**

P.T.O.

Q5) a) What is importance of membrane models? Explain in details with any one example. **[10]**

b) What is desalination? Explain in details about membrane desalination with neat sketches. **[8]**

OR

Q6) a) Explain in details with neat sketches application of reverse osmosis membrane for waste water treatment. **[10]**

b) Explain in details application ultrafiltration membrane for oil water emulsion separation. **[8]**

Q7) a) Explain in details application of membrane for hydrogen separation. **[10]**

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

i) Selectivity

ii) Diffusivity

OR

Q8) a) Explain in details application of membrane for carbon dioxide separation. **[10]**

b) What is liquid membrane? Explain with suitable example. **[8]**



Total No. of Questions : 8]

SEAT No. : ____

PE-2148

[Total No. of Pages : 2

[6584]-47

B.E. (Chemical)

INDUSTRIAL PIPING

(2019 Pattern) (Semester - VII) (409344C) (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) ***Figures to right indicate full marks.***
2) ***Neat diagrams must be drawn whenever necessary.***
3) ***Assume suitable data, if necessary.***

Q1) a) Describe the cathode protection for piping systems. **[9]**

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

i) Heat Exchangers

ii) Storage Tank

OR

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

b) Discuss different types of vibrations and their prevention and control. **[9]**

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

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

OR

Q4) a) Discuss the various steps and design parameters for slurry pipelines. **[9]**

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

P.T.O.

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

b) Describe the various steps for designing utility piping. **[8]**

OR

Q6) a) Discuss piping design strategies for corrosive materials. **[9]**

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

Q7) a) It is planned to insulated the shell of a heat exchanger. The outside diameter of the shell is 30 cm, its outer surface temperature is at 280 ^{0C} and it may be assumed to be remains constant even after applying insulation on the shell. If the outside surface heat transfer coefficient is 2, what is the maximum thermal conductivity of insulating material for effectively reducing heat transfer from shell. **[9]**

b) Derive the relation for the critical radius of insulation of a sphere having radius R. **[9]**

OR

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

i) Insulation for piping system

ii) Purpose and selection of insulation

iii) Optimum thickness of insulation.



Total No. of Questions : 8]

SEAT No. :

PE-2149

[Total No. of Pages : 2

[6584] - 48

B.E. (Chemical)

PETROLEUM REFINING

(2019 Pattern) (Semester - VII)(Elective - III) (409344D)

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.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume suitable data, if necessary.***

Q1) a) Describe the process of Hydro treating with typical schematic diagram. **[9]**

b) Discuss various conversion processes used in refineries? describe refroming operation with a schematic diagram. **[8]**

OR

Q2) a) What is the different conversion processes used in refineries? describe catalytic craking with a schematic diagram. **[9]**

b) Describe the mechanism and working of the coking process with a schematic diagram. **[8]**

Q3) a) What is a solvent exctraction technique? Describe solvent extraction with a schematic diagram. **[9]**

b) Explain in detail about various properties of lube oil. **[9]**

OR

Q4) a) Describe the dewaxing process with a neat schematic diagram. **[10]**

b) Explain in detail about manufacturing of butimens with a neat schematic diagram. **[8]**

P.T.O.

Q5) a) What are various supporting processes used in the refinery? Discuss fluid catalytic cracking techniques with a schematic diagram. **[10]**

b) Write in detail about the thermal cracking of H_2S **[7]**

OR

Q6) a) Discuss the environmental pollution aspects in the refinery. **[9]**

b) What are various supporting processes used in the refinery? Discuss sulphur recovery techniques with a schematic diagram. **[8]**

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

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

OR

Q8) a) Explain the effect of additives on the quality of refinery products. **[9]**

b) Write in details about housekeeping strategies used for petroleum and petroleum products. **[9]**



Total No. of Questions : 8]

SEAT No. :

PE-5944

[Total No. of Pages : 2

[6584]-49R
B.E. (Chemical)
CHEMICAL PROCESS SYNTHESIS
(2019 Pattern) (Semester - VII) (409345 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) ***Use of logarithmic tables, electronic pocket calculator and steam tables is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Explain fractional distillation with suitable. Example. **[8]**

b) Discuss various types of dryers used in chemical process industry. **[8]**

OR

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

a) Evaporation

b) Azeotropic distillation

Q3) Discuss choice of operating conditions by considering the parameter such as operating pressure, reflux ratio, feed condition and type of condenser. **[18]**

OR

Q4) a) Discuss heuristic used for the sequence-selection for simple distillation columns. **[9]**

b) Discuss thermal coupling for direct and indirect distillation sequencing. **[9]**

Q5) a) Explain Heat Exchanger Network in detail. **[9]**

b) Explain graphically heat recovery pinch. **[9]**

OR

Q6) a) Discuss integration of heat pump. **[9]**

b) Explain the Problem Table Algorithm in Pinch Technology. **[9]**

P.T.O.

Q7) a) Comment on quantitative measures of inherent safety, overall safety and health Considerations. **[12]**

b) Explain the intensification of hazardous materials. **[6]**

OR

Q8) a) Explain types of accidents in process industries and their significance.**[9]**

b) Write a note on overall safety and health considerations in chemical plant. **[9]**

♦ ♦ ♦

Total No. of Questions : 8]

SEAT No. :

PE-2151

[Total No. of Pages : 2

[6584]-50
B.E. (Chemical)
INDUSTRIAL MANAGEMENT & ENTREPRENEURSHIP
(2019 Pattern) (Semester - VII) (409345 B) (Elective - IV)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

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

Q1) a) Write a note on fiscal and tax concessions available for entrepreneurship development. **[9]**

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

OR

Q2) a) Explain the role of EDII and NIESBUD in entrepreneurship development. Discuss successful entrepreneurial ventures development. **[9]**

b) Describe the role, problems and prospects for women entrepreneur's development. **[9]**

Q3) a) Explain various theories of team development. **[9]**

b) Explain verbal and nonverbal communication skills in managerial work. **[8]**

OR

Q4) a) Discuss the management roles and theories of Henry Mintzberg. **[9]**

b) Discuss various management theories and managerial work with typical examples. **[8]**

P.T.O.

Q5) a) Elaborate on computer-based project management. **[9]**

b) Describe various uncertain activity times and tracking techniques. **[8]**

OR

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

b) Describe business excellence techniques through six sigma and kaizen. **[8]**

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

a) Business-to-Business marketing.

b) Promotion and Pricing.

c) Product and Brand Management.

OR

Q8) a) Describe the sampling design and data collection methods. **[9]**

b) Elaborate on handling multiple projects with typical examples. **[9]**



Total No. of Questions : 8]

SEAT No. :

PE-5945

[Total No. of Pages : 2

[6584]-51-R
B.E. (Chemical)
GREEN TECHNOLOGY
(2019 Pattern) (Semester - VII) (409345 C) (Elective - IV)

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

Instructions to the candidates :

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

Q1) Write notes on: **[2 × 8 = 16]**

a) Life cycle assessment

b) Eco-management.

OR

Q2) a) Discuss the role of biocatalysis and photocatalysis in sustainable chemical processes **[8]**

b) Explain green process metries with suitable diagram **[8]**

Q3) Explain with example and applications of Supercritical Fluids, Supercritical Carbon dioxide and Supercritical Water with typical examples **[18]**

OR

Q4) a) What is ionic liquid? Discuss ionic liquid as a catalyst in green manufacturing technology **[9]**

b) Explain chemicals from renewable feed stock in detail. **[9]**

Q5) a) Explain applications of Sonochemistry in green chemistry. **[9]**

b) Enlist various emerging greener technologies? Discuss any one with suitable examples **[9]**

OR

P.T.O.

Q6) a) Explain the photochemical reactions with suitable example **[9]**

b) Explain the microwave-assisted reactions with examples **[9]**

Q7) a) Write in brief on electrochemical Synthesis with neat schematic diagram. **[9]**

b) Discuss how green chemistry contributes to sustainable agriculture through eco-friendly pesticides **[9]**

OR

Q8) a) Describe the green aspects involved in the manufacture of Vitamin C **[9]**

b) Write in brief radical process with example **[9]**



Total No. of Questions : 8]

SEAT No. :

PE-2153

[Total No. of Pages : 2

[6584]-52
B.E. (Chemical Engineering)
ADVANCE SEPARATION PROCESSES
(2019 Pattern) (Semester - VII) (409345 D) (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) Explain Reactive distillation in detail **[9]**

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

OR

Q2) a) Explain reactive crystallization process in detail **[9]**

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

Q3) a) Explain the principle and working of ultrafiltration. Discuss its applications **[9]**

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

OR

Q4) a) Explain basic types of modules used in reverse osmosis **[9]**

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

Q5) a) Explain the detail working of Chromatography **[9]**

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

OR

P.T.O.

Q6) 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]**

Q7) a) Write down applications of froth flotation techniques **[9]**

b) What is principle and working of ultra centrifugation and discuss its application **[8]**

OR

Q8) a) Explain Zone electrophoresis in detail **[9]**

b) Explain zone refining in detail **[8]**



Total No. of Questions : 8]

SEAT No. : ____

PE-2154

[Total No. of Pages : 2

[6584]-53
B.E. (Civil Engineering)
DAMS AND HYDRAULICS STRUCTURES
(2019 Pattern) (Semester - VIII) (401011)

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 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 are spillways and what is their necessity? **[5]**

b) Draw a labeled sketch of ogee spillway showing all components **[5]**

c) Explain 'Stilling Basin Types' according IS 4997-1968 **[7]**

OR

Q2) a) Explain importance of 'Energy Dissipators'. **[5]**

b) Explain in details 'Vertical Lift Gate'. **[5]**

c) Design an ogee spillway for concrete gravity dam, for the following data. **[7]**

i) Average river bed level = 100 m

ii) Slope of D/S = 0.7 H: 1V, u/s face is vertical

iii) Spillway crest RL = 204 m

iv) Design discharge = 8000 m^3/s

v) Spillway length is 6 spans with a clear length of 10 m each.
Pier thickness = 2.5 m.

Q3) a) Explain function of pitching on U/S face of earthen dam & turfing. **[5]**

b) Explain in details homogenous embankment type of dam. **[5]**

c) Describe the method of plotting phreatic line for an earth dam with & without horizontal filter at the downstream side. **[8]**

P.T.O.

OR

Q4) a) Explain significance of drainage blanket in earthen dam **[5]**

b) Explain 'Seepage Failure' in earthen dam **[5]**

c) Determine the factor of safety of downstream slope of (homogeneous section) an earth dam drawn to a scale of 1cm = 4 m, for the following data : **[8]**

Area of N-rectangle = 24 cm^2

Area of T-rectangle = 12 cm^2

Area of U-rectangle = 8 cm^2

Length of slip circle arc = 20 cm

angle of internal friction = 25°

Cohesion c = 19.5 kN/m^2

specific weight of soil = 19 kN/m^3

Q5) a) Explain types of canals based on alignment. **[5]**

b) Explain in details limitations of Kennedy's theory. **[5]**

c) Design an irrigation channel by Kennedy's theory to carry a discharge of 36 cumecs. Take rugosity coefficient N = 0.0225 and critical velocity ratio m = 1.05. The channel has a bed slope of 1 in 5000 and side slope of 0.5 H:1 V. Take initial trial depth as 2m. **[8]**

OR

Q6) a) Explain various losses in irrigation of canals **[5]**

b) Explain the concept of canal fall and describe ogee fall in details **[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. **[8]**

Q7) a) Explain in details "Super Passage". **[5]**

b) Explain in details limitation of Bligh's Theory. **[5]**

c) Draw layout plan of a typical diversion head works and label all its part. Write functions of each part. **[7]**

OR

Q8) a) Explain in details "Level Crossing". **[5]**

b) Explain selection criteria for 'Diversion Head Work'. **[5]**

c) Explain 'Creep Theory by Bligh' for the hydraulic design of weir on a permeable foundation. **[7]**

Total No. of Questions : 8]

SEAT No. :

PE-2155

[Total No. of Pages : 4

[6584]-54
B.E. Civil
QUANTITY SURVEYING CONTRACTS AND TENDERS
(2019 Pattern) (Semester - VIII) (401012)

Time :3 Hours] ***[Max. Marks : 70***

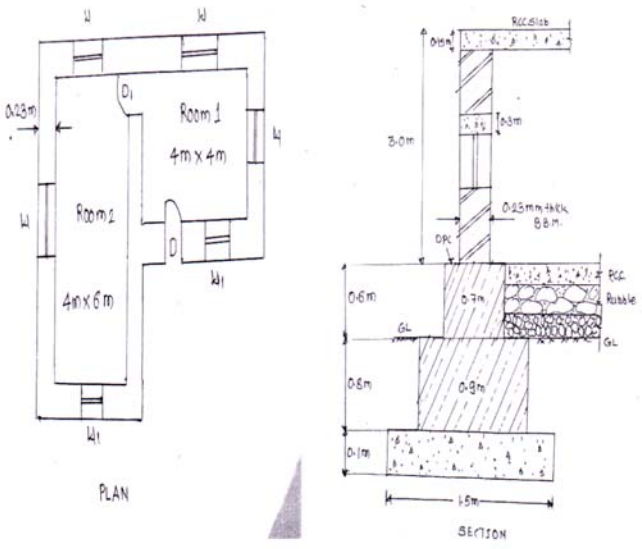
Instructions to the candidates :

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 Right indicate full marks.***
4) ***Use of electronic pocket calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) Explain different methods of taking out quantities. Explain any one with example. **[6]**

b) Figure shows plan and section of residential building, Determine the quantities of following item By PWD Method (Assume any suitable data) **[12]**

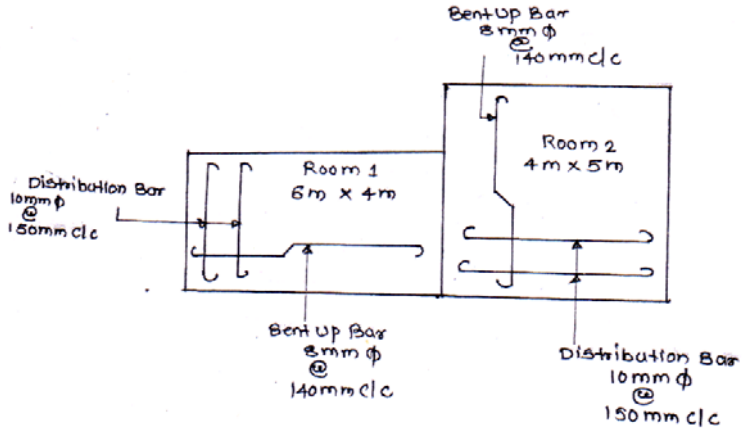
i) Excavation in foundation
ii) PCC in Foundation
iii) UCR masonry in CM (1 : 6) in foundation
iv) CR masonry in CM (1 : 6) in foundation
v) Damp proof course 3 cm thick



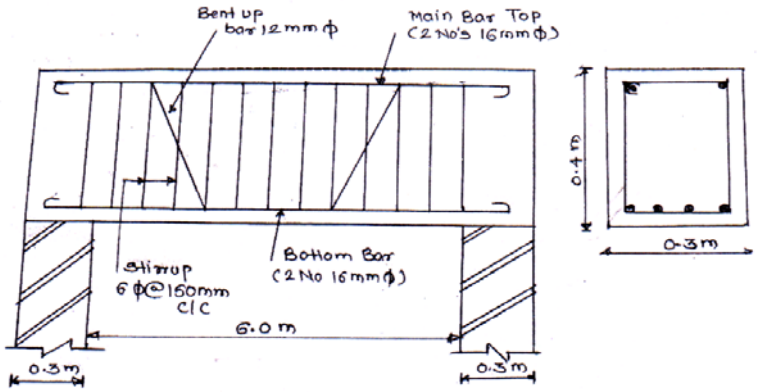
P.T.O.

OR

Q2) a) Determine quantity to steel reinforcement in slab for both room from figure clear cover on both side 20 mm (Assume any suitable data) **[9]**



b) R.C.C simply supported beam of side 300 mm × 400 mm is shown in figure The span of beam is 6.0 m and end bearing (both sides) is 30 cm. calculate total quantity of steel reinforcement. (Assume any suitable data) **[9]**



Q3) a) Differentiate between following methods : **[8]**

i) Mid sectional area method & Mean Sectional area method.

ii) Trapezoidal formula method & Prismoidal formula method.

b) Calculate the quantities of Earthwork is cutting and filling for road with following data : **[10]**

i) Formation width of road is 10 m

ii) Slope in cutting 1 : 2

iii) Slope in Banking 2 : 1

Chainage	0	30	60	90	120
GL in m	400	398	50.50	396	392
FL in m	397	396	395	394	393

OR

Q4) a) List out different methods to workout Earth work quantity for road work. Explain any one method. **[8]**

b) Prepare an estimate of a pipe culvert for following item as shown in Fig. 4 (a) and Fig. 4(b) **[10]**

i) Excavation

ii) Earth filling

iii) Rubble soling

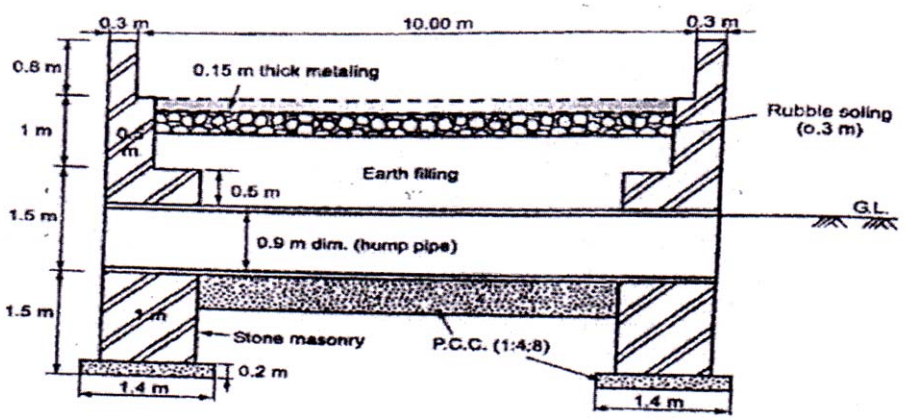


Fig 4(a)

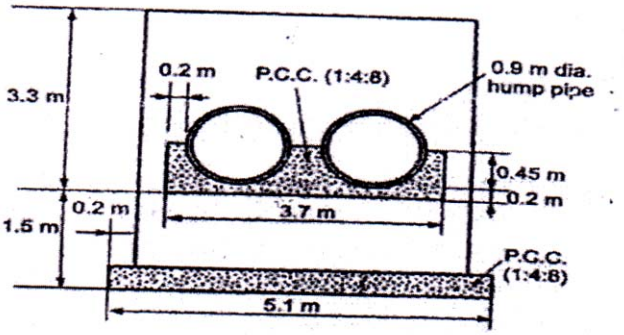


Fig 4(b)

Q5) a) Prepare a rate analysis of 12mm thick cement plaster (1:4) **[9]**

b) What is the necessity of drafting specification for Civil engineering work. Explain **[8]**

i) General specification.

ii) Detailed specification.

OR

Q6) a) Prepare a rate analysis of Cement concrete 1:2:4 for R. C. C. Roof Slab with 2.5 % steel. **[9]**

b) Prepare a detailed Specification for plain cement concrete & Brick Masonry in Superstructure. **[8]**

Q7) a) Why do depreciation occur in the valuation of property? What are the different methods of calculating depreciation. Explain any one method of calculating depreciation stating formula used, merits & demerits. **[6]**

b) Explain with example five purpose of valuation. **[5]**

c) A building is constructed at a cost of 10 lakhs. The life of building may be assumed to be 90 years and the scrap value of building to be 10% of building cost. Determine the depreciation in 60th year. Use straight line method, sinking fund method assuming 10% compound interest. **[6]**

OR

Q8) a) Differentiate between Cost, Price & Value with suitable example. **[6]**

b) Define the following terms : **[5]**

i) Dual rate Year purchase

ii) Sinking Fund

iii) Annuity

iv) Obsolescence

v) Free hold Propert

c) The depreciated replacement value of building has to be found out with the following data : **[6]**

i) Total builtup area = 1500 sq-m

ii) Age of building = 50 years

iii) Life of building = 100 years

iv) Scrap value after useful life = 10%

v) Percentage for sinking fund = 8%

Assume rate of construction as Rs. 4000/sq-m

⌘⌘⌘

Total No. of Questions : 8]

SEAT No. : ____

PE-2156

[Total No. of Pages : 4

[6584]-55
B.E. (Civil)
EARTHQUAKE ENGINEERING
(2019 Pattern) (Semester - VIII) (401013A) (Elective V)

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

Instructions to the candidates :

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7or Q8.***
2) ***Figures in bold to the right, indicate full marks***
3) ***Neat diagrams should be drawn where ever necessary.***
4) ***IS 1893 and IS 13920 are permitted in the examination.***

Q1) Calculate the natural frequencies and the mode shapes for the system shown in Fig. 1. **[18]**

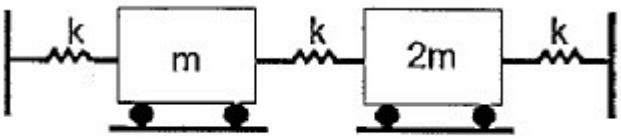


Fig. 1

OR

Q2) Calculate the natural frequencies and the mode shapes for the system shown in Fig. 2. **[18]**

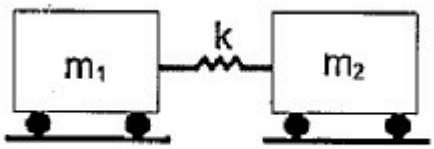


Fig. 2

P.T.O.

Q3) Determine the total base shear as per the provisions of IS: 1893 and distribute along the height of the building for the building shown in Fig. 3. Consider the following data for the calculation. **[17]**

a) size of columns – (300×400) mm,

b) size of beams – (300×350)mm,

c) thickness of slab – 200 mm,

d) live load – 4 kN/m^2,

e) location of the building – zone III,

f) soil condition – rock.

Any additional data required may be suitably considered.

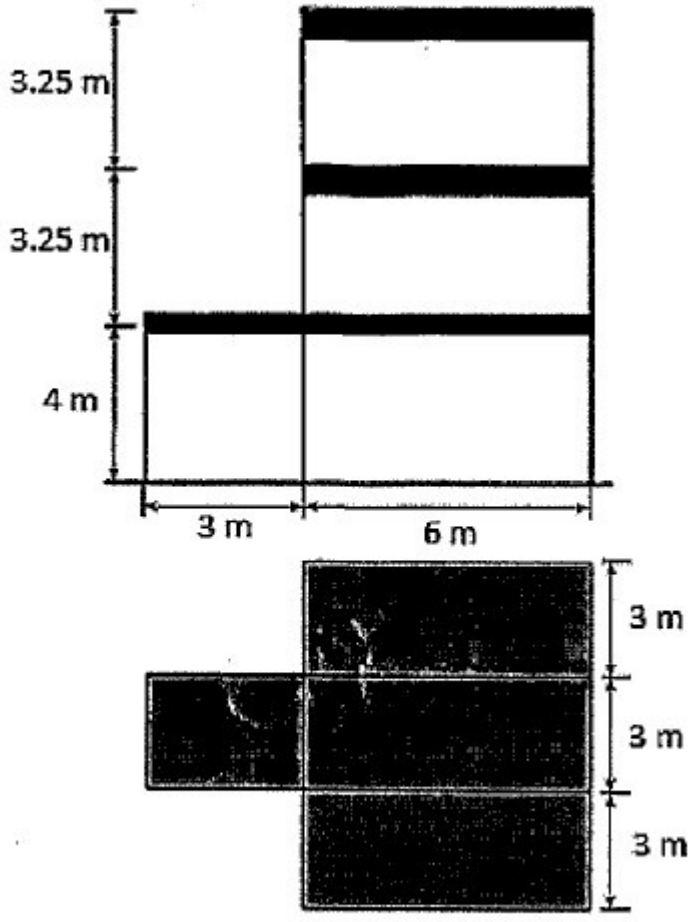


Fig. 3

OR

Q4) For the building shown in Fig. 3, determine the total base shear as per the provisions of IS: 1893 and distribute along the height of the building if the given data is as follows.

a) size of columns – (300×450) mm,

b) size of beams – (300×350) mm,

c) thickness of slab – 225 mm,

d) live load – 5 kN/m^2,

e) location of the building – zone II,

f) soil condition – soft soil.

Any additional data required may be suitably considered. **[17]**

Q5) The natural periods and mode shapes for vibration in the X-direction are given below. Obtain the design seismic force in the X-direction by the dynamic analysis method. Any additional data needed may be suitably considered and clearly mentioned. **[18]**

Natural period, s		Mode 1 0.8	Mode 2 0.2	Mode 3 0.1
	Weight, kN		Mode shapes	
Terrace	3,800	1.0	1.0	1.0
3rd floor	4,500	0.9	0.2	–0.8
2nd floor	4,500	0.7	–0.7	–0.5
1st floor	4,500	0.4	–0.9	1.0

OR

Q6) The natural periods and mode shapes for vibration in the X-direction are given below. Obtain the design seismic force in the Y-direction by the dynamic analysis method. Any additional data needed may be suitably considered and clearly mentioned. **[18]**

Natural period, s		Mode 1 0.5	Mode 2 0.3	Mode 3 0.2
	Weight, kN		Mode shapes	
Terrace	3,800	1.0	1.0	1.0
3rd floor	4,500	0.3	0.2	–1.2
2nd floor	4,500	0.2	–1.1	–0.7
1st floor	4,500	0.8	–0.5	0.3

Q7) a) Define and explain the significance of building configuration in seismic design. How can irregular building shapes impact seismic performance, and what design considerations are necessary to address this issue? **[9]**

b) Provide an overview of the key provisions specified in IS 13920 for seismic design and detailing. **[8]**

OR

Q8) a) Compare and contrast moment-resisting frames and shear walls as lateral load-resisting systems in seismic design. Discuss their advantages, limitations and when one might be preferred over the other. **[9]**

b) Explain the key aspects of reinforcement detailing and connections that contribute to the ductile behavior of structures during earthquakes. **[8]**

Total No. of Questions : 8]

SEAT No. :

PE-2157

[Total No. of Pages : 3

[6584]-56
B.E. (Civil)
STURCTURAL DESIGN OF BRIDGES
(2019 Pattern) (Semester - VIII) (401013-B) (Elective-V)

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

Instructions to the candidates :

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7or Q8.***
2) ***Figure in bold to the right, indicate full marks***
3) ***Neat diagrams should be drawn wherever necessary***

   IS 1343, IRC 6, IRC 112, Bridge Rules and steel table are permitted in the examination.

Q1) For a post tensioned pre-stressed concrete Tee beam slab bridge deck for national highway crossing for IRC class AA tracked vehicle, deck slab of thickness 250 mm is provided. Consider the wearing coat as 80mm. The spacing of the cross girder is 5 m and longitudinal girders are provided at 2.5 m with carriageway of 7.5 m. Span of bridge is 30 m. **[18]**

Design the external prestressed post-tensioned concrete girder.

The following material properties shall be considered for the design.

a) M-45 grade concrete for the deck slab

b) M-60 grade for the girders;

c) Ultimate tensile of the steel used in the girders is 1900 MPa;

d) Compressive strength of concrete at transfer is 35 MPa;

e) The loss in the préstress may be taken as 15%.

f) Any additional data required may be suitably considered.

OR

Q2) For the problem data given in Q.1, design the intermediate prestressed post-tensioned concrete girder, if the live load on the deck slab is IRC Class AA tracked loading. **[18]**

P.T.O.

Q3) A welded plate girder railway bridge is to be analyzed and designed for the data given below: **[17]**

a) Effective span = 29.5 m

b) Total bending moment on each track 292 tonnes

c) Shear force = 312 tonnes

d) Coefficient for dynamic augmentation (CDA) = 0.40

e) Permissible yield stress of steel = 420 N/mm^2

Design the cross-section of the girder and the required end stiffeners, incorporating suitable assumptions where needed.

OR

Q4) For the data given in Q.3, design the cross section and the intermediate transverse stiffeners. **[17]**

Q5) Assume a suitable configuration of the truss for a span of 15.0 m and height of 5.00 m. Other details for bridge are as follows. **[18]**

a) spacing of stingers = 1.9 m;

b) weight of sleeper per meter on each girder = 0.65 kN/m;

c) weight of rail per meter = 0.55 kN/m;

d) EUDL for bending moment = 4850 kN;

e) EUDL for shear force = 5125 kN;

f) impact factor CDA = 0.31;

g) intensity of wind load = 1.65 kN/m2;

h) racking force = 6.1 kN/m.

Design any top chord member.

OR

Q6) For the problem given in Q.5, design the bottom chord member. **[18]**

Q7) a) With neat sketches explain the types of bridge bearings.

b) What is the function of bridge bearing?

c) What factors decide the type of bearings to be used in a bridge structure? **[17]**

OR

Q8) Design an elastomeric bearing to suit the following data **[17]**

Vertical load (Sustained)=200 KN

Vertical Load (Dynamic) = 40 KN

Horizontal force = 60 KN

Modulus of rigidity of elastomer = 1 N/mm2

Friction coefficient = 0.3

Any additional data required may be suitably considered.

Total No. of Questions : 8]

SEAT No. : ____

PE-2158

[Total No. of Pages : 3

[6584]-57
B.E. (Civil)
IRRIGATION AND DRAINAGE
(2019 Pattern) (Semester - VIII) (401013-C) (Elective - V)

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

Instructions to the candidates :

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7or Q8.***
2) ***Answers to the all questions should be written in single answer-book.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Assume suitable data, if necessary.***

Q1) a) Explain characteristic curves of centrifugal pump. **[6]**

b) What are the advantages and disadvantages of drip irrigation system. **[6]**

c) Enlist component parts of lift irrigation system. Explain how to calculate power requirement of centrifugal pump in lift irrigation. **[6]**

OR

Q2) a) Define following terms related to centrifugal pump: **[6]**

i) static head, ii) manometric head, iii) delivery head,

iv) gross head, v) suction head, vi) manometric efficiency

b) Draw a neat sketch of centrifugal pump and explain component parts. **[6]**

c) What is the NPSH of centrifugal pump? Distinguish between available NPSH and required NPSH. **[6]**

P.T.O.

Q3) a) Explain hydraulic design of sprinkler irrigation system. **[9]**

b) Determine the system capacity for a sprinkler irrigation system to irrigate 25 hectares of a crop. Design moisture use rate is 7.5 mm/day. Moisture replaced in soil at each irrigation is 8 cm. Irrigation efficiency is 75 %. Irrigation period is 11 days in a 14-day interval. The system is to be operated for 19 hours per day. **[8]**

OR

Q4) a) Determine the required capacity of a sprinkler system to apply water at the rate of 1.35 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) Draw a labelled sketch showing components of a sprinkler irrigation system. What are advantages and disadvantages of sprinkler irrigation system. **[6]**

c) Explain with neat sketch Fertilizer Applicator in sprinkler irrigation system. **[5]**

Q5) a) What is osmotic potential? How to calculate osmotic potential energy in saturated soils? **[5]**

b) Explain different engineering practices for salinity management. **[6]**

c) Estimate the leaching requirement when the electrical conductivity (EC) of the saturation extract of the soil is 11 mmhos/cm at 25 percent reduction in the yield of cotton. The EC of irrigated water is 1.5 mmhos/cm. **[6]**

OR

Q6) a) What is leaching fraction? Explain how to compute leaching fraction.**[6]**

b) Explain in brief – water stress coefficient. **[5]**

c) A quantity of 100 ml of gypsum solution, having 29 meq/l concentration as calcium, on reacting with 6.5 gm of an alkali soil showed 30 meq/l of Ca+Mg concentration in the filtrate. Estimate the gypsum requirement in meq/100 gm soil. **[6]**

Q7) a) Explain different types of sub surface drainage system layouts. **[6]**

b) It is required to design surface drainage for a new agricultural farm to drain out irrigation tail-water and seasonal rainfall runoff. The maximum rainfall intensity at the site in 30 years record is 38 mm/h. The tertiary drain would have to carry runoff from 6.0 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. **[8]**

c) Enlist different types of drain pipes used for subsurface drainage and brief about anyone. **[4]**

OR

Q8) a) Explain different surface drainage system layouts. **[6]**

b) What is composite drainage system? **[3]**

c) Determine the required drain spacing (L) for the basic design criteria q = 7.9 mm/d, H = 0.87 m, pipe with outer diameter = 0.3 m and wet entry perimeter (u) = 0.45 m. K_1 = 3.5 m/day, K_2 = 2.0 m/day. W= 1.7 m, D = 3 m. Refer Fig. 8 (c).
Use Hooghoudt's formula. Take only two trials. **[9]**

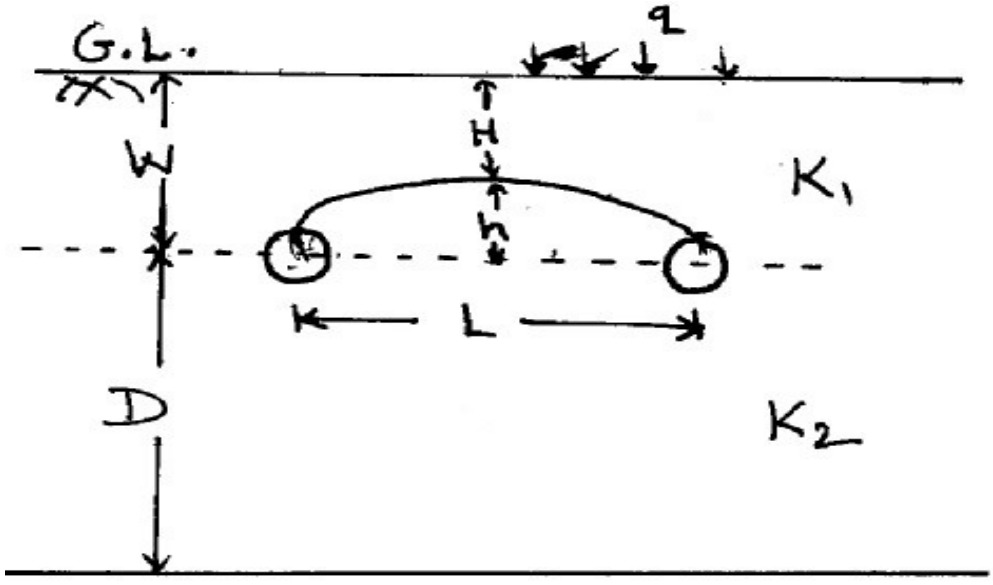


Fig. 8 (c)

Total No. of Questions : 8]

SEAT No. : ____

PE-2159

[Total No. of Pages : 2

[6584]-58
B.E. (Civil)
DESIGN OF PRECAST AND COMPOSITE STRUCTURES
(2019 Pattern) (Semester - VIII) (401013-D) (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, Q.7 or Q.8.***
2) ***Figures in bold to the right, indicate full marks.***
3) ***Is 15916, IS 11384, IS 800 and IS 3935 are allowed in the examination.***
4) ***The designs should comply with the latest codal provisions.***
5) ***If necessary, assume suitable data and indicate clearly.***
6) ***Use of electronic pocket calculator is allowed.***

Q1) Design a simple rectangular precast concrete beam to span a distance of 5 meters. The beam is subjected to a uniformly distributed load of 15 kN/m and a concentrated load of 30 kN at mid-span. Use M30 grade concrete and assume the cover to reinforcement as 25 mm. The width of the beam is 300mm. Perform all necessary calculations and provide the final design. **[18]**

OR

Q2) Design a precast hollow-core slab to be used in a residential building. The slab is required to span a distance of 6 meters and support a uniformly distributed load of 5 kN/m^2. The live load is estimated to be 2 kN/m^2. The hollow-core slab will be made of high-strength concrete (fck = 35 N/mm^2) and will have a total depth (h) of 200 mm, with a clear span (L) of 6 meters. The slab will have a width (b) of 1200 mm. **[18]**

Q3) Using the Indian code IS 800: 2007, calculate the maximum allowable load that a simply supported composite beam, consisting of an ISMB 400 steel beam and an M30 grade concrete slab, can support. Given:
Dimensions of the steel beam: Depth (D)=250 mm, Flange Width (b)=75 mm, and Web Thickness (t) = 8 mm.Slab thickness (h) =100 mm,
Width (b) = 1200 mm, and Concrete Grade (fck) = 30 N/mm^2.

[18]

P.T.O.

OR

Q4) Compare the deflection of a steel-concrete composite beam (as described above) to that of a monolithic ISMB 400 steel beam. Use IS 456: 2000 for concrete and IS 800: 2007 for steel. Determine which design offers superior performance in terms of deflection under a uniformly distributed load of 12 kN/m. **[18]**

Q5) According to IS 456: 2000 and IS 13920: 2016, calculate the required number and spacing of welded stud shear connectors for a composite structure consisting of a 150 mm thick M20 grade concrete slab and an IS MB 300 steel beam. The applied load is a live load of 20 kN/m. **[17]**

OR

Q6) Given the dimensions and material properties of the shear connectors (e.g., diameter, height, and shear strength), analyze and calculate the maximum shear load that the shear connection between the concrete slab and steel beam can withstand without failure. Compare this value with the applied load to ensure the design complies with IS codes. **[17]**

Q7) Design a steel-concrete composite column according to IS 456: 2000 and IS 800: 2007 to support an axial load of 600 KN and a moment of 80 kNm. Use an IS MB 350 steel section and M30 grade concrete. Calculate the required dimensions and reinforcement for the column. **[17]**

OR

Q8) Assess the design of an encased composite column based on IS 11384: 2006, considering its capacity to withstand both axial loads and moments. Calculate the moment-curvature response of the column and ensure it complies with the Indian code. Discuss the implications for structural safety and potential design improvements. **[17]**

Total No. of Questions : 8]

SEAT No. : ____

PE-2160

[Total No. of Pages : 3

[6584]-59
B.E. (Civil)
HYDROPOWER ENGINEERING
(2019 Pattern) (Semester - VIII) (401013 E) (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) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable data if necessary.***
5) ***Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator (non-programmable) and steam tables is allowed.***

Q1) a) What is sedimentation in reservoir? How it is caused? **[5]**

b) Explain the methods used in fixing installed capacity of hydroelectrical power plant. **[6]**

c) In a power station annual factors are as under, Load factor = 60%, capacity factor=50% and use factor= 60%. The power plant has maximum demand of 450000kW, Find **[6]**

i) Annual Energy Production

ii) Reserve capacity above peak point

iii) Hours per year the plant is not in use

OR

P.T.O.

Q2) a) What are the functions of Forebay and Surge Tank. **[5]**

b) The thermal power plant consists of 2X60MW units running for 8000 hours and one 30MW unit running for 2000hours per year. Energy produced by power plant is $876X10^6$ kWh per year. Determine plant load factor and plant load use factor. Assume maximum demand is equal to the plant capacity. **[6]**

c) Define the following terms : **[6]**

i) Connected Load

ii) Diversity factor

iii) Maximum Demand

Q3) a) What is instrumentation in power house? How instrumentation and control is achieved in case of powerhouse? **[5]**

b) Explain different types of intake structure in hydro power plant. **[6]**

c) Discuss different methods of designing penstock. What is meant by economical diameter. **[6]**

OR

Q4) a) Explain the three main divisions of power house structure with neat sketch. **[5]**

b) Explain underground powerhouse and types of layouts of underground powerhouse with neat sketches. **[6]**

c) Define Power house? Explain any four electrical equipment for the power house. **[6]**

Q5) a) Enlist types of Turbines. Write note on selection of turbines for power generation. **[9]**

b) Define Reaction turbine and Impulse turbine with Example. Differentiate between reaction and impulse turbine **[9]**

OR

Q6) a) What is cavitation? How can you minimize it? Also state effect of Cavitation. **[9]**

b) Define Turbine. Write short notes on **[9]**

i) Governing of turbines ii) Water hammer in turbines

Q7) a) What are the provisions for licensing in hydroelectric power generation plant as per electricity act 2003? **[9]**

b) Write a brief note about the different kinds of tariffs for hydropower plants and the tariffs for electrical energy. **[9]**

OR

Q8) a) Describe the concept of carbon credit? Give its importance. Describe long term plans to reduce CO_2 emissions. **[9]**

b) Demonstrate the responsibilities of electricity generation companies. **[9]**

Total No. of Questions : 8]

SEAT No. :

PE-2161

[Total No. of Pages : 2

[6584]-60
B.E. (Civil)
STRUCTURAL AUDIT AND RETROFITTING OF STRUCTURES
(2019 Pattern) (Semester - VIII) (401013F) (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 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 allowed***
6) ***Use of cell phone is prohibited in the examination hall***

Q1) a) Explain in details Local and Global techniques for SHM. Also explain active and passive monitoring. **[9]**

b) Elaborate on the role of Artificial Intelligence (AI) in Structural Health Monitoring. Provide a specific example of how AI contributes to enhancing SHM capabilities **[9]**

OR

Q2) a) Discuss the importance of both short-term and long-term monitoring in SHM, emphasizing their respective applications. **[9]**

b) Explain the process for Structural Health Monitoring (SHM) by explaining how instruments, data collection and data analysis work together. How do these elements play a role in ensuring the safety and health of structures? **[9]**

Q3) a) Discuss the technique of inserting new members contributes to retrofitting. What are the situations where this technique is suitable and effective?**[8]**

b) Assess the suitability of base isolation for retrofitting RC structures, steel structures and masonry structures. Include examples to support your assessment. **[9]**

P.T.O.

OR

Q4) a) Explain the role of jacketing in the retrofitting of structures with a suitable example. **[8]**

b) Introduce the challenges and considerations involved in retrofitting historical structures, emphasizing the preservation of architectural heritage. **[9]**

Q5) a) What is Fiber Reinforced Polymer (FRP) and how does it enhance the structural performance of reinforced concrete elements? **[9]**

b) How is FRP retrofitting carried out using FRP plates? What are the steps involved and how does the application of FRP plates improve the structural behavior of elements? **[9]**

OR

Q6) a) Elaborate on the mechanical properties of FRP materials that make them suitable for retrofitting structures. **[9]**

b) Explain the application of FRP bars in the retrofitting of structures, emphasizing their advantages over traditional steel reinforcement. **[9]**

Q7) a) Describe the steps involved in the analysis and design of an RC beam using FRP for flexural strengthening. **[8]**

b) Identify and explain the key challenges associated with retrofitting damaged structures using FRP. Discuss possible solutions or mitigation strategies **[9]**

OR

Q8) a) Describe the procedure for Retrofitting of RC Beams using FRP for shear strengthening as per provisions of ACI 440. **[8]**

b) Explain how the application of FRP for flexural strengthening improves the flexural strength and ductility of RC beams. **[9]**

Total No. of Questions : 8]

SEAT No. :

PE-2162

[Total No. of Pages : 2

[6584]-61
B. E. (CIVIL)
TQM & MIS
(2019 Pattern) (Semester - VIII) (401014 A) (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) ***Figures to the right side indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable data, if necessary.***

Q1) a) Appraise the importance of ISO Process in construction Sector with example. **[9]**

b) Develop a checklist for formwork checking. **[8]**

OR

Q2) a) Justify the importance of quality manual in construction projects. Explain the documentation process. **[8]**

b) Develop a checklist for concreting activity. **[9]**

Q3) a) Why benchmarking is essential in organization. Explain the benchmarking process. **[8]**

b) Justify the need of quality circle in construction projects. **[9]**

OR

Q4) a) Explain in detail various categories of cost of quality. **[8]**

b) Explain in detail CONQAS, CIDC-CQRA certifications. **[9]**

P.T.O.

Q5) a) How will you apply 5S techniques in construction projects. **[9]**

b) Explain in detail Failure mode effect analysis. **[9]**

OR

Q6) a) Explain in detail KAIZEN concept. How it can be applied in civil engineering organization. **[9]**

b) Explain the Rajeev Gandhi Award & Jamunalal Bajaj Award. **[9]**

Q7) a) Justify the need and importance of MIS in construction sector. **[9]**

b) Explain in detail characteristics of information. **[9]**

OR

Q8) a) Explain in detail operation support system and Transaction process system. **[9]**

b) Explain in detail Executive support system & Executive information system. **[9]**

♦ ♦ ♦

Total No. of Questions : 8]

SEAT No. :

PE-2163

[Total No. of Pages : 3

[6584]-62
B.E. (Civil)
ADVANCED TRANSPORTATION ENGINEERING
(2019 Pattern) (Semester - VIII) (401014 B) (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.5or Q.6, Q7. Qr Q.8***
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) Explain the significance of Non-Motorized Transportation (NMT) System for any country. **[6]**

b) Explain the concept of pedestrian Level of Service. **[6]**

c) Give your Suggestions for improvement of NMT system operating in your city **.** **[6]**

OR

Q2) a) Discuss the benefits of Non-Motorized Transportation System. **[6]**

b) How NMT can help in Urban transport planning? Discuss. **[6]**

c) What is active transport in NMT? Explain its types. **[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) Explain the relationship between speed, travel time, volume, density and capacity. **[7]**

OR

P.T.O.

Q4) a) At right angled intersection of two roads, Road 1 has 4 lanes with total width 12 m & Road 2 has 2 lanes with total width of 6.6 m. The volume of traffic approaching the intersection during hour are 900 and 743 PCU/ hr on the two approaches of Road 1 & 278 and 180 PCU/hr on two approaches of Road 2. Calculate pedestrian crossing time and minimum and revised green time for traffic as per IRC guidelines. **[10]**

b) Write a note on the various traffic regulations & control measures. **[7]**

Q5) a) Discuss in detail design of flexible pavement as per IRC 37. **[10]**

b) Differentiate between Rigid Pavement and Flexible Pavement. **[4]**

c) State the requirements of an ideal pavements **[4]**

OR

Q6) a) Determine the total thickness of flexible pavement using equation for single layer **[6]**

Use following data:

Design wheel load =4200 kg

Tyre Pressure = 6.0 kg/cm2

Elastic Modulus = 150 kg/cm2

Permissible Deflection = 0.25 cm

b) What do you mean by pavement unevenness? How it is measured? What are the permissible limits as per IRC guidelines. **[6]**

c) Explain with neat sketch the functions of the component parts of the flexible pavement. **[6]**

Q7) a) Classify the various types of joints in rigid pavement and mention the object of each. **[6]**

b) What are the objects of providing dowel bar in rigid pavement? Explain. **[6]**

c) Compute the radius of relative stiffness of 25 cm thick cement concrete pavement **[5]**

slab using the following data:

Wheel Load = 7000 kg

Modulus of Elasticity of concrete = 3.0×10^5 kg / cm^2

Poisson's ratio = 0.15

Modulus of subgrade reaction = 30 kg / cm^2

Radius of contact area = 28 cm

OR

Q8) a) Explain in brief the various types of overlays. **[6]**

b) Explain With neat sketches the various distresses in rigid pavements. **[6]**

c) What are the factors causing warping stresses in rigid pavement. **[5]**

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Total No. of Questions : 8]

SEAT No. :

PE-2164

[Total No. of Pages : 2

[6584]-63
B. E. (CIVIL)
GEO SYNTHETIC ENGINEERING
(2019 Pattern) (Semester - VIII) (401014 C) (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) ***Figures to the right side indicate full marks.***
3) ***Assume suitable data, if necessary.***
4) ***Use of electronic pocket calculator is allowed in the examination.***
5) ***Neat diagrams must be drawn wherever necessary.***

Q1) a) Discuss application of geo-synthetics in geo environment. **[9]**

b) Describe the mechanism of filtration and drainage function. **[9]**

OR

Q2) a) State design step for erosion control of embankment by using geo-synthetic material. **[9]**

b) Describe essential properties of soil to be determined for the successful use of a geotextile in a filtration application. **[9]**

Q3) a) Discuss the role of Geo-synthetics in roads and pavements. **[9]**

b) Explain the pavement design process of Giroud and Noiray **[8]**

OR

Q4) a) Describe the concept of geosynthetic separation in paved roadways. **[9]**

b) State different mechanisms of crack propagation in asphalt overlays. **[8]**

P.T.O.

Q5) a) Describe the basic components of a Geo-synthetic reinforced retaining wall. **[9]**

b) What are the various failure modes of geosynthetic-reinforced soil retaining walls? Explain them briefly. **[9]**

OR

Q6) a) Explain in detail construction procedure of reinforcement earth wall. **[9]**

b) Provide a list of various facing elements. Which one is the most economical? **[9]**

Q7) a) Discuss why Consolidation technique is effective in ground improvement using geosynthetic material. **[9]**

b) Illustrate how the use of Geo-grids can raise the carrying capacity of the soil beneath a footing. **[8]**

OR

Q8) a) Describe the term prefabricated vertical drain in ground improvement with neat sketch. **[9]**

b) List the parameters affecting the load-bearing capacity of a geosynthetic-reinforced foundation soil. **[8]**

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Total No. of Questions : 8]

SEAT No. :

PE-2165

[Total No. of Pages : 2

[6584]-64
B.E. (CIVIL)
STRUCTURAL DESIGN OF FOUNDATION
(2019 Pattern) (Semester - VIII) (401014D) (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 side indicate full marks.***
4) ***Assume suitable data, if necessary, and clearly state.***
5) ***All relevant IS codes and steel Table are allowed in the examination.***
6) ***Use of electronic pocket calculator is allowed.***

Q1) a) Explain the I.S. code provisions for the design & construction of pile foundations. **[10]**

b) Short Note on **[7]**

i) Pile Caps

ii) Negative Skin Friction

OR

Q2) a) Explain load carrying capacity of Piles by Static Formulae. **[10]**

b) Short Note on **[7]**

i) Piles subjected to uplift load

ii) Laterally Loaded Piles

Q3) a) Compare the I.S. code provisions & IRC provisions in respect of the design of a well foundation. **[10]**

b) Explain the design guidelines for well foundation for the following components with suitable sketches. **[7]**

i) Well curb

ii) Cutting edge

iii) Skin friction

iv) Bottom plug.

OR

P.T.O.

Q4) a) Define the Caissons foundation and explain its types. **[10]**

b) Explain the various components of well foundation with a suitable sketch. **[7]**

Q5) a) What are the different General requirements and design criteria for machine foundations? **[8]**

b) Explain the analysis and design of the machine foundation using Barkan's method. **[10]**

OR

Q6) a) Explain the steps to design a machine foundation using IS method. **[8]**

b) Explain the effect of vibration on the soil while the design of the foundation. **[10]**

Q7) a) Define retaining walls and explain their types with a neat sketch. **[8]**

b) Explain design procedures for rigid and flexible retaining walls. **[10]**

OR

Q8) a) Define the retaining wall and explain its construction methods. **[8]**

b) Explain various types of pile walls with a neat sketch. **[10]**

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Total No. of Questions : 8]

SEAT No. :

PE-2166

[Total No. of Pages : 3

[6584] - 65

B.E. (Civil)

GREEN STRUCTURES AND SMART CITIES

(2019 Pattern) (Semester - VIII) (401014 E) (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, Q.7 or Q.8.***
2) ***Figures to the right indicate full marks.***
3) ***Your answers will be valued as a whole.***
4) ***Assume suitable data, if necessary.***
5) ***Use of electronic pocket calculator and steam table is allowed.***

Q1) **Attempt the following questions:**

a) How BIPV technology useful in building design? Discuss. **[5]**

b) What is ECBC-2017? How it is useful in reduction in energy consumption and the GHG emissions? **[6]**

c) What is OTTV of buildings? How the technology and innovation play an important role in improving building performance? **[6]**

OR

Q2) **Attempt the following questions:**

a) Why the Overall Thermal Transfer Value (OTTV) is it important in building design? Give suitable example. **[6]**

b) How the builders and developers implement the ECBC-2017? Discuss the challenges incurred during implementation phase. **[5]**

c) What is comfort systems in buildings? Discuss the potential risks associated with poorly designed system. **[6]**

P.T.O.

Q3) **Attempt the following questions:**

a) What is sustainable development? How the smart cities helpful in achievement of the Sustainable Development Goals (SDGs)? **[6]**

b) Enlist the dimensions of a smart city. How do these dimensions contribute to functionality of smart city? **[5]**

c) How the conventional cities are differ than the smart cities, Differentiate in terms of their components and infrastructure. **[6]**

OR

Q4) **Attempt the following questions:**

a) Discuss the strategies and technologies that can be useful in reduction of energy demand. **[6]**

b) What are the key components of green approach useful in meeting the energy demand? **[5]**

c) Discuss the relation between smart city components and improvement in the quality of life for residents. **[6]**

Q5) **Attempt the following questions:**

a) Discuss the followings: **[12]**

i) Solar thermal energy

ii) Singular solar cells.

iii) Hybrid solar cells

b) Why it is difficult to convert the conventional cities into smart cities? Discuss the major issues involved in it. **[5]**

OR

Q6) **Attempt the following questions:**

a) Write a note on followings with suitable justification: **[12]**

i) India's "100 smart cities" policy and mission

ii) Smart city planning and development

b) What is urban planning and management? How the "100" smart cities initiative helps in the planning and management? **[5]**

Q7) **Attempt the following questions:**

a) With an example discuss the cleanliness and sanitation drives in India? **[7]**

b) What is sustainable urbanization and human well-being? What are the key features of the SDG 11? **[7]**

c) How Artificial Intelligence (AI) technology can be useful in smart city development? Discuss. **[5]**

OR

Q8) **Attempt the following questions:**

a) What are the key benefits of Artificial Intelligence (AI) in smart city projects? How it can impact the quality of life for citizens. **[7]**

b) How the government, private sector and civil society play their role in achieving the SDGs. Discuss. **[7]**

c) Why Sustainable Development Goals (SDGs) are important? How you will be benefited from it? **[5]**



Total No. of Questions : 8]

SEAT No. :

PE-2167

[Total No. of Pages : 3

[6584]-66

B. E. (Civil Engineering)

RURAL WATER SUPPLY & SANITATION

(2019 Pattern) (Semester - VIII) (401014 F) (Elective - VI)

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

Instructions to the candidates :

1) ***Solve Q1or 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 in detail the key features and objectives of piped water supply schemes in rural areas. **[6]**

b) Describe the procedure for scour depth calculation for a well located in a river bed. **[6]**

c) Explain in detail the functioning and benefits of hand pump-based water supply schemes in rural regions? **[5]**

OR

Q2) a) Explore different examples of retrofitting projects in water supply systems. Discuss the methodologies, techniques and technologies used to adapt existing infrastructure to enhance water availability, quality and distribution. **[6]**

b) Write detailed notes on: (3 Marks each) **[6]**

i) Gravity main and rising main

ii) ESR/GSR/MBR

c) What are the challenges and solutions associated with water supply schemes in hilly and mountainous regions **[5]**

P.T.O.

Q3) a) Explain in detail the electro — mechanical aspects required in Rural Water Supply Project. **[6]**

b) Discuss the calculation of hydraulic grade line (HGL) and frictional head losses. **[6]**

c) Explain in detail importance of interdisciplinary approach required in rural water supply. **[6]**

OR

Q4) a) Explain in detail, the electro-mechanical components involved in rural water supply from source to ESR. **[6]**

b) Discuss the importance of recording and analyzing test data during hydraulic testing. **[6]**

c) What is the significance of selecting an appropriate rising main and its appurtenances to control water hammer in a water supply system? **[6]**

Q5) a) What is the role of instrumentation in water supply schemes? Discuss the importance of monitoring and data collection for ensuring the efficient operation, maintenance and management of water infrastructure. **[6]**

b) Describe the role and importance of pressure gauges in water supply schemes. How are they used to monitor and control water pressure at various points in the system, ensuring optimal performance and preventing damage to the infrastructure? **[6]**

c) Describe in detail, the working and application of SCADA and PLC in water supply schemes. **[5]**

OR

Q6) a) Discuss in detail, the significance of flow meters in water supply schemes. **[5]**

b) Explain in detail, the role of data logging and remote sensing technologies in water supply schemes. How do these technologies assist in long-term data collection, trend analysis, and predictive modeling for effective planning and maintenance? **[6]**

c) Write short notes on: (3 Marks each) **[6]**

i) Auto pump controller ii) Water meter

Q7) a) Explain in detail, importance of periodic maintenance and its documentation for pumping machinery in water supply systems. **[6]**

b) What are record (as-built) drawings? Explain their importance in WSS documentation. **[6]**

c) Explain involvement of villagers as stakeholders in documentation of WS scheme O&M phase **[6]**

OR

Q8) a) What are the safety considerations that should be emphasized during training on water supply operation and maintenance. Explain importance of their documentation. **[6]**

b) Enlist any 02 methods of leak detection. Explain any one in detail. **[6]**

c) Write short notes on: (3 Marks each) **[6]**

i) Periodical maintenance of pumping machinery

ii) Preventive vs corrective maintenance

Total No. of Questions : 8]

SEAT No. : ____

PE2168

[Total No. of Pages : 3

[6584]-67
B.E. (Civil Engg.)
FOUNDATION ENGINEERING
(2019 Pattern) (Semester - VII) (401001)

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 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 calculator is allowed.***

Q1) a) Explain the term: **[5]**

i) Coeff. of Compressibility.

ii) Compression Index.

iii) Coeff. of volume Compressibility.

iv) Degree of Consolidation

v) Coeff. of Consolidation.

b) A soil stratum is 10 m thick with pervious stratum on top and bottom. Determine the time required for 50% consolidation. Given that coefficient of permeability = 10–7 cm/s, coefficient of compression = 0.0003 cm^2/gm, void ratio = 2 and time factor = 0.197. **[6]**

c) Explain with neat sketch laboratory consolidation test. **[6]**

OR

Q2) a) What is contact pressure? Draw contact pressure distribution of a rigid footing on sandy and clayey soil strata. **[6]**

b) In a consolidation test void ratio decreased from 0.75 to 0.70, when the load was changed from 50kN/m^2. Compute compression index of volume change. **[5]**

c) Discuss with sketch Square root of time fitting method for determination of coefficient of consolidation. **[6]**

P.T.O.

Q3) a) What are the conditions where a pile foundation is more suitable than a shallow foundation? **[6]**

b) A group of 9 piles, 10m long is used as a foundation for bridge pier. The piles used are 30 cm diameter with centre to centre spacing of 0.9m. the subsoil consists of clay with unconfined compressive strength of 1.5kg/cm^2. Determine the efficiency neglecting the bearing action. Assume adhesion factor = 0.9. **[6]**

c) Explain in brief efficiency of pile group. **[5]**

OR

Q4) a) How do you classify piles according to different criteria? **[6]**

b) A group of 16 piles of 50 cm diameter is arranged with a centre to centre spacing of 1.0m. The piles are 9m long and are embedded in soft clay with cohesion 30kN/m^2. Bearing resistance may be neglected for the piles (Adhesion factor 0.6). Determine the ultimate load capacity of the pile group. **[6]**

c) Define Negative Skin Friction. How it is determined. Also explain how it is prevented. **[5]**

Q5) a) Discuss the procedure for proportioning of footing for equal settlement. **[6]**

b) Discuss tilts and shifts: precautionary and remedial measures of well Foundation. **[6]**

c) Explain design steps of raft foundation by elastic (flexible) method. **[6]**

OR

Q6) a) What is meant by shallow foundations? What are the principles of the design of footing? **[6]**

b) What is Caisson? How Caissons are classified based on methods of construction? **[6]**

c) Sketch and describe the various components of the well foundation, indicating functions of each component. **[6]**

Q7) a) Explain the effect of swelling and shrinkage of expansive soils on building constructed. Also, enlist the precautions to be taken. Illustrate with sketches. **[6]**

b) Discuss design principle of undreamed pile. **[6]**

c) List out the various techniques of soil improvement. Explain any one. **[6]**

OR

Q8) a) Discuss preloading with prefabricated vertical drains/sand drains with a neat sketch. **[6]**

b) Explain any four engineering problem associated with black cotton soil.**[6]**

c) Enlist types of cofferdams. Explain any one type with neat sketch. **[6]**

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Total No. of Questions : 8]

SEAT No. :

PE-2169

[Total No. of Pages : 3

[6584]-68

B.E. (Civil)

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) ***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) A car travelling at 22.22 m/sec is overtaking another car moving at 60 kmph on a two lane undivided highway. Assuming an acceleration of the overtaking car as 0.7 m/ sec^2; Calculate **[10]**

i) minimum overtaking sight distance; and

ii) minimum and desirable length of overtaking zones

b) State the various objects of providing extra widening on horizontal curves.**[6]**

c) Distinguish between carriageway width and formation width. **[2]**

OR

Q2) a) Calculate the length of transition curve required for a two lane carriageway of 7.0 m width on horizontal curve, if the design speed is 65 kmph and the road is passing through rolling terrain. The radius of horizontal curve is 200 m. Take extra widening of 0.66 m **[10]**

b) Define gradient. State the various types of gradients. Also state the values of gradient recommended by IRC for plain and rolling terrain. **[6]**

c) State the methods of elimination of crown while providing the superelevation in the field? **[2]**

P.T.O.

Q3) a) Mention the step by step procedure of 'Ductility test on bitumen' **[6]**

b) Define Flakiness Index (FI). How FI is determined in the laboratory. **[6]**

c) List the different types of cutback bitumen. When are these used **[5]**

OR

Q4) a) For a construction of a bituminous road in a certain locality, contractor has received 60/70 grade of bitumen from refinery? Explain in brief the test to be carried out to confirm the adhesion property of bitumen. **[6]**

b) Define Elongation Index (EI). How EI is determined in the laboratory. **[6]**

c) What are the different methods of classifying / grading the bitumen? Explain in brief. **[5]**

Q5) a) Using the following data calculate the wheel load stress at the interior region of a cement concrete pavement using H.M. Westergaard's equation: **[8]**

Wheel load = 5100 kg, Modulus of Elasticity of concrete = 3×10^5 kg/cm^2, Pavement thickness = 15 cm, Poisson's ratio = 0.15, Modulus of subgrade reaction =7.0 kg / cm^3, Radius of wheel load contact = 16 cm.

b) Draw a neat labelled sketch of cross section of flexible pavement and rigid pavement. **[6]**

c) Write a note on temperature stresses in concrete pavement. **[4]**

OR

Q6) a) A two lane two way road is carrying an initial traffic of 1200 Commercial Vehicles per day (CVPD) is to be strengthened to cater the need of growing traffic. The VDF has been found to be 2.0. The rate of growth of traffic is 7.5% per annum. The pavement is to be designed for 15 years. Calculate the cumulative standard axles to be used in design. It is suggested to use the factor of 1.0 to account for lateral placement of wheel loads. **[8]**

b) Mention the step wise procedure of design of flexible pavement as per IRC guidelines. **[6]**

c) Explain in brief PQC and DLC. **[4]**

Q7) a) A bridge has linear waterway of 160 meters constructed across a stream whose natural linear waterway is 230 meters. If the average flood discharge is 1250 m^3 per seconds and average flood depth is 3.5 meters, calculate afflux under the bridge. **[6]**

b) Derive an expression for economical span of the bridge. **[6]**

c) State the various requirements of an ideal permanent way. **[5]**

OR

Q8) a) Name the different types of loading while designing a brief. Explain in brief. **[6]**

b) State the various ideal bridge site characteristics. **[6]**

c) Define gauge. State and explain various gauges adopted by Indian railways. **[5]**



Total No. of Questions : 8]

SEAT No. :

PE-2170

[Total No. of Pages : 2

[6584]-69

B.E. (Civil)

Coastal Engineering

(2019 Pattern) (Semester - VII) (Elective - III) (401003A)

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 diagrams must be drawn wherever necessary.***

Q1) a) Define tide. What are the basic characterisitcs of tides? Explain the process of generation of tides? What effects tides in addition to Sun and Moon? **[9]**

b) Write a detail note on tidal power and discuss the issues in establishing a tidal power plant in a country like India. **[9]**

OR

Q2) a) 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]**

b) How the tides in rivers and estuaries are different than oceanic tides? What are the storm surges? What are the effects of tides on day-to-day lifelong activities along the nearshore region? **[9]**

Q3) a) Define the 'Bed forms'. Explain in details about types of 'Bed forms'. **[8]**

b) Enlist the different environmental factor influencing sediment transfer and explain any three in details. **[9]**

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. **[8]**

b) Define erosion and accretion due to waves. Write a note on following coastal erosion features. **[9]**

i) Notch

ii) Sea Arch

iii) Cliff

Q5) a) Explain the types of near shore structures with example. **[9]**

b) Write a note on 'beach nourishment' and explain the necessity of 'beach nourishment' **[9]**

OR

Q6) a) What is the concept breakwater? How it useful for shore protection? Explain following types of break waters in details. **[9]**

i) Submerged breakwaters

ii) Floating breakwaters

iii) Attached breakwater

b) What is mean by shore protection, enlist various types of shore protection structure and explain the necessity of shore protection. **[9]**

Q7) a) Enlist the any four activity permitted in CRZ-II and CRZ-IV. **[8]**

b) What are the causes of pollution in coastal zone? Discuss the various issues for disposal of waste/dredged spoils in the coastal zones. **[9]**

OR

Q8) a) What is a CRZ? Elaborate the issues related to integrate coastal zone management. **[8]**

b) Write short note about the estuaries, wetland and lagoons, coastal dunes.**[9]**



Total No. of Questions : 8]

SEAT No. :

PE-2171

[Total No. of Pages : 2

[6584]-70
B.E. (Civil)
ADVANCED DESIGN OF CONCRETE STRUCTURES
(2019 Pattern) (Semester - VII) (401003 B) (Elective-III)

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.7or Q.8.***
2) ***Neat sketches must draw wherever necessary.***
3) ***Figures to right indicate full marks.***
4) ***Assume suitable data if necessary.***
5) ***IS 456, IS 3370, IS 1893 and IS 13920 is allowed in the examination hall.***
6) ***Use of non programmable electronic calculator is allowed.***

Q1) a) Explain with neat sketches, the deformation of T 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 levelled backfill of height 4.5 m having unit weight respectively equal to 17 kN/m^3. Angle of repose = 30°, Coefficient of friction between concrete and soil = 0.54, SBC of soil = 185 kN/m^2, depth of foundation = 1.2 m M-20 & Fe-415. **[12]**

OR

Q2) Design L-shaped, retaining wall for levelled backfill for following data. Height of retaining wall is 4.72 m, angle of internal friction 30°, unit weight of soil is 19 kN/m^3 and SBC is 180 kN/m^2. Coefficient of friction between base slab and underlying strata is 0.54. Draw lateral pressure diagram and details of reinforcement detailing of base and stem showing curtailment. M- 20 & Fe 415. **[17]**

Q3) a) Design of circular water tank using IS code method for 1 lakh litres capacity. The joint between the wall and base of tank is rigid. The tank rests on ground. M-30 & Fe 500. **[14]**

b) Explain the approximate analysis and design of circular water tank with rigid base, with proper sketches **[4]**

P.T.O.

OR

Q4) Design a rectangular tank of capacity 90,000 litters using approximate method of analysis. The height of water tank including free board 3.3m. Tank is resting on firm ground. Use M20 and Fe415. Sketch reinforcement details. **[18]**

Q5) a) Discuss different types of shear wall and explain the lateral load resistance mechanism for the shear wall. **[5]**

b) Design a ductile RC shear wall subjected to Shear Force = 521 kN, axial force = 8450 kN, and moment = 4850 kNm. Consider the height of the shear wall as 14m and length as 4.8m. Draw the ductile detailing of the shear wall. **[12]**

OR

Q6) Design a ductile solid shear wall with boundary elements, for a residential building, located in seismic zones IV. Use M30 grade concrete and Fe415 grade of steel. Consider the height of shear wall as 18 m & length of shear wall as 5 m. The RC shear wall is subjected to the following loadings. Shear Force = 450 kN, axial force =7800 kN, axial force on boundary element = 1300 kN and moment = 5,300 kNm. **[17]**

Q7) Determine the seismic forces at each floor level for the commercial RCC structure. The building is a Four storey structure having total height 12 m with three frames placed c/c distance of 8 m forming two bay of size 6 m each. Storey height of 3 m is provided. The building is located in seismic zone II. The soil investigation revealed 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 14 kN/m^2. The floors are to cater a live load of 4 kN/m^2 on floors and 2.5 kN/m^2 on the roof. **[18]**

OR

Q8) a) Explain the approximate methods of analysis for lateral and vertical loading for multi-storey frame. **[4]**

b) 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 MA (–) = 47.52 kNm; MB (–) = 78,61 kNm, Mid span moments: MAB (+) = 54.60 kNm and MBC (+) = 51.80 kNm. Earthquake moments are 180 kNm. Design the beam ABCD for combined effect of lateral and gravity loads for flexure only. Draw the ductile detailing of the reinforcement. **[14]**

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Total No. of Questions : 8]

SEAT No. :

PE-2172

[Total No. of Pages : 2

[6584]-71
B.E. (Civil)
INTEGRATED WATER RESOURCES PLANNING AND MANAGEMENT
(2019 Pattern) (Semester - VII) (401003 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.7or 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 causes prevention & control of surface & ground water pollution. **[10]**

b) Explain the concept of polluters pay principle along with an example.**[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 regulations of Central Pollution Control Board (CPCB) related to water pollution and explain need of its strict implementation and monitoring. **[8]**

Q3) a) Why water is considered as an economic good? State and explain economic value of water. **[10]**

b) State and explain principles of planning and financing of water resources projects. **[7]**

OR

Q4) a) What are the causes and effects of water scarcity and control measures for preventing water scarcity in India? **[10]**

b) Explain in brief economics and decision making in IWRPM. **[7]**

P.T.O.

Q5) a) State and explain UN laws on non-navigable uses of international water courses. **[10]**

b) State and explain Dublin Principles (1992) in detail. **[8]**

OR

Q6) a) What are water rights and state the water allocation priorities in detail. **[10]**

b) State any four municipal corporation laws regarding water supply and drainage. **[8]**

Q7) a) Explain in detail flood forecasting? What are the methods to forecast flood? **[10]**

b) What are the effect of hydraulic structures on river surface profiles and sediment transport? **[7]**

OR

Q8) a) Explain in detail role of dam in flood control and power generation and its importance in IWRPM. **[10]**

b) Explain application of soft computing in flood control. **[7]**

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Total No. of Questions : 8]

SEAT No. : ____

PE-2173

[Total No. of Pages : 3

[6584]-72
B.E. (Civil)
FINITE ELEMENT METHOD (Elective - III)
(2019 Pattern) (Semester - VII) (401003D)

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.7or Q.8.***
2) ***Neat diagram must be drawn whereever necessary.***
3) ***Figures to the right bracket indicate full marks.***
4) ***Assume suitable data, if necessary and clearly state.***

Q1) a) Derive stiffness matrix for a CST element by direct approach. **[9]**

b) Using Lagrange functions determine the shape function for 9 nodded rectangular element. Plot the variation of shape function of a typical corner node, a typical mid side node and central node. **[8]**

OR

Q2) a) Differentiate between lumped loads and consistent loads. **[9]**

b) Determine the shape functions for a two nodded bar element using Local coordinate system with range 1 to 1. **[8]**

Q3) a) Determine the shape functions for a tetrahedron element. **[8]**

b) Determine the Cartesian coordinate (x, y) of the any point P ($\xi = 0.5$, $\eta = 0.6$) as shown in figure 1. **[9]**

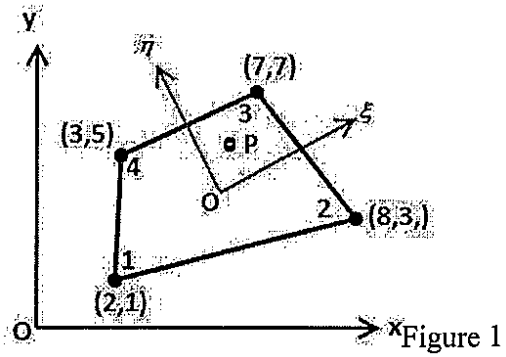


Figure 1

OR

P.T.O.

Q4) a) Using Lagrange functions derive the shape functions for a hexahedron element. **[8]**

b) State the basic theorems of isoparametric formulation also state the advantages of isoparametric formulation. **[9]**

Q5) Analyze the beam shown in Fig. 2 by member approach stiffness matrix method and determine the end reactions. **[18]**

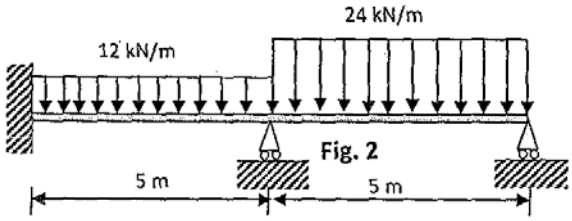


Fig. 2

OR

Q6) Obtain the forces in the plane truss shown in Fig.3 use member approach stiffness matrix method. Take E = 200 GPa and A 2000 mm^2. **[18]**

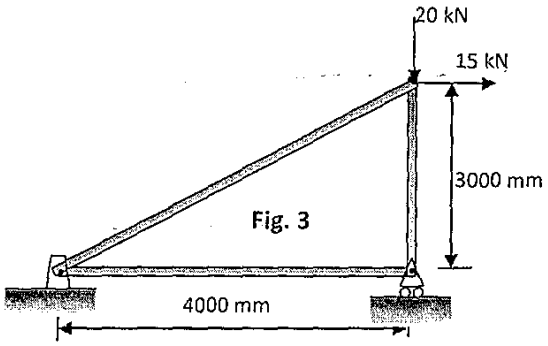


Fig. 3

Q7) Analyze the rigid frame as shown in Fig. 4 by using finite element method. Take EI constant. Neglect axial deformation. **[18]**

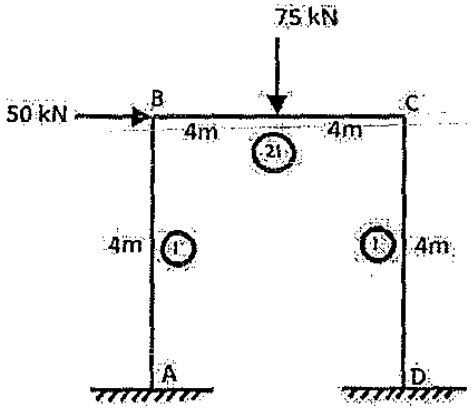


Fig. 4

OR

Q8) Using finite element method, determine unknown joint displacements of the grid as shown in figure 5. E = 2×10^5 MPa, I = 20×10^5 mm^4, G = 0.8×10^5 MPa, J = 50×10^5 mm^4 **[18]**

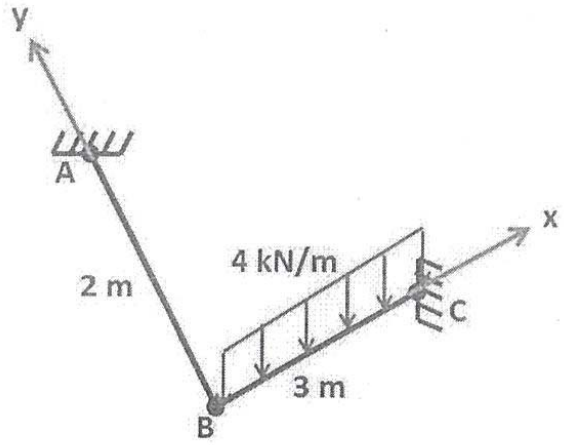


Fig. 5

Total No. of Questions : 8]

SEAT No. :

PE-2174

[Total No. of Pages : 3

[6584]-73
B.E. (Civil)
DATA ANALYTICS (Elective - III)
(2019 Pattern) (Semester - VII) (401003E)

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.7or 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) 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]**

b) Write the difference between covariance and correlation. **[6]**

c) Discuss Data sampling, its types, methods of sampling and ideal sample size selection with relevant examples. **[6]**

OR

Q2) a) Calculate the coefficient of correlation from the data given below by the direct method. **[6]**

X	9	8	7	6	5	4	3	2
Y	15	16	14	13	11	12	10	8

b) Explain Sampling Distribution of the Mean and the Central Limit theorem. **[6]**

c) From following information find the correlation coefficient between advertisement expenses and sales volume using Karl Pearson's coefficient of correlation method. Calculate the coefficient of correlation between the import values and export values. **[6]**

Firm	1	2	3	4	5	6	7	8	9	10
Advertisement Exp. (Rs. In Lakhs)	11	13	14	16	16	15	15	14	13	13
Sales Volume (Rs. In Lakhs)	50	50	55	60	65	65	65	60	60	50

P.T.O.

Q3) 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) The specimen of copper wires drawn form a large lot has 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) **[7]**

OR

Q4) 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. **[10]**

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) Explain Student's t-test method with an example. In which condition will you select Student's t-test? **[7]**

Q5) a) What is predictive analysis? Discuss with at least five real-time applications. **[9]**

b) Explain with suitable examples : **[9]**

i) Data analytics life cycle.

ii) Data cleaning.

iii) Data transformation.

OR

Q6) a) Enlist and explain needs of data Analytics lifecycle. Explain in detail.**[9]**

b) Given the following data obtain the yield when the rainfall is 75cm. The coefficient of correlation between yield and rainfall is 0.8. **[9]**

	Rainfall (cm)	Yield per acre
Mean	67.5	90
S.D.	7.5	15

Q7) a) Define and explain types of machine learning: supervised, unsupervised, reinforced learning. **[5]**

b) Explain in detail Regression and Regression Analysis in Machine learning. **[6]**

c) Explain K means Clustering **[6]**

OR

Q8) a) Define Machine learning, and explain different types of machine learning and its components. **[5]**

b) Explain with an example "Decision Tree" and its classifications. **[6]**

c) Discuss the technique of Support vector machines. **[6]**

Total No. of Questions : 8]

SEAT No. : ____

PE-2175

[Total No. of Pages : 5

[6584]-74

B.E. (Civil)

OPERATIONS RESEARCH

(2019 Pattern) (Semester - VII) (401003F) (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) ***Figures to the Right indicate full marks.***
3) ***Use of calculator is allowed.***
4) ***Assume suitable data if necessary.***

Q1) a) Solve following example using Graphical Method **[8]**

Maximize $Z = 3x_1 + 5x_2$

Subject to

$x_1 \leq 4$

$x_2 \leq 6$

$3x_1 + 2x_2 \leq 18$

$x_1, x_2 \geq 0$

b) Under what circumstances, Big M method is used? Explain with suitable example. **[4]**

c) Explain following terms : **[6]**

i) Slack variables

ii) Surplus variable

iii) Artificial variable

OR

P.T.O.

Q2) a) Solve using Simplex method **[8]**

Minimize $Z = 5000x_1 + 7000x_2$

Subject to

$-2x_1 + x_2 \geq 1$

$x_1 - 2x_2 \geq 1$

$x_1, x_2 \geq 0$

b) Explain the case of infinite solution and infeasible solution in Graphical method. Draw neat sketch. **[6]**

c) Construct dual of the primal equations **[4]**

Maximize $Z = 9x_1 + x_2 + 8x_3$

Subject to

$x_1 + 5x_2 - x_3 \leq 10$

$2x_1 + x_2 - 3x_3 \geq 2$

$4x_1 + 2x_2 - x_3 \leq 10$

$x_1 + 6x_2 + 5x_3 \geq 3$

$4x_1 - 7x_2 + 2x_3 \geq 5$

$x_1, x_2, x_3 \geq 0$

Q3) a) What is unbalanced Assignment problem? How is it solved? **[4]**

b) What is unbalanced transportation problem? How is it solved? **[4]**

c) A department head has 5 subordinates and 4 jobs. The subordinates differ in efficiency and requirement varies as per job. The time (in hours) estimates for each subordinate to perform each job are given below. Find the allocation that minimizes the total time giving one job to each person. **[10]**

		Jobs			
		1	2	3	4
Subordinates	A	1	2	1	4
	B	8	4	6	2
	C	1	5	7	5
	D	9	1	2	8
	E	4	3	6	6

OR

Q4) a) Write a short note on assignment problem and its applications in Civil Engineering. **[4]**

b) Why assignment problem is called as a special case of transportation problem? **[5]**

c) The transportation problem is as given under: **[9]**

	A	B	C	Supply
1	12	15	11	50
2	18	17	20	80
3	13	21	16	70
4	23	19	22	140
Demand	70	90	180	

Find initial solution of the following transportation problem using

i) Least cost method

ii) N-W corner method

iii) Column minima method

Q5) a) Optimize $Z = x_1^2 + x_1x_2 + 3x_2x_3 + 10x_1 + 8x_2 + 6x_3 - 100$ **[6]**

Subject to $x_1 + 8x_2 + x_3 = 20$

$x_1, x_2, x_3 \geq 0$

Use Lagragian Multiplier technique.

b) Carry out the calculation for finding the maxima of following equation using Fibonacci method with 1% accuracy in the interval (0, 5) upto two iterations only. **[8]**

Maximize $f(x) = 12x^5 - 45x^4 + 40x^3 + 5$

c) Distinguish between Golden section method and Fibonacci method. **[3]**

OR

Q6) a) Maximize $Z = 6x_1 + 8x_2 - x_1^2 - x_2^2$ using Lagrangian Multiplier method **[8]**

Subject to

$4x_1 + 3x_2 = 16$

$3x_1 + 5x_2 = 15$

$x_1, x_2 \geq 0$

b) Write a note on Hessian matrix and its application in non-linear programming analysis. **[4]**

c) Prepare Hessian matrix for following equation **[5]**

$f = 2x_1^2 + x_2^2 + 3x_3^2 + 10x_1 + 8x_2 + 6x_3$

Q7) a) Consider following payoff matrix for two firms. **[10]**

Firm XYZ

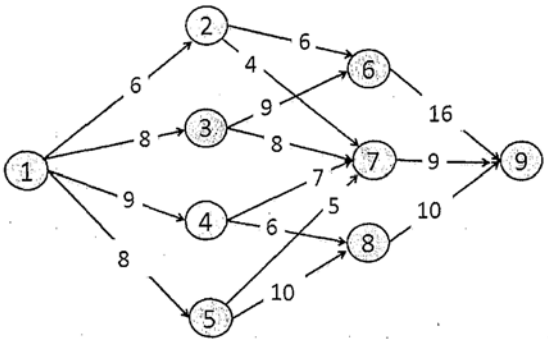
Firm ABC	X	Y	Z
A	4	8	2
B	9	7	8
C	6	5	3

i) Check whether there exists saddle point.

ii) Give optimum strategy for both the firms

iii) Find the value of Game

b) Find the shortest path between nodes 1 and 8 using Dynamic Programming method. **[7]**



The numbers on the arrows represent the distance in kms.

OR

Q8) a) A wheel loader is purchased for Rs 25 lacs with expected life as 8 years. The running cost and resale price in lacs of Rs is given in the following table. **[9]**

Year	1	2	3	4	5	6	7	8
Running cost	1.5	2	2.5	3.5	4.8	6	8	10
Resale price	22	21	20	19	17	14	10	8

Find the replacement year for the wheel loader.

b) Write the applications of following OR techniques in the field of Civil Engineering. **[8]**

i) Simulation

ii) Replacement analysis

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Total No. of Questions : 8]

SEAT No. :

PE-2176

[Total No. of Pages : 3

[6584]-75
B.E. (Civil)
ADVANCE DESIGN OF STEEL STRUCTURES
(2019 Pattern) (Semester - VII) (401004 B) (Elective-IV)

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 and Q. 7 or Q. 8.***
2) ***Neat sketches must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Take f_y = 250 and f_e = 410 grade of steel wherever not given.***
5) ***Take ultimate stress in bolt, f_{ub} = 400 N/mm^2.***
6) ***Assume suitable data, if necessary.***
7) ***Use of electronic pocket calculator, relevant IS codes and Steel table are allowed.***
8) ***Use of cell phone is prohibited in the examination hall.***

Q1) a) Discuss the concept of buckling in light gauge sections and how it affects their design and stability. **[5]**

b) Find permissible load on column for rectangular light gauge section 200×120×2 mm. The effective length of column is 3.6m, Assume f_y = 235 N/mm^2. **[12]**

OR

Q2) a) What are the key design considerations when using light gauge sections for load-bearing applications, and how do they differ from heavier structural steel sections? **[5]**

b) Two channels 200×80 mm with bent lips are connected with web to act as a beam. The thickness of plate is 2.5 mm and the depth of lip is 25 mm. The beam has effective span of 4 m. Determine safe load per meter on the beam. Assume the beam as laterally supported. Use f_y = 235 N/mm^2. **[12]**

Q3) a) How does the selection of circular hollow sections in tubular trusses influence the design procedure? **[5]**

b) Design a hollow circular steel section to carry axial tensile load of 150 kN. Its length is 2.1 m. It is at right angle with other member. Also design welded connection. **[13]**

P.T.O.

OR

Q4) a) What are the relevant codes that apply to design of tubular structures and explain their role in design? **[5]**

b) Design a hollow circular steel section to carry axial compressive load of 170 kN. Its length is 2.3 m. It is at right angle with other member. Also design welded connection. **[13]**

Q5) a) What is a castellated beam, and how is it fabricated from a rolled steel section? **[5]**

b) Design castellated beam for a simply supported beam carries live load of 5 kN/m and dead load of 4 kN/m over a span of 10 m. Assume compression flange of beam is laterally supported throughout the span. **[12]**

OR

Q6) a) What are the modes of failure that castellated beams are susceptible to, and how do they differ from traditional beams? **[5]**

b) A simply supported beam carries total load including dead load and live load of 15 kN/m over the span of 12 m. Design castellated beam assuming compression flange is fully restrained. **[12]**

Q7) Find the collapse load W for the portal frame as shown in figure 1. **[18]**

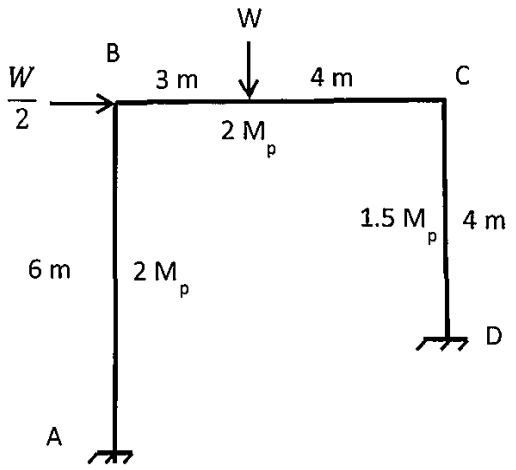


Figure 1

OR

Q8) Analyses the gable frame loaded and supported as shown in figure 2 and find plastic moment capacity M_p. Assume uniform cross section for all members of the frame. **[18]**

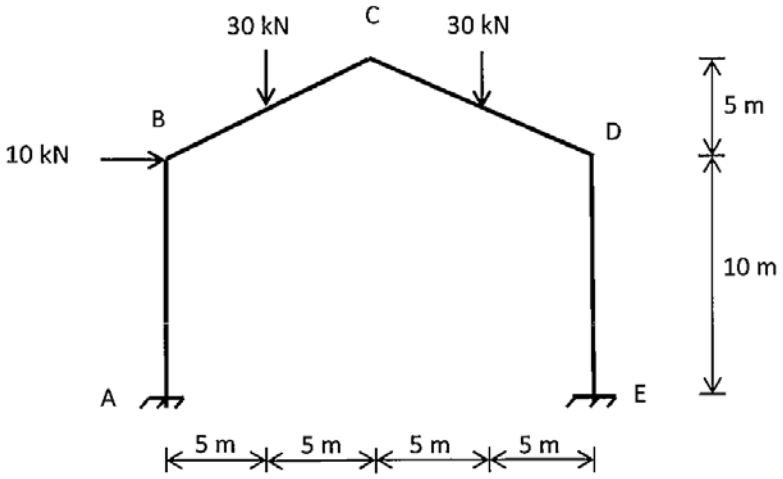


Figure 2

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Total No. of Questions : 8]

SEAT No. :

PE-2177

[Total No. of Pages : 4

[6584]-76

B.E. (Civil)

STATISTICAL ANALYSIS AND COMPUTATIONAL METHODS

(2019 Pattern) (Semester - VII) (401004C) (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 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 Sampling Distribution of the Mean and the Central Limit. **[5]**

b) Explain with an example Z test. **[6]**

c) Write a short note on different types of samples with suitable examples on each. **[6]**

OR

Q2) a) Write a shod note on Data sampling, its types, methods of sampling and ideal sample size selection with relevant examples. **[5]**

b) Explain with an example Chi Square test. **[6]**

c) Write a short note on Process of sampling and explain what is the meaning of “Null Hypothesis”. **[6]**

P.T.O.

Q3) a) Explain in detail assumptions of Z test of Hypothesis. **[6]**

b) 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: 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? Use Student T Test. **[6]**

c) The figures given below are (i) the theoretical frequencies of a distribution and (ii) the frequencies of a normal distribution having the same mean, standard deviation and the total frequency as in (i). **[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.

OR

Q4) a) Explain: **[6]**

i) Hypothesis and hypothesis testing

ii) Null Hypothesis

iii) One and two-sided hypothesis

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) In order to start new ST. bus to a certain remote village it is required to get the average fare of ₹ 400 daily. Reports on number of passengers for 21 days revealed that the average daily collection of fare from the passengers was ₹ 390 with standard deviation of ₹ 40. Do these data support the demand of people for starting new bus to the village? [Use 5% l.o.s.] Use Student T Test. **[6]**

Q5) a) Explain Correlation Analysis and its application to Civil Engineering. **[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, $n = 7$, $\Sigma(x - 150) = 119$, $\Sigma(y - 160) = 84$, $\Sigma(x - 150)2 = 2835$, $\Sigma(y - 160)2 = 2387$, $\Sigma(x - 150)\ \Sigma(y - 160) = 525$. Also, find correlation coefficient between price and supply. **[6]**

OR

Q6) a) Explain Regression analysis and its applications to civil Engineering. **[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 K-S test for goodness of fit. **[6]**

b) For the tabulated values of x and y given below fit a linear curve of the type $y = mx + c$. **[6]**

x	1.0	3.0	5.0	7.0	9.0
y	1.5	2.8	4.0	4.7	6.0

c) If the relation between x and y is of the type $y = a\ bx$. Using following values of x and y, find he values of cot stants a and b for the best fitting curve. **[6]**

x	2.1	2.5	3.1	3.5	4.1
y	5.14	6.788	10.29	13.58	20.578

OR

Q8) a) Explain one and two-sided analysis of variance. **[5]**

b) If X and Y are connected by the relation $ax_2 + by_2 = X$, find the value of a and b by rearranging the relation into linear form by using least square criteria for following data: **[6]**

x	1	2	3	4	5
y	3.35	5.92	8.43	10.93	13.45

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. :

PE-2178

[Total No. of Pages : 2

[6584]-77
B.E. (Civil)
AIRPORT AND BRIDGE ENGINEERING
(2019 Pattern) (Semester - VII) (401004 D) (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. 7or Q. 8,***
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) Explain need of Building information modelling for Airport. **[6]**

b) What is the aim of airport drainage and give functions of the airport drainage **[6]**

c) What is Ultimate and Practical Runway Capacity? Give Factors affecting on Runway Capacity. **[6]**

OR

Q2) a) What are the benefits of Building Information Modelling for Airport? **[6]**

b) Write a Short note on: Virtual Reality **[6]**

c) Give classification of airport pavement and explain in detail. **[6]**

Q3) a) What are the different factors that affecting on the Airport Lighting? **[6]**

b) Write a Short note on Airport Marking **[5]**

c) Explain in brief Heliport and Stolport **[6]**

OR

Q4) a) Write a short note on **[6]**

i) Marking of Heliports

ii) Lighting of Heliports

b) What are the different characteristics of STOL Aircraft? **[5]**

c) How to plan stolports? Give advantages of STOL Aircraft **[6]**

P.T.O.

Q5) a) Give brief classification of different bridge structures **[5]**

b) What are the different components of bridge? Explain in detail with the help of neat sketch. **[5]**

c) What is economic span of bridge? Give Derivation for economic span of bridge. **[7]**

OR

Q6) a) What are the different types of Culvert? Explain in detail with the help of neat sketch. **[5]**

b) What is causeway? Explain the different types of causeway with the help of neat sketch. **[5]**

c) Explain Preliminary and detailed survey work to be done before construction of bridge structure. **[7]**

Q7) a) Give explanation on Direct Method of Calculating the maximum flood discharge. **[10]**

b) From the following data, Calculate linear Waterway required for a bridge to be constructed across the River : **[8]**

Catchment Area = 800 Hectares

Maximum intensity of Rainfall = 1.21 cm per hour

Runoff Coefficient = 0.80

Permissible Velocity = 120 cm/ second

Average depth of flow = 180 cm

OR

Q8) a) Explain in details Movable - Span Super Structures with the help of neat Sketches **[9]**

b) Explain Cut Boat Bridge, Flying Bridge, Lift Bridge and Swing Bridge with the help of neat sketches **[9]**

♦ ♦ ♦

Total No. of Questions : 8]

SEAT No. :

PE-2179

[Total No. of Pages : 3

[6584]-78

B.E. (Civil)

DESIGN OF PRESTRESSED CONCRETE STRUCTURES

(2019 Pattern) (Semester - VII) (Elective - IV) (401004 E)

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) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of electronic pocket calculator is allowed.***
5) ***ISI343:2012 and IS456:2000 codes of practice are allowed.***
6) ***Assume suitable data if necessary.***

Q1) a) A simply supported post-tensioned rectangular beam of size 300 mm × 600 mm (effective) spans 10 m. It carries a live load of 20 kN/m. Design the beam for flexure using parabolic tendon profile. Use M40 concrete and assume 25% loss in prestress. Take 7-wire strands with area = 150 mm^2 and fpu = 1860 MPa. **[10]**

b) Explain the concept and method of design for end block reinforcement in post-tensioned beams. **[7]**

OR

Q2) a) A pre-tensioned T-section has a flange which is 450 mm wide and 300 mm deep. The rib is 200 mm wide and 400mm deep. The effective depth of the cross section is 600 mm. If fck = 60 N/mm^2, fpu = 1500N/mm^2, and the area of prestressing steel Aps = 350 mm^2. Calculate the ultimate flexural strength of the section using IS1343 code provisions. **[8]**

b) An end block of a post tensioned beam is 450 × 600 mm. The prestressing force 1000 kN with the tendon placed centrally at the ends. A bearing plate of 250 mm × 250 mm is provided. Check the bearing stresses developed in concrete having strength, at transfer equal to 35 MPa. **[9]**

P.T.O.

Q3) a) A slab spanning 8 m is to be designed as a one way prestressed concrete slab with parallel post tensioned cables carrying an effective force of 1000kN. The deck slab is required to support a udl of 25kN/m^2. The permissible stresses in concrete should not exceed 20 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 0.95. **[8]**

b) Design a post tension two way slab of effective span 6 m × 8 m with continuity on all side, subjected to superimposed load 4 kN/m^2. Take F.F. load = 2 kN/m^2. Use cable S_3 or S_4, fck = 35 N/mm^2, fy of S_3 or S_4 = 1800 N/mm^2. Design the spacing of cable in both directions. Don't apply checks. **[10]**

OR

Q4) a) A slab spanning 9 m is to be designed as a one way prestressed concrete slab with parallel post tensioned cables carrying an effective force of 750kN. The deck slab is required to Support a udl of 25k/Nm^2. The permissible stresses in concrete should not exceed 35 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 0.95. **[8]**

b) Design a post tension two way slab of effective span 5.5 m × 7.5 m with continuity on all sides, subjected to superimposed load 4.5 kN/m^2. Take F.F. load = 2 kN/m^2. Use cable S_3 or S_4 fck = 40 N/mm^2, fy of S_3 or S_4 = 1800 N/mm^2. Design the spacing of cable in both directions. Don't apply checks. **[10]**

Q5) Design a post tensioned flat slab for the following data: **[18]**

Centre to Centre distance between columns = 12 m in both directions

Square Column size - 900 mm

Floor is to be used for a shopping mall.

Live load-5 kN/m^2 and Floor finish -1.5kN/m^2

Materials- M45, multistrand cables and Slab with drop

OR

Q6) A flat slab system consists of panels of 8 m × 8 m supported on 400 mm × 400 mm columns. Design the slab using DDM. Slab thickness = 200 mm, LL = 5 kN/m^2, Floor finish - 1.5 kN/m^2, Materials - M40, multistrand cables, Slab with drop. Design a post tensioned flat slab. **[18]**

Q7) A prestressed concrete beam with a rectangular section 400 mm wide by 600 mm deep supports a uniformly distributed load of 14 kN/m, which inlcudes the self weight of the beam. The effective span of the beam is 9 m, The beam is concentrically prestressed by a cable carrying a force of 320 kN. Locate the position of the pressure line in the beam. **[17]**

OR

Q8) Design a two-span continuous PSC beam subjected to a live load of 15 kN/m. Beam size = 300 mm × 600 mm. Use M40 concrete, fpu = 1860 MPa, and assume 20% losses. **[17]**



Total No. of Questions : 8]

SEAT No. :

PE-2180

[Total No. of Pages : 2

[6584]-79
B.E. (Civil)
FORMWORK AND PLUMBING ENGINEERING
(2019 Pattern) (Semester - VII) (401004 F) (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) ***Figure to the right indicate full marks.***
4) ***Use of electronic pocket calculator is allowed.***
5) ***Assume suitable data if necessary and refer IS-12183 for numerical.***

Q1) a) Explain in detail about slip formwork. **[8]**

b) What is false work and how is its setting done? **[5]**

c) Draw the neat sketch of RCC wall formwork with its component parts. **[4]**

OR

Q2) a) Write in brief about different loads to be consider for the designing the formwork of slab. **[8]**

b) Draw the neat sketch of slab formwork with its component parts. **[5]**

c) What is meant by sole plate? State role and purpose of sole plate **[4]**

Q3) a) Explain the role of plumbing designer and plumber in plumbing works. **[9]**

b) Explain drawbacks of current plumbing system in view of need for sustainable development. **[9]**

OR

Q4) a) Explain the different waterborne diseases **[9]**

b) Explain the prevention of waterborne disease. **[9]**

P.T.O.

Q5) a) Give in details about types of fitting in plumbing. **[8]**

b) Enlist the types of water distribution systems in buildings explain any one with sketch **[9]**

OR

Q6) a) How dose grease trap work in detail with sketch **[8]**

b) Enlist the types of drainage systems in buildings explain any one with sketch **[9]**

Q7) a) Explain the design consideration of plumbing system **[8]**

b) State code provisions on pressure and velocity in plumbing system. **[6]**

c) Write the number of water fixture unit for WC, wash basin, bath tub and shower. **[4]**

OR

Q8) a) Calculate the total number of fixture unit for the G+1 residential building having 2 bath room shower, 1 kitchen sink with 15 mm tap, 2 water closet, 2 bath tub, 3 wash basin **[8]**

b) Draw layout of plumbing fixture unit for toilets with detailing. **[6]**

c) Write down the different water supply demand based on population projection for different type of building as per Indian Standard. **[4]**



Total No. of Questions : 8]

SEAT No. :

PE-2181

[Total No. of Pages : 2

[6584]-80
B.E. (Civil)
AIR POLLUTION AND CONTROL
(2019 Pattern) (Semester - VII) (401004 A) (Elective - IV)

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

Instructions to the candidates :

1) ***Answer Q1 or 2, Q3 or 4, Q5 or 6, Q7 or 8.***
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) Describe the process of conducting an air pollution survey and outline the key factors, both basic and statistical, to consider when choosing sampling locations? **[6]**

b) Enlist and explain the techniques and equipment employed in the sampling particulate matter. **[6]**

c) Explain isokinetic sampling? **[5]**

OR

Q2) a) Derive stack emission monitoring for particulate and gaseous matter? **[6]**

b) What does ambient air quality monitoring entail according to the CPCB, and what are the National Ambient Air Quality Standards? **[6]**

c) Convert the 50 $\mu g/m^3$ of So_2 concentration in ppm. Assume temperature 25 and pressure at 103.193 KPa. **[5]**

Q3) a) Define emission inventory and elucidate its role in air quality management? **[6]**

b) Clarify the concepts of the bottom-up and top-down approaches to developing emission inventories. **[6]**

c) Enumerate the various classifications of air quality modelling? **[5]**

OR

P.T.O.

Q4) a) Describe the emission inventory framework established by the CPCB? **[6]**

b) What are the categorizations of air quality models based on their characteristics, which include physical, statistical, and deterministic types? **[6]**

c) Explain assumptions, strengths, and limitations of AMREOD model USEPA? **[5]**

Q5) a) Explain working principle of a gravity settling chamber with neat sketch. Also, state advantages and disadvantages? **[9]**

b) With a neat sketch explain the principles, construction, and working of the cyclone? Also, state advantages and disadvantages? **[9]**

OR

Q6) a) Explain in detail working of Electrostatic Precipitator. State its advantages and disadvantages? **[9]**

b) Outline the criteria used to select control equipment and elaborate on their associated objectives? **[9]**

Q7) a) Define indoor air pollution with Sources and causes of indoor air pollution? **[6]**

b) Define sick building syndrome and elaborate on the recommended remedial measures to address it? **[6]**

c) Describe the process of measuring odours, Determination of type and intensity of odour? **[6]**

OR

Q8) a) Elaborate on the concept of odour pollution, covering its sources, methods of measurement, and techniques for control? **[6]**

b) Describe the strategies for managing indoor air pollution and provide an explanation of air cleaning systems? **[6]**

c) Explain in detail the techniques for managing indoor air pollution and list the plant species employed for this purpose? **[6]**

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Total No. of Questions : 8]

SEAT No. : ____

PE-2182

[Total No. of Pages : 2

[6584]-81
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, Q5 or Q6, Q7 or Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***

Q1) a) What is one-to-all broadcast? Explain it with the help of algorithm for one-to-all broadcast on hypercube. Comment on cost calculation. **[7]**

b) Explain circular shift operation? **[6]**

c) Write a short note on prefix-sum operation. **[4]**

OR

Q2) a) Explain with example and algorithm all-to all broadcast on 3 * 3 mesh **[7]**

b) Explain cost analysis of all to all broadcast operation. **[6]**

c) Explain Scatter and Gather operations. **[4]**

Q3) a) Explain parallel Matrix —Matrix multiplication algorithm with example? **[7]**

b) Explain circular shift operation on mesh and hypercube network. **[6]**

c) How to improve speed of communication operation. **[4]**

OR

Q4) a) What is granularity? What are effects of granularity on performance of parallel systems? **[7]**

b) Explain sources of overhead in parallel program. **[6]**

c) Explain performance matrices of parallel systems. **[4]**

P.T.O.

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 compare exchange and compare–split operation on parallel Computers. **[8]**

b) What are the issues in sorting on parallel computers with example? **[6]**

c) Explain odd- even transportation on bubble sort using parallel formulation. **[4]**

Q7) a) Write short notes on : **[8]**

i) Parallel Merge Sort ii) GPU Applications

b) Explain communication strategies for parallel BFS. **[6]**

c) What is Kubernets? Explain its features and applications. **[4]**

OR

Q8) a) Explain the recursive decomposition in parallelizing quick sort. **[8]**

b) Compare shared address and message passing formulation of quick sort. **[6]**

c) Explain Parallel Depth First Search algorithm in detail? **[4]**

Total No. of Questions : 8]

SEAT No. :

PE-2183

[Total No. of Pages : 3

[6584]-82
B.E. (Computer Engineering)
DEEP LEARNING
(2019 Pattern) (Semester - VIII) (410251)

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 indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable data if necessary.***

Q1) a) List the main steps involved in training a Convolutional Neural Network (CNN) for image classification? Why normalization is important before training a CNN. **[6]**

b) Given an input of size 64 × 64, a kernel size of 5 × 5, stride = 2, and 'same' padding : **[6]**

i) What will be the size of the output feature map?

ii) How does padding help retain the spatial size?

c) What are Convolutional Neural Networks (CNNs) primarily used for in deep learning? List at least four real-world applications. **[6]**

OR

Q2) a) What is Interleaving Between Layers in CNN? Why is Interleaving Important? Explain the role of each interleaving layer? **[6]**

b) What is the ReLU activation function? Write its mathematical expression and describe how it transforms the input x=[–3,–2,–1,0,2,5,8] **[6]**

c) Explain how input data flows through a typical CNN architecture from the raw image to the final output layer? **[6]**

Q3) a) How is the computational graph of an RNN different from that of a feedforward neural network? **[6]**

b) List the types of Recurrent Neural Network (RNN) and explain Long Short-Term Memory (LSTM) three gates? **[6]**

c) What is Encoder-Decoder architecture, and how does it work in sequence-to- sequence learning? **[6]**

P.T.O.

OR

Q4) a) What are limitations of Bidirectional RNNs, and how do they differ from standard RNNs? **[6]**

b) Explain any Seven Challenges of Long-Term Dependencies? **[6]**

c) How Echo State Network Differ from Traditional RNNs? **[6]**

Q5) a) What is a Boltzmann Machine? Describe its structure and components. **[6]**

b) List at least five real-world applications of Generative Adversarial Network (GANs) and describe any one in detail. **[6]**

c) Describe the difference between generative and discriminative phases in Deep Belief Networks (DBNs). **[5]**

OR

Q6) a) What is the role of the discriminator in a Generative Adversarial Network (GAN)? What are the inputs and outputs of a discriminator network? **[6]**

b) Explain the following Term : **[6]**

i) Deep Belief Network

ii) Deep Generative Model

c) Discuss the role of GANs in anomaly detection. How do they help identify outliers in data? **[5]**

Q7) a) What is dynamic programming in the context of reinforcement learning? How does it differ from traditional Dynamic Programming (DP) in computer science? **[6]**

b) Define the terms: state, action, reward, and policy in the context of Reinforcement Learning (RL). **[6]**

c) What is a Markov Decision Process (MDP)? Define its components. **[5]**

OR

Q8) a) How does the recurrent layer in a Deep Recurrent Q-Networks (DQRN) help in decision-making over sequences? **[6]**

b) What is Q-learning? How does it differ from other reinforcement learning algorithms? **[6]**

c) How can the game of Tic-Tac-Toe be formulated as a reinforcement learning problem? **[5]**

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Total No. of Questions : 8]

SEAT No. :

PE-2184

[Total No. of Pages : 3

[6584]-83

B.E. (Computer Engineering)

NATURAL LANGUAGE PROCESSING

(2019 Pattern) (Semester - VIII) (410252 A) (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 indicate full marks.***
3) ***Neat diagrams must be drawn whenever necessary.***
4) ***Make suitable assumptions whenever necessary.***

Q1) a) Given the following sentence corpus: **[9]**

S1: “language models learn patterns”

S2: “models learn from data”

S3: “data helps improve language models”

1) Construct a bigram model from the above sentences.

2) Compute the smoothed bigram probability of the sentence “language models learn from data” using Add-1 smoothing.

3) Show all intermediate steps including vocabulary size, unigram and bigram counts.

b) Explain the concept of probabilistic language modeling using Markov assumptions. Construct a trigram language model using a given text corpus and compute the probability of a given sentence using Maximum Likelihood Estimation (MLE). Illustrate your answer with appropriate equations and examples. **[9]**

OR

P.T.O.

Q2) a) Explain how Non-negative Matrix Factorization (NMF) differs from Latent Dirichlet Allocation (LDA) in topic modeling. Use a document-term matrix to show how NMF factorizes the matrix and interprets the result. **[9]**

b) Consider the following three documents: **[9]**

- Dl: "neural networks are powerful"
- D2: deep learning powers neural models"
- D3: "networks and models are important"

1) Compute the TF-IDF score of the term "neural" in all three documents.

2) Show how document frequency (DF) and inverse document frequency (IDF) are computed.

3) Interpret the results to determine in which document "neural" is more significant?

Q3) a) Explain the Vector Space Model in the context of Information Retrieval. How are documents and queries represented and how is relevance computed between them? **[9]**

b) Compare and contrast Entity Extraction, Relation Extraction and Coreference Resolution. How do these tasks contribute to building knowledge from unstructured text? Illustrate with examples. **[8]**

OR

Q4) a) Describe the Named Entity Recognition (NER) system building process. Given a sample sentence, outline the steps you would take to build an NER system using a supervised learning approach. **[9]**

b) What is Cross-Lingual Information Retrieval (CLIR)? Discuss the challenges involved and evaluate the different approaches to implementing CLIR systems. **[8]**

Q5) a) Describe Walker's algorithm for word sense disambiguation. How does it differ from other disambiguation techniques like Lesk's Algorithm and what are the scenarios where it can be most effective? **[9]**

b) List the tools available for the development of NLP applications. Write about the significant features of NLTK and Gensim libraries. **[9]**

OR

Q6) a) Compare the IndoWordNet with the traditional WordNet. What are the key advantages of IndoWordNet, especially in the context of Indian languages? **[9]**

b) Which types of tasks are performed by the Gensim library? Give an example. **[9]**

Q7) a) Compare the architectures of Rule-Based Machine Translation (RBMT) and Statistical Machine Translation (SMT). How does each approach handle syntactic and semantic ambiguities? **[9]**

b) Explain Natural Language Generation with reference architecture. **[8]**

OR

Q8) a) Explain the architecture and challenges of building a Question Answering (QA) system. **[9]**

b) Discuss the key components of a conversational agent, such as chatbots or virtual assistants. How do natural language generation and understanding play a role in creating effective conversational agents? **[8]**

Total No. of Questions : 8]

SEAT No. :

PE-2185

[Total No. of Pages : 2

[6584]-84
B.E. (Computer Engineering)
IMAGE PROCESSING
(2019 Pattern) (Semester - VIII) (410252 B) (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 diagram must be drawn wherever necessary.***
3) ***Assume Suitable data if necessary***

Q1) a) Explain Image Segmentation with its application? **[6]**

b) Write short note on following. **[6]**
i) Point Detection ii) Edge Detection

c) Discuss in detail the Gradient operators & Laplacian operator's for edge detection. **[6]**

OR

Q2) a) Explain Hough Transform with suitable example **[6]**

b) Explain Region Splitting and Merging algorithm? **[6]**

c) Discuss various steps involved in K-means Clustering for segmentation? **[6]**

Q3) a) What is the redundancy? Explain any 3 type of redundancies useful for image compression. **[6]**

b) Explain any three Image Compression Measures? **[6]**

c) Find the set of code words and average word length using Huffman Coding scheme for a set of gray levels with probabilities given below.**[6]**

Input	G1	G2	G3	G4	G5	G6	G7	G8
Probability	0.03	0.05	0.02	0.15	0.05	0.15	0.25	0.3

P.T.O.

OR

Q4) a) Describe arithmetic coding with an example for compression of image **[6]**

b) Explain Huffman encoding with example? **[6]**

c) Write short note on Tensor in Computer vision? **[6]**

Q5) a) Compare Image Enhancement and Image Restoration? **[6]**

b) Explain the concept of Inverse Filtering and also mention the limitations of it. **[6]**

c) Explain Wiener Filtering algorithm for Image Reconstruction? **[5]**

OR

Q6) a) Explain Image Degradation Model? **[6]**

b) Explain Inverse Filtering? **[6]**

c) Explain Lucy-Richardson Filtering algorithm for Image Reconstruction? **[5]**

Q7) a) Discuss workflow of Digital Photogrammetric Process. **[6]**

b) Explain in detail the Computer Tomography? **[6]**

c) What are the differences between multispectral and hyperspectral imagery? **[5]**

OR

Q8) a) What are the different types of medical imaging techniques? Explain each briefly. **[6]**

b) Explain techniques used in Medical Image Enhancement. **[6]**

c) Write a note on ‘Satellite Image Processing. **[5]**

Total No. of Questions : 8]

SEAT No. :

PE-2186

[Total No. of Pages : 2

[6584]-85
B.E. (Computer Engineering)
SOFTWARE DEFINED NETWORKS
(2019 Pattern) (Semester - VIII) (410252C) (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,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) Write a short note on VLANs. **[6]**

b) Explain SDN Use Cases in Data Centre. **[6]**

c) Which are the 4 tiers of data centers? **[6]**

OR

Q2) a) What short note on Traffic Engineering? **[6]**

b) Explain the data center architecture components. **[6]**

c) What are data center demands? **[6]**

Q3) a) Explain in detail Network Function Virtualization (NFV). **[6]**

b) Explain Northbound Application Programming Interface **[6]**

c) What is the Composition of SDN? **[5]**

OR

Q4) a) What is SDN Programming?What are Current Languages and Tools used in SDN Programming. **[6]**

b) What is mininet? Explain its basic commands? **[6]**

c) What are the applications of SDN? **[5]**

Q5) a) Explain Southbound Application Interface in detail. **[6]**

b) What are the challenges of NVF? **[6]**

c) How NVF Works? Discuss in detail. **[6]**

OR

Q6) a) Distinguish between SDN Vs NVF. **[6]**

b) Explain NVF architecture. **[6]**

e) What is an in-line Network Function? **[6]**

P.T.O.

Q7) a) Write in brief about Floodlight Controller? **[6]**

b) Write a short note on Data Center Orchestration. **[6]**

c) What is Bandwidth Calendaring (BWC)? **[5]**

OR

Q8) a) What is IETF SDN Framework? **[6]**

b) Explain Juniper SDN Framework. **[6]**

c) Explain ODL (Open Daylight) controller? **[5]**

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Total No. of Questions : 8]

SEAT No. :

PE-2187

[Total No. of Pages : 2

[6584]-86
B.E. (Computer Engineering)
ADVANCE DIGITAL SIGNAL PROCESSING
(2019 Pattern) (Semester - VIII) (410252 D) (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) ***Assume suitable data jf necessary.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicates full marks.***

Q1) a) Explain in detail Decimation by factor D. **[6]**

b) What is sampling rate conversion of Bandpass Signals? **[6]**

c) Describe AR lattice-ladder filters. **[5]**

OR

Q2) a) Explain in detail Interpolation by factor I. **[6]**

b) Explain Sampling rate conversion by Rational factor I/D, with block diagram. **[6]**

c) What is multi rate signal processing? Explain any two applications of multi rate signal processing. **[5]**

Q3) a) Explain nonparametric methods for power spectrum estimation by using The Bartlett method **[6]**

b) Differentiate and compare Harr Wavelet and Daubechies Wavelet. **[6]**

c) Discuss applications of DCT and WT. **[6]**

OR

Q4) a) Discuss about computation of energy density spectrum. **[6]**

b) Explain DCT as an Orthogonal Transform. **[6]**

c) What is computational requirement of nonparametric power spectrum estimates? **[6]**

Q5) a) Discuss speech coding and Discuss why digital processing of speech? **[8]**

b) What is the process for speech recognition and speech segmentation? Enlist the techniques and describe with suitable example. **[10]**

P.T.O.

OR

Q6) a) Differentiate between Adaptive Transform coding and harmonic coding. **[8]**

b) What is speaker verification? Why is it important? Justify with appropriate applications. How is it different from speaker identification? **[10]**

Q7) a) What is image enhancement? Why is it needed? Enlist and explain the image enhancement techniques. **[8]**

b) Enlist the different types of optimum linear filter. Discuss the applications of Wiener and Median filters in brief. **[9]**

OR

Q8) a) Write a fundamental steps in Digital Image Processing. **[8]**

b) Describe the use of Low pass, High pass and Bandpass filters for image smoothing and edge detection. **[9]**



Total No. of Questions : 8]

SEAT No. :

PE-2188

[Total No. of Pages : 2

[6584]-87
B.E. (Computer Engineering)
PATTERN RECOGNITION
(2019 Pattern) (Semester - VIII) (410253 A) (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 side 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]**



Total No. of Questions : 8]

SEAT No. :

PE-2189

[Total No. of Pages : 2

[6584]-88
B.E. (Computer Engineering)
SOFT COMPUTING
(2019 Pattern) (Semester - VIII) (410253 B) (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, Q.7 or Q.8.***
2) ***Assume suitable data if necessary.***
3) ***Neat diagrams must be drawn wherever necessary.***

Q1) a) Explain Hill Climbing with a suitable diagram. **[6]**

b) Describe Evolutionary programming. **[6]**

c) Explain the artificial hummingbird algorithm. **[6]**

OR

Q2) a) Explain Simulated Annealing with a suitable diagram. **[6]**

b) How can Genetic Programming be applied to automatically generate and optimize code for specific software tasks or bug fixing? **[6]**

c) Differentiate between standard PSO and binary PSO. **[6]**

Q3) a) Let x = { 1,2,3,4,5,6,7,8 } A={ 1,2,3.5), B={ 1,3,4,6,7} Prove the following properties for given sets(Any Two) **[6]**

i) Commutativity
ii) De Morgan's law
iii) Law of Contradiction
iv) Idempotency

b) Explain Rank ordering method of Membership valueAssignment. **[5]**

c) Describe applications of Fuzzy Logic Control System. **[6]**

OR

Q4) a) For following fuzzy sets perform union, intersection operation **[6]**

A= {(X1,0.4),(X2,0.5),(X3,0.2),(X4,0.4),(X5,0.8)}

B = {(Xl ,0.3),(X2, 1.0),(X3,0.8),(X4,0.7),(X5,0.6)}

b) Explain Weighted Average Method of defuzzification. **[5]**

c) Explain System Architecture and Operation of Fuzzy Logic Control System. **[6]**

P.T.O.

Q5) a) Describe Encoding and Selection in Genetic Algorithm. **[6]**

b) Define the terms 'Individual' and 'Genes' in Genetic Algorithm. **[5]**

c) Design a solution to the Traveling Salesman Problem using Genetic Algorithm. **[6]**

OR

Q6) a) Describe Crossover (Recombination) and Mutation in Genetic Algorithm. **[6]**

b) Define the terms 'Fitness' and 'Populations' in Genetic Algorithm. **[5]**

c) Mention the advantages and limitations of Genetic Algorithms. **[6]**

Q7) a) Explain hybrid systems for speech and language processing. **[9]**

b) Describe Fuzzy sets and Genetic Algorithms in Game Playing. **[9]**

OR

Q8) a) Explain hybrid systems for decision making. **[9]**

b) Describe Soft Computing for Color Recipe Prediction. **[9]**

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Total No. of Questions : 8]

SEAT No. :

PE-2190

[Total No. of Pages : 2

[6584]-89
B. E. (Computer Engineering)
BUSINESS INTELLIGENCE
(2019 Pattern) (Semester - VIII) (410253 C) (Elective-VI)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
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) State the different types of reports with their applications. **[6]**

b) Explain the multidimentional data model with example **[6]**

c) State the difference between relational and multidimentional data model. **[6]**

OR

Q2) a) Suggest the use of Data grouping & Sorting, Filtering Reports. **[6]**

b) Explain the Relational data model with example. **[6]**

c) Explain the detail Drill up and Drill Down. **[6]**

Q3) a) Explain data reduction in detail with example. **[7]**

b) What is data Transformation? Explain Data transformation Process in details. **[5]**

c) Explain data validation, incompleteness, noise,inconsistency of quality of input data. **[5]**

OR

Q4) a) What is Contingency Table? What is Marginal Distribution? Justify with suitable example. **[7]**

b) Write short notes on data discretization. **[5]**

c) Explain the following Data Reduction technique:Sampling, Feature selection, Principal components analysis. **[5]**

P.T.O.

Q5) a) What is logistic regression? Discuss the types of logistic regression. **[6]**

b) What is the difference between hierarchical clustering and partitioning method? **[6]**

c) What is decision tree? Explain with a case study. **[6]**

OR

Q6) a) Define - frequent item set, Minimum Support Count, Hierarchical Clustering, Regression. **[6]**

b) What are the association rules? How to evaluate them using support and confidence? Explain with Example. **[6]**

c) Explain the logistic regression.with example. **[6]**

Q7) a) Define Business Intelligence. List and explain any 3 tools for Business Intelligence. **[6]**

b) Write a note on BI Applications in CRM. **[6]**

c) What are the advantages of Business Intelligence in ERP. **[5]**

OR

Q8) a) Justify how BI is useful for Customer Relationship Management. **[6]**

b) Explain the Role of BI in finance and marketing. **[6]**

c) State the role of Data Analytics in any business with example. **[5]**



Total No. of Questions : 8]

SEAT No. :

PE-2191

[Total No. of Pages : 2

[6584]-90
B. E. (Computer Engineering)
QUANTUM COMPUTING
(2019 Pattern) (Semester - VIII) (410253 D) (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) ***Figures to the right side indicate full marks.***
4) ***Use of Calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Describe the process of assessing the efficiency of approximating quantum circuits when using a discrete set of gates. **[9]**

b) How does the distinction between a classical bit and a quantum bit (qubit) lead to enhanced efficiency in Deutsch's algorithm compared to classical algorithms? **[9]**

OR

Q2) a) Illustrate the process of qubit operations using matrix representations. Provide an example of a single-qubit gate and show its effect on a basis state. **[9]**

b) What is principle of deferred measurement, draw and explain Controlled-U operation and its equivalent in terms of circuit elements. **[9]**

Q3) a) Compare and contrast DFT and FFT. Derive the mathematical representation of each and highlight their importance in computational efficiency. **[9]**

b) Describe the feasibility of constructing a quantum circuit using a universal set of quantum gates. Justify your answer by discussing the properties and capabilities of universal quantum gates in quantum computation **[8]**

OR

Q4) a) Define the discrete Fourier transform and elaborate on the concept of Fourier coefficients, discussing their significance in signal processing and data analysis **[9]**

P.T.O.

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

i) Key elements of the quantum circuit model of computation.

ii) Exponential complexity growth of quantum systems.

Q5) a) Discuss the constraints associated with Kitaev's phase estimation algorithm when applied to the order-finding application. **[9]**

b) Write the steps involved in the phase estimation algorithm for order- finding applications. **[9]**

OR

Q6) a) Explain how Shor's algorithm uses quantum principles to factor large integers efficiently. Outline the steps and identify the importance of QFT in the process. **[9]**

b) In the context of general applications of the quantum Fourier transform, explain the following terms: **[9]**

i) The hidden subgroup problem

ii) Discrete logarithms

Q7) a) Explain how quantum algorithms are used to solve optimization problems in the finance sector. Provide examples involving portfolio optimization or risk assessment. **[9]**

b) Illustrate and provide an explanation for a hybrid feedforward quantum neural network, incorporating both quantum and classical components **[8]**

OR

Q8) a) Define Quantum Artificial Intelligence (Quantum AI) and its relationship to Quantum Machine Learning (QML). **[8]**

b) Explain the concept of private key cryptography and provide an overview of the encoding and decoding process within a private key crypto-system, detailing how messages are secured and transmitted securely between parties. **[9]**

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Total No. of Questions : 8]

SEAT No. :

PE2192

[Total No. of Pages : 3

[6584]-91
B.E. (Computer Engineering)
DESIGN AND ANALYSIS OF ALGORITHMS
(2019 Pattern) (Semester - VII) (410241)

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 whenever necessary.***
3) ***Assume suitable data, if necessary.***
4) ***Figures to the right indicate full marks.***

Q1) a) Compare greedy algorithmic strategy and dynamic programming strategy. **[6]**

b) We are given a set of 4 jobs. The deadline and the associated profit with each job is given below. **[8]**

Jobs	A	B	C	D
Deadline	2	1	1	2
Profit	75	40	50	35

Assume that every job takes a single unit of time. Maximize the total profit if only one job can be scheduled at a time using a greedy algorithmic strategy.

c) Comment on the statement "Greedy method always provides the optimal solution". **[3]**

OR

Q2) a) Write a control abstraction for dynamic programming strategy. Comment on the time complexity of this abstraction? **[7]**

b) Find the binomial coefficients of $(x+y)^5$, using dynamic programming approach. **[10]**

P.T.O.

Q3) a) Consider the set A of five numbers {5,10,15,20,25}. We wish to find the subset of A such that sum of the numbers in this subset is equal to 30. Solve this problem to find the first solution using backtracking approach. Show space tree being created. **[10]**

b) Write a control abstraction for branch and bound strategy, Enlist few applications of branch and bound method. **[8]**

OR

Q4) a) Traveling salesperson has to make trip between three cities P,Q,R. The cost matrix is given below. No edge is indicated by ∞. The tour will start from city P. Solve this travelling salesperson problem using branch and bound method. **[10]**

G=	P	Q	R
P	∞	4	2
Q	3	∞	4
R	1	8	∞

b) Write an algorithm for graph colouring problem using backtracking method. Let the graph consists of n nodes and that there are m-number of availble colours. What is the time complexity of this algorithm? **[8]**

Q5) a) Prove that amortized cost per operation in k-bit binary counter is O(1).**[5]**

b) What are intractable problems? Does traveling salesperson Problem belong to this class of problems? Justify your answer. **[6]**

c) Briefly explain any two methods of amortized analysis. **[6]**

OR

Q6) a) Explain in brief amortized analysis. Consider stack as an example and single push, single pop and multiple pop operations. Give the amortized costs for these stack operations. **[9]**

b) Does randomized algorithm for quick sort, improves the average case time complexity? Discuss. **[4]**

c) Comment on the statement "The problem of Searching an ordered list or searching an unordered list belongs to the class of tractable problems".**[4]**

Q7) a) Let the hash code for the text be "4133124" and that for the pattern matching text be "124". Use modulo arithmetic with the prime number 13 and apply Rabin-Karp string matching algorithm for this case. Show the stepwise process of matching the pattern. What is the time complexity of this algorithm? **[10]**

b) Compare and contrast row-wise and block-wise approaches in multithreaded matrix multiplication with respect to: division of work, communication overhead and cache efficiency. **[8]**

OR

Q8) a) Consider the text T and the pattern text P. Write a naïve string-matching algorithm. Show the stepwise process of working of this algorithm if T = "KITCHEN" and P = "HEN". **[10]**

b) Write a distributed algorithm to find the minimum spanning tree. **[8]**

Total No. of Questions : 8]

SEAT No. :

PE-2193

[Total No. of Pages : 3

[6584]-92
B.E. (Computer Engineering)
MACHINE LEARNING
(2019 Pattern) (Semester - VII) (410242)

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) ***Draw neat diagram wherever necessary.***
4) ***Assume suitable data, if necessary.***

Q1) a) What is R2 measure of evaluation? **[6]**

b) Explain the concept of a cost function and its role in Gradient Descent. **[6]**

c) What is the primary purpose of the L2 regularization term in the Ridge Regression cost function? **[6]**

OR

Q2) a) Describe the bias-variance trade-off and its relationship to underfitting and overfitting. **[6]**

b)

Month	Amount spent	Sales
Mar-23	13447.45	5750.00
Feb-23	10692.38	44305.00
Jan-23	3067.05	34980.00
Dec-22	200.00	10500.00
Nov-22	12343.18	39154.00
Oct-22	12300.18	23065.00
Sep-22	11960.35	20745.00
Aug-22	9924.53	42000.00
Jul-22	8873.12	5750.00
Jun-22	6383.40	41500.00
May-22	1397.60	13500.00

The table shows advertisement spent and sales figure for 11 months. Predict what would be sales if ad spend is 10800/- using linear regression. **[6]**

c) What are different techniques to reduce overfitting? **[6]**

P.T.O.

Q3) a) Explain the basic principles of a Support Vector Machine (SVM). What are support vectors and how does SVM find the optimal hyper plane for classification? **[5]**

b) What is Multi Class Classification? Explain the variants of Multi Class Classification. **[6]**

c) You have a binary classification model with the following confusion matrix: **[6]**

True Positives (TP): 120

True Negatives (TN): 45

False Positives (FP): 10

False Negatives (FN): 5

Calculate the accuracy, precision, recall, and F1-score of the model.

OR

Q4) a) With suitable diagram, Explain Random forest Algorithm with example. **[5]**

b) What are different distance metrics are used in K-NN? **[6]**

c) Why ensemble learning is used for ML? **[6]**

Q5) a) What is K-means clustering, and how does it work? Explain the basic principles of this unsupervised machine learning algorithm and its applications. **[5]**

b) Why K-medoid is used? Explain K-medoid algorithm. **[6]**

c) Define the terms Core point, Border point, Noise point, Eps (ε), MinPts (min - samples), Reachability, Density-connected used in the Density-Based Spatial Clustering (DBSCAN) algorithm. **[6]**

OR

Q6) a) What is isolation factor model? **[5]**

b) Write short note on following Hierarchical clustering method : **[6]**

i) Agglomerative

ii) Dendogram

c) Explain the intrinsic and extrinsic methods for measuring clustering quality. **[6]**

Q7) a) Describe the architecture of Artificial Neural Network. **[6]**

b) Explain the Recurrent Neural Network (RNN) with suitable example. **[6]**

c) Explain building blocks of RBF networks. **[6]**

OR

Q8) a) What is multilayer perceptron? Describe with diagram. **[6]**

b) Explain the Convolution Neural Network (CNN) with suitable example. **[6]**

c) What is the role of activation functions in neural networks, and why are they necessary for the network's learning process? **[6]**



Total No. of Questions : 8]

SEAT No. :

PE-2194

[Total No. of Pages : 2

[6584]-93
B.E. (Computer Engineering)
BLOCK CHAIN TECHNOLOGY
(2019 Pattern) (Semester - VII) (410243)

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) ***Assume suitable data, if necessary.***

Q1) a) Discuss following consensus algorithms used in blockchain technology. **[8]**

i) Proof of work

ii) Proof of activity

iii) Proof of Burn

iv) Proof of Stake

b) Explain in detail **[6]**

i) Bitcoin

ii) Ethereum

iii) Hyperledger

c) Explain the concept of Bitcoin in Blockchain Technology **[4]**

OR

Q2) a) Discuss the difference between Bitcoin and Ethereum. **[4]**

b) Explain the difference between a permissioned and permissionless consensus approach. **[4]**

c) Explain the Byzantine General Problem in the context of blockchain consensus. **[4]**

d) Explain the role of IOTA in the context of the Internet of Things (IoT) **[6]**

P.T.O.

Q3) a) What is Metamask illustrate in details. **[9]**

b) List and explain types of cryptocurrencies. **[8]**

OR

Q4) a) Compare and Contrast Coinbase and Binance. **[8]**

b) Differentiate between metmask and coinbase wallet. **[9]**

Q5) a) What is Ethereum? Explain in detail it differs from traditional cryptocurrencies. **[8]**

b) Identify two types of Ethereum networks and briefly explain the purpose of each. **[9]**

OR

Q6) a) Explain the concept of a smart contract with an example. **[8]**

b) How does Swarm contribute to decentralized storage in the Ethereum ecosystem? **[9]**

Q7) a) Describe the role of blockchain in financial sector. **[9]**

b) Describe the role of blockchain in Government sector. **[9]**

OR

Q8) a) Explain role of blockchain in healthcare. **[9]**

b) Discuss potential challenges and benefits of implementing blockchain in Voting system. **[9]**



Total No. of Questions : 8]

SEAT No. :

PE-2195

[Total No. of Pages : 2

[6584]-94
B.E. (Computer Engineering)
PERVASIVE COMPUTING
(2019 Pattern) (Semester - VII) (410244 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.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***

Q1) a) What are Context aware systems? State its type with example. **[6]**

b) What are the main Challenges in Context-Awareness Computing? **[6]**

c) Describe different applications of context-awaresystem. **[6]**

OR

Q2) a) Which context is commonly assumed to be the most important when designing context-aware systems? Justify your answer. **[6]**

b) Describe how to determine the location in mobile networks. **[6]**

c) Write a short note on ICT System Awareness. **[6]**

Q3) a) Explain the term in short : **[6]**

i) Classical Logic intelligent systems.

ii) Soft Computing IS Models

b) Discuss the hurdles while designing intelligent system interaction. **[6]**

c) Explain hybrid intelligent system based upon horizontal and vertical layering. **[6]**

OR

Q4) a) Describe the use of an agent interaction protocol suite in the interaction of multiple ISs designed as MAS. **[6]**

b) Explain reactive type intelligent system model in detail. **[6]**

c) What is Interaction Multiplicity? State different type of Interaction Multiplicity. **[6]**

Q5) a) What is HCI? What is the importance of HCI? What are different advantages and disadvantages of HCI? **[9]**

b) Describe Wearable Computing Architecture. **[8]**

P.T.O.

OR

Q6) a) State different challenges in designing privacy protection for wearable devices? **[9]**

b) Write note on interaction design and UX design. **[8]**

Q7) a) What are the solutions for pervasive computing challenges. **[9]**

b) What are the new access control methods necessary for context aware wearable technology? **[8]**

OR

Q8) a) Explain different open issues of security in pervasive computing. **[9]**

b) How can pervasive computing be useful in handling social digital divide? Explain. **[8]**

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Total No. of Questions : 8]

SEAT No. :

PE-2196

[Total No. of Pages : 2

[6584]-95
B.E. (Computer Engineering)
MULTIMEDIA TECHNIQUES
(2019 Pattern) (Semester - VII) (410244 B) (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.7or Q.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) Differentiate between SNR (Signal-to-Noise Ratio) and SQNR (Signal-to- Quantization Noise Ratio) in evaluating audio quality. **[5]**

b) What are the key characteristics of high-definition television (HDTV)?How does HDTV improve upon the picture quality of standard-definition television? **[6]**

c) What is the basic principle behind the operation of a Cathode Ray Tube (CRT)? What are some advantages of CRT technology in comparison to modern display technologies? **[6]**

OR

Q2) a) How would you identitfy the limitations of CRT? Draw and explain atypical electronic signal for one scan line of NTSC composite video.**[5]**

b) What is chroma subsampling, and why is it used in digital video compression? How does chroma subsampling affect image quality and file size? **[6]**

c) Write a short note on-1.PCM 2. DPCM, 3. DM. **[6]**

Q3) a) What is quantization, and how does it contribute to lossy compression techniques? **[5]**

b) What are some challenges in video compression, and how are they addressed in modern standards? **[6]**

c) Describe the evolution of MPEG video coding standards, including MPEG-1, MPEG-2, MPEG-4, and subsequent versions. **[6]**

OR

P.T.O.

Q4) a) What is JPEG Standard? Draw and explain block diagram for JPEGencoder. **[5]**

b) Identify the advantages and disadvantages of Arithmetic Coding as compared to Huffiuian Coding? **[6]**

c) What are three most used numerical distortion measures in imagecompression? Explain in detail. **[6]**

Q5) a) Explain any two future applications of Immersive Technologies. **[6]**

b) Explain input devices in detail- controllers, motion trackers and motion capture technologies for tracking. **[6]**

c) Short Note on- AR, VR and MR. **[6]**

OR

Q6) a) Discuss VR, AR and MR in detail and also future applications of Immersive Technologies. **[6]**

b) Short Note on- –1. Head Mounted VR Displays 2. Augmented and Mixed reality glasses. **[6]**

c) Enlist the input devices that are popularly used in immersive experience systems. Explain any input device in detail. **[6]**

Q7) a) What changes would you make in the medical field using Big Data and Al technology? **[6]**

b) Draw and explain each layer from the architecture of the Internet of Things (IoT). **[6]**

c) Judge the importance of immersive experiences for designing academic applications which serve communication between educators, researchers, and students. **[6]**

OR

Q8) a) Explain the use of Big Data and AI technology in medical field. **[6]**

b) Decide the major functions of AI-Based software? Explain how AI achieves incredible accuracy. **[6]**

c) What alternative services would you suggest using M-IoT for Road Safety system? **[6]**

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Total No. of Questions : 8]

SEAT No. :

PE-2197

[Total No. of Pages : 2

[6584]-96
B.E. (Computer Engineering)
CYBER SECURITY AND DIGITAL FORENSICS
(2019 Pattern) (Semester - VII) (410244 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.7or Q.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) What are the various steps taken by computer forensics specialists. **[8]**

b) Describe in brief the significance of data recovery and backup. Explain various data recovery solutions. **[9]**

OR

Q2) a) Explain in brief computer forensic services. Write the applications of Digital forensics in health care. **[8]**

b) What is role of digital forensics in law enforcement? **[9]**

Q3) a) Discuss the various legal aspects of collecting and storing digital evidence. **[9]**

b) Enlist and explain different computer evidence processing steps. **[9]**

OR

Q4) a) What are various methods of collecting digital evidence and explaine any four digital evidence collection steps. **[9]**

b) What is chain custody? Discuss methods to control the contamination of digital evidence? **[9]**

Q5) a) Describe different approaches for validating forensics data. **[9]**

b) Explain the approaches for seizing digital evidence at the crime scence.**[8]**

OR

P.T.O.

Q6) a) Describe the steps of identifying digital evidence in computer forensics. **[9]**

b) Explain process of developing standard procedures for network forensics using network forensics tools. **[8]**

Q7) a) Write short notes on : **[9]**

i) Computer forensics tools testing and validation.

ii) E-mail crimes

b) State the features of any five Computer forensic hardware tools. **[9]**

OR

Q8) a) What is the volatile evidence. **[9]**

b) Write short notes : **[9]**

i) Role of client and server in email.

ii) Specialized email crimes & investigations tools.

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Total No. of Questions : 8]

SEAT No. :

PE-2198

[Total No. of Pages : 2

[6584]-97
B.E. (Computer Engineering)
OBJECT ORIENTED MODELING & DESIGN
(2019 Pattern) (Semester - VII) (410244 D) (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.7or Q.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) What are use case models? State the guidelines for constructing use case model. **[5]**

b) State the relationship between class and state model. **[5]**

c) Explain nested State diagram with example. **[8]**

OR

Q2) a) Draw a Sequence diagram for online bookshop. **[5]**

b) Explain Concurrency with example. **[5]**

c) Draw and explain various components of Activity diagram in detail. **[8]**

Q3) a) Write short note on Data storage management. **[5]**

b) What are partitions and layers in subsystem? **[5]**

c) Draw a Activity diagram for ATM Card verification. **[7]**

OR

Q4) a) How do you decide allocation of subsystems to processors? **[5]**

b) What are the several ways for implementing control in a software system. **[5]**

c) What is Application state model? How it is designed? Enlist various steps for constructing Application state model. **[7]**

Q5) a) Explain Implementation modeling in detail. **[5]**

b) Differentiate between Forward Engineering vs Reverse Engineering. **[5]**

c) Draw and explain ATM domain class model in detail. **[7]**

P.T.O.

OR

Q6) a) What is class design? Explain in detail. **[5]**

b) What is Re-Cursing Downward? **[5]**

c) Explain Wrapping and Maintenance. **[7]**

Q7) a) What is idiom? What can idiom can provide? **[5]**

b) What is pattern? Explain it with suitable example. **[5]**

c) Explain in brief all 3 categories of the pattern. **[8]**

OR

Q8) a) What is view handler pattern? Explain in detail. **[5]**

b) Explain any one communication pattern in detail with suitable diagram. **[5]**

c) Write short note on idioms and style. **[8]**



Total No. of Questions : 8]

SEAT No. :

PE-2199

[Total No. of Pages : 2

[6584]-98
B.E. (Computer Engineering)
DIGITAL SIGNAL PROCESSING (Theory)
(2019 Pattern) (Semester - VII) (410244 E) (Elective - 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.7or 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) Draw the basic butterfly structure for DIT FFT algorithms and obtain computational complexity of FFT algorithms. **[5]**

b) Find the Z transform of Unit impulse signal $\delta(n)$. **[5]**

c) Compute the 8-point DFT of a sequence x(n)= (1/2,l/2,l/2,l/2,0,0,0,0)**[8]**

OR

Q2) a) Find the Z transform of advanced Unit impulse signal δ (n+k), k>0. **[5]**

b) Write a short note on practical consideration in FFT algorithm for Bit reversal. **[5]**

c) Why Z- transform need to be specified only with ROC? What are the all-possible ROCs for finite and infinite duration sequences? **[8]**

Q3) a) How the characteristics behavior of causal discrete time signals depends on pole zero location with respect to unit circle? Explain with example.**[10]**

b) Write a short note on All zero LTI system. **[7]**

OR

Q4) a) LTI system is described by $h(n) = (0.9)^n u(n)$. Plot magnitude response of system using analytical method. **[10]**

b) Define Unilateral Z -transform. State system stability and causality property of system with respect to Z -transform. **[7]**

P.T.O.

Q5) a) Write a short note on Linear phase conditions for FIR filter. **[8]**

b) Write a five properties of commonly used window for filter design. **[10]**

OR

Q6) a) What is Gibbs phenomenon? **[8]**

b) What is the Principle of Impulse Invariant method? Explain the mapping between S- plane to Z- Plane for Impulse Invariant method. Explain transformation of analog filter into a stable digital filter using this method. **[10]**

Q7) a) What is Transpose structure and feedback in IIR system? **[8]**

b) Explain the features of ADSP 21XX processor, and Tiger SHARC DSP processor. **[9]**

OR

Q8) a) Explain the structure for Linear Phase FIR filter for even and odd samples. **[8]**

b) Write a short note on OMAP (Open multimedia application platform) **[9]**



Total No. of Questions : 8]

SEAT No. :

PE-2200

[Total No. of Pages : 2

[6584]-99
B.E. (Computer Engineering)
INFORMATION RETRIEVAL
(2019 Pattern) (Semester - VII) (410245 A) (Elective - IV)

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

Instructions to the candidates :

1) ***Solve Q1 or Q2 and Q3 or Q4 and Q5 or Q6 and Q7 or Q8.***
2) ***Figures to the right indicates full marks.***
3) ***Neat diagram must be drawn whenever necessary.***
4) ***Assume suitable data if necessary.***

Q1) a) Explain General purpose Data Compression for High Query Performance in detail. **[6]**

b) List out various Huffman Coding Techniques and explain Length Limited Huffman code technique in detail. **[6]**

c) Explain Parametric Gap Compression in detail. **[5]**

OR

Q2) a) Explain different possible classes of symbol wise compression in detail. **[6]**

b) Which are the different Context-Aware Compression Methods, explain any Context- Aware Compression Method in detail. **[6]**

c) Differentiate between Huffman coding versus arithmetic coding. **[5]**

Q3) a) Explain the concept of term frequency in detail. **[6]**

b) Give in detail the concept of Language Models and Smoothing. **[6]**

c) Enlist various simple document features and explain any one features in detail. **[6]**

OR

P.T.O.

Q4) a) Explain Document Length: BM25 retrieval system in detail. **[6]**

b) Illustrate the process of Relevance Feedback in detail with suitable example. **[6]**

c) Explain the various problems of categorization and filtering. **[6]**

Q5) a) List and explain different aspects of IR evaluation. **[6]**

b) Explain Throughput and Latency used while evaluating performance of a search engine strategies in detail. **[6]**

c) What is the role of Minimizing Adjudication Effort to produce a set of judgments for IR evaluation. **[5]**

OR

Q6) a) Differentiate between Arithmetic Mean Versus Geometric Mean in detail. **[6]**

b) Which are the different methods are used for Selecting the Documents for Adjudication. **[6]**

c) Elaborate the use of Statistical analysis to estimate a system's performance. **[5]**

Q7) a) Which are the different ways used by search engine to process the queries faster, explain with suitable example. **[6]**

b) Explain the concept Term Partitioning in detail with suitable example. **[6]**

c) Explain the term Dynamic Ranking in detail. **[6]**

OR

Q8) a) Explain the concept of Extended PageRank in detail. **[6]**

b) Elaborate the Various categories of user needs in web queries for query analysis. **[6]**

c) Brief in detail the structure of Web. **[6]**

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Total No. of Questions : 8]

SEAT No. :

PE-2201

[Total No. of Pages : 2

[6584]-100
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) ***Attempt Q.1 or Q.2, Q.3 or Q.4 Q.5 or Q.6, Q. 7or Q.8.***
2) ***Figures to the right indicates full marks.***
3) ***Neat diagram must be drawn whenever necessary.***
4) ***Assume suitable data if necessary.***

Q1) a) Discuss in detail about synchronization issues in CUDA. **[6]**

b) Explain error avoiding methods in CUDA. **[6]**

c) Write a note on synchronization issues in CUDA. **[6]**

OR

Q2) a) How would you illustrate the memory leak and what is the common cause of it? **[6]**

b) Write a note on Race hazard in CUDA. **[6]**

c) Explain in detail about parallel programming issues. **[6]**

Q3) a) Differentiate serial convolution with parallel convolution. **[6]**

b) Explain how would you evaluate the execution model of OpenCL. **[6]**

c) Write a note on NVIDIA GPU. **[5]**

OR

Q4) a) Explain host device interaction in detail. **[6]**

b) Explain the memory object queries? **[6]**

c) What are different openCL components? **[5]**

P.T.O.

Q5) a) Write common parallel execution patterns. **[6]**

b) How will you apply parallel prefix sum operation? **[6]**

c) Discuss the use of GPU parallel algorithm. **[6]**

OR

Q6) a) Define convolution. Give the importance of convolution parallel algorithm. **[6]**

b) Explain the sparse matrix multiplication model. **[6]**

c) Explain in detail about task parallelism and data parallelism. **[6]**

Q7) a) Explain Efficient Neural Network Training/Inferencing. **[6]**

b) Discuss the different methods in Image Format Descriptor. **[6]**

c) Describe how OpenCL can be used for Heterogeneous computing **[5]**

OR

Q8) a) Explain OpenCL application design process. **[6]**

b) What is Kernel? Describe in detail about the features of Kernel programming model. **[6]**

c) Enlist and explain few OpenCL applications. **[5]**

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Total No. of Questions : 8]

SEAT No. :

PE-2202

[Total No. of Pages : 2

[6584]-101
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) ***Answer Q.1 or Q.2, Q.3 or Q.4 Q.5 or Q.6, Q. 7or Q.8.***
2) ***Figures to the right indicates full marks.***
3) ***Assume suitable data, if necessary.***

Q1) a) Draw and explain frame structure GSM system in details. **[6]**

b) Write a short note on Base Station Subsystem and Network Switching Subsystem. **[6]**

c) Draw and explain the GPRS protocol stack. **[6]**

OR

Q2) a) State advantages, disadvantages and applications of GPRS. **[6]**

b) Write a short note on IEEE802.11 **[6]**

c) Compare UMTS and GSM. **[6]**

Q3) a) Write a short note on: HLR and VLR. **[6]**

b) Explain types of handovers in GSM. **[6]**

c) Draw and explain GSM MAP protocol hierarchy. **[5]**

OR

Q4) a) Explain handoff performancc evaluation metrics. **[6]**

b) Compare horizontal handoff and vertical handoff. **[6]**

c) Explain in details VLR Identification Algorithm. **[5]**

P.T.O.

Q5) a) Explain Home agent and foreign agents in mobile IP. **[6]**

b) Draw and explain network architecture of VANET in details. **[6]**

c) Explain 3G wireless network. **[6]**

OR

Q6) a) Write a short note on: tunneling and encapsulation. **[6]**

b) Explain DHCP in details. **[6]**

c) Draw and explain WTA architecture in details. **[6]**

Q7) a) State advantages, disadvantages and applications of 5G. **[6]**

b) Explain block diagram of UMTS in details. **[6]**

c) Explain CDMA2000 in details. **[5]**

OR

Q8) a) Explain different types of UMTS channels. **[6]**

b) Compare HSDPA and HSUPA. **[6]**

c) Explain LTE in details. **[5]**

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Total No. of Questions : 8]

SEAT No. :

PE-2203

[Total No. of Pages : 2

[6584] - 102

B.E. (Computer Engineering)

SOFTWARE TESTING AND QUALITY ASSURANCE

(2019 Pattern) (Semester - VII) (410245 D) (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 indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable additional data, if necessary.***
5) ***Use of a non-programmable calculator is allowed.***

Q1) a) Differentiate between blackbox and whitebox testing. **[6]**

b) How would you explain system testing & acceptance testing. **[6]**

c) What do you mean by unit and integration testing. What are the approaches used in integration testing? **[6]**

OR

Q2) a) Discuss Boundary valve analysis and equivalence class partition. **[6]**

b) What is cookies testing? Explain cookies testing with an example. **[6]**

c) Differentiate between functional testing and Non functional testing. **[6]**

Q3) a) Write a note on customer satisfaction. **[5]**

b) Discuss problematic areas in software development life cycle. **[6]**

c) Can you explain quality plan in details. **[6]**

OR

P.T.O.

Q4) a) Explain Why - ISO - 9001 standard & it's important's in software testing. **[5]**

b) What do you understand regarding quality control & explain two methods of quality control. **[6]**

c) List & explain the limitations of CMM model. **[6]**

Q5) a) List & explain benefits of Automation Testing. **[6]**

b) What is performance testing? Explain the uses of it as well. **[6]**

c) Explain different Automated Testing process. **[6]**

OR

Q6) a) Explain different mannual testing process **[6]**

b) How would you explain R.P.A. **[6]**

c) Illustrate selenium's IQE. Explain in details. **[6]**

Q7) a) Can you explain how to maintain SQA. **[5]**

b) Compare the Ishikawa's flowchart & Histogram tools. **[6]**

c) Explain the six sigma characteristics in detail. **[6]**

OR

Q8) a) Explain ISO 9000 standard in detail. **[5]**

b) Explain in brief - Histogram, Flowchart & Control chart. **[6]**

c) Explain the activities to achieve high software quality in detail. **[6]**



Total No. of Questions : 8]

SEAT No. : ____

PE-2204

[Total No. of Pages : 2

[6584]-103
B.E. (Computer Engineering)
COMPILERS
(2019 Pattern) (Semester - VII) (410245 E) (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. 7or 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) Explain Directed Acyclic Graph and its algorithm for creating DAG with Example. **[10]**

b) What is syntax tree? Generate syntax tree and Postfix notation for expression a + b * c. **[8]**

OR

Q2) a) Describe Triples and Indirect Triples. **[8]**

b) Generate three address codes for the following and represent it in suitable three address code formats. A = (B + C* D) / F. **[10]**

Q3) a) Explain the model of Activation record. **[9]**

b) What are Nested procedures & Explain issues related to nested procedures? **[8]**

OR

Q4) a) Compare Static scope & Dynamic scope with example. **[9]**

b) Discuss Dangling Pointers in detail. **[8]**

P.T.O.

Q5) a) What is Peephole Optimization in Compiler Design? Explain its working and different techniques to implement Peephole Optimization. **[10]**

b) Explain Code generation through suitable example? **[8]**

OR

Q6) a) Discuss various issues in code generation phase. **[10]**

b) Explain Register allocation and Assignments in details. **[8]**

Q7) a) What is DAG based local optimization? Explain with example. **[9]**

b) What do you mean by a common sub-expression? Discuss the algorithm for elimination of Common sub-expression and execution of super-scalar processors in details. **[8]**

OR

Q8) a) What is the need for Optimization? Explain local, global and loop optimization. **[9]**

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

i) Data flow equations,

ii) Iterative data flow analysis

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Total No. of Questions : 8]

SEAT No. :

PE-2205

[Total No. of Pages : 2

[6584] - 104

B.E. (Electrical Engineering)

SWITCHGEAR AND PROTECTION

(2019 Pattern) (Semester - VIII) (403148)

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 additional data, if necessary.***
5) ***Use of a non-programmable calculator is allowed.***

Q1) a) Explain the following ratings of the circuit breaker. **[4]**
- i) Making Capacity
- ii) Symmetrical Breaking capacity

b) Explain the Vacuum Circuit breaker with a neat diagram. **[6]**

c) A 22 KV, 600MVA, 5 sec circuit breaker suddenly closes on occurring of fault. Determine **[8]**
- i) The symmetrical breaking current
- ii) The asymmetrical breaking current assuming 50% DC component
- iii) The short time current rating
- iv) The peak making current

OR

Q2) a) Explain with a neat diagram puffer type SF6 circuit breaker. **[6]**

b) Describe the following concerned with the circuit breaker **[4]**
- i) short time current
- ii) asymmetrical breaking capacity

c) A Vacuum circuit breaker is rated as 3 phase,1600 A, 2000 MVA, 33 KV, 1 second. Determine **[8]**
- i) Beaking current
- ii) Making current
- iii) STC
- iv) Rated normal current

P.T.O.

Q3) a) Discuss three demerits of Static Relay. **[3]**

b) Explain the Nyquist's criterion and sampling theorem. **[6]**

c) Explain Numerical Relay with its block diagram and state its application. **[8]**

OR

Q4) a) Draw block diagram of Static Relay. **[3]**

b) Explain Antialising Filter. **[6]**

c) Describe PMU with its block diagram. **[8]**

Q5) a) i) Enlist the faults occurring in the alternator. **[4]**

ii) What do you mean by incipient faults in case of transformer.

b) Explain the single phasing problem associated with 3-phase Induction Motor and hence suggest suitable protection scheme for it. **[6]**

c) Explain the following abnormal condition with its protection schemes. **[8]**

i) Loss of prime mover

ii) Loss of Excitation

OR

Q6) a) State abnormal conditions occurring in the Induction motor. **[4]**

b) With a neat diagram describe the protection scheme for magnetizing inrush protection for the transformer. **[6]**

c) Explain the transverse percentage differential protection scheme for synchronous generators. **[8]**

Q7) a) Describe the impedance relay for distance protection. **[3]**

b) Explain the effect of Arc resistance on **[6]**

i) Impedance relay

ii) MHO relay

c) With neat diagram explain three stepped distance protection scheme. **[8]**

OR

Q8) a) What do you mean by term Directional and Non - Directional overcurrent relay. **[3]**

b) Explain the effect of Power swing on **[6]**

i) Reactance relay

ii) MHO relay

c) State advantages and disadvantages of PLCC. **[8]**



Total No. of Questions : 8]

SEAT No. :

PE-2206

[Total No. of Pages : 2

[6584]-105
B.E. (Electrical Engineering)
ADVANCED ELECTRICAL DRIVES AND CONTROL
(2019 Pattern) (Semester - VIII) (403149)

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 additional data, if necessary.***
5) ***Use of non-programmable calculator is allowed.***

Q1) a) Explain AC dynamic (rheostatic) braking of three-phase induction motor with the two-lead connection. **[4]**

b) Explain how to obtain multi quadrant operation of Induction motor drives. **[6]**

c) Explain close loop speed control of 3-phase Induction Motor. **[8]**

OR

Q2) a) Explain Plugging of three phase induction motor. Draw speed torque characteristics. **[4]**

b) Write the merits and demerits of VSI and CSI fed Induction motor Drives. **[6]**

c) Explain the principle of Vector control of three phase Induction motors with a neat diagram. **[8]**

Q3) a) State the construction block diagram and working of BLDC drive in motoring modes. **[9]**

b) Explain with block diagram the operation of vector control of BLDC motor drives. **[9]**

OR

Q4) a) What are the control strategies used for Permanent magnet Brushless DC motor? How constant torque control is used? **[9]**

b) Explain the close loop control of BLDC drive by using PI controller. **[9]**

P.T.O.

Q5) a) Which are the different topology of rotor construction used in PMSM? Explain any one in detail. **[8]**

b) Describe the construction of synchronous reluctance motor. Also explain the suitability of this motor for EV application. **[8]**

OR

Q6) a) Explain motoring and regenerative braking operation for permanent magnet synchronous motor drive. **[8]**

b) Write a short notes on application of Synchronous Reluctance Motor in electric vehicle **[8]**

Q7) a) What is the selection criterion for motors? How ratings of the motor subjected to variable load duty is decided? **[10]**

b) Explain the type of drive used and control achieved for specific operation in case of following applications. (for any two) **[8]**

i) Textile mills

ii) Centrifugal pump

iii) Traction drives

OR

Q8) a) Write short notes on Rolling mill drive and Why Four quadrant operation of drive is need for rolling mill drive? **[10]**

b) Write a short note on solar and battery powered drives. **[8]**

Total No. of Questions : 8]

SEAT No. :

PE-2207

[Total No. of Pages : 2

[6584]-106

B.E. (Electrical Engineering)

DIGITAL CONTROL SYSTEM

(2019 Pattern) (Semester - VIII) (403150A) (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.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necescary.***
4) ***Assume suitable additional data, if necessary.***
5) ***Use of a non-programmable calculator is allowed.***

Q1) a) Define complete state controllability of a linear Time Invariant Dosctere time system. Explain Gilbert's Test for distinct eigenvalues and repeated eigenvalues. **[8]**

b) Consider the system $x(k+1) = Gx(k) + Hu(k)$,

where $G = \begin{bmatrix} 0 & 1 \\ -25 & -6 \end{bmatrix}, H = \begin{bmatrix} 0 \\ 1 \end{bmatrix}, C = \begin{bmatrix} 3 & 1 \end{bmatrix}$

Determine the state feedback gain such that the system will have a closed loop at $-3 \pm j4$ using a direct substitution formula. **[9]**

OR

Q2) a) Explain the principle of duality. **[8]**

b) Explain the pole placement design using Ackerman's Formula. **[9]**

Q3) a) Define full-order state observer and minimum-order state observer. Draw a block diagram and explain it. **[8]**

b) Explain the compensator design by the separation principle. **[9]**

OR

P.T.O.

Q4) a) Explain the design of a state regulator for a discrete-time system. Provides the steps for design. **[8]**

b) Consider the system $x(k+1) = Gx(k) + Hu(k)$ $y(k) = Cx(k)$

where $G = \begin{bmatrix} 0 & 1 \\ -0.16 & 1 \end{bmatrix}$, $H = \begin{bmatrix} 0 \\ 1 \end{bmatrix}$ $C = \begin{bmatrix} 3 & 1 \end{bmatrix}$

Determine the observer gain such that the system will have a closed loop at $-0.5 \pm j0.5$ using a direct substitution formula. **[9]**

Q5) a) Discuss Bilinear transformation with frequency warping. **[9]**

b) Explain the concept of pole-zero matching. **[9]**

OR

Q6) a) Explain the transformation of the state-space model to a controllable canonical form. **[9]**

b) Explain the following methods for discretizing analog controllers. **[9]**

i) Euler's backward method

ii) Euler's forward method

Q7) a) Explain the Stepper motor digital control system with a block diagram. **[9]**

b) Explain the process of hybrid simulation. **[9]**

OR

Q8) a) Explain the digital speed control system with a block diagram. **[9]**

b) Explain how simulation of discrete-time control of continuous-time plant is carried out. Explain with a block diagram. **[9]**

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Total No. of Questions : 8]

SEAT No. :

PE-2208

[Total No. of Pages : 2

[6584]-107
B.E. (Electrical)
RESTRUCTURING & DEREGULATION
(2019 Pattern) (Semester - VIII) (403150B) (Elective-V)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7or Q8***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable additional data, if necessary.***
5) ***Use of non-programmable calculator is allowed.***

Q1) a) Explain rate of return regulation and yardstick regulation. **[9]**

b) Write a note on consumer tariff structures and considerations. **[8]**

OR

Q2) a) Write the salient features of Electricity act 2003. **[9]**

b) Explain the national Electricity policy. **[8]**

Q3) a) Explain any two models based on contractual arrangements. **[9]**

b) Explain trading of carbon credits and Renewable Energy credits. **[9]**

OR

Q4) a) Explain models based trading monopoly, single buyer, wholesale competition. **[9]**

b) Explain ISO models. **[9]**

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

i) Market efficiency

ii) Market power

b) Explain forward contracts and forward markets. **[8]**

OR

Q6) a) Explain market power mitigation and settlement process. **[9]**

b) Write a short note on :HHI Index, Lerner index , Energy coefficient. **[8]**

P.T.O.

Q7) a) Explain: **[9]**

i) ATC

ii) CBM

iii) TRM

b) Write a short note on: Transmission pricing methods **[9]**

OR

Q8) a) Explain in detail the market based methods of congestion management. **[9]**

b) Write note on cost components of transmission system. **[9]**



Total No. of Questions : 8]

SEAT No. :

PE-2209

[Total No. of Pages : 2

[6584]-108
B.E. (Electrical Engineering)
SMART GRID
(2019 Pattern) (Semester - VIII) (403150C) (Elective-V)

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

Instructions to the candidates:

1) ***Each question carry 18 or 17 marks***
2) ***Solve question Q1 or Q2, Q3 or Q4, Q5 or Q6 and Q7 or Q8***
3) ***Figures to the right side indicate full Marks***
4) ***Assume the suitable data, if necessary***
5) ***Neat diagrams must be down wherever necessary.***

Q1) a) Highlight on role of geographic information system in smart grid and also give its function. **[9]**

b) Draw and explain functional block diagram of smart substation. **[9]**

OR

Q2) a) Draw and explain functional block diagram of smart meter. **[9]**

b) Explain the different functions of Advance metering infrastructure(AMI). **[9]**

Q3) a) Explain the role of HAN in smart grid. **[9]**

b) Explain with the help of neat diagram WAMPAC. **[8]**

OR

Q4) a) Explain the protocol Architecture of zigbee. **[9]**

b) Explain cloud computing and its need. **[8]**

Q5) a) Explain architecture of micro grid with neat labelled diagram. Also state the applications of micro grid. **[9]**

b) State and explain the issues of interconnecting the micro grid with the utility grid. **[9]**

OR

Q6) a) Compare Micro grid and Smart Grid. **[9]**

b) Explain about protection and control.of micro grid. **[9]**

P.T.O.

Q7) a) Explain Power Quality issues of grid connected Renewable Energy Sources. **[9]**

b) Explain the concept of power quality and EMC in Smart Grid. **[8]**

OR

Q8) a) Explain the Reliability indices CAIDI, CAlFI, MAIDI and MAIFI. [**9]**

b) Explain the different types of data analytics in smart grid. **[8]**

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Total No. of Questions : 8]

SEAT No. :

PE-2210

[Total No. of Pages : 2

[6584]-109
B.E. (Electrical)
SENSOR TECHNOLOGY (Open Elective)
(2019 Pattern) (Semester - VIII) (Elective-V) (403150D)

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 side indicate full marks.***
3) ***Assume suitable data if necessary.***

Q1) a) What are different types of depth sensor? Explain any 2 with neat sketch. **[10]**

b) Explain 3D depth camera sensor with a sketch. **[7]**

OR

Q2) Explain working principle of OPT 3007 light sensor with neat sketch, advantages and limitations with applications of the same. **[17]**

Q3) Explain LM 35 temperature sensor w.r.t. pinout, features, applications and explain how LM35 temperature sensor measures a temperature. **[18]**

OR

Q4) Explain with neat diagram INA240 current sense amplifier and DRV 5053 hall effect sensor. **[18]**

Q5) a) Explain Potentio metric position sensor and Induction position sensor with neat sketch. **[10]**

b) Explain with diagram a magneto resistive position sensor. **[7]**

OR

Q6) a) Explain DRV 5032 Hall effect sensor w.r.t. construction, working principle and applications. **[10]**

b) Explain AFE 5805 ultrasonic sensor. **[7]**

P.T.O.

Q7) a) Write short note on 'Application of sensors in drone". **[9]**

b) Focus on laser sensors. **[9]**

OR

Q8) a) Explain concept of 'Smart sensor'. What are the elements in such an unit? Show with the help of diagram, the arrangement of these elements. [**10]**

b) What are the different deviations that need be compensated in sensor systems? How is a non linearity taken care of in a present day smart sensor? **[8]**

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Total No. of Questions : 8]

SEAT No. : ____

PE-2211

[Total No. of Pages : 3

[6584] - 110

B.E. (Electrical Engineering)

EHV AC TRANSMISSION

(2019 Pattern) (Semester - VIII) (403151 A) (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, Q.7 or Q.8.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable additional data, if necessary.***
5) ***Use of a non-programmable calculator is allowed.***

Q1) a) Write down the expressions for charge potential in multiconductor lines. **[4]**

b) For a 400-kv line, calculate the maximum surface voltage gradients on

the centre and outer phases in horizontal configuration at the maximum operating voltage of 420 kV, r.m.s. line-to-line. The other dimensions are H = 13m, S = 1l m,N = 2, r = 0.0159 m,B = 0.45 m. **[6]**

c) Explain Field of sphere gap and also derive equation as $S_1S_2 = R^2$ **[8]**

OR

Q2) a) Explain the field of a point charge and its properties. Derive the equation for the electrostatic field of a point charge. **[4]**

b) A charge of 10 mC is placed at a distance of 2 metres from the centre of a sphere of radius 0.5 metre (1-metre diameter sphere). Calculate the magnitude, polarity and location of a point charge Q2 which will make the sphere at zero potential. **[6]**

c) Explain Maximum Surface Voltage Gradients for $N \geq 3$. **[8]**

P.T.O.

Q3) a) Discuss the effects of high electrostatic field on animal **[3]**

b) Evaluate the horizontal, vertical and total value of electrostatic field components near the single circuit transmission line which are energized by three phase voltages. **[6]**

c) Explain the concept of insulated ground wire and explain the purposes served by insulated ground wire. **[8]**

OR

Q4) a) Explain the terms in detail Let-go currents. **[3]**

b) Discuss the effects of high electrostatic field in detail for plants and humans **[6]**

c) Explain the terms in detail: **[8]**

i) Primary shock current

ii) Secondary shock current

Q5) a) State atleast 4 formulae for power loss due to corona **[4]**

b) Explain the corona formation and attenuation of travelling waves due to corona loss **[6]**

c) Explain formation of corona and define terms **[8]**

i) Disruptive corona voltage

ii) Visual corona voltage

OR

Q6) a) Explain Corona inception voltage **[4]**

b) With the help of simple block diagram, explain the audible noise measuring circuit in EHV AC lines. **[6]**

c) Explain Charge-voltage diagram. Derive an expression for corona loss for ac voltage of conductor and compare it with Ryan Hen line formula. **[8]**

Q7) a) Write down the Electrical characteristics of EHV Cables **[3]**

b) Explain detail classification of cables and mention typical insulation thickness for EHV cables. **[6]**

c) Write note on various properties of XLPE used in EHV cables. **[8]**

OR

Q8) a) State the three factors to be considered in the design of EHV lines based upon the steady state limits. **[3]**

b) Name the materials used for insulation in EHV cables and state the properties of SF6 gas as an insulating materials used in cables **[6]**

c) Define tan δ loss factor and derive an expression for insulation resistance of a cable **[8]**



Total No. of Questions : 8]

SEAT No. :

PE-2212

[Total No. of Pages : 2

[6584]-111
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 Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Figures to the right side indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable additional data, jf necessary.***
5) ***Use of non-programinable calculator is allowed.***

Q1) a) What do you mean by coefficient of utilization? **[4]**

b) 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]**

c) Explain the various factors to be considered for design of indoor illumination scheme **[8]**

OR

Q2) a) What is Light loss factor? State its types and explain. **[4]**

b) What is Polar Curve? Describe its types. State its significance. **[6]**

c) What are different components of flux are considered in zonal cavity method? Explain each of them **[8]**

Q3) a) Define following terms **[3]**

i) Reflection factor

ii) Lumen

b) State and explain the advantages of good illumination schemes. **[6]**

c) Explain the procedure for design of illumination for an aquarium and swimming pool. **[8]**

OR

P.T.O.

Q4) a) Define following terms **[3]**

i) Depreciation factor

ii) Waste light factor

b) Explain briefly with respect to residential lighting the following: **[6]**

i) General lighting

ii) Decorative lighting

iii) Spot / Focus lighting

c) Explain illumination scheme for health care centres & hospitals **[8]**

Q5) a) Which lighting is used for Stadium and sports complex **[4]**

b) Explain the illumination design for advertisement/ hoardings. **[6]**

c) What are the important features needed in street light luminaires? **[8]**

OR

Q6) a) What is glare in street lighting? Explain each in brief **[4]**

b) Explain following terms with respect to road lighting — **[6]**

i) Visual performance

ii) Visual comfort

iii) Glare

c) Explain the various Road classifications according to BIS. **[8]**

Q7) a) Compare intelligent lighting for domestic and commercial use. **[3]**

b) Explain natural light conduiting system (any two) **[6]**

c) Explain the working principle and construction of OLED. Support the answer with a diagram. **[8]**

OR

Q8) a) What are intelligent LED Fixtures? Explain. **[3]**

b) Explain working of Laser arrangement with suitable diagram. State types of LASERs. **[6]**

c) Explain construction and working of Fiber optic cables. State and explain its types. (any two). Support your answer with diagram. **[8]**

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Total No. of Questions : 8]

SEAT No. :

PE-2213

[Total No. of Pages : 2

[6584]-113
B. E. (Electrical Engineering)
ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING
(2019 Pattern) (Semester - VIII) (403151 D) (Elective -VI) (Open Elective)

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 the concept of Bayesian Networks in probabilistic reasoning? **[4]**

b) What is the difference between first-order logic and propositional logic in AI? **[6]**

c) How does the concept of time play a role in probabilistic reasoning over time? **[8]**

OR

Q2) a) Explain how Bayesian Networks are used for probabilistic reasoning in uncertain knowledge domains? Provide a real-world example. **[4]**

b) What is a Markov model? Explain the concept of the Markov property. **[6]**

c) What is Partial Order Planning in Context of AL Planning & Provide An Example Scenario Where Partial Order Planning is Useful. **[8]**

Q3) a) Discuss the role of labeled training data in supervised learning and its significance. **[4]**

b) Provide examples of hypothesis classes with Low and high VC dimensions **[6]**

c) Define the concept of Probably Approximately Correct (PAC) learning and its goals. **[7]**

OR

P.T.O.

Q4) a) Define Machine Learning? and explain how it differs from traditional programming? **[4]**

b) Explain the difference between Supervised Learning and Unsupervised Learning. Provide an example for each? **[6]**

c) Explain the concept of regression in machine learning. How does model selection and generalization play a crucial role in building accurate regression models? **[7]**

Q5) a) What is linear regression and what is its main objective? **[4]**

b) What is Lasso regression and how does it differ from Ridge regression? **[6]**

c) What is the difference between ridge and lasso regression? What is the least angle regression **[8]**

OR

Q6) a) What are some of the key characteristics of the Lasso regression technique, and how do related path algorithms assist in its implementation? **[4]**

b) How does logistic regression differ from linear regression, and what is the logistic function used for? **[6]**

c) Explain Partial Least Squares (PLS) regression and highlight its advantages over other regression techniques? **[8]**

Q7) a) Explain the Apriori algorithm and how it is used in Association Rule Mining? **[4]**

b) What is Gaussian Mixtures and how does it relate to Soft K-means Clustering? In the context of Gaussian Mixtures, what is the "single state case"? **[6]**

c) What are some limitations of the K-means clustering algorithm? What are some advantages of using the K-means clustering algorithm? **[7]**

OR

Q8) a) What are Generalized Association Rules and how do they differ from traditional association rules? **[4]**

b) What are the key elements or components of a reinforcement learning problem? What is Temporal Difference (TD) learning and how does it work in reinforcement learning? **[6]**

c) What is Cluster Analysis, and what is its primary objective? What is a proximity matrix in the context of cluster analysis? **[7]**

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Total No. of Questions : 8]

SEAT No. : ____

PE2214

[Total No. of Pages : 2

[6584]-114
B.E. (Electrical Engineering)
POWER SYSTEM OPERATION AND CONTROL
(2019 Pattern) (Semester - VII) (403141)

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 additional data is necessary.***
5) ***Use of non-programmable calculator is allowed.***

Q1) a) Draw and explain the working of speed governor system of turbo generator. **[4]**

b) Obtain the generator model, turbine model and power system model of single area load frequency control. **[6]**

c) Explain the block diagram and frequency response of the proportional plus integral controller in the single area load frequency control. **[8]**

OR

Q2) a) Write the short note and necessity of automatic generation control (AGC). **[4]**

b) Explain: **[6]**

i) Area Control Error (ACE) in single area load frequency control

ii) Area Control Error (ACE) in two area load frequency control.

c) With the neat block diagram, explain two areas of load frequency control. **[8]**

Q3) a) Explain the concept of cost curve of thermal unit. **[3]**

b) Explain the dynamic programming method used for unit commitment. **[6]**

c) Explain Lagrange multiplier method used for economic load dispatch without transmission loss and no constraints on generation limit, while meeting load. **[8]**

OR

P.T.O.

Q4) a) What is the need for a unit commitment study in the power system? Explain. **[3]**

b) State the various methods for the unit commitment. Hence, explain the 'priority list method' for unit commitment. **[6]**

c) The fuel costs of a two-unit plant are given by **[8]**

$C_1 = 100 + 2P_1 + 0.005 P_1^2$

$C_2 = 200 + 2P_2 + 0.01 P_2^2$

Where P_1 and P_2 are in MW. The plant supplies a load of 450 MW. Find economic load scheduling pf the two units and the incremental fuel cost. Neglect losses.

Q5) a) What is the interconnection of the power system? State its advantages. **[4]**

b) Explain in detail-Capacity Interchange. **[6]**

c) What are the criteria of applying capacity interchange, diversity interchange, inadvertent interchange between interconnected utilities. **[8]**

OR

Q6) a) Explain in detail: Interchange evaluation with unit commitment. **[4]**

b) Explain the following. **[6]**

i) Emergency power interchange

ii) Energy banking.

c) Explain the concept of a power pool in energy control. State and explain the advantages associated with a power pool? Also, discuss constraints related to the power pool. **[8]**

Q7) a) What are the effects of voltage instability on the power system? Explain in detail. **[4]**

b) Give the detailed classification of the voltage stability based on the time frame and based on nature of the disturbance. **[6]**

c) Derive the expression of the power-voltage relationship for drawing the PV curve in detail and hence draw the PV curve with showing stable-unstable region. **[7]**

OR

Q8) a) Define the following terms: **[4]**

i) Voltage Stability

ii) Voltage Collapse

b) Explain the following voltage stability indices with their formula **[6]**

i) Fast Voltage Stability Index (FVSI)

ii) Line Stability Index (Lmn)

iii) Line stability factor (LQP)

c) State the procedure to draw the QV curve. Hence, draw the QV curve with showing stable-unstable regions. **[7]**

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Total No. of Questions : 8]

SEAT No. :

PE-2215

[Total No. of Pages : 3

[6584]-115
B.E. (Electrical Engineering)
ADVANCED CONTROL SYSTEM
(2019 Pattern) (Semester - VII) (403142)

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 necescary.***
4) ***Assume suitable additional data, if necessary.***
5) ***Use of a non-programmable calculator is allowed.***

Q1) a) Clearly explain the following terms : **[6]**

i) Physical variables,

ii) Phase variables and

iii) Canonical variables

b) A feedback system is characterized by the closed loop transfer function

$$\frac{Y(s)}{U(s)} = \frac{1}{s^3 + 7s^2 + 14s + 8}$$

Obtain a state space model in phase variable form. **[6]**

c) Determine the expression for the solution of homogeneous state equation. **[6]**

OR

Q2) a) Define the State transition matrix. Write its properties. **[4]**

b) What are the different methods to find State transition matrix? Explain any one method in detail. **[6]**

c) Consider a control system with state model

$$\dot{x} = \begin{bmatrix} 0 & 1 \\ -2 & -3 \end{bmatrix} x + \begin{bmatrix} 0 \\ 2 \end{bmatrix} u; \begin{bmatrix} x_1(0) \\ x_2(0) \end{bmatrix} = \begin{bmatrix} 0 \\ 1 \end{bmatrix};$$

Compute the state transition matrix. Also find the solution of state. **[8]**

P.T.O.

Q3) a) Explain what is the pole placement technique with the help of transformation matrix method. **[4]**

b) Define controllability. Explain with a suitable example, how the controllability of a system can be checked? **[4]**

c) Consider the system $\dot{x} = Ax + Bu$; **[10]**

$$y = Cx$$

Where $A = \begin{bmatrix} 1 & 2 & 0 \\ 3 & -1 & 1 \\ 0 & 2 & 0 \end{bmatrix}$; $B = \begin{bmatrix} 2 \\ 1 \\ 1 \end{bmatrix}$; $C = \begin{bmatrix} 0 & 0 & 1 \end{bmatrix}$;

Design a state observer to place the observer poles at $s = -3 + j1$; $s = -3 - j1$ and $s = -4$.

OR

Q4) a) Explain the pole placement technique with direct substitution method. **[4]**

b) Discuss the effect of pole zero cancellation on the controllability and the observability of the system. **[6]**

c) Examine the observability of the system **[8]**

$\dot{x} = Ax + Bu$;

$Y = Cx$

Where $A = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 0 & -2 & -2 \end{bmatrix}$; $B = \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix}$; $C = \begin{bmatrix} 3 & 4 & 1 \end{bmatrix}$.

Q5) a) State and explain sampling theorem. **[4]**

b) Explain the stability analysis of closed loop system in z-plane using Jury's test. **[6]**

c) Consider the system whose characteristic equation is $F_1(z) = 2z^4 + 7z^3 + 10z^2 + 4z + 1$ Comment on stability. **[7]**

OR

Q6) a) State and explain digital control system. Also write it's advantages and limitations. **[4]**

b) Explain mapping between s-plane and z-plane. **[6]**

c) Determine the range of K, using Jury's stability analysis for which sampled data control system described by polynomial **[7]**

$Q(z) = z^2 + (0.368K-1.368)z + (0.368+0.264K)$ is stable.

Q7) a) Define and explain sliding mode control. **[5]**

b) Explain Gain scheduling adaptive control strategy with proper block diagram. **[6]**

c) State and explain the linear quadratic regulator. problem. **[6]**

OR

Q8) a) Explain the adaptive control and its various schemes. **[5]**

b) What is chattering and how it is attenuated? **[6]**

c) Draw and explain Model Reference Adaptive Control. **[6]**

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Total No. of Questions : 8]

SEAT No. : ____

PE-2216

[Total No. of Pages : 2

[6584]-116
B.E. (Electrical Engineering)
PLC & SCADA
(2019 Pattern) (Semester - VII) (403143(A)) (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) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable additional data, if necessary.***
5) ***Use of non-programmable calculator is allowed.***

Q1) a) Explain rule for proper construction of PLC ladder diagram? **[4]**

b) Explain ON delay timer in details along with its timing diagram? **[6]**

c) Draw the ladder diagram for following function table Input I1, I2 output Q1, Q2, Q3, Q4? **[8]**

I1	I2	Q1	Q2	Q3	Q4
0	0	1	1	0	0
0	1	0	1	1	0
1	0	0	1	1	0
1	1	1	0	0	1

OR

Q2) a) Explain Master Control Relay (MCR) Instruction with diagram? **[4]**

b) Explain UP counters in details along with its ladder diagram? **[6]**

c) Three motor are controlled using three separate timers. Each motor will remain ON for 10 second. After every 10 second previous motor stop and next motor become ON. This will be continuing in a cycle. Switch I1 is used for start and I2 is used for stop the cycle. Following table explain the function. Input I1, I2 output M1, M2 and M3 **[8]**

I1=1 and I2=0	Timer	Time	M1	M2	M3
----	T1	10 sec	1	0	0
----	T2	10 sec	0	1	0
---	T3	10 sec	0	0	1
I1=0 and I2=1	----	----	0	0	0

P.T.O.

Q3) a) Explain Short note on PID Controller. **[3]**

b) Explain the effect of changes in K_p, K_i and K_d on the performance of the system? **[6]**

c) Explain speed control of DC motor with DC source with suitable diagram? **[8]**

OR

Q4) a) Explain Overload protection for AC motor? **[3]**

b) Explain any two method of PID tuning? **[6]**

c) Explain speed control of DC motor with AC source with suitable diagram? **[8]**

Q5) a) Explain the various communication technologies used in SCADA system? **[4]**

b) Draw and explain SCADA architecture in details? **[6]**

c) State and explain advantages and disadvantages SCADA System? **[8]**

OR

Q6) a) State the desirable properties of SCADA system? **[4]**

b) Explain three generation of SCADA Architecture? **[6]**

c) Draw and explain SCADA in automatic substation control? **[8]**

Q7) a) What is protocol and state different types of SCADA protocol? **[3]**

b) Draw and explain OSI model and their function? **[6]**

c) Draw and explain DNP3 protocol? **[8]**

OR

Q8) a) State advantages and Application DCS System? **[3]**

b) Draw and explain CIP protocol and their Function? **[6]**

c) Draw and explain IEC 16850 layered architecture? **[8]**

Total No. of Questions : 8]

SEAT No. : ____

PE-2217

[Total No. of Pages : 2

[6584]-117
B.E. (Electrical Engineering)
Power Quality Management
(2019 Pattern) (Semester - VII) (403143 B) (Elective - III)

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

Instructions to the candidates :

1) ***Solve Q1 or Q2, Q3 or Q4, Q5 or Q6 and Q7 or Q8***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable additional data, if necessary.***
5) ***Use of non-programmable calculator is allowed.***

Q1) a) Explain with a neat diagram the area of vulnerability and critical distance. Also explain the procedure to determine the area of vulnerability **[9]**

b) Discuss sag requirements for computer and allied equipment. Explain CBEMA and ITIC curves in reference to power quality. **[9]**

OR

Q2) a) Explain various causes and consequences of voltage sag. **[9]**

b) List the mitigation techniques for voltage sags. Explain any Two in detail. **[9]**

Q3) a) 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 the above cases and specify respective THD levels.

b) Describe Voltage versus current Harmonics. **[8]**

OR

P.T.O.

Q4) a) Explain in brief, the following terms related to the power system under non- sinusoidal conditions. **[10]**

i) Active power

ii) Reactive power

iii) Apparent power

iv) Power factor

v) Phase sequence

b) Define harmonics, inter-harmonics and sub-harmonics. Explain the effects of harmonics on all equipment. **[8]**

Q5) a) Explain the following related to harmonics. **[10]**

i) K-rated transformer

ii) Harmonics amplification by Capacitor

b) What is the need for IEEE standards in the harmonic study? Give their objectives. **[7]**

OR

Q6) a) Explain the Harmonic study procedure hence describe various computer tools used for Harmonic analysis. **[10]**

b) Explain the function of an active filter. How does it overcome the drawback of a passive filter in controlling harmonics? **[7]**

Q7) a) Explain the factors to be considered while selecting the instrument for monitoring? **[9]**

b) What are the requirements of a power quality monitor to monitor various power quality parameters and various techniques of data collection? **[8]**

OR

Q8) a) Write a note on desirable characteristics of power quality measurement equipment. **[9]**

b) Write a note on selection of test location in the PQ monitoring. **[8]**

Total No. of Questions : 8]

SEAT No. :

PE-2218

[Total No. of Pages : 2

[6584]-118
B.E. (Electrical Engineering)
High Voltage Engineering
(2019 Pattern) (Semester - VII) (403143 C) (Elective - III)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Solve Q1 or Q2, Q3 or Q4, Q5 or Q6 and Q7 or Q8.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable additional data, if necessary.***
5) ***Use of non-programmable calculator is allowed.***

Q1) a) State & Explain with diagram causes of power frequency over voltages & switching surges. **[9]**

b) Explain in details Reynold's and Mason's theory of charge formation in Clouds. **[8]**

OR

Q2) a) Describe in detail lightening phenomenon. **[9]**

b) Write a short note on insulation co-ordination. **[8]**

Q3) a) Explain modified Marx circuit for generation of impulse voltage. **[6]**

b) Draw a neat diagram of 3 stage cascade transformer and explain its working. **[6]**

c) Explain wave front and wave tail time. **[6]**

OR

Q4) a) With a neat diagram explain working of Tesla coil. **[6]**

b) Explain three electrode gap mechanism to control the tripping of impulse generator. **[6]**

c) Explain parallel resonance circuit. **[6]**

P.T.O.

Q5) a) Explain sphere gap voltmeter with proper diagram. **[6]**

b) With proper diagram explain measurement of dielectric constant. **[6]**

c) Explain working of peak reading voltmeter. **[6]**

OR

Q6) a) Explain how a sphere gap can be used to measure the peak value of voltages. **[6]**

b) With neat sketch explain cathode ray oscilloscope for impulse voltage measurement. **[6]**

c) Explain with circuit diagram the measurement of dielectric constant. **[6]**

Q7) a) Describe earthing and shielding of high voltage laboratories. **[9]**

b) Discuss following tests carried out on porcelain insulator: **[8]**

i) 50% Dry impulse flashover test

ii) Impulse with stand test

OR

Q8) a) Write a short note on Design, layout and grounding of HV laboratory. **[9]**

b) List the different tests done on surge arresters? Mention the procedure for testing. **[8]**

Total No. of Questions : 8]

SEAT No. :

PE-2219

[Total No. of Pages : 2

[6584]-119
B.E. (Electrical Engineering)
ROBOTICS AND AUTOMATION
(2019 Pattern) (Semester - VII) (403143 D) (Elective III)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Solve Q1 or Q2, Q3 or Q4, Q5 or Q6 and Q7 or Q8.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable additional data, if necessary.***
5) ***Use of non-programmable calculator is allowed.***

Q1) a) Explain the rules for establishing the link coordinate frames. **[4]**

b) What is inverse kinematics? Explain the general property of existence and uniqueness of solution. **[6]**

c) Draw the link coordinate diagram and explain the arm matrix equation for the four- axis SCARA robot. **[8]**

OR

Q2) a) What is the difference between direct and inverse kinematics? Explain in detail. **[4]**

b) Explain forward solution for simple robot system. **[6]**

c) Explain Denavit - Hartenberg (D - H) representation assigned for right-handed orthonormal coordinate frames. Write the algorithm (steps) for D-H representation for deriving the forward kinematics for any manipulator. **[8]**

Q3) a) What are the basic parameters of photoelectric sensors that need to be considered during the selection of it? **[3]**

b) Explain the construction and working of absolute and incremental encoders along with the diagram. **[6]**

c) What are the different proximity sensors that are used in Robotics? Explain any one with the schematic diagram. **[8]**

P.T.O.

OR

Q4) a) What is the importance of the sensors in robotics? Explain with any application. **[3]**

b) What are position sensors? How position sensors are used in Robotics. Enlist the different types of position sensors used in robotics. **[6]**

c) Explain the construction and working of LVDT along with its schematic diagram. **[8]**

Q5) a) Explain the concept of manipulator Jacobian, Jacobian inverse in brief. **[4]**

b) Explain Resolved Motion Position Control (RMPC) with the help of a neat sketch. **[6]**

c) Establish the relation between the rotation matrix and angular velocity in detail. **[8]**

OR

Q6) a) Explain the trapezoidal velocity profile for robotic arm position control. **[4]**

b) Explain Joint Position Control (JPC) with the help of a neat sketch. **[6]**

c) Explain the modelling of the D.C. motor with load with relevant equations and diagrams. **[8]**

Q7) a) Explain how robots are used in material handling, picking, and packaging. **[3]**

b) Explain the spray-painting robot in detail. **[6]**

c) Explain how robots are used in the defence and surveillance industry. **[8]**

OR

Q8) a) Explain the selection criteria of the robot for industrial applications. **[3]**

b) Explain how robots are used in home automation. **[6]**

c) Explain different fields of robot applications and explain in detail in case of Arc welding. **[8]**

Total No. of Questions : 8]

SEAT No. : ____

PE-2220

[Total No. of Pages : 2

[6584]-120
B.E. (Electrical)
ALTERNATE ENERGY SYSTEM
(2019 Pattern) (Semester - VII) (403144 A) (Elective - IV)

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

Instructions to the candidates :

1) ***Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7or Q8.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable additional data, if necessary.***
5) ***Use of non-programmable calculator is allowed.***

Q1) a) List the various control mechanisms used for wind turbine. Explain any two in detail. State the expression for power contained in wind with nomenclature. **[8]**

b) Find the diameter of a wind turbine to generate 3.95 KW at wind speed of 6.9 m/s and a rotor speed of 120 rpm. Assume power coefficient = 0.4, efficiency of electrical transmission = 0.95, efficiency mechanical transmission = 0.9, Air density (at standard atm pressure and temp) = 1.19 kg/m^3 **[10]**

OR

Q2) a) Define **[8]**

i) Pitch Control

ii) Pitch angle

iii) Yaw Control

iv) Cut- out Speed

b) Provide a breakdown of the elements comprising wind power systems, along with a brief description of each component? **[10]**

Q3) a) Enumerate the different methods of biomass conversion, and delve into the details of one particular method. **[9]**

b) Explain the process of power generation from municipal waste, with block diagram. **[9]**

OR

P.T.O.

Q4) a) What do you think about the biogas as a future fuel, What are the various factors that affects biogas generation. **[9]**

b) Explain any one gasifier in detail with a neat diagram. **[9]**

Q5) a) Classify energy storage system, explain pumped hydroelectric storage with diagram. **[9]**

b) Explain the working principle of battery, describe lead- acid battery. **[9]**

OR

Q6) a) What is fuel cell? Describe the principle of working of hydrogen - oxygen fuel cell. **[9]**

b) State various methods of hydrogen production. Describe any one method with a diagram. **[9]**

Q7) a) What is the meaning of Time value of money? Why should it be considered? What is Net Present Value (NPV) **[8]**

b) Define and Explain with examples. **[8]**

i) Simple payback period.

ii) Return on investment.

iii) Net present value.

iv) Time Value of Money.

OR

Q8) a) Provide a well-presented illustration of how a renewable energy source is linked to the grid? Also, list the different parameters necessary for synchronizing the renewable energy source with the grid. **[8]**

b) A person wants to purchase a solar water heating system of Rs. 30000, It is required to do a down payment of Rs. 5000. An annual end of year payment of Rs. 3400 is required for 10 years. However, the person elects to pay 3200, yearly and a balance payment at the end. Determine the value of balanced payment if money is worth 10% interest. **[8]**

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Total No. of Questions : 8]

SEAT No. :

PE-2221

[Total No. of Pages : 2

[6584]-121
B.E. (Electrical Engineering)
ELECTRICAL AND HYBRID VEHICLE
(2019 Pattern) (Semester - VII) (403144 B) (Elective - IV)

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

Instructions to the candidates :

1) ***Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q.7or Q.8.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***

Q1) a) List out the various types of sensors used in EV and describe how they function? **[4]**

b) Write a short note on Battery swapping system. **[6]**

c) Explain energy management strategies with general architecture for EV's. **[8]**

OR

Q2) a) Explain the mechanism of a fuel cell electric vehicle's drive train. **[4]**

b) Draw & explain the EV Fleet Management. **[6]**

c) Explain EV Subsystems and Configurations. **[8]**

Q3) a) State different drive trains configuration in HEVs and explain any one. **[8]**

b) Explain the strategies used in Power Management Systems for HEV. **[9]**

OR

Q4) a) What is energy hybridization and explain operation of a hybrid energy system? **[8]**

b) Explain fundamentals of Vehicle dynamics and its consideration for series HEV modeling. **[9]**

P.T.O.

Q5) a) State the criteria for battery selection in EV. **[4]**

b) Discuss motor torque calculations for an EV. **[6]**

c) Draw and explain PMSM motor control for an EV application. **[8]**

OR

Q6) a) Write a short note on CAN vehicle network. **[4]**

b) Mention important considerations for Sizing the Power converter. **[6]**

c) Draw and explain Induction motor control for an EV application. **[8]**

Q7) a) List Li-ion battery recycling policy and standards. **[4]**

b) Explain revised guidelines and standards for charging infrastructure of Electric Vehicles. **[6]**

c) What is a star labelling scheme for Li-ion packs? **[7]**

OR

Q8) a) What is start up? Mention any one EV startup in detail. **[4]**

b) Write a note on FAME - II policy. **[6]**

c) Explain EV tariff rate declared by government for EV charging. **[7]**

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Total No. of Questions : 8]

SEAT No. :

PE-2222

[Total No. of Pages : 2

[6584]-123
B.E. (Electrical)
HVDC & FACTS
(2019 Pattern) (Semester - VII) (403144 D) (Elective - IV)

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

Instructions to the candidates :

1) ***Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q.7or 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, Mollier charts, electronic pocket calculator and steam tables is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) What way VSC based HVDC system is different than conventional HVDC system? Explain control of VSC based HVDC system. **[9]**

b) Discuss HVDC Light Technology. Can VSC based HVDC Systems are suitable for renewable energy generation? Explain. **[8]**

OR

Q2) a) Explain in detailed dc link control in VSC based HVDC system. **[9]**

b) Discuss with suitable diagram the power transfer characteristics of VSC based HVDC system. **[8]**

Q3) a) What are the challenges in power electronic controllers which will be used in modern complex power system? What can be the probable remedial solutions? **[9]**

b) How reactive power control can be achieved by conventional reactive power compensators? **[9]**

OR

Q4) a) What is the role of dc link in power controllers? With neat diagram explain dc link converter topologies. **[9]**

b) Explain types of FACTS controllers and describe their applications. **[9]**

P.T.O.

Q5) a) What are the different modes of operations of STATCOM? Also describe the control scheme of STATACOM. **[10]**

b) Compare TCSC and SSSC. **[8]**

OR

Q6) a) Discuss different configurations of SVCs. **[10]**

b) Compare STATCOM and TCSC **[8]**

Q7) a) With neat sketches describe the construction of UPFC and its applicability in power system. **[9]**

b) Elaborate the internal control structure of UPFC. **[8]**

OR

Q8) a) Explain terminal regulation mode, phase angle control mode and impedance control modes of UPFC. **[9]**

b) Illustrate functionalities of Interline power flow controller. **[8]**

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Total No. of Questions : 8]

SEAT No. :

PE-2223

[Total No. of Pages : 3

[6584]-124

B.E. (Electronics & Telecommunication Engineering)

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 and Q.7 or Q.8 from the following questions.***
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 the working of A valanche photodetector with a neat diagram. **[6]**

b) Define the term quantum efficiency and the responsivity of a photodetector. How the quantum efficiency and the responsivity of a photodetector are related to each other. **[6]**

c) When 3×10^{11} photons each with a wavelength of 0.85×10^{-6} m are incident on a photodiode on average $l.2 \times 10^{11}$ electrons are collected at the terminals of the device. Determine the quantum efficiency and the responsivity of the photodiode at 0.85 μm. **[6]**

OR

Q2) a) Explain the following terms in terms of an optical detector. **[6]**

i) Dark Current Noise

ii) Quantum Noise

iii) Thermal Noise

b) Describe the basic detection process in a photoconductive detector. Also, state any two advantages and disadvantages of a photodiode. **[6]**

c) An avalanche photodiode has a quantum efficiency of 45% at 0.85 μm. When illuminated with radiation of this wavelength it produces an output photocurrent of 10 μA after avalanche gain with a multiplication factor of 250. Calculate the received optical power to the device. **[6]**

P.T.O.

Q3) a) Explain in detail the importance of budgets. What are the different system considerations for the rise time budget? Explain with equations. **[6]**

b) Enlist the system design considerations for an optical communication network. **[6]**

c) An engineer has the following components available **[6]**

i) GaAlAs laser diode operating at 850 nm and capable of coupling 1 mW (0 dbm) into a fiber

ii) 10 sections of cable each of which is 500m long has a 4 db/km attenuation and has connectors on both ends.

iii) Connector loss of 2 db/connector

iv) A pin Photodiode receiver

v) An avalanche photodiode receiver

Using these components, the engineer, wishes to construct a 5 km link operating at 20 Mb/s. If the sensitivities of the PIN and APD receivers are –45 dbm and –56 dbm respectively, which receiver should be used if a 6 dB system operating margin is required?

OR

Q4) a) Write a short note on : **[6]**

i) Optical Isolators

ii) Optical circulators

b) With the help of neat sketch describe WDM architectures. **[6]**

c) A 2 × 2 fiber coupler has an input optical power level of P_0 = 135 μW. The coupler output powers are P_1 = 60 μW, P_2 = 55 μW, P_3 = 4.3 μW. Find the following coupling parameters **[6]**

i) Splitting Ratio

ii) Cross Talk

iii) Insertion Loss

iv) Excess Loss

Q5) a) Explain the desirable properties of optical network with advantages. **[6]**

b) Describe the Gigabit Passive Optical Network (GPON) using an appropriate diagram. **[6]**

c) Compare Asynchronous and Synchronous Optical Network. **[5]**

OR

Q6) a) What is FTTX? Draw and Explain the architecture of FTTX. **[6]**

b) Explain the concept of FDDI with an appropriate diagram. **[6]**

c) Compare Active Optical Network (AON) and Passive Optical Network (PON). **[5]**

Q7) a) Using an appropriate diagram,describe and explain the experimental setup used in the OTDR technique. **[6]**

b) Describe the Eye Diagram Test. Give an explanation of the basic measuring parameter. **[6]**

c) Explain the experimental setup for the time-domain fiber dispersion measurement with suitable diagram. **[5]**

OR

Q8) a) Draw and explain the schematic of the experimental setup used to calculate fiber attenuation using the cutback method. **[6]**

b) Explain optical spectrum analyzer in detail. **[6]**

c) Explain the NA measuring technique with the help of diagram. **[5]**

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Total No. of Questions : 8]

SEAT No. :

PE-2224

[Total No. of Pages : 2

[6584]-125

B.E. (Electronics and Telecommunication Engineering)

BIOMEDICAL SIGNAL PROCESSING

(2019 Pattern) (Semester - VIII) (404191-A) (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, 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) Describe the 10-20 electrode placement system of the EEG Signal. **[8]**

b) Classify the neurological evoked potential with respect to Auditory, somatosensory, Visual and Event-Related Potentials. **[10]**

OR

Q2) a) Articulate the feature extraction techniques of EEG. What are the possible sources of noise in Electroencephalogram Acquisition? **[8]**

b) What is the brain? Explain main parts of the brain and their functions. **[10]**

Q3) a) Which are the neuromuscular diseases in EMG. Explain any one with example. **[7]**

b) Describe Motor Unit, Muscle Contraction, Signal of Muscles and significance of Electromyogram. **[10]**

OR

Q4) a) Define muscle? Which are the types of muscle? **[7]**

b) Illustrate the following EMG signal analysis approaches: Time Domain Analysis, Frequency and Wavelet-Domain Analysis. **[10]**

P.T.O.

Q5) a) What is the Blood Pressure? Explain the term Hypertension in blood flow. **[8]**

b) Explain Magnetoencephalography (MEG). What is Magnetoencephalography used for? What is an MEG test used to diagnose? **[9]**

OR

Q6) a) With the help of neat diagram, explain Arterial Catheter placement system. **[8]**

b) Describe Electrooculogram (EOG). How is an Electrooculogram recorded? What is EOG used to measure? **[9]**

Q7) a) Draw the block diagram of bioelectrical signal recordings and explain it in details? **[9]**

b) Differentiate Digital filters: IIR and FIR filters. **[9]**

OR

Q8) a) Summarize Adaptive noise canceller in bio signals. [**6]**

b) Write a short notes on: **[12]**

i) Notch filters

ii) Optimal filtering

iii) Least Mean Squares (LMS) algorithms

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Total No. of Questions : 8]

SEAT No. : [ ]

PE-2225

[Total No. of Pages : 2

[6584]-126
B.E. (E&TC)
INDUSTRIAL DRIVES AND AUTOMATION
(2019 Pattern) (Semester - VIII) (404191-B) (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 carries full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Classify converter drives and explain feedback controlled closed loop speed control drive. **[8]**

b) Explain PI controller with neat diagram. **[6]**

c) Compare Open loop control and Closed loop control system. **[4]**

OR

Q2) a) With the help of neat circuit diagram and waveforms explain working of Class E chopper. **[8]**

b) A 220 V, 24 A 1000rpm separately excited dc motor has an armature resistance of 2 Ω. Motor is controlled by chopper with frequency of 500 Hz and a source voltage of 230 V. Calculate the duty ratio for 1.2 times rated torque and 500 rpm. **[6]**

c) Compare Converter drives & Chopper drives. **[4]**

Q3) a) With the help of neat circuit diagram explain Current Source Inverter (CSI) for speed control of three phase induction motor. **[9]**

b) What are the different types of breaking techniques used for induction motors? Explain any one in detail. **[9]**

P.T.O.

OR

Q4) a) Explain Stator voltage control using AC Voltage controller induction motor. **[9]**

b) Enlist different speed control methods for induction motor. Explain why variable frequency control method by constant v/f is popular and widely used. **[9]**

Q5) a) What is synchronous motor? Explain construction of three phase synchronous motor. **[7]**

b) What is torque angle of a synchronous motor? Draw torque vs torque angle characteristics for a cylindrical rotor synchronous motor. **[6]**

c) What are the different torques used in Synchronous motor? Explain it. **[4]**

OR

Q6) a) Explain operation of permanent magnet synchronous motor drive with neat diagram. **[7]**

b) Explain constant voltage/Hertz closed loop control of synchronous motor. **[6]**

c) State advantages and limitations of PMSM. **[4]**

Q7) a) What are the types of stepper motor? Explain operation of any one type of stepper? **[8]**

b) With the help of cross section diagram, explain the operation of hybrid stepper motor. **[5]**

c) Explain Static and dynamic characteristics of Stepper motor. **[4]**

OR

Q8) a) Explain Permanent Magnet Stepper Motor with neat construction diagram. **[8]**

b) Explain with circuit diagram working of microprocessor based stepper motor control and state its advantages. **[5]**

c) State advantages and applications of Stepper Motors. **[4]**

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Total No. of Questions : 8]

SEAT No. : ____

PE-2226

[Total No. of Pages : 2

[6584]-127
B.E. (E&TC/Electronics)
ANDROID DEVELOPMENT
(2019 Pattern) (Semester - VIII) (404191C) (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.***
5) ***Use of electronic pocket calculator is allowed.***

Q1) a) Explain basic building blocks of Android Application. **[9]**

b) Explain :

i) Broadcast Receiver.

ii) Role of content Provider **[8]**

OR

Q2) a) Explain Activity life cycle. **[9]**

b) Explain components of communication in Android. **[8]**

Q3) a) What is Intent? Explain Linking Activities. **[9]**

b) Explain components of screen and Adapting Display Orientation. **[9]**

OR

Q4) a) Explain about Absolute and Relative Layouts. **[8]**

b) Explain **[10]**

i) Fragment Lifecycle

ii) Split/ Multi Screen Activities

Q5) a) What is the significance of UI? Explain any Six UI views with diagram. **[9]**

b) Explain Graphics in Android. **[8]**

OR

P.T.O.

Q6) a) Explain Text View in detail. **[9]**

b) Explain Animation in Android. **[8]**

Q7) a) Explain Internal data storage and External Data Storage. **[9]**

b) Write short note on SQLite. **[9]**

OR

Q8) a) Explain about accessing phone services (Call, SMS, and MMS). **[9]**

b) Discuss about: **[9]**

i) JSON Parsing

ii) JSON Web Service

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Total No. of Questions : 8]

SEAT No. :

PE-2227

[Total No. of Pages : 2

[6584]-128
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 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) Describe Hardware Abstraction Layer (HAL) drivers. **[9]**

b) Explain the classification of API and also illustrate the API naming Rules. **[8]**

OR

Q2) a) Elaborate USB Modules in the STM 32F4 Microcontroller. **[9]**

b) Illustrate 12C and CAN Modules in STM32F4 Microcontroller. **[8]**

Q3) a) What are synchronization primitives and how are they used in FreeRTOS? **[9]**

b) Write C code for a task in FreeRTOS that toggles an LED every second. **[9]**

OR

Q4) a) What is FreeRTOS? How FreeRTOS is configured using STM32 CubeMX? **[9]**

b) Describe ChibiOS and Contiki OS. **[9]**

Q5) a) Design an embedded system for Image transfer between PC and STM32F4. **[8]**

b) How do you configure the SPI interface on the STM32F4 microcontroller and What are the steps involved in initializing a graphical LCD? **[9]**

OR

P.T.O.

Q6) a) Illustrate procedure of GUI Formation with TouchGFX for any two applications. **[8]**

b) Elaborate how to Install Touch GFX for Graphical User Interface (GUI). **[9]**

Q7) a) Describe Loading and interfacing methods in Embedded Android. **[9]**

b) Articulate requirements of Android. **[9]**

OR

Q8) a) What are some advantages of using Android over other mobile operating systems? **[9]**

b) Describe Loading and interfacing methods in Embedded Systems. **[9]**

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Total No. of Questions : 8]

SEAT No. :

PE-2228

[Total No. of Pages : 2

[6584]-129
B.E. (E&TC)
MOBILE COMPUTING
(2019 Pattern) (Semester - VIII) (404191-E) (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 side indicate full marks.***
4) ***Assume suitable data, if necessary.***
5) ***Use of calculator is allowed.***

Q1) a) What are the key differences between MANETs and VANETs? **[8]**

b) Explain Data flow diagram with Client initialization via DHCP explanation. **[9]**

OR

Q2) a) How does Ad Hoc On-Demand Distance Vector Routing (AODV) route the data? What are its advantages and disadvantages. **[8]**

b) What is hybrid routing? Explain zone routing protocol (ZRP) with suitable diagram. **[9]**

Q3) a) Explain the Traditional TCP and implications of mobility control? **[8]**

b) Explain transaction-oriented TCP with Diagram? Write Advantages & Disadvantages? **[9]**

OR

Q4) a) Explain the modifications of Indirect TCP. What are its advantages and disadvantages? **[8]**

b) Explain need of Mobile IP and elaborate IP Packet Delivery? **[9]**

Q5) a) Explain fading and different types of fading in detail. **[9]**

b) Explain Ricean fading channel model. Differentiate between Rayleigh fading and Ricean fading. **[9]**

OR

P.T.O.

Q6) a) Describe multipath propagation with neat diagram. What is ISI in multipath fading channels? **[9]**

b) What is non-coherent detection? Explain with neat diagram, non-coherent detection of FSK. **[9]**

Q7) a) Draw B2B model and explain any one B2B application. **[9]**

b) What is (Business to Customer) B2C. List the B2C applications. List the pro and cons of M-commerce. **[9]**

OR

Q8) a) What is mobile computing? Explain any five characteristics of mobile computing. **[9]**

b) State and explain the responsibilities of Operating Systems in mobile devices. Compare features of Windows Mobile OS, Palm OS, Symbian OS, iOS, Android OS, and Blackberry OS. **[9]**



Total No. of Questions : 8]

SEAT No. :

PE-2229

[Total No. of Pages : 2

[6584]-130
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) ***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 Gate-Level Modeling in Verilog with a suitable example. **[9]**

b) Write Verilog code for 4-Bit Up-Down Counter with Testbench. **[9]**

OR

Q2) a) Write Verilog code for Full-Adder with Testbench. **[9]**

b) Explain blocking and nonblocking statements with relevant syntax. **[9]**

Q3) a) Explain in brief various methods of partitioning. **[9]**

b) Write Short note on : fixed-die routing, variable-die routing. **[8]**

OR

Q4) a) Explain: Floorplanning control parameters in detail. **[9]**

b) Enlist the various goals of Placement & explain Coarse placement. **[8]**

Q5) a) Justify the criterions for Processor selection in SOC systems. **[9]**

b) Contrast: VLIW Processors vs Superscalar Processors. **[9]**

OR

Q6) a) Explain in detail : Processor Micro-Architecture with suitable block diagram. **[9]**

b) Explain: Basic elements in Instruction handling. **[9]**

P.T.O.

Q7) a) Explain in detail : AMBA Bus Architecture. **[9]**

b) Write Short note on: CACHE Memory. **[8]**

OR

Q8) a) Explain On-Die types of Memory chip technologies. **[9]**

b) Write Short note on: ST bus protocols: Type - II. **[8]**

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Total No. of Questions : 8]

SEAT No. :

PE-2230

[Total No. of Pages : 2

[6584]-131
B.E. (E & TC)
NANO ELECTRONICS
(2019 Pattern) (Semester - VIII) (404192B) (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 side indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain Structure of CNT & Carbon nano tubes **[8]**

b) Explain Nano material and its types **[8]**

OR

Q2) a) Explain properties of CNT **[8]**

b) Explain Method to Stabilize Nano particles **[8]**

Q3) a) Explain Optical lithography 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

Q6) a) Explain Nano tubes Actuators **[9]**

b) Explain types of Super molecular Switches. **[9]**

P.T.O.

Q7) a) Explain Piezo-Electric Biosensor **[9]**

b) Which are types of Nano Sensor? Explain Nano biosensor. **[9]**

OR

Q8) a) What is use of Nano technology in Electronics? **[9]**

b) Explain Transformation. **[9]**

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Total No. of Questions : 8]

SEAT No. :

PE-2231

[Total No. of Pages : 2

[6584]-132
B.E. (Electronics) (E & TC)
REMOTE SENSING
(2019 Pattern) (Semester - VIII) (404192 C) (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 side indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Enlist the differences between raster data and vector data. **[8]**

b) Explain various standard products offered by the space agencies to the end user for satellite data processing. **[8]**

OR

Q2) a) Explain various band combinations and color composites used in satellite image processing with suitables examples of LANDSAT 8 bands. **[8]**

b) Describe the significance of NDVI. Calculate NDVI of a plant with NIR = 0.40 and RED = 0.30 and determine whether the plant is healthy or stressed. **[8]**

Q3) a) Explain microwave remote sensing with various real life applications and benefits. **[8]**

b) Explain the concept of SAR and SLAR with suitable diagrams and why SAR is preferred over SAR. **[10]**

OR

Q4) a) Explain the principle of RADAR and brief the concept microwave polarisation in Synthetic Aperture Radar **[8]**

b) Explain the principle of LIDAR operation, enlist its types and applications. **[10]**

P.T.O.

Q5) a) Explain various segments of GNSS technology. **[10]**

b) Explain the augmentation system and its types and application areas. **[8]**

OR

Q6) a) Explain the navigation message of the GNSS signal with a suitable diagram. **[8]**

b) How does location based services work and brief the types of LBS applications. **[10]**

Q7) a) Brief the application of remote sensing in Environmental management with use cases and methodology. **[8]**

b) Brief the application of remote sensing in disaster management with use cases and methodology. **[10]**

OR

Q8) a) Brief the application of remote sensing in Forest management with use cases and methodology. **[10]**

b) Brief the application of remote sensing in Urban sprawl planning and management with use cases and methodology. **[8]**

♦ ♦ ♦

Total No. of Questions : 8]

SEAT No. :

PE-2232

[Total No. of Pages : 2

[6584]-133
B.E. (E & TC) (Electronics)
DIGITAL MARKETING
(2019 Pattern) (Semester - VIII) (404192 (D)) (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.***
3) ***Neat diagrams must be drawn wherever necessary.***

Q1) a) Explain the importance of Google Adwords in current digital marketing landscape : Explain how to create an Ad group. **[9]**

b) Describe different Google Ad types and their specific applications in marketing strategies. **[8]**

OR

Q2) a) How do SEM tools integrate with Google Adwords to optimize ad performance? **[9]**

b) Explain how to link a website or blog with Google Analytics to track ad performance and user engagement. **[8]**

Q3) a) List out the steps required for You Tube Account setup while creating a business account with a personal account and explain about You Tube Monetization. **[9]**

b) Explain B to C perspective and B to B perspective. **[8]**

OR

P.T.O.

Q4) a) Explain facebook marketing in detail and the types of facebook marketing. **[9]**

b) List advantages and disadvantages of social media for business. **[8]**

Q5) a) List out different types of linkedIn advertising and explain any two in details. **[9]**

b) What do you mean by Email marketing and explain its types. **[9]**

OR

Q6) a) Explain the steps for Email campaigning through HTML. **[9]**

b) Write a short note on : **[9]**

a) Web forms b) Linked In message pitching.

Q7) a) What do you mean by Automated and Smart Bidding. Explain with suitable examples. **[9]**

b) Write a short note on : **[9]**

a) Podcast b) No click results

OR

Q8) a) List advantages & disadvantages of OTT platforms. **[9]**

b) Explain : Visual search and online reviews. **[9]**

Total No. of Questions : 8]

SEAT No. : [ ]

PE2233

[Total No. of Pages : 2

[6584]-134
B.E. (E & TC)
RADIATION AND MICROWAVE THEORY
(2019 Pattern) (Semester - VII) (404181)

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 calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) Draw and explain the principle of operation of isolator. **[6]**

b) Draw Magic Tee and explain its working with the scattering matrix. **[6]**

c) Draw H plane Tee and explain its working with its scattering matrix. **[6]**

OR

Q2) a) Draw and explain working principle of two hole directional coupler with its scattering matrix. **[6]**

b) A 10 dBm directional coupler has a directivity of 40dBm, if the applied input power P1 = 10mW, then calculate power outputs at port 2,3 and 4 of a lossless directional coupler. **[6]**

c) Draw E plane Tee and explain its working with its scattering matrix. **[6]**

Q3) a) Explain the operation of two cavity klystron with its constructional diagram. **[6]**

b) Write a short note on limitations and advantages of conventional tubes and solid-state devices. **[6]**

c) Draw and explain mode characteristics of single cavity klystron used in laboratory. Explain electronic tuning. **[6]**

OR

P.T.O.

Q4) a) Draw the construction of single cavity klystron tube and explain its working. **[6]**

b) A reflex klystron operates at the peak mode of n = 2 with beam voltage V0= 300V and beam current I0 = 20mA. If rf signal voltage V_1 = 40 V, then determine the input power, output power and efficiency. **[6]**

c) Draw the construction and explain the working of Magnetron. **[6]**

Q5) a) Draw and explain V-I characteristics of Gunn diode to justify its amplifying behavior. **[6]**

b) Draw the construction and explain working of TRAPATT diode. **[6]**

c) Draw the construction and explain working of Varactor Diode. **[5]**

OR

Q6) a) Compare IMPATT, TRAPATT and BARITT diode with respect to its operating frequency, working principle, and efficiency. **[6]**

b) Explain construction and working principle of tunnel diode with its VI characteristics. **[6]**

c) Explain application of PIN diode as a modulator with neat diagrams. **[5]**

Q7) a) Explain any two applications of microwaves in detail. **[5]**

b) Explain impedance measurement using slotted transmission line. **[6]**

c) Explain the experimental set up to measure SWR and wavelength using slotted transmission line. **[6]**

OR

Q8) a) Define SAR, PEL and PET **[6]**

b) Explain attenuation measurement using power ratio measurement technique. State drawback of power ratio measurement technique. **[5]**

c) Explain any three health hazards due to radiations in details. **[6]**

❋ ❋ ❋

Total No. of Questions : 8]

SEAT No. :

PE-2234

[Total No. of Pages : 2

[6584]-135

B.E. (Electronics and Telecommunication Engineering)

VLSI DESIGN AND TECHNOLOGY

(2019 Pattern) (Semester - VII) (404182)

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) ***Assume suitable data, if necessary.***

Q1) a) Write the features of CPLD in detail and give it's applications. **[8]**

b) Draw and explain the architecture of FPGA & compare between CPLD and FPGA. **[10]**

OR

Q2) a) Draw and explain macrocell in detail. **[8]**

b) Draw and explain PLD design flow. **[10]**

Q3) a) Draw and explain CMOS Inverter schematic and it's voltage transfer characteristics. **[9]**

b) What are the merits of Transmission gate? Design 2:1 multiplexer using transmission gate. **[8]**

OR

Q4) a) Write short note on channel legth modulation. **[6]**

b) Write short note on Device siziry. **[6]**

c) Write short note on velocity saturation. **[5]**

Q5) a) What is DRC? Explain in detail rules in CMOS VLSI design? **[9]**

b) Draw stick diagram for Inverter, NAND and NOR gate. **[9]**

OR

Q6) a) Write short note on Design issues like Antenna Effect. **[6]**

b) Write short note on SPICE simulation. **[6]**

c) Write short note on Layout Vs schematic. **[6]**

P.T.O.

Q7) a) Explain the need for Design for Testability? Explain stuck-at-0 and stuck-at-1 faults with example. **[9]**

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

i) JTAG

ii) Boundary scan

OR

Q8) a) What is the need of BIST? Explain typical BIST in detail. **[9]**

b) Draw the TAP controller state diagram and explain. **[8]**



Total No. of Questions : 8]

SEAT No. :

PE-2235

[Total No. of Pages : 2

[6584]-136
B. E. (E & TC)
CLOUD COMPUTING
(2019 Pattern) (Semester - VII) (404183)

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

Instructions to the candidates :

1) ***Answer Q.1 or Q.2 and Q.3 or Q.4 and Q.5 or Q.6 and 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) Differentiate between Cloud Computing and Virtualization. **[6]**

b) Explain in brief Hardware Virtualization and Software Virtualization techniques. **[6]**

c) Write short notes on: **[6]**

i) CPU Virtualization.

ii) Memory Virtualization.

OR

Q2) a) Explain how virtualization is being leveraged in education, enterprise, and disaster recovery? **[6]**

b) Describe the concept of virtual clustering. How does it improve fault tolerance and scalability in virtualized environments? **[6]**

c) Justify virtualization improves scalability in virtualized environments, elaborate your answer. **[6]**

Q3) a) Draw and explain the cloud CIA security model. **[6]**

b) Describe with relevant real world usage; the phases in the Cloud Computing Life Cycle (CCLC). **[6]**

c) Explain the role of host security in SaaS, PaaS and IaaS. **[5]**

OR

P.T.O.

Q4) a) Apply the concept of cloud reference architecture to describe how a cloud service is deployed in practice. **[6]**

b) State the characteristics and elaborate on relation between OSI layer and firewall with the help of types of firewall. **[6]**

c) Apply your understanding of virtualization to explain security threats and solutions specific to virtualized environments. **[5]**

Q5) a) Explain with use case; the architecture of Google App Engine. **[6]**

b) Discuss the various roles provided by Azure operating system in compute services. **[6]**

c) Enlist and describe any two types of cloud platforms. **[6]**

OR

Q6) a) Differentiate between Google cloud platform and Amazon Web Services. **[6]**

b) Describe the steps involved in creating an EC2 instance. **[6]**

c) Explain the cost models in cloud computing. **[6]**

Q7) a) Apply your understanding of IoT to analyze how various enabling technologies (such as RFID, sensor networks and cloud computing) contribute to the development of an IoT based smart system. Support your answer with real life use case. **[6]**

b) Explain how IoT technologies like Smart Devices Integration, can be applied to enhance online social networking, with suitable examples. **[6]**

c) Describe any three enabling technologies for IoT. **[5]**

OR

Q8) a) Demonstrate the role of embedded systems in the implementation of IoT by describing how they are integrated into a real-world IoT application. **[6]**

b) Classify and compare different types of distributed systems based on their architecture, functionality, and use-cases. Support your answer with real world examples. **[6]**

c) Explain role of Big Data Analytics in context of IoT application. **[5]**

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Total No. of Questions : 8]

SEAT No. :

PE-2236

[Total No. of Pages : 2

[6584]-137
B. E. (E&TC) (Electronics)
SPEECH PROCESSING
(2019 Pattern) (Semester - VII) (404184 A) (Elective - III)

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

Instructions to the candidates :

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 and Q7 or Q8***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data, if necessary.***

Q1) a) Explain in detail estimation of formant and pitch parameters using cepstrum. **[10]**

b) Explain Basic principles of linear predictive analysis using Autocorrelation method. **[7]**

OR

Q2) a) With the help of basic speech production model, explain the principles of LPC analysis. How to decide number of formants? **[10]**

b) Explain in detail computation of Mel Frequency Cepstral Coefficients (MFCC). **[7]**

Q3) a) With a block diagram explain ADPCM technique of speech coding. Compare PCM and ADPCM **[9]**

b) Draw the block schematic and Explain in detail adaptive transform coder (ATC). **[9]**

OR

P.T.O.

Q4) a) Explain sub-banding coding What is the role of a poly phase filter in sub band coder? **[9]**

b) With the help of block diagram, explain homomorphic speech processing. **[9]**

Q5) a) Draw the block schematic of automatic speaker verification system and explain the process in training and testing phase. **[9]**

b) Explain waveform concatenation technique for text-to-speech synthesis. **[9]**

OR

Q6) a) What is the difference between speaker identification and speaker verification? What are the features used for speaker recognition / verification system and how? **[9]**

b) What is speech recognition? What are some of the main applications for ASR (Automatic Speech Recognition)? Explain ASR system. **[9]**

Q7) a) Draw and explain the architecture of convolutional network. **[10]**

b) Explain TTS synthesis using support vector machine. **[7]**

OR

Q8) a) Define following Machine learning algorithm performance parameters **[10]**

i) Accuracy

ii) Sensitivity

iii) Specificity

iv) True positive

v) False Negative

b) Explain Simple Recurrent Neural Network. Compare feed forward network and Recurrent neural network (RNN). **[7]**

Total No. of Questions : 8]

SEAT No. : ____

PE-2237

[Total No. of Pages : 2

[6584]-138

B.E. (Electronics & Telecommunication)

PLC, SCADA & AUTOMATION

(2019 Pattern) (Semester - VII) (404184 B) (Elective - III)

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 indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain the concept of latching with the help of ladder diagram of PLC. **[5]**

b) With the ladder diagram & truth table, realize the 2 i/p logic gates.

i) X-OR

ii) X-NOR **[8]**

c) Explain Delay OFF-TIMER in PLC with the help of an example in ladder logic. **[5]**

OR

Q2) a) What is Control relay in PLC programming? Explain suitable example with the help of ladder diagram. **[4]**

b) With the ladder diagram & truth table, realize the 3 input NAND gate. **[4]**

c) Write a ladder logic for the following event- **[10]**

i) Fill in the tank upto level Lu.

ii) Heat & stir the liquid for 30 min.

iii) Empty the tank upto level LE.

iv) Repeat the process.

Use START push as NO, STOP as NC, use limit switches for level, sketch the diagram.

P.T.O.

Q3) a) What is SCADA? Draw & explain the architecture of SCADA. **[7]**

b) Explain the function of MTU & RTU in detail. **[7]**

c) Enlist the applications of SCADA in industrial automation. **[4]**

OR

Q4) a) Define the term SCADA & explain the components of SCADA system. **[7]**

b) Explain an applications of SCADA system in industrial automation. **[7]**

c) What is HMI? Explain HMI Interface in SCADA. **[4]**

Q5) a) What is DCS? Explain architecture of DCS in detail. **[9]**

b) Explain in detail the application of water treatment plant as DCS. **[8]**

OR

Q6) a) Explain the basic concept of DCS system? Explain the components of DCS. **[6]**

b) What are advantages of DCS system? State application of DCS. **[6]**

c) Compare PLC, DCS & SCADA. **[5]**

Q7) a) What is CNC? Explain with a block diagram. **[9]**

b) State the advantages & applications of CNC m/c in manufacturing. **[8]**

OR

Q8) Write short notes on:

a) Foundation field bus. **[4]**

b) Ethernet. **[4]**

c) Devicenet. **[4]**

d) Industry 4.0 Standard. **[5]**



Total No. of Questions : 8]

SEAT No. :

PE-2238

[Total No. of Pages : 2

[6584]-139

B.E. (Electronics & Telecommunication / Electronics)

JAVA SCRIPT

(2019 Pattern) (Semester - VII) (404184 C) (Elective - III)

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 indicate full marks.***
4) ***Assume suitable additional data, if necessary.***

Q1) a) What is Anonymous Function in JavaScript? Explain its use with an example. **[6]**

b) Write a JavaScript program to explain how to get input from user and display output to window. List different methods used to display output. **[6]**

c) Describe different ways of creating the object using JavaScript. Explain how to access object properties with example. **[6]**

OR

Q2) a) What are the different ways to enumerate the properties of object? Explain with example. **[6]**

b) Write a JavaScript program that will append on object to an array and will check if an object is an array data types. **[6]**

c) Describe the term recurive function with example. **[6]**

Q3) a) Describe the term “Capturing Groups” in regular expression with suitable example. **[6]**

b) List the RegExp object properties. Explain any two in detail. **[6]**

c) Write a JavaScript program to compare two strings using various methods. **[5]**

OR

P.T.O.

Q4) a) Explain search() and split() method used in regular expression with suitable example. **[6]**

b) Explain the repetition quantifiers in regular expression with suitable example. **[6]**

c) Describe the term Greedy Matching in regular expression with example. **[5]**

Q5) a) List different DOM methods used for accessing elements. Explain any two with suitable example. **[6]**

b) Explain in detail Netscape 4 event model. **[6]**

c) Describe how to create, insert and append nodes in DOM. **[6]**

OR

Q6) a) Describes the terms DOM and HTML elements. **[6]**

b) Explain event and event handler with an example. **[6]**

c) Describe different event model issues. **[6]**

Q7) a) Explain Browser Object Model with suitable diagram. **[6]**

b) What is frame? Explain the HTML tags to create frames and how to change the properties of the frame. **[6]**

c) Write a Java Script code to create a student information Form to accept information like Name Address, City, State, Gender, Mobile Number, and email id. **[5]**

OR

Q8) a) Describe the term controlling window. Enlist different window methods with their use. **[6]**

b) Write a Java Script code for a simple calculator using Java script for operations like addition, multiplication, subtraction, division, square of a number etc. **[6]**

c) List and explain different properties and methods used in location object. **[5]**



Total No. of Questions : 8]

SEAT No. :

PE-2239

[Total No. of Pages : 2

[6584] - 140

B.E. (Electronics & Telecommunication Engineering)

EMBEDDED SYSTEM & RTOS

(2019 Pattern) (Semester - VII) (404184 D) (Elective - III)

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 indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) State the features of µCOS - II Real Time Operating System. **[4]**

b) Explain following µCOS - II kernel service with suitable diagrams. **[8]**

i) Semaphores

ii) Mailbox

c) Explain the message queue functions in RTOS for creating a queue and sending a message to the queue. **[6]**

OR

Q2) a) Explain the following µC/OS - II functions. **[4]**

i) OSTaskCreate()

ii) OSTimeDly()

b) Explain the time management functions in RTOS. **[8]**

c) Explain with state diagram the state of a task in RTOS. **[6]**

Q3) a) Differentiate between BIOS and Boot-loader. **[4]**

b) Explain in detail the concept of Embedded Linux Distributions. **[8]**

c) Explain the various binary utilities in tool chain. **[6]**

OR

P.T.O.

Q4) a) What are the memory requirements of embedded Linux? **[4]**

b) Draw a typical embedded Linux development set up and explain how it works. **[8]**

c) Explain in detail the role of GNU debugger. **[6]**

Q5) a) What is Linux kernel configuration? Explain the steps in Linux kernel configuration. **[5]**

b) Explain the following file systems used in Embedded Linux. **[5]**

i) JFFS2

ii) ext4

iii) cramfs

iv) ext2

v) ReiserFS

c) Explain functional blocks of the boot-loader. **[7]**

OR

Q6) a) Draw and explain architecture of Linux Kernel. **[5]**

b) Explain the steps for porting U-Boot. **[5]**

c) List and explain the device driver operations. **[7]**

Q7) a) Explain the embedded software development tools. **[9]**

b) List the specifications and features of Beaglebone board. Explain the steps to boot up the Beaglebone board. **[8]**

OR

Q8) a) List the tasting and debugging tools. Explain how testing and debugging is carried out with the help of these tools. **[9]**

b) List the specifications and features of Raspbery-Pi Board. List the OS Supported by Raspbery-Pi. Write a short note on Raspbian OS. **[8]**



Total No. of Questions : 8]

SEAT No. : ____

PE-2240

[Total No. of Pages : 2

[6584] - 141

B.E. (Electronics & Telecommunication Engineering)

MODERNIZED IOT

(2019 Pattern) (Semester - VII) (404184 E) (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) ***Draw neat diagrams wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain IEEE 802.15.4 IoT Protocol in detail. **[9]**

b) Explain HTTP and MQTT session layer Protocol in IoT. **[8]**

OR

Q2) a) What is HART. Explain Basic Working of HART. **[9]**

b) Explain DHCP and AMQP network layer protocol w.r.t. IoT. **[8]**

Q3) a) How will Arduino communicate with Raspberry pi? Explain with example. **[9]**

b) Write a short note on Contiki OS and COOJA simulator. **[8]**

OR

Q4) a) Explain any 8 Arduino functions in detail. **[8]**

b) Explain the process of IoT deployment with respect to Raspberry Pi. **[9]**

Q5) a) Explain Wi-Fi backscatter in IIoT design. **[9]**

b) Explain eHealth IoT applications in detail. **[9]**

OR

P.T.O.

Q6) a) Enlist challenges faced by industry related IoT Applications. **[9]**

b) Explain IIAF Framework in detail. **[9]**

Q7) a) Explain case study on air pollution control system. **[9]**

b) Explain home automation system with neat diagram. **[9]**

OR

Q8) a) Design IoT based Patient surveillance system. **[9]**

b) Explain case study on forest fire detection system w.r.t. IoT. **[9]**



Total No. of Questions : 8]

SEAT No. :

PE-2241

[Total No. of Pages : 2

[6584]-142
B.E. (E & TC)
DATA MINING
(2019 Pattern) (Semester - VII) (404185 A) (Elective - IV)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Answer Q. No. 1 or 2, Q. No. 3or 4, 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 in detail the different techniques to improve classification accuracy. **[9]**

b) What are the different data visualization techniques? **[9]**

OR

Q2) a) Give the significance of Market Basket Analysis with example. **[9]**

b) Write the steps involved in FP growth algorithm. **[9]**

Q3) a) Detail linear regression with an example. **[9]**

b) Explain the procedure involved in rule-based classification. **[9]**

OR

Q4) a) Give the various steps involved in ID3 algorithm? **[9]**

b) Explain in detail the methodology involved in Support Vector Machines. **[9]**

Q5) a) Write short notes on hierarchical clustering. **[9]**

b) Discuss k-means algorithm with an example. **[8]**

OR

P.T.O.

Q6) a) What are the different types of data in cluster analysis? **[9]**

b) Differentiate between classification and clustering. **[8]**

Q7) a) What are the different types of crawlers? **[9]**

b) Give an account on differences between data mining and text mining. **[8]**

OR

Q8) a) Define web mining and explain web content mining. **[9]**

b) Write salient features ofspatial data mining. **[8]**

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Total No. of Questions : 8]

SEAT No. :

PE-2242

[Total No. of Pages : 2

[6584] - 143

B.E. (Electronics & Telecommunication Engineering)

ELECTRONICS PRODUCT DEVELOPMENT

(2019 Pattern) (Semester - VII) (404185 B) (Elective - IV)

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 indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain methods of product debugging. **[8]**

b) Explain in detail mechanism for cooling for an electronic product. **[10]**

OR

Q2) a) Describe documentation preparation for product. **[8]**

b) Write a note on: **[10]**

i) User interface

ii) Embedded and real-time software.

Q3) a) Explain the waterfall model of software development. **[7]**

b) State the salient features of **[10]**

i) Algorithm

ii) Flowchart

iii) Pseudo code

OR

Q4) a) Discuss any One with the help of a neat diagram /schematic. **[7]**

i) Structured programming

ii) Coupling and cohesion

b) Explain the spiral model of software development. **[10]**

P.T.O.

Q5) a) Discuss the development plan for risk abatement in software development. **[8]**

b) What is real-time software? Explain its significance in product design with examples. **[10]**

OR

Q6) a) Define / Explain the following terms associated with PCB design. **[10]**

i) Containment

ii) Electromagnetic interference (EMI)

iii) Electromagnetic compatibility (EMC)

iv) Immunity

v) Susceptibility

vi) Suppression

vii) Electrostatic discharge (ESD)

viii) Transmission mode of RF energy

b) Explain fan and forced cooling. **[8]**

Q7) a) What is testing and debugging? Explain the steps indebugging. **[6]**

b) Discuss tips for troubleshooting analog circuits and digital circuits. Also discuss the checklist for powering circuits during troubleshooting and debugging. **[6]**

c) With respect to the debugging process. explain the different types of characterization of components. **[5]**

OR

Q8) a) What are electromechanical components? Explain any two electromechanical components. **[6]**

b) Define documentation. What are the different types of documents to be prepared by the product manufacturer? **[6]**

c) Discuss the visual techniques of documentation with suitable examples. **[5]**



Total No. of Questions : 8]

SEAT No. :

PE-2243

[Total No. of Pages : 2

[6584]-144
B.E. (E & TC)
DEEP LEARNING
(2019 Pattern) (Semester - VII) (404185 C) (Elective - IV)

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

Instructions to the candidates :

1) ***Solve any four questions Que 1 or Que2 and Que 3 or Que4 and Que 5 or Que 6 and Que 7 or Que 8.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Assume suitable data, if necessary.***

Q1) a) What is the significance of Batch Normalization? How covariate shift reduced using batch normalization? **[7]**

b) Describe the following activation functions: **[10]**

i) Sigmoid,

ii) Threshold,

iii) ReLU 'Vanishing Gradient' occur in Sigmoid Function and 'Dying ReLU' occur in ReLu — Justify

OR

Q2) a) Write a Note on **[7]**

i) Dropout Method and

ii) Regularization

b) Explain the concept of Overfitting and Underfitting in deep learning. Support both terms using real time examples? **[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

P.T.O.

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]**

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Total No. of Questions : 8]

SEAT No. :

PE-5946

[Total No. of Pages : 2

[6584]-145

B.E. (Electronics and Telecommunication/Electronics)

LOW POWER CMOS

(2019 Pattern) (Semester - VII) (404185D) (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 inidcate full marks.***
4) ***Assume Suitable data if necessary.***

Q1) a) Explain the mathematical derivation for the optimal stage ratio in an inverter chain and analyze how transistor sizing is selectively applied to balance dynamic switching power against sub-threshold leakage. **[10]**

b) Discuss how the vertical reordering of transistors in a CMOS stack reduces propagation delay and explain how partitioning complex logic networks into sub-gates optimizes both performance and area. **[8]**

OR

Q2) a) Evaluate the architectural advantages of double-edge triggered flip-flops for frequency reduction and describe the internal logic of self-gating flip-flops used to minimize redundant clock switching. **[10]**

b) Describe the impact of cell sizing and Boolean function variety on layout efficiency and explain how adjustable threshold voltages via body biasing are utilized to manage the power-performance trade-off. **[8]**

Q3) a) Explain the role of signal probability and transition density in power estimation, and describe how BDDs or statistical techniques like Monte Carlo are used to handle signal correlations and reconvergent fan-out.**[9]**

b) Discuss the origin of glitching power in CMOS circuits and evaluate how sensitivity analysis can be used to identify and optimize gates that contribute most significantly to spurious switching activity. **[8]**

OR

Q4) a) Analyze the necessity of input vector compaction for efficient power simulation and compare the power dissipation characteristics of Domino logic against static CMOS. Specifically focusing on the pre-charge/ evaluate cycle. **[9]**

P.T.O.

b) Evaluate the effectiveness of Genetic Algorithms and Steepest Descent in estimating maximum power dissipation for circuit reliability, and compare these to ATPG-based approaches for finding worst-case switching patterns. **[8]**

Q5) a) Analyze the primary sources of software-induced power dissipation in embedded systems and compare the trade-offs between Gate-level Architecture-level, and Instruction Level power estimation techniques in terms of accuracy and computational overhead. **[10]**

b) Discuss the methodology of Instruction Level Power Analysis (ILPA), specifically focusing on how base energy costs and inter-instruction switching activities on system bases are quantified to estimate-total software energy. **[8]**

OR

Q6) a) Evaluate how software-level strategies. such as instruction reordering to reduce Hamming distance and loop transformations to minimize expensive off-chip memory accesses, contribute to significant dynamic power savings. **[10]**

b) Describe the framework of Hardware-Software Co-design for low power and explain how automated code generation and power management states (DVFS) are synchronized to optimize the energy-delay product of a system. **[8]**

Q7) a) Explain the fundamental principles of adiabatic switching and analyze how the use of a ramped power-clock enables energy recovery, effectively bypassing the traditional $E = \frac{1}{2} CV^2 d_d$ energy limit. **[9]**

b) Discuss the significance of battery aware synthesis in portable systems specifically evaluating how scheduling algorithms exploit the "recovery effect" and "rate capacity effect" of chemical batteries to extend operational life. **[8]**

OR

Q8) a) Analyze the challenged posed by Process. Voltage, and Temperature (PVT) fluctuations in nanometer technologies and describe how variation-tolerant techniques like Adaptive Body Biasing (ABB) ensure circuit reliability and power efficiency. **[9]**

b) Evaluate the capabilities of modern CAD tools in the low-power synthesis flow, focusing on their role in automating complex optimization such as clock gating operand isolation, and power-aware physical placement.**[8]**

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Total No. of Questions : 8]

SEAT No. :

PE-5947

[Total No. of Pages : 3

[6584]-146

BE (Electronics and Telecommunication/Electronics)

Smart Antennas

(2019 Pattern) (Semester - VII) (404185E) (Elective - IV)

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

Instructions to the candidates :

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 and Q7 or Q8***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data, if necessary.***

Q1) a) What is Mutual Coupling Effects in smart antennas? Which Performance issues are generated due to such mutual coupling? How to mitigate such issues. **[8]**

b) What is Smart Antenna? What are various types of Smart Antennas, explain benefits and drawbacks of Smart Antennas. **[9]**

OR

Q2) a) Explain the architecture of a smart antenna system with suitable diagram. **[8]**

b) What is beam steering? How does beam steering contribute to the effectiveness of smart antennas? Explain the key factors for implementing beam steering antennas. **[9]**

Q3) a) How do the Root MUSIC and Cyclic MUSIC algorithms contribute to the beam forming capabilities of smart antennas? With respect to key principles and other factors differentiate between these two MUSIC algorithms. **[9]**

b) What is Direction of Arrival (DOA)? List out various algorithms used to estimate DOA. Explain in detail linear prediction method for spectral estimation. **[9]**

P.T.O.

OR

Q4) a) Explain how Eigen Structure method approach is utilized for estimation of DOA? Explain in detail about Estimation of Signal Parameters via Rotational Invariance Techniques (ESPR IT) algorithm **[9]**

b) Write short note on; **[9]**

i) Maximum Entropy Method.

ii) Maximum Likelihood Method.

Q5) a) What is Beam forming? How does Direct Matrix Inversion (DMI) contribute to the optimization and performance enhancement of smart antenna systems? **[9]**

b) List out various adaptive algorithms for beam forming. Explain in brief about Linearly Constrained Minimum Variance (LCMV) algorithm & explain how does LCMV help in enhancing the quality of a signal in the presence of interference? **[9]**

OR

Q6) a) Explain the concept of Classical Beam former and Statistically Optimum Beam-forming Weight Vector. **[9]**

b) What is use of beam forming in smart antennas? What is fully adaptive array? Explain the LMS algorithm for smart antenna sytem? **[9]**

Q7) a) Compare SISO, SIMO, MISO, MIMO systems with respect following points, **[8]**

i) Number of Tx & Rx antennas

ii) BER

iii) Throughput

iv) Method for signal transmission

v) Quality of received signals

vi) Channel capacity

vii) Coverage

viii) SNR

b) What is antenna array? Explain in detail for various important issues and the state-of-the-art development for mm-wave hybrid arrays **[9]**

OR

Q8) a) What is the concept of MIMO system List out & explain various types of MIMO systems **[9]**

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

i) Massive MIMO.

ii) Antenna used in MIMO system.



Total No. of Questions : 8]

SEAT No. : ____

PE2244

[Total No. of Pages : 2

[6584]-147

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) ***Assume suitable data, if necessary.***
4) ***Use of non-programmable scientific calculator is allowed.***

Q1) a) State the equation for a Proportional Derivative (P+D) controller. Draw a circuit diagram for a Proportional Derivative (P+D) mode controller. **[6]**

b) Explain Ziegler Nichol's method of process control loop tuning. Tabulate the Ziegler Nichol's tuning formulae. **[6]**

c) In the Ziegler-Nichols method, the critical gain was found to be 8.2, and the critical period was 4.2 min. Find the standard settings for (i) Proportional mode control (ii) PI control (iii) PID control. **[6]**

OR

Q2) a) State the equation for a P+I controller. Sketch a neat circuit diagram for a P+I controller. **[6]**

b) Explain the concept of relay based tuning. State the advantages of relay based tuning. **[6]**

c) A proportional derivative controller has a 0.4 to 2.0 V input measurement range, a 0 to 5V output , Kp = 5%/% and Kd = 0.08 % per (%/min). The period of the fastest expected signal change is 1.5 sec. Implement this controller with an op-amp circuit. **[6]**

Q3) a) Explain with neat diagram feed-forward control scheme for a steam heated heat exchanger. **[6]**

b) Explain cascade control system with the help of suitable example. **[6]**

c) Explain auctioneering control scheme for tubular catalytic reactor. **[6]**

OR

P.T.O.

Q4) a) Explain Air: Fuel ratio control scheme for boiler furnace. Draw a neat P&ID for the same. **[6]**

b) Explain selective control scheme to protect process equipment. **[6]**

c) Explain split range control scheme with suitable example. **[6]**

Q5) a) What is Adaptive Control? Why do we need adaptive control? Explain Programmed or Scheduled Adaptive Control System. **[9]**

b) Explain with the help of neat block diagram Model Reference Adaptive Control (MRAC). **[8]**

OR

Q6) a) Explain the concept of self-tuning regulator with the help of neat block diagram. **[9]**

b) Explain Internal Model Control (IMC) for a First Order with Dead Time process. **[8]**

Q7) a) Explain the following design considerations for final control elements- **[9]**

i) capacity

ii) precision

iii) dynamics

iv) failure position

b) Explain steps involved in defining the problem in process control design. **[8]**

OR

Q8) a) Explain the hierarchy of control structure. **[9]**

b) Explain how plant performance is monitored in a typical process industry. **[8]**



Total No. of Questions : 8]

SEAT No. :

PE-2245

[Total No. of Pages : 2

[6584]-149
B.E. (Electronics)
ARTIFICIAL INTELLIGENCE AND NEURAL NETWORK
(2019 Pattern) (Semester - VIII) (404211B) (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) ***Assume Suitable data if necessary***
4) ***Use of non-programmable scientjfic calculator is allowed.***

Q1) a) Explain Elements of Neural Network with diagram? **[5]**

b) Explain Batch Normalization and Weight normalization? **[6]**

c) Draw and explain Architecture of Back Propagation Networks? **[6]**

OR

Q2) a) Explain Training of Neural Network? **[5]**

b) Explain the term Overfitting and Underfitting and write the various techniques to reduce it? **[6]**

c) With the help of neat diagram describe Sigmoid function and Tanh function? **[6]**

Q3) a) Explain How Convolution Neural Network Works? **[6]**

b) What is Padding and Pooling in Convolution Neural Network? **[6]**

c) Explain Advantages and Disadvantages of Convolution Neural Network? **[6]**

OR

Q4) a) Explain application of Convolutional Neural Network in detail? **[6]**

b) Describe Convolution layer and Strides in Convolution Neural Network? **[6]**

c) Explain components of Convolutional Neural Network? **[6]**

Q5) a) Describe different Recurrent neural network architecture in details? **[9]**

b) Explain Forward propagation and back propagation in Recurrent Neural Network? **[8]**

OR

P.T.O.

Q6) a) Explain Application, Advantages and disadvantages of Recurrent Neural Network? **[9]**

b) Explain Two issues of Standard Recurrent Neural Network with Diagram? **[8]**

Q7) a) Explain Natural Language processing using deep learning? **[6]**

b) Explain Speech recognition using deep learning? **[6]**

c) Describe Handwritten Digit Recognition using CNN? **[6]**

OR

Q8) a) Describe Image classification using deep learning.? **[6]**

b) Explain Various Applications Areas of Deep Learning? **[6]**

c) Explain in details different Phases of NLP? **[6]**



Total No. of Questions : 8]

SEAT No. :

PE-2246

[Total No. of Pages : 2

[6584]-150
B.E. (Electronics Engineering)
AUDIO VIDEO ENGINEERING
(2019 Pattern) (Semester - VIII) (404211C) (Elective-V)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Draw and Explain IPTV System. **[8]**

b) Write a short note on HD Video projector. **[8]**

OR

Q2) a) Explain the Transmitter and Receiver block Diagram of Wi-Fi TV. **[8]**

b) Compare LED,LCD and OLED display device. **[8]**

Q3) a) Draw and Explain block diagram of digital TV Transmitter. **[9]**

b) Explain MAC decoding in digital TV with suitable diagram. **[9]**

OR

Q4) a) What are the different encoding methods of picture in Mpeg-2. **[9]**

b) Draw and explain the block diagram of Jpeg compression technique. **[9]**

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

i) cone type loudspeaker

ii) Dolby 5.1 digital sound system

b) Explain the block diagram of typical PA system. **[9]**

OR

Q6) a) Explain the different Acoustical design aspect of auditorium. **[9]**

b) State various type microphones. Explain any one microphone and application in detail. **[9]**

P.T.O.

Q7) a) Explain the block diagram of Blue ray DVD player. **[9]**

b) Draw and explain the block diagram of CD recorder. **[9]**

OR

Q8) a) Compare CD,DVD and Blu-ray DVD. **[6]**

b) Write a short note on Mp3 player. **[6]**

c) State advantages and disadvantages of optical recording techniques. **[6]**

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Total No. of Questions : 8]

SEAT No. :

PE-2247

[Total No. of Pages : 2

[6584]-151
B.E. (Electronics)
AUTOMOTIVE ELECTRONICS
(2019 Pattern) (Semester - VIII) (404211D) (Elective-V)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6 and Q7 or Q8***
2) ***Figures to the right side indicate full marks.***

Q1) a) Explain the architecture of an 8/16-bit microcontroller, focusing on Ports, Timer/Counters, Interrupts, Watchdog timers, and PWM. **[9]**

b) Explain Criteria to choose the right microcontroller/processor for various automotive applications. **[9]**

OR

Q2) a) Describe the tool chains used for different processors such as Renesas, Quorivva, and Infineon. **[9]**

b) Explain Engine calibration, Torque table. **[9]**

Q3) a) Explain CAN, LIN Communication Protocol. **[9]**

b) Explain the relevance of protocols such as TCP/IP and Wireless LAN standards (e.g., Bluetooth, IEEE 802.1 lx) in automotive applications.**[8]**

OR

Q4) a) Discuss how TCP/IP enables network communication in vehicles and facilitates data exchange between onboard systems and external networks. **[9]**

b) Explain the integration of Global Positioning Systems (GPS) and General Packet Radio Service (GPRS) in telematics solutions. **[8]**

Q5) a) Explain the significance of control systems in regulating vehicle performance, safety, and efficiency. **[9]**

b) Explain Generator Model and Controller Model. **[9]**

OR

P.T.O.

Q6) a) Describe the use of Simulink simulations in automotive system development. and describe the system response using different control methods. **[9]**

b) Explain the techniques used to improve the accuracy of motor models based on real-world data and experimental validation. **[9]**

Q7) a) Explain the electronic transmission checks and diagnosis process in automotive systems. **[9]**

b) Compare on-board and off-board diagnostics in automobiles. **[8]**

OR

Q8) a) Describe the diagnostic procedures and sequences used to identify faults in electronic transmission systems. **[9]**

b) Discuss the role of electronic control units (ECUs) in monitoring and controlling transmission functions. **[8]**

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Total No. of Questions : 8]

SEAT No. :

PE-2248

[Total No. of Pages : 2

[6584]-152
B.E. (Electronics)
RENEWABLE ENERGY SYSTEM & DSM
(2019 Pattern) (Semester - VIII) (404212 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, Q.7 or Q.8.***
2) ***Figures to the right side indicate full marks.***

Q1) a) Discuss the operation of wind turbines at maximum power. Explain the factors that influence maximum power operation and how wind turbine controllers adjust turbine operation to achieve optimal performance. **[8]**

b) Identify and describe the different types of wind turbines, including horizontal- axis and vertical-axis designs. Compare and contrast their advantages, disadvantages and applications in various wind conditions. **[9]**

OR

Q2) a) Explain the concept of wind energy conversion and its significance in renewable energy generation. Discuss the basic components of a wind energy conversion system and their respective functions. **[9]**

b) Define the relationship between power and wind speed in wind turbines. Describe the concept of Tip Speed Ratio (TSR) and its importance in maximizing power output from wind turbines. **[8]**

Q3) a) Discuss the role of biomass in a diversified energy portfolio and its potential for contributing to energy security and rural development. Evaluate the challenges and opportunities associated with scaling up biomass utilization for sustainable energy production on a regional or national level. **[9]**

b) Explain anaerobic digestion as a biomass conversion technology. Describe the process of anaerobic digestion, including feedstock preparation, microbial digestion and biogas production. **[9]**

OR

P.T.O.

Q4) a) Describe biogas plants, including floating and fixed dome types. Discuss their design, operation and applications for decentralized energy production in rural and urban settings. **[9]**

b) Explore municipal solid waste management strategies for biomass utilization. Discuss methods for collecting, sorting and processing organic waste to extract energy through composting, anaerobic digestion, or incineration. **[9]**

Q5) a) Outline the process of developing a tidal power scheme. Discuss key considerations such as site selection, environmental impact assessment, turbine technology, grid integration and project financing. **[9]**

b) Discuss wave energy and its characteristics. Explain how waves are formed and describe the factors that influence wave energy potential, including wave height, period and direction. **[8]**

OR

Q6) a) Explain tidal energy and its characteristics. Discuss the factors that influence tidal patterns, such as lunar cycles, geographic location and coastal topography. **[9]**

b) Describe methods for estimating tidal energy potential at a given site. Discuss factors such as tidal range, water depth, flow velocity and energy extraction efficiency that affect the feasibility and output of tidal energy schemes. **[8]**

Q7) a) Explain the Electricity Act and regulatory framework governing DSM initiatives. Discuss the role of regulatory agencies in promoting DSM, setting targets, establishing incentives, and ensuring compliance with DSM policies. **[9]**

b) Discuss technology options for DSM in lighting, space cooling (ceiling fans, AC systems), refrigeration and water cooling. Describe energy-efficient technologies, smart controls and automation systems used to optimize energy consumption and demand. **[9]**

OR

Q8) a) Define Demand-Side Management (DSM) and explain its relevance in the context of electricity supply and consumption. Discuss how DSM helps utilities manage electricity demand, reduce peak loads and improve system efficiency. **[9]**

b) Describe the objectives of load shape management in the context of DSM. Discuss how utilities use load shape objectives to optimize electricity supply, balance generation and demand and meet customer needs efficiently. **[9]**

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Total No. of Questions : 8]

SEAT No. :

PE-2249

[Total No. of Pages : 2

[6584]-153
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) ***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) State key features of Bluetooth Low Energy (BLE) protocol. State advantages, disadvantages of Bluetooth Low Energy (BLE) protocol. **[6]**

b) Draw and explain cross layer protocol stack architecture. **[6]**

c) Write short note on: **[8]**

i) Z-Wave Protocol

ii) ISA 100.1 la protocol/standard

OR

Q2) a) List key features of Wibree protocol/standard. State advantages, disadvantages of Wibree protocol/standard. **[6]**

b) Explain architecture of Wireless HART protocol/standard **[6]**

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

i) IEEE802. 15.4 Low rate WPAN

ii) 6LoWPAN

Q3) a) What is routing in wireless sensor network? Explain full-network broadcast routing protocol with flow diagram. **[8]**

b) Explain collection tree routing protocol and Zigbee routing protocol in wireless sensor networks. **[8]**

OR

P.T.O.

Q4) a) What is localization in wireless sensor network? Explain types of location information in WSN. Explain localization precision and localization accuracy. **[8]**

b) Explain the proximity schemes and ranging schemes for localization in wireless sensor networks. **[8]**

Q5) a) Explain goal oriented attacks and layer oriented attacks in wireless sensor networks. **[8]**

b) Explain Statistical analysis in wireless sensor network. Explain compressive sampling in statistical analysis in wireless sensor network. **[8]**

OR

Q6) a) With the help of diagram explain random clustering technique in WSN. **[8]**

b) Explain defensive measures for attacks in physical layer and data link layer in WSN **[8]**

Q7) a) Explain semantic problems and global problems in deployments of wireless sensor network. **[6]**

b) Explain the Top-down design process of deployment of WSN. **[6]**

c) Explain early WSN deployments in brief. Explain the requirement analysis in WSN. **[6]**

OR

Q8) a) What is deployment in wireless sensor network? Explain early WSN deployment with example. **[6]**

b) Explain the Bottom-up design process of deployment of WSN. **[6]**

c) Explain link/path problems and topology problems in deployments of wireless sensor network. **[6]**

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Total No. of Questions :8]

SEAT No. : [ ]

PE2250

[Total No. of Pages : 2

[6584]-154
B.E. (Electronics Engineering)
VLSI DESIGN
(2019 Pattern) (Semester-VII) (404201)

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) Draw circuit Diagram, waveforms and explain the operation of 6T SRAM cell. **[9]**

b) Explain the classification of memory. Enlist the performance parameters and timing parameters of semiconductor memory. **[8]**

OR

Q2) a) Sketch the diagram and explain the working of 3T- DRAM along with read and write operation. **[9]**

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

i) One Transistor DRAM cell

ii) Sense amplifier

Q3) a) Explain in detail about the Block Placement and channel definition. **[9]**

b) Discuss the two complementary ways to improve clock distribution. Explain in detail about H-tree and balanced tree clock network. **[8]**

OR

Q4) a) Enlist the advantages of Package in chip design. Explain Power distribution in details. **[9]**

b) Describe Routing in VLSI design cycle. Explain Global Routing in detail. **[8]**

P.T.O.

Q5) a) Explain in detail with suitable example about implementing functions using Shannon's Decomposition. **[9]**

b) Explain in detail about Dedicated Memory in FPGAs. List out the benefits of boundary scan. **[9]**

OR

Q6) a) Sketch the block diagram of TAP controller and explain it in detail. **[9]**

b) Explain carry chains and cascade carry chains in FPGA with neat sketch. **[9]**

Q7) a) Sketch the Schematic and Stick Diagram of the following circuits: **[10]**

i) CMOS NOR Gate

ii) CMOS Inverter

b) Explain the concept of modelling and extraction of circuit parameters from physical layout in detail. **[8]**

OR

Q8) a) Illustrate the concept of constant-field scaling and constant voltage scaling in detail. **[10]**

b) Describe Lambda-based layout design rules in detail. Explain the Automatic layout tools in detail. **[8]**



Total No. of Questions : 8]

SEAT No. : ____

PE-2251

[Total No. of Pages : 2

[6584]-155

B.E. (Electronics)

Advanced Power Electronics

(2019 Pattern) (Semester - VII) (404202)

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.***

Q1) a) Explain Basic characteristics of DC motors, Operating modes, and Motor performance parameters. **[8]**

b) Elaborate 1ϕ converter fed drives for separately excited DC motors for continuous operations with suitable waveforms. **[9]**

OR

Q2) a) A 15 hp, 220V, 2000 rpm, separately excited DC motor a load requiring a torque TL = 45 N-m at a speed of 1200 rpm. Field circuit resistance R_f=147Ω, armature circuit resistance R_a= 0.25Ω and the voltage constant of motor is K_v= 0.7032 V/A- rad/S. The field voltage is 220V. Armature current is continues and ripple free. Determine
i) Back emf, E_g ii) Required armature voltage, E_a and
iii) The rated armature current, I_a of the load. **[9]**

b) Explain working principle of chopper fed drives with circuit diagram and suitable waveforms. **[8]**

Q3) a) Draw & Explain Induction motor Characteristics in details. **[9]**

b) Elaborate Variable frequency PWM VSI Drives with suitable waveforms. **[9]**

P.T.O.

OR

Q4) a) Explain stator voltage control, stator voltage and frequency control, rotor resistance control methods for controlling speed of induction motor. **[9]**

b) Explain braking of induction motors. **[9]**

Q5) a) Explain with neat circuit diagram and waveform, working of permanent magnet brushless DC motor drives. **[9]**

b) Explain operation of Servo motor drives in details with circuit diagram and suitable waveforms. **[8]**

OR

Q6) a) Explain Working of switched reluctance motor drives with suitable circuit diagram and waveforms. **[9]**

b) Elaborate Synchronous reluctance motor drive in details with suitable diagrams. **[8]**

Q7) a) Explain PV characteristics of solar power system. **[9]**

b) Explain types of PV System **[9]**

i) Stand-alone PV system

ii) Grid connected PV system

OR

Q8) a) Explain types of wind generator control of wind turbines. **[9]**

b) Compare Standalone wind energy system and Grid connected wind energy system. **[9]**

Total No. of Questions : 8]

SEAT No. :

PE-2252

[Total No. of Pages : 2

[6584]-156
B. E. (Electronics Engineering)
ELECTRONICS SYSTEM DESIGN
(2019 Pattern) (Semester - VII) (404203)

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) Explain the selection criteria of microcontroller for particular DAS application. **[6]**

b) Draw and explain interfacing of temperature sensor with microcontroller **[6]**

c) Compare SPI & 12C bus **[8]**

OR

Q2) a) What are different factors to be considered in selection of Microcontroller? Explain it in details. **[6]**

b) Draw and explain interfacing of LCD with microcontroller? **[6]**

c) Write short note on: **[8]**

i) LIN Bus

ii) CAN Bus

Q3) a) What are the features of assemblers & cross compiler **[8]**

b) Explain factors affecting the choice of assembly language & high level language **[8]**

OR

Q4) a) With the help of neat diagram, explain different phases of software design **[8]**

b) What are features of high level & low level languages? **[8]**

P.T.O.

Q5) a) Explain in details: Shielding & Guarding in precision circuits **[8]**

b) Explain rules of PCB Design for mixed signal circuits **[8]**

OR

Q6) a) List and explain different design considerations for high speed digital circuit PCB. **[8]**

b) What is EMI & EMC? Explain the different standards for same **[8]**

Q7) a) Explain the importance of DC analysis with example. **[6]**

b) Explain DSO with the help of diagram. **[6]**

c) What is the need of probes & what are the different probes used in logic analyzer? **[6]**

OR

Q8) a) What is need of environmental testing? Explain any one type of environmental testing? **[6]**

b) Explain any two analysis used in finding fault in circuit. **[6]**

c) Explain Logic Analyzer with the help of neat block diagram? **[6]**

♦ ♦ ♦

Total No. of Questions : 8]

SEAT No. :

PE-2253

[Total No. of Pages : 2

[6584]-157
B.E (Electronics Engineering)
Internet of Things
(2019 Pattern) (Semester - VII) (404204A) (Elective - III)

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

Instructions to the candidates :

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 and Q7 or Q8***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data, if necessary.***

Q1) a) Draw and explain in detail architecture of Wireless Sensor Network. **[6]**

b) What is full form of IaaS? Explain what is IaaS? What are merits and demerits of IaaS. **[6]**

c) Where does WSN find applications? Explain any one application in detail with appropriate diagram. **[8]**

OR

Q2) a) What are challenges of cloud computing? Explain each challenge in brief. **[6]**

b) What are different types of cloud? With help of neat diagram explain each type in detail **[6]**

c) With the help of neat diagram explain how WSN can be used in Healthcare system. **[8]**

Q3) a) What is DC motor. Draw the interfacing diagram of DC motor with Arduino Board. Also write the program for same. **[8]**

b) What is Raspberry Pi? Draw the interfacing diagram of LED with Raspberry Pi. Also write the program for blinking LED with delay of 10 second. **[8]**

P.T.O.

OR

Q4) a) Explain the principle of LDR sensor. Draw the interfacing diagram of LDR sensor with Arduino Board. Also write the program for same. **[8]**

b) What is Arduino? What do you mean by open source hardware and software? State the features of Arduino because of which it is widely preferred. **[8]**

Q5) a) What are the characteristics of Big data? List out the components of Big data solution. Also explain each one in detail. **[8]**

b) Explain the following terms: **[8]**

i) Statistical Models

ii) Contingence and Correlation

OR

Q6) a) Explain the following terms: **[8]**

i) Analysis of Variance

ii) Data Dispersion

b) Draw architecture of Hadoop. Why is Hadoop used for big data analysis? Explain different features of Hadoop. **[8]**

Q7) a) Explain the Smart Agriculture monitoring system using IoT. **[9]**

b) With the help of neat diagram explain IoT based Smart Car Parking system. **[9]**

OR

Q8) a) Write short notes on trends in Wearable Technology. Also list any two applications for same. **[9]**

b) Explain in detail any one case study where IoT is playing a vital role in real life. **[9]**

Total No. of Questions : 8]

SEAT No. :

PE-2254

[Total No. of Pages : 2

[6584]-158
B.E.- (Electronics)
SOFTWARE DEFINED RADIO
(2019 Pattern) (Semester - VII) (404204B) (Elective III)

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

Instructions to the candidates :

1) ***Solve Q1 or Q2, Q3 or Q4, Q5 or Q6 and Q7 or Q8***
2) ***Figures to the right side indicate full marks.***
3) ***Assume the suitable data, if necessary.***

Q1) a) What do you mean by Channel Estimation? Explain any one channel estimation technique. **[8]**

b) Describe multi-rate operations such as decimation, interpolation and resampling. **[8]**

OR

Q2) a) Explain the role of **[8]**

i) DSP techniques in SDR,

ii) OFDM in SDR

b) Explain the concept of sample timing recovery and its importance in SDR **[8]**

Q3) a) Briefly explain the significance of IEEE 1900.x standards in Cognitive Radio standardization. How do these standards contribute to in the field of Cognitive Radio? **[9]**

b) Explain cognitive capability, operating frequency and reconfiuration in cognitive radio. **[9]**

P.T.O.

OR

Q4) a) Identify the emerging trends and technologies that shape the future of wireless networks. **[9]**

b) Elaborate the spectrum management challenges in cognitive radio **[9]**

Q5) a) Draw and explain the architecture of cognitive radio **[9]**

b) What is Spectrum Brokering? Explain Spectrum Brokering Services Information Modelling. **[9]**

OR

Q6) a) Explain how is the statistical characterization of node locations utilized in topology-aware CRN architectures? **[9]**

b) Describe a common architecture for spectrum sensing in Cognitive Radio networks. Explain the importance of spectrum sensing in Cognitive Radio Networks? **[9]**

Q7) a) Explain Public Safety Communication, TETRA and C2000. **[9]**

b) Briefly describe the characteristics of commercial wireless communication networks. How Cognitive Radio improves the performance of commercial wireless networks? **[9]**

OR

Q8) a) Write a note on **[9]**

i) Bandwidth requirements in cognitive radio

ii) White space assessment in cognitive radio

b) Explain the economic value of spectrum and optimum utilization of spectrum in cognitive. **[9]**

Total No. of Questions : 8]

SEAT No. : ____

PE-2255

[Total No. of Pages : 2

[6584]-159
B. E. (Electronics)
Testing and Verification for SOC Design
(2019 Pattern) (Semester - VII) (404204 C) (Elective - III)

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

Instructions to the candidates :

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 and 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) Design algorithm for Fault Simulation with appropriate example. **[6]**

b) Which statistical models used for fault simulation, Explain in brief. **[6]**

c) Which are the steps to enhance Testability of circuit? **[6]**

OR

Q2) a) Explain Analog and Digital Testing Processes of VLSI. **[6]**

b) Explain in detail various Fault models with its level in details. **[6]**

c) Explain any two from the following Testing techniques with respect to test equipment: **[6]**

i) Automatic Test equipment

ii) Chip testing technique

iii) Electrical parameter Testing

P.T.O.

Q3) a) Explain testing methodology for sequential circuits. **[5]**

b) Explain testing methodology for combinational circuits. **[5]**

c) What is Simulation-Based Sequential Circuit ATPG? Explain in detail. **[8]**

OR

Q4) a) What are the significance for Combinational ATPG program? **[10]**

b) Elaborate briefly redundancy identification for combinational circuit. **[4]**

c) Elaborate briefly redundancy identification for sequential circuit. **[4]**

Q5) a) What are the importance of Digital DFT scanning methods? Explain in brief. **[8]**

b) Write a note on Random Logic Built in self test (BIST). **[9]**

OR

Q6) a) Explain Built in self test (BIST) for VLSI chip in brief. **[9]**

b) Explain DFT methods for Scan design. **[8]**

Q7) a) Give different Description languages for boundary scan. **[9]**

b) Write a brief note on BIST **[8]**

OR

Q8) a) Is any factor responsible for the selection of scanning Memory BIS? If yes, then explain 4 in brief. **[9]**

b) Explain system configuration steps with boundary scan. **[8]**

Total No. of Questions : 8]

SEAT No. :

PE-2256

[Total No. of Pages : 2

[6584]-160
B.E. (Electronics)
MOBILE COMMUNICATION
(2019 Pattern) (Semester - VII) (404205 A) (Elective - IV)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Answer the Q1. Or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
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) Differentiate between equalizer and diversity techniques **[6]**

b) Explain in any two space diversity methods. **[6]**

c) With neat diagram explain the operation of RAKE receiver. **[6]**

OR

Q2) a) What is mean by Equalizers? Classify the equalizers. **[6]**

b) Explain with neat diagram BPSK receiver. **[6]**

c) Explain with neat diagram the working of QPSK Transmitter and Receiver **[6]**

Q3) a) Draw and explain GSM Architecture in details. **[8]**

b) Explain in details Call processing of Mobile terminated call in AMPS **[9]**

OR

Q4) a) What are the different logical channel in GSM & explain each channel. **[8]**

b) Explain in details Mobile Station originated call setup procedure. **[9]**

P.T.O.

Q5) a) Explain generic architecture of TD-SCDMA. **[9]**

b) Explain in details Interference-Mitigation Techniques of radio network. **[8]**

OR

Q6) a) Draw & explain GSM Time Hierarchy. **[9]**

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

Q7) a) Draw and explain the Distributed Central Switching Office for CCS **[6]**

b) With neat diagram explain network architecture for UMTS. **[6]**

c) Draw the layer architecture of protocol SS7 and explain it. **[6]**

OR

Q8) a) Write note on development in wireless network. **[6]**

b) Compare wireless network & fixed telephone network. **[6]**

c) Draw and explain X.25 protocol in details. **[6]**

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Total No. of Questions : 8]

SEAT No. :

PE-2257

[Total No. of Pages : 2

[6584]-161

B.E. (Electronics Engg.)

EMBEDDED SYSTEMS

(2019 Pattern) (Semester - VII) (404205 B) (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 side indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) What is Piping? Explain its significance in the speed of embedded system? **[6]**

b) Explain Task Scheduler. Describe the types of Task Scheduling algorithms. **[6]**

c) Compare Response & Recovery concepts in embedded system. **[5]**

OR

Q2) a) What is interrupt. Explain Interrupt handling mechanism in an embedded system. **[6]**

b) Describe message Queue, Mailbox and Event register in embedded system. **[6]**

c) Explain intertask communication in embeddes system. **[5]**

Q3) a) What are the features of QNX Neutrino & Vx Works. **[6]**

b) What is RTOs? Compare it with OS. **[6]**

c) Compare Vx Works & Microclos RTOS. **[5]**

OR

Q4) a) Describe selection criteria of RTOS in any embedded application. **[6]**

b) What is Embedded Linux. Explain features. **[5]**

c) Enlist the RTOS available. Explain the consideration of any RTOS for embedded system. **[6]**

P.T.O.

Q5) a) Describe the steps of embedded system design. **[6]**

b) Explain Design matrix of embedded system. **[6]**

c) Compare Logic analyzer & in circuit emulator. **[6]**

OR

Q6) a) Explain software tools used for testing & design of embedded system. **[6]**

b) Draw & explain block diagram of logic analyzer. **[6]**

c) Describe the project management cycle of any embedded system. **[6]**

Q7) a) Describe the case study of Adaptive cruise control. **[6]**

b) Describe the case study of Automatic Chocolate Vending Machine. **[6]**

c) Describe the case study of Smart card embedded system. **[6]**

OR

Q8) a) Explain RTOS in transmission system using TCP/IP Protocol. **[6]**

b) Describe the coding steps followed in smart card development of embedded system. **[6]**

c) Explain coding steps case study of Chocolate Vending Machine. **[6]**



Total No. of Questions : 8]

SEAT No. :

PE-2258

[Total No. of Pages : 2

[6584]-162
B.E. (Electronics)
OPTIMIZATION TECHNIQUES
(2019 Pattern) (Semester - VII) (404205 C) (Elective - IV)

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

Instructions to the candidates:

1) ***Solve any four questions Que. 1 or Que. 2 and Que. 3 or Que. 4 and Que. 5 or Que. 6 and Que. 7 or Que. 8.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Assume suitable data if necessary.***

Q1) a) Maximize $Z = 200 X_1 + 400 X_2$ **[9]**

Subject to:

$x_1 + 3 x_2 \leq 400$

$x_1 + 2 x_2 \leq 350$

$x_1 + x_2 \geq 200$

$x_1 \geq 0, x_2 \geq 0$

b) Solve the following Linear Programming Problem graphically : **[9]**

Maximize:

$Z = 3 x_1 + 2 x_2$

Subject to:

$x_1 + x_2 \leq 4$

$2 x_1 + x_2 \leq 5$

$x_1 \geq 0, x_2 \geq 0$

OR

Q2) a) Explain the **Standard Form of a Linear Programming Problem** and provide a step-by-step method to **solve a system of linear equations using Gaussian elimination.** Additionally, discuss the **Simplex Algorithm** for identifying an optimal point and improving a non optimal basic feasible solution. **[9]**

b) State the **fundamental theorem of linear programming,** explain the **pivotal reduction of a general system of linear equations,** and outline the procedure of the **Simplex algorithm** for improving a non-optimal basic feasible solution. **[9]**

P.T.O.

Q3) a) Use the **Dichotomous Search Method** to minimize the function $f(x) = x^2 + 4x + 4$ in the interval [0,5] with a tolerance of 0.01. **[9]**

b) Use **Quadratic Interpolation** to find the minimum of the function $f(x) = x^2 - 4x + 3$ using the points (1,f (l)), (2,f (2)) and (3, f (3)). **[8]**

OR

Q4) a) Compare and contrast elimination methods and interpolation methods in one-dimensional minimization. **[8]**

b) Explain the convergence characteristics of direct root methods in one- dimensional minimization. **[9]**

Q5) a) Differentiate between Direct Search Methods and Indirect Search Methods in Unconstrained Optimization. **[9]**

b) Explain the Conjugate Gradient Method and its advantages over the Steepest Descent Method. **[9]**

OR

Q6) a) Minimize the function $f(x, y) = x^2 + y^2 + 4x - 6y + 13$ using the steepest descent method starting from the initial point $(x_0, y_0) = (0, 0)$. Perform two iterations with a step size of 0.1. **[9]**

b) Use Powell's method to minimize the function $f(x, y) = (x-1)^2 + (y-2)^2$, starting from the initial point $(x_0, y_0) = (0, 0)$. Perform one complete cycle of optimization along the coordinate directions. **[9]**

Q7) a) Explain the Karush-Kuhn-Tucker (KKT) conditions and their significance in constrained optimization. **[9]**

b) Discuss the key components and applications of Quadratic Programming (QP) in constrained optimization. **[8]**

OR

Q8) a) What is the Generalized Reduced Gradient (GRG) Method? Explain its steps and relevance in solving nonlinear programming problems. **[9]**

b) Compare the necessary and sufficient conditions for constrained and unconstrained optimization. **[8]**

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Total No. of Questions : 8]

SEAT No. : ____

PE2259

[Total No. of Pages : 2

[6584]-163
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 the 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 interprocess communication? What are various types of Synchronous and asynchronous communication in IPC? Why it is blocking receive has no disadvantages in Java. **[8]**

b) Explain the concept of "happened-before" relationship in the context of Lamport's logical clock algorithm? How does an algorithm assign timestamps to events in a distributed system? **[9]**

OR

Q2) a) Define External Data Representation, Marshalling and Unmarshalling. Discuss the three alternative approaches to XDR and marshalling. **[8]**

b) Consider the Figure 1 that shows four processes (P1, P2, P3, P4) with events a, b, c,... and messages communicating between them. Assume that initial logical clock values are all initialized to 0. List the Lamport timestamps for each event shown in Figure 1. Assume that each process maintains a logical clock as a single integer value as a Lamport clock. Provide timestamps for each labeled event. **[9]**

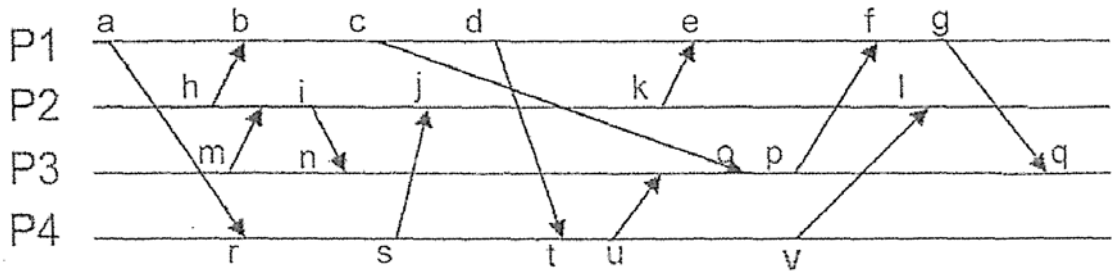


Figure 1: A space-time diagram

P.T.O.

Q3) a) Discuss the two important reasons for wanting to replicate data and how does replication relate to scalability? **[9]**

b) What is client-centric consistency model? Explain monotonic read consistency with suitable example. **[9]**

OR

Q4) a) What is the distribution commit problem? Discuss how this problem is solved using the two-phase commit protocol with suitable diagram. **[9]**

b) What is the key issue in distributed system that supports replication? Differentiate replica-server and content placement. Discuss in brief, various ways to compute best placement of replica servers. **[9]**

Q5) a) Why Quality of Service Management is important in Distributed Multimedia Systems? Describe QoS manager responsibilities using suitable graphical representation. **[8]**

b) Describe the Sun Network File System architecture in details. **[9]**

OR

Q6) a) Describe the design of a peer-to-peer file sharing application designed to support very large multimedia files. How does the BitTorrent protocol operate? **[9]**

b) Describe, using the appropriate diagram, how a web service is implemented in horizontal distribution using web server clusters. **[8]**

Q7) a) Explain the following in brief: **[9]**

i) Wearable devices

ii) PVM

iii) JINI

b) What is Service Oriented Architecture (SOA)? Explain the various SOA components. How does it differ from traditional software architecture?**[9]**

OR

Q8) a) Explain in brief, the key features of Prometheus including data model, query language, or alerting rules. **[9]**

b) Explain in brief following Microkernels **[9]**

i) CHORUS

ii) Mach

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Total No. of Questions : 8]

SEAT No. :

PE-2260

[Total No. of Pages : 2

[6584]-164
B.E. (I.T.)
SOFTWARE DEFINED NETWORK
(2019 Pattern) (Semester - VIII) (414451A) (Electiv-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.***

Q1) a) Define Design goals of Network Virtualization? **[9]**

b) Describe Benefits & Challenges for Network Function Virtualization? **[9]**

OR

Q2) a) Enlist and explain various Virtual Network Applications in Cloud Computing? **[9]**

b) Describe Various Services of Cloud using SDN? **[9]**

Q3) a) Define Data center Network & explain goals of Data center Design? **[9]**

b) Describe Taxonomy of DCN topology & Explain Fat-Tree topology in detail? **[9]**

OR

Q4) a) Write Short note on Failure recovery and Multi Tenancy issues in Data Centers? **[9]**

b) Enlist various Programmable languages of SDN in detail? **[9]**

Q5) a) What are applications of Software Defined Network Security (SDN) Security? **[9]**

b) Explain Security Analysis and Potential attacks in SDN in detail? **[9]**

OR

Q6) a) Demonstrate the Network Security enhancement using the SDN Framework? **[9]**

b) What are the Solutions to the security issues in SDN? **[9]**

P.T.O.

Q7) a) Differentiate Reactive versus Proactive Applications of SDN applications? **[8]**

b) Write a short note on Traffic Engineering for Service Providers? **[8]**

OR

Q8) a) Describe Traffic Engineering in Mobile Networks with neat diagram? **[8]**

b) Draw & Explain application of Open Daylight Controller? **[8]**

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Total No. of Questions : 8]

SEAT No. :

PE-2261

[Total No. of Pages : 2

[6584]-165
B.E. (Information Technology)
SOCIAL COMPUTING
(2019 Pattern) (Semester - VIII) (414451B) (Elective-V)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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.***

Q1) a) What is data mining? Explain Motivations for Data mining in Social Media. **[9]**

b) Explain Keyword Search, Query Semantics and Answer Ranking. **[8]**

OR

Q2) a) Explain clustering algorithm with single linkage clustering. **[9]**

b) What is classification? Explain with diagram. **[8]**

Q3) a) How to measure Influence of Homophily? **[8]**

b) Discuss shuffle test designed for in the context of social influence. **[9]**

OR

Q4) a) Explain the Homophily & Influence. **[8]**

b) Explain Edge-Reversal Test, Randomization Test. **[9]**

Q5) a) Write a note on components of behaviour analysis methodology. **[9]**

b) Explain individual behaviour modelling and social community structure. **[9]**

OR

Q6) a) What is Collective behaviour modelling? **[9]**

b) Explain Classical Recommendation Algorithms. **[9]**

P.T.O.

Q7) a) Explain quality of analytics for processing human language Data. **[9]**

b) Explain Mining Web pages with Scraping, Parsing, and crawling Web. **[9]**

OR

Q8) a) What is natural language processing? Explain different steps which are involved inNLP. **[9]**

b) What is TF-IDF? Explain with the help of example. **[9]**

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Total No. of Questions : 8]

SEAT No. :

PE-2262

[Total No. of Pages : 2

[6584]-166

B.E. (INFORMATION TECHNOLOGY)

Natural Language Processing

(2019 Pattern) (Semester - VIII) (414451 C) (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 side indicate full marks.***
4) ***Assume Suitable data if necessary***

Q1) a) What are the different types of cohesion? Provide an example of each. **[6]**

b) How do formal semantics models represent meaning? Illustrate with an example **[6]**

c) Write a short note on Semantic Analysis **[6]**

OR

Q2) a) What is discourse processing and why is it important in natural language understanding **[6]**

b) What is the role of ontologies in meaning representation? Illustrate with an example **[6]**

c) Explain the difference of discourse structure from other reference mechanisms **[6]**

P.T.O.

Q3) a) Explain the journey of text processing from word Sequences to dependency Paths **[7]**

b) Write short note on the following **[10]**

i) InFact System Overview

ii) GlobalSecurity.org

OR

Q4) a) Write a note on "Learning to Annotate Cases with Knowledge Roles"**[9]**

b) Elaborate on trainable document separation to explain how pages are classified during the process, using relevant examples or techniques. **[8]**

Q5) a) Explain the process of multi-document summarization. Prove it with proper example **[8]**

b) Explain the process of multi-document summarization. Apply the same on sample document and show the process. **[9]**

OR

Q6) a) How does the quality of data affect the outcome of a modeling task?**[8]**

b) What is automatic document separation, and how does it work? **[9]**

Q7) a) Explain in detail Information Retrieval. Explain Design features of Classical - Information Retrieval Systems **[10]**

b) Explain the stammers in detail also frame net and word net. **[8]**

OR

Q8) a) Explain below models of Information Retrieval 1. Boolean Model 2. Probabilistic Model **[10]**

b) Explain design feature of IR system with a neat diagram **[8]**

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PE-2263

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B.E. Information Technology

SOFT COMPUTING

(2019 Pattern) (Semester - VIII) (414451 D) (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 side indicate full marks.***
4) ***Assume Suitable data if necessary.***

Q1) a) What are fuzzy relations? Explain following operations on fuzzy relations

i) Intersection ii) Containment. **[9]**

b) What is fuzzy logic? Enlist and explain it's application areas. **[8]**

OR

Q2) a) List and explain following fuzzy set operations with e.g.

i) Normal fuzzy set ii) Product of fuzzy set. **[9]**

b) What is Fuzziness? Explain the merits and demerits of fuzzy logic. **[8]**

Q3) a) What is Genetic Algorithm? With the neat flow chart explain operations of simple genetic algorithms. **[9]**

b) What are types of mutation and cross over techniques.? Explain in brief.**[9]**

OR

Q4) a) What are Applications of Genetic Algorithms? Explain how genetic algorithms are used in search and optimization? **[9]**

b) Explain Encoding in Genetic Algorithms in detail. **[9]**

P.T.O.

Q5) a) What is significance of Hybrid Systems in Soft Computing? What are various Hybrid Systems in Soft Computing? Explain any two. **[9]**

b) Explain Simplified Fuzzy ARTMAP with suitable case study. **[8]**

OR

Q6) a) Explain the working of Neuro fuzzy system with suitable diagram. **[9]**

b) Compare and contrast Genetic Algorithm based Back-propagation Network and Fuzzy Backpropagation network with suitable diagrams.**[8]**

Q7) a) Describe an application about how soft computing can be used in mobile adhoc networks. **[9]**

b) Describe an application of fuzzy in pattern recognition-character recognition. **[9]**

OR

Q8) Write Short Notes on following: (Any Three) : **[18]**

a) Ant colony optimization (ACO)

b) Neuro-Fuzzy modeling

c) Tabu search

d) Particle Swarm Optimization (PSO).

Total No. of Questions : 8]

SEAT No. :

PE-2264

[Total No. of Pages : 2

[6584]-168

B.E. (Information Technology)

GAME ENGINEERING

(2019 Pattern) (Semester - VIII) (414451 E) (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 side indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume Suitable data if necessary***

Q1) a) What are the four objectives to accomplish onboarding? **[6]**

b) What are the potential downsides of gamification and how can they be mitigated? **[6]**

c) Explain Remodelling design for opponents move in gamification. **[6]**

OR

Q2) a) What is MBA framework of game designing? **[6]**

b) How do game mechanics influence user engagement in digital products and services? **[6]**

c) For game designer how badges are an excellent way to encourage social promotion of their product and services? **[6]**

Q3) a) How do the “Rules of Digital Games’ differ from those of traditional board or card games? **[6]**

b) How does “Strategic Network Formation” impact the design and outcomes of network games? **[5]**

c) What is the “Price of Anarchy” and how does it relate to network games and their outcomes? **[6]**

P.T.O.

OR

Q4) a) What are the "Three Levels" of rules in game design and how do they relate to gameplay? **[6]**

b) How does "Utility-based Resource Allocation" impact gameplay in network games? **[5]**

c) What is "Selfish Routing" and how does it relate to network games? **[6]**

Q5) a) List and exptain the features of any gamification server. **[6]**

b) Explain useful features of mambo. How mambo platform can be used for e- learning activity? **[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]**

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 of the advantages and disadvantages of using Flowlab for game development and how does it compare to other game engines? **[6]**

c) What are some key features of Scratch and how does it differ from other game engines in terms of accessibility and ease of use? **[6]**

Q7) a) How have game developers used game engineering to create a competitive and engaging experience in Counter-Strike? **[8]**

b) How have game developers used game engineering to create a flexible and customizable experience in Minecraft? **[9]**

OR

Q8) a) What are some ways in which game engineering can be used to create effective advertising campaigns? **[8]**

b) How does game engineering play a role in the creation and maintenance of a blockchain-based game like Axie Infinity? **[9]**

Total No. of Questions : 8]

SEAT No. :

PE-2265

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[6584]-169
B. E. (Information Technology)
ETHICAL HACKING AND SECURITY
(2019 Pattern) (Semester - VIII) (414452 A) (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 side indicate marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain Metasploit in detail. **[6]**

b) Explain Port Scanning with Metasploit. **[6]**

c) What is Social Engineering Toolkit (SET) **[6]**

OR

Q2) a) Explain the client-side exploitation method in detail. **[6]**

b) What are system hacking counter measures list any five. **[6]**

c) Explain the terms keyloggers and spyware? **[6]**

Q3) a) What is LXD Linux container. **[6]**

b) Explain Windows privilege escalation techniques. **[5]**

c) What is the Access token manipulation technique? **[6]**

OR

Q4) a) Explain in detail Horizontal escalation and Vertical escalation techniques. **[6]**

b) Explain the step-by-step path to privilege escalation. **[5]**

c) Detail describe Privilege Escalation Attack Vectors. **[6]**

P.T.O.

Q5) a) Explain the terms Cross-Site Scripting (XSS) and Cross-Site request forgery (CSRF). **[9]**

b) What are the OWASP top 10 Web Application Security Risks explain any four tools. **[8]**

OR

Q6) a) Describe in detail SQL injection and Code injection in Web Application Hacking. **[6]**

b) What is Web Application Security? **[5]**

c) Explain Secure Application Architecture in web application security. **[6]**

Q7) a) Explain the term, Wi-Fi Hacking. **[6]**

b) Explain the working of Wi-Fi Hacking. **[6]**

c) Differentiate between WEP, WAP, WAP2 and WAP3. **[6]**

OR

Q8) a) What is an Evil Twin attack? **[6]**

b) Write a Short note on: **[6]**

i. WPA2 cracking.

ii. Network Snipping.

iii. Social Engineering.

c) How to secure Home and Business Wi-Fi Networks. **[6]**

♦ ♦ ♦

Total No. of Questions : 8]

SEAT No. : ____

PE2266

[Total No. of Pages : 2

[6584]-170

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) ***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 depth perception? Explain Monocular depth cues. **[9]**

b) Write short note on Perception of Motion. **[9]**

OR

Q2) a) Explain shading models. **[6]**

b) Write short note on Perception of Color. **[6]**

c) Explain Stereo depth cues. **[6]**

Q3) a) How does Augmented Reality Work? Describe with an appropriate example. **[9]**

b) Describe any two applications of Augmented Reality. **[8]**

OR

Q4) a) Explain the working of Augmented Reality. **[8]**

b) Explain Ingredients of an Augmented Reality Experience. **[9]**

P.T.O.

Q5) a) Explain different components of Augmented Reality. **[9]**

b) Write short note on - Sensor based tracking and Vision based Tracking method in Augmented Reality. **[9]**

OR

Q6) a) What is Spatial Augmented Reality? Explain with example. **[9]**

b) Write short note on - Marker based tracking and Vision based Tracking method in Augmented Reality. **[9]**

Q7) a) What is natural-feature tracking? Describe with any one application. **[9]**

b) Explain Multiple-Camera Infrared Tracking. **[8]**

OR

Q8) a) Which are the main augmented reality software components? **[9]**

b) Explain Simultaneous Localization and Mapping for Augmented Reality. **[8]**

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Total No. of Questions : 8]

SEAT No. :

PE2267

[Total No. of Pages : 2

[6584]-171
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) ***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 business report. Illustrate the components of business reporting system. **[8]**

b) What is data visualization? Explain the need for data visualization in Business intelligence. **[5]**

c) Write short note on Closed Loop BPM Cycle. **[5]**

OR

Q2) a) List and explain the four perspectives of Balanced Scorecards. **[8]**

b) List and briefly explain different types of Business Report. **[5]**

c) List and justify any five KPls for a real time business scenario. **[5]**

Q3) a) Discuss structure of mathematical model for decision support. **[9]**

b) How would you apply what-if analysis to a real-world business scenario, such as a manufacturing company facing fluctuations in raw material costs or a retail chain considering the impact of a new competitor entering the market? Develop a case study outlining the steps involved in conducting the analysis, the key variables to consider, and the potential implications for decision-making within the organization. **[8]**

OR

P.T.O.

Q4) a) Write short note on: **[9]**

i) Prescriptive analytics

ii) Descriptive analytics

iii) Predictive analytics

b) How does the level of certainty, uncertainty, and perceived risks surrounding our key business initiatives impact decision-making processes and strategic planning within our organization? **[8]**

Q5) a) Explain role of Business Intelligence (BI) in Telecommunication with the help of an example. **[6]**

b) How does the integration of visual analytics empower managers to enhance revenue generation strategies within the business? **[6]**

c) How might Netflix effectively measure the impact of offering a 30-day free trial on customer acquisition costs? **[6]**

OR

Q6) a) Write short note on: ERP and Business Intelligence. **[6]**

b) Explain application of Business Intelligence in Fraud Detection with a suitable example. **[6]**

c) Explain role of Business Intelligence (BI) in Retail Industry with the help of an example. **[6]**

Q7) a) What key factors should be prioritized when formulating an effective BI strategy for maximizing business success? **[6]**

b) Write short note on: Business Intelligence and Cloud Computing. **[6]**

c) Could you provide a brief overview of the analytics applications tailored for consumer use? **[5]**

OR

Q8) a) Provide a concise overview of how organizations utilize location-based analytics to enhance their operations and decision-making processes? **[6]**

b) Write short note on: Issues of Legality, Privacy, and Ethics. **[6]**

c) Explain with the help of appropriate steps BI Search and Text Analytics. **[5]**

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Total No. of Questions : 8]

SEAT No. : ____

PE2268

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[6584]-172
B.E. (Information Technology)
BLOCKCHAIN TECHNOLOGY
(2019 Pattern) (Semester - VIII) (414452D) (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.***
4) ***Assume suitable data, if necessary.***

Q1) a) Which are components of Ethereum Ecosystem explain in detail. **[7]**

b) Explain how smart contract work in detail. **[6]**

c) Explain blockchain platform in detail. **[5]**

OR

Q2) a) What is Ethereum programming language Explain in detail. **[7]**

b) Write Short Note on- **[6]**

i) Block & Blockchain

ii) Ethereum feature

c) Explain Runtime Byte Code in detail. **[5]**

Q3) a) State and explain benefits of Hyper ledger Fabric. **[6]**

b) Which are advantages of Hyperledger. **[6]**

c) Differences between Blockchain & Hyper ledger. **[5]**

OR

Q4) a) What is the use of Hyperledger in blockchain? **[6]**

b) How Does Hyper Ledger Fabric Work? Explain. **[6]**

c) What kind of applications can be built on Hyperledger fabric? **[5]**

P.T.O.

Q5) a) Short note on- **[7]**

i) Consensus Mechanism

ii) Proof of activity

b) Describe Tokenizing Shares and Fund Raising in detail. **[6]**

c) How are tokenization and blockchain technology related? **[5]**

OR

Q6) a) Explain how blockchain tokenization help in enterprise system in detail. **[7]**

b) State and explain different types of Consensus algorithm. **[6]**

c) How can a token be backed by a physical asset? **[5]**

Q7) a) Explain benefits of blockchain in various scenarios. **[6]**

b) Explain legal aspect of money laundering and ransomware. **[6]**

c) State and explain different aspect of healthcare where Blockchain. Technology can be used. **[5]**

OR

Q8) a) Explain any two application areas of Blockchain Technology. **[6]**

b) Explain security risk of blockchain. **[6]**

c) Explain merits and demerits of Blockchain technology. **[5]**



Total No. of Questions :8]

SEAT No. :

PE2269

[Total No. of Pages : 2

[6584]-173

B.E. (Information Technology)

INFORMATION AND STORAGE RETRIEVAL

(2019 Pattern) (Semester-VII) (414441)

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) Define and explain the following terms. **[6]**

i) MRR

ii) NDCG

b) Calculate precision and recall scores for the search, using the given data. A database contains 80 records on a particular topic and a search was conducted on that topic and 60 records were retrieved. Out of 60 records retrieved, 45 were relevant. **[6]**

c) What are the various techniques used to specify query in information visualization? **[6]**

OR

Q2) a) What are User oriented measures used in performance evaluation of IR systems? **[6]**

b) Explain DCG and F-Score measures used in performance evaluation of IR system. **[6]**

c) Define and explain the following terms. **[6]**

i) Precision

ii) Recall

P.T.O.

Q3) a) What is data modelling in multimedia IR? Explain it in detail? **[9]**

b) Explain in detail Multimedia office Server (MULTOS). **[8]**

OR

Q4) a) What is multimedia IR? Explain GEMINI approach for Multimedia IR. **[9]**

b) Describe Multimedia data support in Commercial DBMS? **[8]**

Q5) a) Explain search engine mechanism with a neat diagram. **[6]**

b) Explain Crawler-indexer Architecture with neat diagram. **[6]**

c) Discuss the challenges faced in web searching. **[6]**

OR

Q6) a) Write a short note on Web Scraping. **[6]**

b) What is ranking? Explain importance of ranking in detail. **[6]**

c) Write a note on request module and beautiful soup library. **[6]**

Q7) a) Define Recommender system? Explain in brief Content based recommendation **[9]**

b) Explain Vector Space Model for XML Retrieval. **[8]**

OR

Q8) a) Explain in detail Content Based Recommendation of Documents. **[9]**

b) Differentiate between Collaborative filtering system and content based filtering system. **[8]**



Total No. of Questions : 8]

SEAT No. :

PE-2270

[Total No. of Pages : 2

[6584]-174
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 diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain with suitable example Forward Pass and Backward Pass **[9]**

b) Explain objectives of activity planning in detail with suitable example **[9]**

OR

Q2) a) How do network diagrams help in project planning? Define predecessor, Successor and parallel activities. Give a real word example of each. **[9]**

b) List different project scheduling Techniques? Explain the Difference between CPM and PERT. **[9]**

Q3) a) What are the different tools and methods used for monitoring and regulating project operations? **[8]**

b) What are the different methods used in visualizing progress. Explain in detail? **[9]**

OR

Q4) a) Explain version control and change control process in SCM with neat diagram **[8]**

b) Explain plan monitor control cycle used in the project in detail with example **[9]**

P.T.O.

Q5) a) How to select a right person for the job? Explain the recruitment process in detail **[9]**

b) What is Leadership? Explain Different approaches of leadership **[9]**

OR

Q6) a) Explain Oldham-Hackman job characteristic model **[9]**

b) With relevant examples, differentiate between management and leadership. **[9]**

Q7) a) Explain any four metrics used for developer practices? **[6]**

b) Define Application Lifecycle Management (ALM) tools? What feature should be considered while choosing an ALM Tools? List some examples of ALM tools? **[6]**

c) List any four examples of reports for metrics in agile projects? **[5]**

OR

Q8) a) Explain application life cycle with its phases? **[6]**

b) What is visibility in DevOps? What are the different ways to enable the visibility in Azure DevOps? **[6]**

c) What is Azure Borad? Explain with suitable example? **[5]**



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

PE2271 **[Total No. of Pages : 2**

[6584]-175
B.E. (Information Technology)
DEEP LEARNING
(2019 Pattern) (Semester - VII) (414443)

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 indicate full marks.***

Q1) a) What type of neural network is preferred for sequence modeling? Why? State other applications with architectural diagrams for this type of neural network. **[9]**

b) How RNN is different than simple neural network? Draw architecture diagram and explain functioning. **[9]**

OR

Q2) a) What type of neural network is preferred for hierarchical data analysis? Why? State other applications with architectural diagrams for this type of neural network. **[9]**

b) Differentiate among RvNN, RNN and FFNN. **[9]**

Q3) a) What is encoder-decoder architecture pattern? Where is it used? **[8]**

b) What is a regularized auto-encoder? Where is it used? **[9]**

OR

Q4) a) Write a short note on - Applications of autoencoders. **[8]**

b) Differentiate among contractive autoencoders and Stochastic autoencoders. **[9]**

Q5) a) What are the variants of CNN? Explain any one in detail. **[9]**

b) Explain the concept of domain adaptation with suitable examples. **[9]**

OR

P.T.O.

Q6) a) Explain the concept of distributed presentation with suitable examples. **[9]**

b) What is greedy layer-wise pre-training network? **[9]**

Q7) a) How are deep learning techniques used in NLP systems? Explain with diagrams. **[8]**

b) Explain deep learning-based recommender systems with suitable diagrams. **[9]**

OR

Q8) a) Explain the role of CNNs in computer vision. **[8]**

b) How is social network analysis done using deep learning architectures? **[9]**



Total No. of Questions : 8]

SEAT No. :

PE-2272

[Total No. of Pages : 2

[6584]-176
B.E. (Information Technology)
MOBILE COMPUTING
(2019 Pattern) (Semester - VII) (414444A) (Elective III)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 and 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 the advances in Fifth generation telecommunication standard in detail. **[8]**

b) Compare all Mobile generations. **[9]**

OR

Q2) a) Explain MIMO technology in details. **[8]**

b) What is 4G and how it works? List down specification of 4G. **[9]**

Q3) a) Explain VANET Architecture in details. **[9]**

b) What is Mobile IP and need of Mobile IP? **[9]**

OR

Q4) a) Why is Mobile IP packet required to be forwarded through a tunnel? Explain minimal techniques of encapsulation of Mobile packet. **[9]**

b) Write a short note on Hybrid Routing ZRP Protocol, Explain with architecture. **[9]**

P.T.O.

Q5) a) Explain the working of Mobile TCP and its advantages and disadvantages. **[8]**

b) Describe briefly WAP protocol stack in details. **[9]**

OR

Q6) a) What is Mobile Agent? Describe different features of Mobile Agent. **[8]**

b) Compare I-TCP, Snooping TCP and Mobile TCP. **[9]**

Q7) a) Describe Application Framework of Android Operating System. **[9]**

b) Write a short note on Mobile Operating System. **[9]**

OR

Q8) a) What is Mobile Payment? Explain types of Mobile Payment in detail **[9]**

b) Describe iOS Software Development Kit (SDK) in details. **[9]**

Total No. of Questions : 8]

SEAT No. :

PE-2273

[Total No. of Pages : 2

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B.E. (Information Technology)

HIGH PERFORMANCE COMPUTING

(2019 Pattern) (Semester - VII) (414444 B) (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) ***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 advantages and disadvantages of non-blocking communication? **[5]**

b) Describe the circular q-shift operation. **[5]**

c) Write a short note on All-to-All broadcast and reduction in parallel algorithms. **[8]**

OR

Q2) a) Explain scatter and gather communication operations with a suitable diagram. **[5]**

b) Explain a scenario where synchronous communication is preferred over asynchronous communication. **[5]**

c) How One-to-All broadcast and All-to-One reduction are used in parallel algorithms? **[8]**

Q3) a) Define sequential execution time and parallel execution time. How do they relate? **[5]**

b) Discuss the concept of scalability in parallel systems and the methods used to measure it. **[5]**

c) Describe how communication and synchronization contribute to parallel overheads. **[7]**

OR

P.T.O.

Q4) a) Define following performance metrics for parallel systems: **[5]**

Speedup

Efficiency

b) What is meant by "minimum execution time" in a parallel program? Explain in detail. **[5]**

c) What is granularity? Explain the effect of granularity on the performance of parallel systems. **[7]**

Q5) a) What is memory contention in CUDA, and how can it affect the performance of a parallel program? **[5]**

b) What are the consequences of improper synchronization in CUDA kernels? **[5]**

c) List and explain key components of CUDA architecture in detail. **[7]**

OR

Q6) a) Explain the difference between global memory, shared memory, and local memory in CUDA. **[5]**

b) Describe the key differences between CUDA and OpenMP. **[5]**

c) Describe processing flow of CUDA-C program with a diagram. **[7]**

Q7) a) How does parallel matrix-matrix multiplication differ from sequential multiplication? **[5]**

b) What challenges are faced when sorting large data on parallel machines? Give an example. **[5]**

c) How can Depth-First Search(DFS) be done in parallel? What is the time complexity of this approach? **[8]**

OR

Q8) a) Describe parallel bubble sort. How is it different from its sequential version? **[5]**

b) Comment on the parallel formulation of Dijkstra's All-Pairs Shortest Paths problem. **[5]**

c) Explain the parallel Best-First Search algorithm with a suitable example. **[8]**



Total No. of Questions : 8]

SEAT No. :

PE-2274

[Total No. of Pages : 2

[6584]-178

B.E. (Information Technology)

MULTIMEDIA TECHNOLOGY

(2019 Pattern) (Semester - VII) (414444 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) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Evaluate the role of audio compression in modern computer applications. **[6]**

b) Describe lossless and lossy audio compression techniques in brief. **[6]**

c) State the advantages and disadvantages of various video file formats (e.g, AVI, MOV, FLV) for online streaming. **[6]**

OR

Q2) a) Explain in brief the stages involved in MPEG audio compression. **[9]**

b) Compare and contrast the characteristics of analog and digital sound waves. How these differences can impact the quality and storage of audio in computer applications? **[9]**

Q3) a) Differentiate between Traditional Animation and Computer Animation. **[6]**

b) Describe various Prinicples of Animation (Any Five). **[5]**

c) Analyze the case study on Animation Services for Digital Advertising. **[6]**

OR

Q4) a) Discuss various Techniques of Animation. **[9]**

b) State and explain Applications of Animation. **[8]**

P.T.O.

Q5)	a)	Discuss various Forms of Virtual Reality (VR).	**[6]**
	b)	Write a short note on "Human Physiology and Perception".	**[6]**
	c)	Analyze the Virtual Clinic case study.	**[6]**

OR

Q6)	a)	Draw and explain the Architecture of Virtual Reality(VR).	**[9]**
	b)	Describe different Applications of Virtual Reality (VR).	**[9]**

Q7)	a)	Explain the different Networked Multimedia Applications.	**[6]**
	b)	State and explain various Features of Multimedia Processing Software.	**[6]**
	c)	Evaluate the Role of Animation and VFX in Video Games.	**[5]**

OR

Q8)	a)	Describe Multimedia Database with proper example.	**[9]**
	b)	Elaborate the concept of Media on Demand.	**[8]**



Total No. of Questions : 8]

SEAT No. :

PE-2275

[Total No. of Pages : 2

[6584]-179

B.E. (Information Technology)

SMART COMPUTING

(2019 Pattern) (Semester - VII) (414444 D) (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) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Define the concept of ubiquitous computing? Discuss the important features of ubiquitous computing? **[8]**

b) Discuss various application areas of ubiquitous computing? Explain any two major application areas of ubiquitous computing? **[9]**

OR

Q2) a) What are the internal system properties proposed by Weiser with neat diagram. **[8]**

b) Discuss iHCI in ubiquitous computing?How it is different than explicit HCI. **[9]**

Q3) a) What do you meant by "Smart" devices? Explain important characterisitcs of smart devices in ubiquitous computing? **[9]**

b) What role does virtualization play? Discuss about the necessity of a virtual machine monitor. **[8]**

OR

Q4) a) Draw a neat diagram of service provision life cycle and explain in details.**[9]**

b) Explain the concept of Service Oriented Architecture with neat diagram?**[8]**

P.T.O.

Q5) a) What are different types of control systems used for physical world tasks? Explain in detail. **[9]**

b) Discuss Micro-Electro-Mechanical Systems (MEMS) in detail? **[9]**

OR

Q6) a) Discuss the advantages and disadvantages of embedded system? Explain how it is different than normal operating system? **[10]**

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

i) Micro-sensors

ii) Nanocomputing

Q7) a) Discuss key features of Internet of Things? **[8]**

b) What are the different components of IoT? Explain with neat diagram? **[10]**

OR

Q8) a) Describe different Characteristics of Smart Home? Which are different communication technologies used for Smart Homes. **[10]**

b) Write short note on Smart Agricultural System. **[8]**



Total No. of Questions : 8]

SEAT No. :

PE-2276

[Total No. of Pages : 2

[6584]-180
B.E. (Information Technology)
BIOINFORMATICS
(2019 Pattern) (Semester - VII) (414445 A) (Elective - IV)

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 labelled diagrams must be drawn wherever necessary.***
3) ***Assume Suitable data if necessary***

Q1) a) Describe the Smith-Waterman algorithm for local alignment and provide an example of its use. **[8]**

b) Define sequence visualization and explain why it is used and discuss the concept of Structure Visualization. **[9]**

OR

Q2) a) Discuss and state the difference between global and local alignments methods? **[8]**

b) Describe how statistical methods can be used to analyze microarray data. **[9]**

Q3) a) Explain two different clustering algorithms and explain how they are used to group data. **[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) Discuss the advantages and disadvantages of using biological algorithms to solve computational problems. **[9]**

b) Explain the FASTA algorithm in detail, with a diagram. Discuss the advantages and disadvantages of FASTA and provide examples of its applications. **[9]**

P.T.O.

Q5) a) What are the advantages and disadvantages of ab initio methods? Discuss in detail. **[8]**

b) What are the components of modeling and simulation system? Explain in detail with a neat diagram **[9]**

OR

Q6) a) Describe the hierarchical organization of protein structure and provide an example illustrating each level of organization. **[8]**

b) What is Drug and Drug discovery process? Explain Applications of Bioinformatics in Drug Discovery Process. **[9]**

Q7) a) Provide specific examples of products or processes that have been developed using genetic engineering. **[9]**

b) What is the role of biotechnology in environment? **[9]**

OR

Q8) a) Discuss the emerging trends and advancements in medical technology that are shaping the future of medicine. Include topics such as precision medicine, personalized therapies, and the integration of artificial intelligence in healthcare. **[9]**

b) What are some everyday applications of nanotechnology in various aspects of our lives? **[9]**

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Total No. of Questions : 8]

SEAT No. :

PE-2277

[Total No. of Pages : 2

[6584]-181
B.E. (Information Technology)
INTRODUCTION TO DEVOPS
(2019 Pattern) (Semester - VII) (414445 B) (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) Explain role of continuous integration server. What operations a CI server can executes? **[6]**

b) What are benefits of Continuous Integration (CI) and Continuous Delivery (CD)? **[6]**

c) What is build stage? Write step wise process to generate builds? **[6]**

OR

Q2) a) Explain what technology changes are required in the development tool chain to enable DevOps? **[6]**

b) How the use of DevOps pipeline phases does improve performance? **[6]**

c) What is a continuous integration and delivery in pipeline? Does it pay off? **[6]**

Q3) a) Explain the role of Integration testing in DevOps? How it is different from conventional testing. **[5]**

b) What are the four main stages of a deployment pipeline? **[4]**

c) Explain the Trade-offs in the deployment pipeline with details. **[8]**

OR

Q4) a) Discuss components of continuous testing. **[5]**

b) Write a short note on the Commit Stage. **[4]**

c) Write a Short note on : **[8]**

i) Automated Acceptance Test Gate.

ii) Integration Testing.

P.T.O.

Q5) a) Justify the use of Continuous Monitoring System in DevOps? List the factors involved in Monitoring System. **[6]**

b) What is Behavior-Driven Monitoring? How it works? **[6]**

c) Identify what is the need of SRE? And explain what are the roles and responsibilities of SRE with relation to DevOps? **[6]**

OR

Q6) a) Elaborate the steps involved in logging and creation of the dashboard. **[6]**

b) Write a short note on: **[6]**

i) White box monitoring

ii) Black-box monitoring

c) Write about building monitoring system and monitoring infrastructure. **[6]**

Q7) a) What is version control? How Git Hub is used in version control? **[6]**

b) Write short note on Kubernetes. **[6]**

c) Explain the role of Jenkins in Continuous Integration and Continuous Delivery. **[5]**

OR

Q8) a) Illustrate the use of containers while creating container-based application design. Explain various containers used in relation with DevOps. **[6]**

b) Discuss Selenium and its role in DevOPs lifecycle. **[6]**

c) Explain continuous testing and tools used for it. **[5]**

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Total No. of Questions : 8]

SEAT No. :

PE-2278

[Total No. of Pages : 2

[6584]-182
B.E. (Information Technology)
COMPUTER VISION
(2019 Pattern) (Semester - VII) (414445 C) (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 orQ.6, Q.7 or Q.8.***
2) ***Draw neat diagrams and assume suitable data wherever necessary.***
3) ***Figures to the right side indicates full marks.***

Q1) a) Explain the process of feature matching and discuss its challenges in the presence of noise and occlusion. **[9]**

b) Discuss the process of edge linking and how it helps to form continuous edges. **[9]**

OR

Q2) a) Describe how feature tracking is used in video stabilization and motion capture. **[9]**

b) Explain the use of edges and vanishing points in 3D reconstruction from 2D images. **[9]**

Q3) a) Explain the Hough Transform (HT) for line detection and how it works to detect lines in an image. **[9]**

b) Describe the RANSAC algorithm and explain how it is used for straight line detection. **[8]**

OR

Q4) a) Discuss the role of multi-resolution approaches in overcoming speed problems in Hough Transform. **[9]**

b) Describe methods for detecting ellipses in images and how they differ From circular detection. **[8]**

P.T.O.

Q5) a) Discuss the challenges of interpreting the three-dimensional world in computer vision. How do different methods for 3D vision address these challenges? **[9]**

b) Discuss the concept of optical flow and its use in motion estimation. **[9]**

OR

Q6) a) Explain methods used to enforce surface smoothness and their effect on the accuracy of 3D models. **[9]**

b) Explain the significance of surface reconstruction in point-based and volumetric representations. **[9]**

Q7) a) Discuss the process of object detection in photo albums and its applications in organizing personal photo collections. **[9]**

b) Discuss the role of intelligent photo editing in enhancing images within personal photo collections. **[8]**

OR

Q8) a) Discuss the advantages and limitations of using particle filters in complex environments. **[9]**

b) Describe the challenges of implementing efficient image search in large personal photo collections. **[8]**

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Total No. of Questions : 8]

SEAT No. :

PE-2279

[Total No. of Pages : 2

[6584]-183
B.E. (Information Technology)
WIRELESS COMMUNICATION
(2019 Pattern) (Semester - VII) (414445 D) (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 side indicate full marks.***
4) ***Assume Suitable data if necessary.***

Q1) a) Explain the Principle of TDMA. What are different features of TDMA? **[9]**

b) What is MIMO? Explain two formats of MIMO. **[9]**

OR

Q2) a) What is OFDM technique? Also, explain OFDMA transmitter and receiver. **[9]**

b) How Code Division Multiple Access Technique is implanted while accessing a channel for multiple users? Support your theory answer with example. **[9]**

Q3) a) What are the different challenges in WAP? Also, write down the advantages and disadvantages of WAP. **[9]**

b) What is LoRaWAN? Elaborate LoRaWAN network elements. **[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 security issues and challenges in GSM. **[9]**

b) Explain in details Visible Light Communication. Also, explain its applications. **[9]**

OR

Q6) a) What is multimedia security? Explain multimedia security in 5G and 6G. **[9]**

b) Explain Bluetooth Security Architecture in detail. **[9]**

Q7) a) What is quantum Technology? Explain quantum Technology for a 5G/6G wireless network? **[9]**

b) Explain Simultaneous Transmission and Reflection (STAR) for 360^0 coverage in details. **[8]**

OR

Q8) a) Explain how 5G network works along-with its benefits. **[9]**

b) State and explain various applications of wireless technology. **[8]**

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Total No. of Questions : 8]

SEAT No. : ____

PE2280

[Total No. of Pages : 2

[6584]-184

B.E. (Instrumentation & Control)

PROCESS INSTRUMENTATION

(2019 Pattern) (Semester - VIII) (406268)

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) Develop suitable control strategy for accumulator level control in distillation column. **[8]**

b) Develop cascade control scheme for top product composition control in distillation. **[9]**

OR

Q2) a) Develop inferential control for composition control of distillate. **[8]**

b) State objectives of distillation column control. Why it is difficult to control? State any two reasons. **[9]**

Q3) a) Develop feedback control strategy for double drum dryers. **[8]**

b) Develop suitable selective control strategy for multi-effect evaporators. **[9]**

OR

Q4) a) Compare single effect and multi-effect evaporators. **[8]**

b) Develop cascade control scheme for dryer control. **[9]**

P.T.O.

Q5) a) Comment on recipe, formula, lot and procedure. **[9]**

b) Develop ratio control strategy for exothermic reactors with neat diagram. **[9]**

OR

Q6) a) In an exothermic reactor objective is to maintain the temperature inside the reactor within permissible limits. Develop appropriate control strategy to maintain temperature in exothermic reactors. **[9]**

b) Develop cascade control strategy for temperature control in endothermic reactors with neat diagram. **[9]**

Q7) a) Develop anti-surge control system for compressors. **[9]**

b) Develop on-off pressure control for parallel pumps. **[9]**

OR

Q8) a) Develop on-off level control in dual pump station. **[9]**

b) Explain with neat sketch surge phenomenon in compressors. **[9]**



Total No. of Questions : 8]

SEAT No. :

PE-5091

[Total No. of Pages : 2

[6584]-185

B.E. (Instrumentation & Control)

ADVANCED EMBEDDED SYSTEMS

(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 and 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) Describe with neat sketch, 3-stage pipelining of ARM-7. **[9]**

b) Describe on chip ADC configuration of ARM-7 processor. **[8]**

OR

Q2) a) Elaborate I^2C protocol of LPC2148 microcontroller with typical connection diagram. **[9]**

b) Compare between SPI and I^2C. **[8]**

Q3) a) Draw the neat block diagram and elaborate ARM bus technology. **[9]**

b) Draw the neat interfacing diagram and elaborate the operation of 16 ×2 LCD Display. **[8]**

OR

Q4) a) Describe memory controllers and interrupt controllers for the ARM processor. **[9]**

b) Draw the neat interfacing diagram and elaborate the operation of electromechanical relay interfacing with LPC2148 μc. **[8]**

P.T.O.

Q5) a) Describe the function of ENTRY, EXPORT and AREA assembler directives. **[9]**

b) Draw the neat interfacing diagram and elaborate the operation of SD card interfacing with LPC2148 μc. **[9]**

OR

Q6) a) Elaborate registers used in THUMB state. Justify how code density will be improved using THUMB. **[9]**

b) Draw the neat interfacing diagram and elaborate the operation of EEPROM AT24CXX interfacing with LPC2148. **[9]**

Q7) It is decided to develop the environmental monitoring system using LPC2148μc. The parameters are to be display on LCD display & set point is entered through key board. For this system,

a) Identify different parameters. **[3]**

b) Enlist selected sensors. **[3]**

c) Develop block diagram. **[4]**

d) Elaborate the operation of system. **[4]**

e) Develop algorithm. **[4]**

OR

Q8) Develop embedded system for home automation using LPC2148 μc. Provide the facility to display parameters on LCD display & provide the facility to communicate the information through SMS. For this system,

a) Identify different parameters **[3]**

b) Enlist selected sensors. **[3]**

c) Develop block diagram. **[4]**

d) Elaborate the operation **[4]**

e) Develop the algorithm. **[4]**

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Total No. of Questions : 8]

SEAT No. :

PE2281

[Total No. of Pages : 1

[6584]-186
B.E. (Instrumentation and Control)
ELECTRIC VEHICLES
(2019 Pattern) (Semester - VIII) (Elective - V) (406270 A)

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) *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 of EV 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]**

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. :

PE2282

[Total No. of Pages : 2

[6584]-187

B.E. (Instrumentation and Control)

SAFETY INSTRUMENTATION SYSTEMS

(2019 Pattern) (Semester - VIII) (Elective-V) (406270 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 indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) How are protection layers tested and maintained over the lifecycle of a safety instrumented system? **[9]**

b) Elaborate the Evacuation Procedure of the safety in detail. **[9]**

OR

Q2) a) How are safety requirements specified and documented in accordance with industry standards such as IEC 61508 and IEC 61511? **[9]**

b) Discuss the SIS related to Fire and Gas (F&G) Systems. **[9]**

Q3) 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]**

OR

Q4) a) Elaborate the process steps of As Low As Reasonably Practical (ALARP). **[9]**

b) What are some common challenges and limitations associated with determining and verifying SIL levels in practice? **[9]**

Q5) a) Describe the Estimating Initiating event frequencies. **[8]**

b) Examine the Markov Model with the help of neat block diagram. **[9]**

OR

P.T.O.

Q6) a) How is life defined for safety instrumented systems, and what factors can impact the life of an SIS? **[8]**

b) Discuss the Consequence Analysis of hazardous incidents. **[9]**

Q7) a) Elaborate the Operation and Maintenance Procedures for safe operation. **[8]**

b) What are the key components and functions of a furnace/fired heater safety shutdown system, and how are these components integrated to ensure safe and reliable operation? **[9]**

OR

Q8) a) Explain Lifecycle Cost Analysis of a furnace/fired heater. **[8]**

b) Elaborate the Installation, Commissioning and Pre-startup Tests. **[9]**

Total No. of Questions : 8]

SEAT No. :

PE2283

[Total No. of Pages : 2

[6584]-188

B.E. (Instrumentation and Control)

RENEWABLE ENERGY SYSTEMS

(2019 Pattern) (Semester - VIII) (Elective - V) (406270 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) ***Neat diagrams must be drawn wherever necessary.***
4) ***Use of Calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) State the significance of energy storage system in renewable system. Elaborate the working of Lithium Ion Rechargeable battery with neat diagram. **[10]**

b) Elaborate the working of Super Capacitors 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 fuel cells with neat diagram. **[7]**

Q3) a) What is Power Converters? State the Role of Power Converter in Renewable System. Elaborate the working of Power Converter with the help of block diagram. **[10]**

b) With a block diagram, explain the working of MPPT. **[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) State the role of Solar Photovoltaic System? Compare Isolated and non-isolated type of solar photovoltaic system. **[8]**

P.T.O.

Q5) a) State the applications of Renewable Energy. Explain the working of Solar water heater with neat diagram. **[10]**

b) Elaborate on the working of Solar water Pump with neat diagram. **[7]**

OR

Q6) a) Justify how renewable energy is efficient from application point of view. Elaborate on the working of solar Street Lamp with neat diagram. **[10]**

b) Elaborate on the working of solar cooker with neat diagram. **[7]**

Q7) a) State the significance of wind energy. Describe the wind energy conversion technology with neat diagram. **[10]**

b) Elaborate on the various aspects of wind turbine design **[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) Elaborate the concept of Wind farm with neat diagram. **[8]**

Total No. of Questions : 8]

SEAT No. :

PE2285

[Total No. of Pages : 2

[6584]-190
B.E. (Instrumentation & Control)
CYBER SECURITY
(2019 Pattern) (Semester - VIII) (406271A) (Elective - VI)

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

Instructions to the candidates:

1) ***Answer Q1 or Q2,Q3or Q4,Q5or 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 Diffie Hellman key exchange algorithm. Explain it with suitable example. **[8]**

b) Explain the RSA algorithm. **[10]**

Perform the RSA algorithm on the given data and explain how encryption and decryption are performed on the message: p=7, q=11 ,e= 17 and m=8.

OR

Q2) a) What is ECC. What is the general equation for elliptic curve systems? **[10]**

b) Elaborate the concept of ElGamal cryptosystem with its applications. **[8]**

Q3) a) List difference between MD5 & SHA. **[9]**

b) Write a note on : **[8]**

i) Web Security

ii) Mail Security

OR

Q4) a) What do you mean by ethics in information security? How ethics is important in information security? What are the ethical issues in information security? **[9]**

b) Define key Cyber-law terms. Integrate concepts of Cyber-law into everyday business practices by reviewing Cyber-law internet security issues. **[8]**

P.T.O.

Q5) a) What are the types of attacks. Explain Counter Measure for Different Attacks. **[10]**

b) Discuss the key legal perspectives in India concerning the protection of intellectual property rights (IPR) and their impact on innovation and economic development. Provide examples and analyze the role of Indian legislation and institutions in safeguarding IPR. Highlight any recent developments or challenges in this area. **[8]**

OR

Q6) a) Discuss the classification of cybercrimes in detail. Provide a comprehensive overview of the different categories of cybercrimes, their characteristics, and examples to illustrate each category. **[10]**

b) Define overfitting and underfitting in the context of machine learning models. Explain how overfitting and underfitting can occur in Decision Trees and Random Forests. **[8]**

Q7) a) What is cybercrime. Explain with example. **[8]**

b) Discuss the classification of cybercrimes against individuals, Provide a detailed overview of the characteristics and its example. **[9]**

OR

Q8) a) Explore the classification of cybercrimes against government entities. Discuss the defining characteristics and offer illustrative examples of cybercrimes directed at governments. **[9]**

b) Explain the challenges in protecting intellectual property online and provide case studies of high-profile cybercrimes against property, highlighting the economic and legal implications. **[8]**



Total No. of Questions : 8]

SEAT No. :

PE2286

[Total No. of Pages : 2

[6584]-191

B.E. (Instrumentation & Control)

AUTOMATION IN AGRICULTURE

(2019 Pattern) (Semester - VIII) (406271B) (Elective - VI)

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) ***Assume suitable data if necessary.***

Q1) a) What is the necessity of Irrigation system? Explain different irrigation methods. **[8]**

b) Write short notes on. **[10]**

i) Irrigation scheduling.

ii) Application of SCADA for DAM parameters & control.

OR

Q2) a) What are the different ways of measuring soil moisture? Explain any two soil moisture measurement methods. **[9]**

b) Write short notes on "Green Houses and instrumentation". **[9]**

Q3) a) Draw flow diagram of Sugar Industry and explain. **[9]**

b) Explain instrumentation and control required for milk processing plant. **[8]**

OR

Q4) a) Draw flow diagram of Distillery plant & explain instrumentation involved in Distillery plant. **[10]**

b) List dairy products plant and explain any one dairy product plant. **[7]**

P.T.O.

Q5) a) Define food processing. How do you measure food quality? Explain. **[8]**

b) Explain the following standards. **[10]**

i) Codex Standards

ii) Agmark

OR

Q6) a) Explain recommended international code of hygiene for various food products. **[9]**

b) Write short notes on "Biosensors". **[9]**

Q7) a) Explain the trends in modern food processing. **[9]**

b) With example explain the application of SCADA in food packing industry. **[8]**

OR

Q8) a) What are the various equipment's for creating and maintaining controlled atmosphere in food packing industry? Explain in detail. **[9]**

b) With example explain the application of PLC in food packing industry. **[8]**



Total No. of Questions : 8]

SEAT No. :

PE2287

[Total No. of Pages : 2

[6584]-192
B.E. (Instrumentation and Control)
ENVIRONMENTAL INSTRUMENTATION
(2019 Pattern) (Semester - VIII) (406271C) (Elective - VI)

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

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3or 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 wherever necessary.***
4) ***Use of Calculator is allowed.***
5) ***Assume Suitable data if necessary***

Q1) a) Discuss the equation governing the settling or rising velocity of discrete particles in a fluid. How does hindered settling affect this process? Discuss the real-world applications where understanding particle settling behaviour is critical. **[10]**

b) Discuss the design and operating considerations to maximize the efficiency of a settling basin in wastewater treatment plants. **[7]**

OR

Q2) a) Explain the laboratory analysis techniques used for assessing the quality of groundwater samples. Highlight the parameters typically analyzed and their significance in evaluating water quality. **[10]**

b) Discuss the specific instruments for detecting and monitoring contaminants in soil and groundwater. (minimum two instruments each). **[7]**

Q3) a) Define COD and BOD. Explain their significance in assessing organic pollution levels in wastewater. Evaluate the importance of COD and BOD testing in monitoring wastewater quality and designing treatment processes. **[10]**

b) Discuss the methods used for rainwater harvesting: rooftop harvesting, surface runoff harvesting, and groundwater recharge techniques. **[8]**

OR

P.T.O.

Q4) a) Explain velocity-area flow meters and ultrasonic flow meters for closed-channel flow measurement. Highlight their advantages and limitations. **[10]**

b) Explain the criteria for selecting optimum wastewater sampling locations. How do factors such as flow rate, mixing conditions, and pollutant distribution influence sampling site selection? **[8]**

Q5) a) Discuss the significance of addressing air pollution. Analyze the detrimental effects of air pollution on human health, ecosystems, and the economy, citing relevant examples. **[10]**

b) Explain various air sampling methods and equipment used in air pollution monitoring. **[7]**

OR

Q6) a) Briefly explain various strategies for controlling air pollution at the source. Discuss the challenges of implementing these strategies for achieving sustainable air quality. **[10]**

b) Assess the impact of air pollution on public health. Discuss the air pollutants which contribute to respiratory diseases, cardiovascular problems, and other health issues. **[7]**

Q7) a) Explain the principle of operation of a barometer and its role in measuring atmospheric pressure. Discuss the significance of atmospheric pressure in weather forecasting and climate analysis. **[10]**

b) Discuss the working principle of ceilometers. What are the key components used in it? **[8]**

OR

Q8) a) Explain the basic working of barometers, rain gauges, and ceilometers used at weather stations. How is the data integrated for predicting the environment? **[10]**

b) List the instruments typically found in a Rover Environmental Monitoring Station (REMS). Briefly describe the function of the instruments used. **[8]**



Total No. of Questions :8]

SEAT No. :

PE2288

[Total No. of Pages : 2

[6584]-193
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 indicate full marks.***
4) ***Assume suitable data, if necessary.***
5) ***Use of calculator is allowed.***

Q1) a) With neat sketch explain feedback control strategy for heat exchanger control. **[8]**

b) Discuss procedure for determination of PID controller using Zeigler-Nichols closed loop tuning method with any suitable example. **[9]**

OR

Q2) a) Comment on tuning and fine tuning of a controller with suitable example. **[8]**

b) Determine closed loop stability conditions of PI controller for FOPDT model for set point change. **[9]**

Q3) a) Illustrate selective control method for protection of equipment with suitable example. **[9]**

b) Explain feedback-feedforward control system. Also explain its advantages over feedback and feedforward control systems. **[9]**

OR

Q4) a) With neat sketch explain cascade control and its tuning procedure. **[9]**

b) Discuss split range control with suitable example. **[9]**

P.T.O.

Q5) a) Explain relative gain array (RGA) and its important properties. Using RGA discuss procedure for determining of recommended controller pairing in detail. **[9]**

b) Explain loop interaction and decoupling in multivariable control system in detail **[8]**

OR

Q6) a) Enlist the properties of RGA matrix. The RGA for a hydrocracker is provided for a 4×4 system, which is as follows: **[9]**

	u_1	u_2	u_3	u_4
y_1	0.931	0.150	0.080	–0.164
y_2	–0.011	–0.429	0.286	1.154
y_3	–0.135	3.314	–0.27	–1.19
y_4	0.215	–2.03	0.9	1.919

Where y_1 to y_4 are various compositions and u_1 to u_4 are various flow rates in the Hydrocracker. What is the best input – output pairing based on the RGA values?

b) Analyze the direct and indirect effect of interaction with help of 2×2 systems. **[8]**

Q7) a) With neat block diagram explain design of model based PID controller in detail. **[9]**

b) Determine PID controller design parameters using IMC method for FOPDT process model. **[9]**

OR

Q8) a) Give importance of Smith Predictor technique and explain its working in detail with neat block diagram. **[9]**

b) Draw and explain block diagram of model predictive controller in detail. **[9]**



Total No. of Questions : 8]

SEAT No. :

PE-2289

[Total No. of Pages : 2

[6584]-194
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 Q1 or Q2, Q3 or Q4, Q5 or Q6,Q7 or Q8.***
2) ***Neat diagram must be drawn whenever necessary.***
3) ***Figure 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) State the importance of vendor registration process with suitable example and enlist various document required for it. **[9]**

b) Elaborate the Process of Vendor registration and vendor evaluation for the purchase of the equipment **[8]**

OR

Q2) a) State the importance of tender document and what general information is to be furnished in tender document **[9]**

b) Illustrate the significance of purchase order with appropriate example and comment on content of Purchase order **[8]**

Q3) a) Develop piping and Instrumentation diagram for typical flow control loop **[9]**

b) Explain the significance of Process flow diagram(PFD) in detail engineering **[9]**

OR

Q4) a) Discuss the importance & scope of material balance sheet in Project Engineering with suitable example **[9]**

b) Discuss the significance of Instrument layout & Junction box layout with suitable example. **[9]**

P.T.O.

Q5) a) Evaluate the Process of Earthling and Grounding for general and power Signals **[9]**

b) Develop loop wiring diagram for any typical process. **[8]**

OR

Q6) a) Prepare Manufacturing bill of material(MBOM) for any one application **[9]**

b) Discuss the significance of Instrument diagram and Hook up diagram with suitable example **[8]**

Q7) a) Illustrate the Panel testing Procedure and its documentation require at this stage. **[9]**

b) Explain the significance of Customer Acceptance Test (CAT) with suitable example **[9]**

OR

Q8) a) State the important feature of intelligent operator Interface. **[9]**

b) Prepare a factory acceptance test (FAT) for a control panel. **[9]**

♦ ♦ ♦

Total No. of Questions : 8]

SEAT No. : ____

PE2290

[Total No. of Pages : 2

[6584]-195
B.E. (Instrumentation & Control)
DIGITAL IMAGE PROCESSING
(2019 Pattern) (Semester - VII) (406263A) (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 whenever necessary.***
3) ***Use of electronic pocket calculator is allowed.***
4) ***Assume suitable data, if necessary.***

Q1) a) What is image enhancement in frequency domain. Explain with neat diagram and example? **[9]**

b) Explain the spatial filtering. **[8]**

OR

Q2) a) Explain linear stretching and non-linear stretching. **[8]**

b) Write short note on histogram specification with some examples. **[9]**

Q3) a) Explain in brief the edge linking in case of image segmentation. **[9]**

b) Enlist the different types of classifiers. Explain any one in detail. **[9]**

OR

Q4) a) What is edge discountinuities. Explain in detail. **[9]**

b) Explain the different methods for edge detection. **[9]**

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

b) What the need of image compression. Explain different methods in short. **[9]**

OR

P.T.O.

Q6) a) Compare Lossy and lossless compression. **[9]**

b) Explain LZW compression in detail. **[9]**

Q7) a) Explain the fingerprint verification using image processing. **[8]**

b) How image processing is used in military application. Explain with neat diagram. **[9]**

OR

Q8) a) Explain the application in image processing in agriculture field. **[8]**

b) Write a short note on application of image processing in space. **[9]**



Total No. of Questions : 8]

SEAT No. : ____

PE2291

[Total No. of Pages : 2

[6584]-196
B.E. (Instrumentation & Control)
DATA ANALYTICS
(2019 Pattern) (Semester - VII) (406263B) (Elective - III)

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

Instructions to the candidates:

1) ***Attempt 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.***

Q1) a) Explain linear regression with suitable example. **[9]**

b) Explain advantages and disadvantages of regression model. **[9]**

OR

Q2) a) Explain Apriori algorithm with example. **[10]**

b) Define following terms with example : Confidence and Lift. **[8]**

Q3) a) Explain construction of decision tree using suitable example. **[9]**

b) How would you evaluate a Decision tree classification. **[8]**

OR

Q4) a) How Naive Baye's classification works? Give its applications. **[9]**

b) Explain following decision the algorithms : **[8]**

i) ID 3

ii) C4.5

Q5) a) Explain importance of visualization of data along with suitable example. **[9]**

b) Explain analytical techniques used in big data visualization. **[9]**

OR

P.T.O.

Q6) a) What are the tools used in data visualization? **[9]**

b) Explain any three techniques for visual representation of data. **[9]**

Q7) a) Explain following terms : **[9]**

i) Key value store

ii) Document store

iii) Column family store

b) What are four major categories of NOSQL Tools. **[8]**

OR

Q8) a) What is Map-Reduce? Explain working of Map-Reduce with example. **[8]**

b) Explain with advantages and disadvantages of Map-Reduce. **[9]**



Total No. of Questions : 8]

SEAT No. : ____

PE2292

[Total No. of Pages : 2

[6584]-197
B.E. (Instrumentation & Control)
WIRELESS SENSOR NETWORKS
(2019 Pattern) (Semester - VII) (406263C) (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 whenever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) List any four MAC layer protocol for WSN? **[9]**

b) Write short notes on power efficient gathering in sensor information system. **[9]**

OR

Q2) a) Describe LEACH protocol with the help of neat diagram? **[9]**

b) Write short note on Geographical routing? **[9]**

Q3) a) Differentiate between TCP and UDP of Transport control Protocol? **[9]**

b) Write short note on ESRT? **[9]**

OR

Q4) a) Explain Existing Transport Control protocol – CODA? **[9]**

b) Write short note on performance of Transport Control Protocols? **[9]**

Q5) a) Explain the Middleware Linking Applications and Networks? **[8]**

b) Write short note on Iris Net? **[9]**

OR

P.T.O.

Q6) a) Explain the architecture of Middleware for WSN? **[8]**

b) Write advantages and disadvantages of Middleware WSN? **[9]**

Q7) a) Explain Layer wise attack in wireless sensor Networks? **[8]**

b) Write short note on possible solutions for Jamming? **[9]**

OR

Q8) a) Write the requirements issues and challenges in security provisioning network? **[8]**

b) Explain Black hole attack? **[9]**



Total No. of Questions : 8]

SEAT No. :

PE5972

[Total No. of Pages : 2

[6584]-198

B.E. (Instrumentation & Control)

PROCESS MODELLING & OPTIMIZATION

(2019 Pattern) (Semester-VII) (406263 D) (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) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicates full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Explain ATV method to obtain system model. **[8]**

b) Explain pulse testing method and its advantages over other method. **[9]**

OR

Q2) a) Explain sine wave testing method. **[8]**

b) Explain merits & demerits of step & sine wave testing. **[9]**

Q3) a) Write note on robustness Doyle Stein criterion. **[8]**

b) Define MRI. Explain condition for resiliency & its significance. **[9]**

OR

Q4) a) Calculate the MRI for the plant with transfer function matrix at zero frequency. **[8]**

$$\mathrm{Gm(S)} = \begin{bmatrix} \dfrac{12.8e^{-s}}{1+16.7s} & \dfrac{-18.9e^{-3s}}{1+21s} \\ \dfrac{6.6e^{-7s}}{1+10.9s} & \dfrac{-19.4e^{-3s}}{1+14.4s} \end{bmatrix}$$

b) Calculate RGA for the process with same transfer function. (Q4a) **[9]**

P.T.O.

Q5) a) Determine whether following functions are convex or concave. **[9]**

i) $f(x) = 2x_1^2 - 6x_1x_2 + 4x_2^2$

ii) $f(x) = x_1^2 + x_2^2 + x_3^2$

iii) $f(x) = x_1 + 4x_2 + 8$

b) Discuss the necessary & sufficient condition for minimum & maximum. **[9]**

OR

Q6) a) Explain quadratic approximation for objective function. **[9]**

b) What is constraints in optimization? Explain constraint & unconstraint objective function with example. **[9]**

Q7) a) Explain steepest descent method. **[9]**

b) Explain Lagrange multiplier method for equality constraints minimize $f(x) = 4x_1^2 + 5x_2^2$ subjected to $n(x) = 2x_1 + 3x_2 - 6 = 0$ **[9]**

OR

Q8) a) Explain scanning & bracketing procedure for optimization of unconstrained problem. **[9]**

b) What is optimization? Explain the need of optimization with suitable example. **[9]**



Total No. of Questions : 8]

SEAT No. :

PE-5943

[Total No. of Pages : 2

[6584]-199R
B.E. (Instrumentation & Control)
CLOUD COMPUTING
(2019 Pattern) (Semester - VII) (406264 A) (Elective - IV)

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

Instructions to the candidates :

1) ***Answer Q.1 or Q.2, Q.3or Q.4, Q.5 or Q.6, Q.7or 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) Analyze the architecture of Virtual Machine with brief operations. **[9]**

b) Comment on "Although virtualization is widely accepted today, it does have its limits". **[9]**

OR

Q2) a) Demonstrate hon os-level virtualization con be used to Deploy containerized applications with Docker. **[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 & features that are available in VPC?**[8]**

OR

Q4) a) Illustrate the storage of amazon EC2 instance? **[9]**

b) Comment on the performance expectations by customer on EBS. **[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 & cloud computing. Elaborate with suitable diagram & 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 & cloud computing". **[9]**

Q7) a) Comment on : **[9]**

i) Location aware applications.

ii) Energy aware cloud computing.

iii) Intelligent fabrics and paints.

b) Analyze how Docker simplifies process management compared to virtual machines **[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

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

PE2294 **[Total No. of Pages : 3**

[6584]-200

B.E. (Instrumentation & Control)

SOFT COMPUTING

(2019 Pattern) (Semester - VII) (Elective - IV) (406264 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 diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Enlist all defuzzification methods. Explain any two defuzzification methods? **[9]**

b) What is meant by Lambda cut of a fuzzy set? Show that Lambda cut relation of fuzzy relation is crisp. **[9]**

OR

Q2) a) What are Fuzzy propositions? List the operations on Fuzzy propositions? **[9]**

b) What is Fuzzy Inference System (FIS)? Illustrate Mamdani FIS and Sugeno FIS with examples? **[9]**

Q3) a) Explain fuzzy control for smart cars with particular parameter of car. **[9]**

b) Consider a local area network (LAN) of interconnected workstations that communicate using Ethernet protocols at a maximum rate of 20 Mbit/s. The two fuzzy sets given below represent the loading of the LAN: **[9]**

$$\mu_S(x) = \left\{ \frac{1.0}{0} + \frac{1.0}{1} + \frac{0.9}{2} + \frac{0.4}{5} + \frac{0.1}{7} + \frac{0.3}{9} + \frac{0.0}{10} \right\}$$

$$\mu_C(x) = \left\{ \frac{0.0}{0} + \frac{0.1}{1} + \frac{0.3}{2} + \frac{0.5}{5} + \frac{0.3}{7} + \frac{0.8}{9} + \frac{1.0}{10} \right\}$$

where $S\sim$ represents silent and $C\sim$ represents congestion. Perform algebraic product, bounded sum and bounded difference over the two fuzzy sets.

OR

P.T.O.

Q4) a) What is Cooperative Neural Fuzzy system? Illustrate its classification types? **[9]**

b) Represent the standard fuzzy set operations using Venn diagram. **[9]**

Q5) a) Using Zadeh's notation, determine the λ-cut sets for the given fuzzy sets: **[9]**

$$\underline{S}_1 = \left\{\frac{0}{0} + \frac{0.5}{20} + \frac{0.65}{40} + \frac{0.85}{60} + \frac{1.0}{80} + \frac{1.0}{100}\right\}$$

$$\underline{S}_2 = \left\{\frac{0}{0} + \frac{0.45}{20} + \frac{0.6}{40} + \frac{0.8}{60} + \frac{0.95}{80} + \frac{1.0}{100}\right\}$$

i) $S_1 \cup \underline{S}_2$

ii) $\underline{S}_1 \cap \underline{S}_2$

iii) $\overline{\underline{S}}_1$

iv) $\overline{\underline{S}}_2$

b) Enlist different methods of defuzzification? Explain any one in detail. **[8]**

OR

Q6) a) Using the intuition method develop fuzzy membership functions for the following shapes. **[8]**

i) Trapezoid.

ii) Gaussian function.

iii) Isosceles triangle.

b) Consider the two fuzzy sets **[9]**

$$A = \left\{\frac{0}{0.2} + \frac{0.8}{0.4} + \frac{1}{0.6}\right\} \quad B = \left\{\frac{0.9}{0.2} + \frac{0.7}{0.4} + \frac{0.3}{0.6}\right\}$$

Using Zadeh's notation express the fuzzy sets into λ-cut sets for $\lambda = 0.4$ for the following operations.

i) $A \cap B$

ii) $A \cup B$

Q7) a) Differentiate the following: **[8]**

i) Convex and Nonconvex Fuzzy Set.

ii) Normal and Subnormal Fuzzy Set.

b) Distinguish between fuzzy and probability with example. Explain any two methods of composition techniques on fuzzy relations with examples. **[9]**

OR

Q8) a) Design the fuzzy controller for industrial temperature control. Clearly State the assumptions made if any. **[9]**

b) Explain the method of Construction of rule bases by self-learning in detail. **[8]**



Total No. of Questions : 8]

SEAT No. : ____

PE-5803

[Total No. of Pages : 2

[6584]-201

B.E. (Instrumentation and Control)

AUTOMOTIVE INSTRUMENTATION

(2019 Pattern) (Semester - VII) (406264 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 diagrams must be drawn wherever necessary.***
4) ***Use of Calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Define Passive Safety system. State the Advantages of Passive Safety system. Explain working of any one Passive safety system with neat diagram. **[10]**

b) With an example explain the working principle of Dynamic radar Cruise control Active Safety system with the help of neat diagram. **[7]**

OR

Q2) a) Compare Active and Passive Safety Systems. State the role of Instrumentation & Control in Advanced Safety Systems. Justify which system is better giving examples. **[10]**

b) Discuss the working principle of Air bag Passive Safety system with neat diagram. **[7]**

Q3) a) Elaborate the working principle of Controller Area Network (CAN) Protocol with diagram used in Automotive. **[8]**

b) Elaborate the Role of Standards in Automotive. Justify how Standards plays an important role in proper Functioning. List the types of Automotive Industry Standards used in Automotive. **[10]**

OR

P.T.O.

Q4) a) Elaborate the working principle of Media Oriented System Transport (Most) protocol with diagram used in Automotive. **[8]**

b) Define Protocols & Elaborate the Role of Protocols in Automotive. Justify how Protocols plays an important role in proper Functioning. List the types of Protocols used in Automotive. **[10]**

Q5) a) Define Electric Vehicle. State the advantages of Electric Vehicle over Internal Combustible Engine. Elaborate the role of Inverters system in Electric Vehicles with neat diagram. **[10]**

b) With regards to Critical Aspects of Design for Electric Vehicles Elaborate the Role and working principle of DC Converters in Electric Vehicles with diagram. **[7]**

OR

Q6) a) State the basics of Electro mobility. State motor Topologies. Mention the Specification of the electrical vehicle in concordance with driving cycle and rangerequirements. **[10]**

b) With regards to Critical Aspects of Design for Electric Vehicles Elaborate the Role and working principle of Power Electronic Controllers in Electric Vehicles with diagram. **[7]**

Q7) a) Define IoT. State the role of IoT in Electric Vehicles. Discuss the Working Phenomenon of Vehicle of Network (V2N) Communication with the help of block diagram. **[10]**

b) With the help of neat block diagram, Explain the working of Vehicle to Vehicle (V2V) system. **[8]**

OR

Q8) a) List the benefits of IoT with examples over Traditional technologies used in I.C. (Internal Combustion) Engines. Discuss the Working Phenomenon of Vehicle to infrastructure (V2I) system with the help of block diagram. **[10]**

b) With the help of neat block diagram, Explain the working of Telematics system. **[8]**



Total No. of Questions : 8]

SEAT No. :

PE2295

[Total No. of Pages : 3

[6584]-203

B.E. (Mechanical)

COMPUTER INTEGRATED MANUFACTURING

(2019 Pattern) (Semester - VIII) (402048)

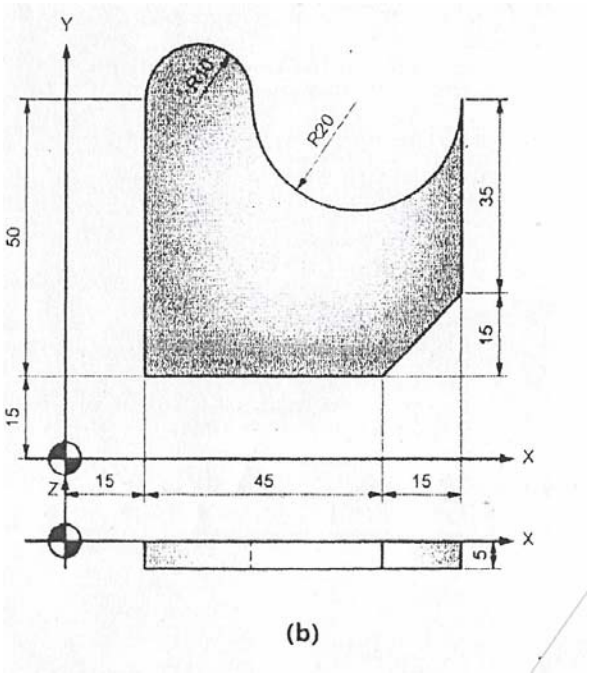
Time : 2½ Hours] *[Max. Marks : 70*

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 wherever necessary.***

Q1) a) Explain the types of continuous motion path control system for NC machine with figure. State the G-code used in it. **[8]**

b) Write a NC Part program to machine component, by using G and M codes. Use end mill of 6mm diameter and assume suitable machining parameter. Assume suitable value for spindle speed in rpm, feed in mm/min. Use Metric mode and absolute system. **[10]**

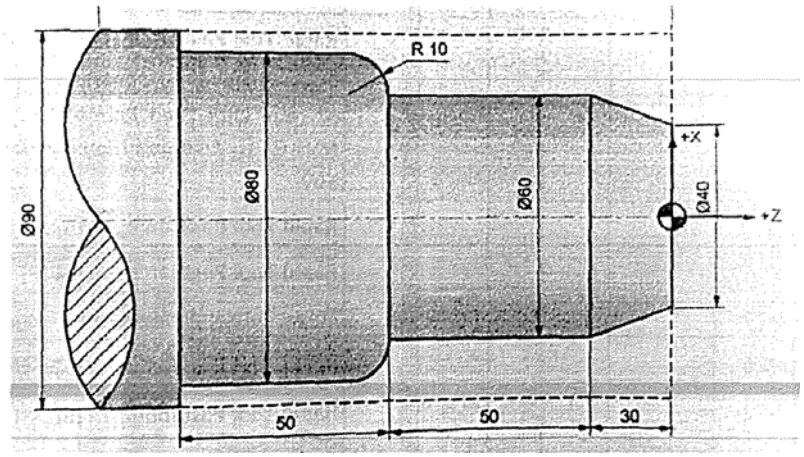


(b)

OR

P.T.O.

Q2) a) Write NC part program for the following component. Assume suitable cutting parameters. Raw material size diameter 90 mm and length 130 mm. **[10]**



b) What do you mean by Tool length and Radius compensation in CNC part program? **[8]**

Q3) a) Define material requirement planning. Explain the different factors to be considered in Material Requirements Planning. **[9]**

b) What is capacity planning? Explain different types of capacity planning.**[8]**

OR

Q4) a) Explain computer aided inspection and quality control. Explain any two methods of computer aided inspection technique. **[9]**

b) Explain shop floor control system. What are the objectives of shop floor control systems? **[8]**

Q5) a) With neat sketch, explain different layouts used in flexible manufacturing system. **[9]**

b) What is Automated guided vehicle? Explain different types of automated guided vehicles with sketch. **[9]**

OR

Q6) a) Explain methods of grouping parts into part families. **[8]**

b) Consider a GT machine cell with five machines Ml ,M2,M3,M4 and M5. Determine the most logical sequence of machines for this data using Hollier method. **[10]**

To Machine / From Machine	M1	M2	M3	M4	M5
M1	0	20	80	0	0
M2	0	0	0	0	85
M3	10	0	0	0	0
M4	10	0	10	0	0
M5	0	70	0	0	20

Q7) a) What is Industry 4.0? What are the technologies and functions associated with Industry 4.0? **[8]**

b) Explain Big-Data and Cloud Computing used for IoT along with its benefits and limitations. **[9]**

OR

Q8) a) Explain applications of Web based Manufacturing system. **[8]**

b) Explain with an example how Digital Twin is implemented for Smart Manufacturing? **[9]**

✪ ✪ ✪

Total No. of Questions : 8]

SEAT No. :

PE2296

[Total No. of Pages : 3

[6584]-204
B.E. (Mechanical)
ENERGY ENGINEERING
(2019 Pattern) (Semester-VIII) (402049)

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 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) Discuss with neat sketch Plant Layout of High Capacity Diesel Engine Power Plant. Enlist the applications of the same. **[8]**

b) Draw the hydrograph and flow duration curve for the following data: **[9]**

Month	Inflow(m^3/s)	Month	Inflow(m^3/s)
Jan.	1600	July	3000
Feb.	1200	Aug.	3000
March	800	Sept.	1600
April	800	Oct.	800
May	800	Nov.	800
June	1200	Dec.	1000

Determine:

i) Storage capacity for a constant demand of 1100 m^3/s

ii) Number of additional months this storage capacity can be utilized if there is no rain fall.

OR

Q2) a) What do you mean by nuclear fission? Discuss in brief. Elaborate functions of following elements of nuclear reactor. **[8]**

i) Coolants

ii) Control Rods

b) Describe the Sodium Graphite Reactor with following points. **[9]**

i) Labelled Diagram

ii) Construction and working

iii) Material for different elements of reactor

iv) Limitations

P.T.O.

Q3) a) Discuss concept of thermal efficiency and work ratio of Gas Turbine cycle. How Regeneration technique helps to improve thermal efficiency of Gas Turbine cycle? Elaborate with neat schematic and T-s diagram. **[9]**

b) The air enters the compressor of a gas-turbine power plant at 1 bar, 30 degrees Celsius and 162 tons per hour. The maximum cycle temperature, pressure is 650 degrees Celsius, 5 bar respectively. The two stage expansion with reheating pressure of 2.24 bar is used in the plant. In the reheater gas is heated up to maximum cycle temperature. The isentropic efficiency of compressor, first turbine, and second turbine is 80%, 85%, 90% 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) Power output of plant in MW

OR

Q4) a) Elaborate the gas and steam combined cycle plant with cycle arrangement, T-s diagram, advantages and disadvantages. **[9]**

b) Explain the Integrated Gasification Combined Cycle (IGCC) plant with cycle arrangement, T-s diagram, merits and demerits. **[9]**

Q5) a) State the main functions of the relays. What are different types of the same? Discuss working of any one relay with a neat sketch. **[9]**

b) What are different methods thermal energy storage? Explain anyone with simple diagram. Discuss the principles of energy management with storage systems. **[8]**

OR

Q6) a) A hydro-electric plant costs Rs 3000 per kW of installed capacity. The total annual charges consist of 5% as interest; depreciation at 2%, operation and maintenance at 2% and insurance, rent etc. 1.5%. Determine a suitable two-part tariff if the losses in transmission and distribution are 12.5% and diversity of load is 1.25. Assume installed capacity of the station be 100 kW & maximum demand on the station is 80% of the capacity and annual load factor is 40%. What is the overall cost of generation per kWh? **[9]**

b) Discuss the performance and operating characteristics of power plant using: **[8]**

i) Input-output curve

ii) Plant Efficiency curve

iii) Heat rate curve

iv) Incremental heat rate curve

Q7) a) Explain following terms in brief related to wind power systems. **[9]**

i) Cut-in Speed

ii) Cut-out Speed

iii) Rated Speed

iv) Betz Limit

v) Co-efficient of power

vi) Blade Tip ratio

b) Which type of turbines are used in Tidal power plants? Explain single basin and double basin tidal power plants with a neat sketch. **[9]**

OR

Q8) a) Discuss open type MHD based power generation system with following points. **[9]**

i) Labelled Diagram

ii) Construction and working

iii) Advantages

iv) Limitations

b) Explain Hydrogen Energy systems with following points. **[9]**

i) Working principle of hydrogen production,

ii) Methods of hydrogen storage

iii) Applications



Total No. of Questions : 8]

SEAT No. :

PE2297

[Total No. of Pages : 4

[6584]-205
B.E. (Mechanical)
QUALITY AND RELIABILITY ENGINEERING
(2019 Pattern) (Semester - VIII) (Elective - V) (402050A)

Time : 2½Hours] *[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 diagrms, whenever necessary.***
3) ***The figures to the right indicates full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Explain failure density and failure rate. Describe the main features of the 'bathtub' failure rate curve, explaining why each of the three regions has its characteristic shape. **[8]**

b) Explain the following Terms (Any 3): **[9]**

i) Safety and Reliability

ii) Importance and Reliability

iii) Areas of Reliability

iv) Uncertainty Analysis in Reliability

OR

Q2) a) Explain the following probability distributions (Any 2): **[8]**

i) Poisson's distribution

ii) Exponential distribution

iii) Log-normal distribution

b) In an engine manufacturing plant, 70% of the crankshaft is ground by machinist 'R' and 30% by machinist 'S'. It is known from past experience that the crankshaft ground by machinists'R' and 'S' contain 2 and 3 defective units respectively. If a randomly selected crankshaft is found to be defective, find the probability that it was ground by the machinist 'R'. **[5]**

c) A system has a constant failure rate of 10^{-3}/hr. What is the probability that the system will fail before t = 1000 hrs? Determine the probability that it works at least 1000 hr. **[4]**

P.T.O.

Q3) a) Write a short note on (Any 2): **[10]**

i) Tie Set and Cut Set Methods of Reliability Evaluation

ii) Cold, Hot, and Standby Redundancy Techniques

iii) Reliability Evaluation by Conditional Probability Method

b) A system having four subsystems has a reliability level of 0.95 for 10 hrs. Mission time of continuous operation. Subsystems 1 & 3 must be there for the successful operation of the system. Subsystem 2 has to function for only 9 hrs. for the operation of the system and its importance factor is 0.95. Subsystem 4 has to function for 8 hrs. for the operation of the system and its importance factor is 0.9. Number of modules in each subsystem is given below. What are allocated subsystem reliabilities and system reliability? Use the AGREE Allocation Method. **[8]**

Subsystem No. (i)	1	2	3	4
No. of Modules (N_i)	15	25	100	70

OR

Q4) a) Calculate the reliability for the system shown in the following Fig. 1. The number in each block shows the reliability of the individual component. **[10]**

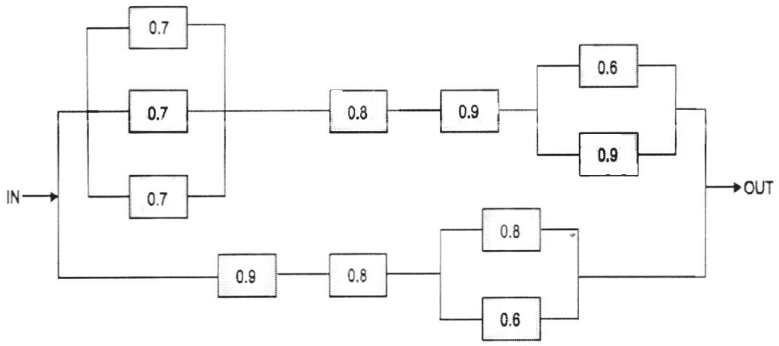


Fig. (1)

b) The following data refer to the predicted reliability of six components in a series. In case the desired reliability of the system does not fall below 0.85. Find the reliability goal for individual components. **[8]**

Components	1	2	3	4	5	6
Predicted Reliability	0.994	0.998	0.990	0.996	0.990	0.980

Q5) a) What is FMECA? Give the procedure of FMECA. State the importance of RPN in FMECA, with example. **[9]**

b) A room with two light bulbs is operated by a single switch. By assuming the 'No light in the room' as the top undesirable event. Construct the fault tree for the system shown in Fig 2. **[8]**

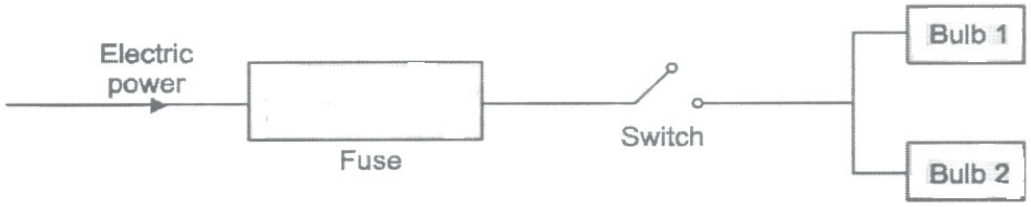


Fig. (2)

OR

Q6) a) Write Short notes on: **[9]**

i) Fault Tree Analysis

ii) Ishikawa for failure representation (Cause Effect Diagram)

iii) Symbols used in FTA

b) 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. Construct the fault tree for the system shown in Fig 3. **[8]**

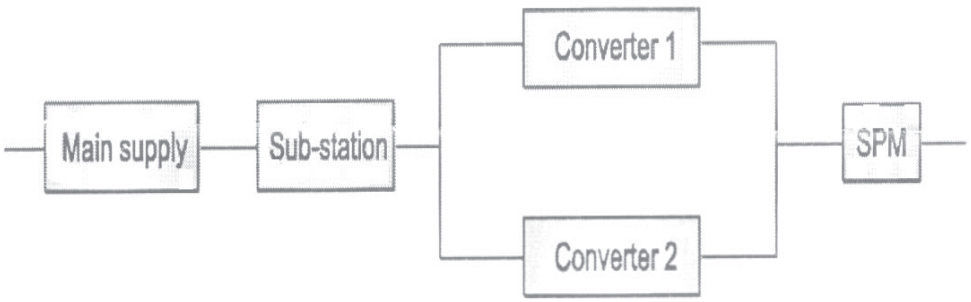


Fig. (3)

Q7) a) i) Explain factors affecting on Maintainability. **[10]**

ii) From the following data collected at a plant:

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) Explain Availability and Maintainability. Show that mean time to repair (MTTR) is the reciprocal of repair rate, from the basic maintainability equation. **[8]**

OR

Q8) a) 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.

b) Classify the different tests carried out for Reliability testing and explain in brief (Any 2): **[8]**

i) Accelerated Life Testing (ALT)

ii) Highly Accelerated Life Testing (HALT)

iii) Highly Accelerated Stress Screening (HASS)

Total No. of Questions : 8]

SEAT No. :

PE2298

[Total No. of Pages : 2

[6584]-206
B.E. (Mechanical)
ENERGY AUDIT AND MANAGEMENT
(2019 Pattern) (Semester - VIII) (Elective -V) (402050B)

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 whenever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Describe the factors influencing costing of coal, compressed air, natural gas, and electricity. **[9]**

b) Explain the term -Internal Rate of Return (IRR) with its advantages and disadvantages. **[8]**

OR

Q2) a) What is the NPV for a project of life 3 years, which requires a capital investment of 60000 and yields 30000 in the first year, 40000 in the second year, and 50000 in the third year, if the interest rate is 7 %? **[9]**

b) Explain the 'Simple Payback Period' method of financial analysis with its advantages and limitations. **[8]**

Q3) a) Calculate pump efficiency from the data given: pump flow is 0.50 m^3/s, power absorbed: 320 KW, suction head +1.1 m, Delivery head 50 m, motor efficiency 85%,type of drive: direct coupled, density of water 996 kg/m^3. **[9]**

b) Describe the energy conservation opportunities in DG sets. **[9]**

OR

Q4) a) Enlist the types of steam traps and explain any two with a neat sketch. **[9]**

b) What are the energy conservation opportunities in the Refrigeration and HVAC system? **[9]**

P.T.O.

Q5) a) What are the advantages of power factor (PF) improvement in electrical systems? Explain how PF is improved. **[9]**

b) Discuss essential components of electric tariff and explain the "Two-part tariff'. **[8]**

OR

Q6) a) What are the types of lamps used in lighting systems? Write down their features with typical applications. **[9]**

b) List the types of motors and explain the different losses occurring in electric motors. **[8]**

Q7) a) Write a short note on Trigeneration and write its advantages. **[9]**

b) What is the need of cogeneration? Explain cogeneration in detail with suitable examples. **[9]**

OR

Q8) a) Write a note on the shell-tube heat exchanger and plate heat exchanger. **[9]**

b) Explain the Waste Heat Recovery (WHR) in the industry and write its direct and indirect benefits. **[9]**

Total No. of Questions : 8]

SEAT No. :

PE2299

[Total No. of Pages : 2

[6584]-207
B.E. (Mechanical)
MANUFACTURING SYSTEMS AND SIMULATION
(2019 Pattern) (Semester - VIII) (Elective -V) (402050C)

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) What are the Material Handling Equipment? Explain in details. **[9]**

b) Short Note On **[8]**

i) Cellular manufacturing

ii) Just-in-time (Design of Kanban systems)

OR

Q2) a) What is a Capacity planning? **[6]**

b) Discuss Production Planning and inventory control. **[6]**

c) Short note on Scheduling. **[5]**

Q3) a) Explain Intelligent simulation using artificial intelligence (AI). **[8]**

b) What is simulation, Explain basic simulation concept. Advantages and disadvantages of simulation. **[10]**

OR

Q4) a) What are the components of system in modelling and simulation? **[8]**

b) Explain following Input data in details. **[10]**

i) Deterministic input data

ii) Probabilistic input data

iii) Discrete input data

iv) Continuous input data

P.T.O.

Q5) a) How to create a problem statement for a project? Explain in details **[9]**

b) What is the difference between discrete and continuous events? **[8]**

OR

Q6) a) What is simulation in production and operations management? **[9]**

b) Explain Validation Model Assumptions in details? **[8]**

Q7) a) Short Note on **[8]**

i) Design of Simulation Experiments

ii) Calibration and validation of Models

b) What is the assembly line balancing? How do you balance a line in manufacturing? **[10]**

OR

Q8) a) What are the 4 functions of material handling system? **[8]**

b) What are the three main functions of material management? **[5]**

c) What are the basic rules of material handing? **[5]**

Total No. of Questions : 8]

SEAT No. :

PE2300

[Total No. of Pages : 2

[6584]-208
B.E. (Mechanical)
ENGINEERING ECONOMICS AND FINANCIAL MANAGEMENT
(2019 Pattern) (Semester - VIII) (Elective - V) (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) Differentiate cost accounting and management accounting. **[8]**

b) What steps are followed in preparation for the profit and Loss Account and Balance Sheet from incomplete records? **[10]**

OR

Q2) a) What is a profit and loss Statement? Explain its concepts in detail. **[8]**

b) What are the main features of the cash flow statement? Explain the treatment of foreign exchange losses while preparing the cash flow statement. **[10]**

Q3) a) State the advantages and disadvantages of budgeting. **[8]**

b) Give classification of budgets based on time, condition, and function. **[9]**

OR

Q4) a) What is the budget and steps in budgeting? **[8]**

b) Explain incremental, activity, and value proposition methods of budgeting. **[9]**

Q5) a) Explain about the steps involved in export-import procedures. **[9]**

b) Explain the concept of international business and its motives. **[8]**

OR

P.T.O.

Q6) a) Define international trade and reasons for international trade. **[9]**

b) What are the functions and qualities of money? **[8]**

Q7) a) Write a short note on: **[10]**

i) Crowdfunding

ii) Venture Capitals

b) Explain Funding Processes. **[8]**

OR

Q8) a) What is a business valuation? Explain any three Valuation Methods. **[10]**

b) State and explain entrepreneurial finance and corporate finance. **[8]**

Total No. of Questions : 8]

SEAT No. : ____

PE2301

[Total No. of Pages : 2

[6584]-209

B.E. (Mechanical)

ORGANIZATIONAL INFORMATICS

(2019 Pattern) (Semester - VIII) (402050E) (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 wherever necessary.***

Q1) a) Write note on following for Product data issues. **[9]**

i) Availability

ii) Change

iii) Confidentiality

b) What is Product Data Management? Why is PDM used? **[9]**

OR

Q2) a) What is PLM? What are the modules in PLM? **[10]**

b) What are benefits of product data management system? **[8]**

Q3) a) Trace the evolution from MRP to MRP II into ERP.. **[9]**

b) Explain any 4 components of ERP software used in market? **[8]**

OR

Q4) a) Provide an introduction to any 2 prominent ERP software highlighting their key features and differences. **[9]**

b) Distinguish between Business Engineering and Business Process Engineering. **[8]**

P.T.O.

Q5) a) What is MES implementation? What are the benefits of MES implementation? **[9]**

b) What is MES and ERP integration? Explain its benefits and shortcomings with example. **[8]**

OR

Q6) a) Explain various models in details for MES **[9]**

i) Detailed production scheduling.

ii) Product definition management.

iii) Production Execution management.

b) What is workflow management in ERP? What are the 5 stages of workflow? **[8]**

Q7) a) Explain following term in case of Information system. **[10]**

i) Cloud Computing

ii) Artificial intelligence systems

b) What is E-commerce business model, explain it in detail? **[8]**

OR

Q8) a) Explain the term SCM, CRM & SRM. **[9]**

b) Explain Security of an Information System. **[9]**



Total No. of Questions : 8]

SEAT No. :

PE2302

[Total No. of Pages : 2

[6584]-210
B.E. (Mechanical Engineering)
COMPUTATIONAL MULTI BODY DYNAMICS
(2019 Pattern) (Semester - VIII) (402050F) (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) ***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 derivation of equations of motion using Newton-Euler Equations. **[6]**

b) Explain the basic terms related various MBD formulation methods - Kinetic energy, potential energy, total energy, generalized forces on a rigid body, Generalized Inertia, Mass matrix. **[12]**

OR

Q2) a) Explain the derivation of equations of motion using Lagrange's method. **[8]**

b) What is Lagrange's form of D' Alembert's principle? Explain it. **[10]**

Q3) a) What is Iterative solution for Planar Kinematic Analysis? How to generate/model Iterative solution of systems of non-linear equations?**[9]**

b) How to assemble systems of equations for position analysis for Planar Kinematic Analysis? **[8]**

OR

Q4) a) Explain the computation of spring element forces and damper element forces of planar dynamic system. **[9]**

b) What is Forward Dynamic Analysis of Planar System? Explain with two applications. **[8]**

P.T.O.

Q5) a) Explain: **[9]**

(i) Reference frames for the location of a body in space and

(ii) Screw motion of rigid body in space.

b) What is Kinematic Analysis of Spatial Systems? How to defines joint frames for Kinematic Analysis of Spatial Systems? **[9]**

OR

Q6) a) What are the constraints required for the description in space of revolute, prismatic, cylindrical, spherical and screw kinematic pairs? Explain it.**[10]**

b) What open-chain and closed-chain kinematic system of Spatial Systems? Explain in detail. **[8]**

Q7) a) What is Recursive Dynamics? How to do Computation of generalized forces and reaction forces using Recursive Inverse Dynamics for spatial system? **[10]**

b) What are the existing Kinematic Simulation softwares? Explain any two. **[7]**

OR

Q8) a) Explain the Multibody Dynamics Simulation software with respect to method, application, advantages, limitations. **[10]**

b) What are the domain specific applications of kinematic Simulation software? **[7]**

Total No. of Questions : 8]

SEAT No. : ____

PE2303

[Total No. of Pages : 2

[6584]-211

B.E. (Mechanical)

PROCESS EQUIPMENT DESIGN

(2019 Pattern) (Semester - VIII) (402051 A) (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, 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) Explain design of thick cylinders subjected to internal pressure based on maximum principal strain theory and derive equation to find thickness of cylinder wall. **[9]**

b) Explain the purpose of pre-stressing of cylinders. Explain auto frottage in detail with neat labelled sketch. **[8]**

OR

Q2) a) A closed cylinder of 300 mm inner diameter is to be designed to with stand an internal pressure of 25 MPa. The cylinder is to be made of plain carbon steel 15C8. (S_{ut} = 440 N/mm^2, S_{yt} = 240 N/mm^2 and v = 0.29) If the factor of safety based on yield strength is 1 .5, determine the thickness of cylinder wall using: **[10]**

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. **[7]**

P.T.O.

Q3) a) Explain shell and tube type of heat exchanger with neat labelled sketches. **[9]**

b) Explain the selection of pumps and compressors. **[8]**

OR

Q4) a) Explain with neat sketch design of storage vessels. **[9]**

b) Define and explain types of valves used on pipe line. **[8]**

Q5) a) Define processes, process parameters and their correlation. **[10]**

b) State variables of Automatic Process control. **[8]**

OR

Q6) a) List the different pressure measuring instruments and explain principal, construction and working of Bourdon tube with neat labelled sketch. **[9]**

b) Describe with neat labelled sketches, the construction and working of LVDT with its advantages and disadvantages. **[9]**

Q7) a) List the fabrication methods used for manufacturing of Pressure Vessels. Explain bending operation used in manufacturing of pressure vessels. **[9]**

b) Explain how AI/IOT can be used to overcome challenges at Fuel Pumping station. **[9]**

OR

Q8) a) Explain planning and manufacture of process equipment like pressure vessels and chimneys. **[9]**

b) Differentiate between Destructive and Non-destructive Testing. Explain Magnetic Particle test used for detection of surface defect. **[9]**



Total No. of Questions : 8]

SEAT No. : ____

PE2304

[Total No. of Pages : 3

[6584]-213
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, 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) What are the major advantages of solar cells over conventional methods of power system? **[5]**

b) Define fill factor and explain current - voltage characteristic of solar cell. **[5]**

c) A photovoltaic cell has an open circuit voltage of 0.6V and a short circuit current of 250 A/m^2 at a cell temperature of 40°C. Calculate the voltage and current density that maximises the power of the cell. What would be the corresponding maximum power output per unit cell area? **[8]**

OR

Q2) a) Explain principle of working of Solar cell with neat sketch. **[5]**

b) Explain different types of solar cells on the basis of material thickness and the type of junction structure. **[5]**

c) A residential house has a power requirement of 400 W for 4 hours every night. It is proposed to meet the requirement by using a PV array, a battery storage system and an inverter. The whole system is over designed so that it can meet one extra night's requirement even if there has been no sunshine during the day. Calculate number of PV modules and batteries required. Given : **[8]**

i) Solar radiation is available for an average of six hours daily and average hourly global radiation flux incident on the array is 650 W/m^2.

ii) Battery rating = 12 V; 120 Ah. Depth of discharge = 0.7 Charging and discharging efficiency = 0.9.

iii) Inverter efficiency at full load =0.85.

P.T.O.

Q3) a) Explain the following terms in short. **[6]**

i) Swept Area

ii) Tip Speed ratio

iii) Power coefficient

b) What are the design considerations of Horizontal and Vertical axis wind turbines? **[4]**

c) A 40 m diameter wind turbine with 3 blades and 700 kW power output. The wind speed is 14 m/s and the air density is 1.225 Kg/m^3 :

i) Find the rotor rpm if the wind turbine operates at a TSR of 4.0.

ii) Find the tip speed of the rotor.

iii) What gear ratio is needed to match the rotor speed to the generator speed if the generator must run at 1800 rpm?

iv) What is the efficiency of wind turbine under these conditions? **[8]**

OR

Q4) a) Explain in detail impact of Wind Power Plant on environment. **[4]**

b) Write a note on operating Characteristics of wind mill. **[5]**

c) A propeller type wind turbine has the following data: Speed of the free wind at a height of 10 m = 12 m/s Air density = 1.226, $\alpha = 0.14$, Height of tower = 100 m, Diameter of rotor = 80 m, Wind velocity at the turbine reduces by 20 %, Generator efficiency = 85% Determine. **[9]**

i) Total Power available in wind Power extracted by the turbine.

ii) Electrical power generated Axial thrust on the turbine.

iii) Maximum axial thrust on the turbine.

Q5) a) Write short note on Yaw control. **[6]**

b) Explain maintenance procedure for Solar PV plant. **[6]**

c) Calculate the annual energy output production from a horizontal axis wind turbine with swept area 300 m^2 and operating in a wind regime with an average wind speed of 8 m/s the density of wind is 1.225 kg/m^3 and the wind power coefficient is 0.35. **[6]**

OR

Q6) a) Describe the basic principle of photovoltaic power plant. **[6]**

b) Write short note on DPR preparation for roof top solar plants. **[6]**

c) Explain in short the stand alone systems. **[6]**

Q7) a) Explain the term : **[3]**

i) True density of biomass

ii) Apparent density of biomass

iii) Bulk density of biomass

b) Explain Circulating Fluidized bed gasifier in detail with neat sketch. **[6]**

c) A saw dust sample one gm is heated in muffle furnace to find out the proximate analysis. The sample was heated at temp 105°C for 3 hrs mass is reduced to 0.87gm. Then 1gm sample is heated at 550°C for 9 min mass reduced to 0.27gm. Afterward the 1gm sample is heated at 550°C for 6 hrs and mass is reduced by 0.026gm. Estimate the proximate analysis for the saw dust on dry basis. **[7]**

OR

Q8 a) Explain biodiesel production with transesterification process. **[4]**

b) The ultimate analysis of the biomass Pongamia pinnata used in the downdraft gasifier, for the composition of carbon (C), hydrogen (H), nitrogen (N) and sulphur (S), is carried out using EuroEA Elemental Analyzer AS given as below. **[6]**

Name	C%	H%	N%	S%	ASH%	O%
Pongamia Pinnata	4.462	44.547	8.872	--	1	41.119

Find out the formula for the biomass Pongamia pinnata.

c) Explain with neat sketch Fixed dome type bio-gas plant. **[6]**



Total No. of Questions : 8]

SEAT No. : ____

PE2305

[Total No. of Pages : 2

[6584]-214
B.E. (Mechanical)
AUTOMATION AND ROBOTICS
(2019 Pattern) (Semester - VIII) (402051 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, 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. **[8]**

b) What are the factors which must be considered while choosing the drive system for robots? **[9]**

OR

Q2) a) Mention the need of gear boxes and explain the benefits of Planetary, Cycloidal Gearbox. **[9]**

b) Write about various types of motion conversion. **[8]**

Q3) a) What are the Grippers? Explain their Types and applications used in Robotics. **[9]**

b) What are the Toolings? Explain their Types, Classification, Significance and Applications used in Robotics. **[8]**

OR

Q4) a) What are the Sensors and intelligent sensor? Give classification of a sensing device. **[9]**

b) Enlist the criteria of sensor selection for various applications in robotics.**[8]**

P.T.O.

Q5) a) Define the various components of transformation from transformation matrix. Also shortly describe rotational transformation and rotation matrix. **[9]**

b) Explain DH Parameters with one example of basic robot. **[9]**

OR

Q6) a) Explain with neat sketch moment of inertia and inertia tensor. **[9]**

b) Establish the mathematical expressions of direct dynamics of two joints/ link manipulator with two joints using Lagrangian Approach. **[9]**

Q7) a) Write a note on robot economics and safety. **[9]**

b) What are the types of robot programming? Explain offline programming and also state its advantages and disadvantages. **[9]**

OR

Q8) a) Write a note on

i) Industrial application of robot

ii) Pick-&-place material transfer application

iii) Machine loading & unloading application. **[9]**

b) What are the various non-industrial applications of robots? Write short description of each. **[9]**



Total No. of Questions : 8]

SEAT No. :

PE2306

[Total No. of Pages : 2

[6584]-215
B.E. (Mechanical)
INDUSTRIAL PSYCHOLOGY AND ORGANIZATIONAL BEHAVIOR
(2019 Pattern) (Semester - VIII) (402051 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 diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) What is performance appraisal? Explain methods of performance appraisal. **[9]**

b) Explain concept of Performance Management and state objectives of Performance Management. **[8]**

OR

Q2) a) What is job dissatisfaction? How it affects the organization and the ways to reduce factors causing job dissatisfaction. **[9]**

b) Explain job satisfaction. Explain the factors influencing job satisfaction. **[8]**

Q3) a) What are the different types of organizational theories? Explain Human Relations theory. **[10]**

b) Explain the characteristics of leadership and state its relevance to supervision. **[8]**

OR

Q4) a) Explain importance of ethics in an organization. **[10]**

b) What are the different theories of learning? Explain Classical Conditioning Theory in detail. **[8]**

P.T.O.

Q5) a) Explain different stages in group development. **[9]**

b) List decision making techniques and define any 5 of them. **[8]**

OR

Q6) a) Explain in detail the role of power in leadership. **[9]**

b) List down the characteristics of good leadership. **[8]**

Q7) a) Describe the Approaches to Manage Organizational Change. **[10]**

b) State and explain which forces are responsible for organizational change? **[8]**

OR

Q8) a) Explain the need of interventions in organizational development. Describe the process of interventions in organizational development. **[10]**

b) Explain the need of Organizational Development and explain any one theory of Organizational Development. **[8]**



Total No. of Questions : 8]

SEAT No. :

PE2307

[Total No. of Pages : 2

[6584]-216
B.E. (Mechanical Engineering)
ELECTRICAL AND HYBRID VEHICLE
(2019 Pattern) (Semester - VIII) (402051 E) (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, Q.7or 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 with neat sketch construction and working of brushless DC motor and also state its advantages and disadvantages. **[9]**

b) Determine the rating of motor required for following data: Gross curb weight (GCW) = 100 Kg , load on vehicle =70 kg, Maximum speed = 50 kmph., Road friction = 0.01, Coefficient of drag =0.9, Density of air = 1.2 kg/m^3, Frontal area of vehicle = 0.6 m^2 ,Wheel radius= 0.28 m. Suggest the motor rating to cover the distance of 90 kms per charge. **[9]**

OR

Q2) a) Explain with neat sketch construction and working of Li-ion battery used for EV. **[9]**

b) In e-auto, the battery rating is 20Ahs at 24 volts. It has maximum speed of 25 kmph and motor has power of 250 Watts. How much distance it will cover. Assume suitable data.

Case 1 Using lead acid battery (Assume power available 50%)

Case 2 Using Li-ion battery (Assume power available 95%)

How much range will increase? **[9]**

Q3) a) Compare between mechanical differential and electric differential. **[8]**

b) Explain the concept of fuel efficiency analysis and its significant features for electric vehicle? **[9]**

OR

P.T.O.

Q4) a) Electric vehicle has the following attributes :drag coefficient of 0.20 with vehicle frontal cross sectional area 2.5m^2 , available battery energy of 25kWh.Assuming density of air 1.2 kg/m^3.At particular moment with a vehicle speed of 100km/hour, calculate aerodynamic drag force, power and distance covered for driving condition of i) calm condition with no wind ii) windy conditions with a 12 km/h headwind. **[9]**

b) Write a note on braking system in EV and their types **[8]**

Q5) a) What is retrofitting and explain problems associated with retrofitting of two wheeler. **[9]**

b) Explain with neat sketch construction and working of rear end suspension system in vehicles. **[9]**

OR

Q6) a) What is homologation? What are the national/international testing/ regulation/licensing/approval organizations and agencies? **[9]**

b) Write a note on crash testing and testing of tracks. **[9]**

Q7) a) Explain with neat sketch charging architecture. **[8]**

b) Explain following: grid voltages, frequencies and wiring, real power, apparent power and power factor. **[9]**

OR

Q8) a) Describe and illustrate a typical structure of battery management systems (BMS) along with its significant functions. **[9]**

b) Describe and illustrate hazard/safety management of batteries during/after operations. **[8]**



Total No. of Questions :8]

SEAT No. :

PE2308

[Total No. of Pages : 5

[6584]-217

B.E. (Mechanical Engineering)

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.7or 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) Discuss any one method of capacity controls of reciprocating compressor. **[6]**

b) Explain with neat sketch of frost control circuit. **[5]**

c) Explain with neat sketch transcritical cycle. **[6]**

OR

Q2) a) Explain with neat sketch flooded type evaporator. **[6]**

b) Explain with sketch LP/HP cut-off. **[5]**

c) Explain with sketch simple ejector refrigeration system. **[6]**

Q3) a) Explain load calculation factors of air conditioning(four). **[8]**

b) The atmospheric air at 30°C dry bulb temperature and 75% relative humidity enters a cooling coil at the rate of 200 m^3/min. The coil dew point temperature is 14°C and the by-pass factor of the coil is 0.1. Determine: **[10]**

i) The temperature of air leaving the cooling coil

ii) The capacity of the cooling coil in kW

iii) The amount of water vapour removed per min, and

iv) The sensible heat factor for the process

OR

P.T.O.

Q4) a) Explain Thermal exchange of human body with Environment. **[8]**

b) The room sensible and latent heat loads for an air-conditioned space are 30 kW and 10 kW respectively. The room condition is 25°C dry bulb temperature and 50% relative humidity. The outdoor condition is 35°C dry bulb temperature and 60 % relative humidity. The ventilation requirement is such that on mass flow rate basis 20% of fresh air is introduced and 80% of supply air is recirculated. ADP of the cooling coil is 5°C. Determine: **[10]**

i) RSHF;

ii) BPF of cooling coil;

iii) supply air flow rate;

iv) outside air sensible heat;

v) outside air latent heat;

vi) Capacity of cooling coil in TR

Q5) a) Explain any four types of air distribution devices. **[8]**

b) A rectangular duct, 0.15 m× 0.12 m is 20m long and carries a standard air at the rate of $0.3 m^3/s$ having density $1.2 kg/m^3$. Calculate the total pressure required at inlet of the duct in order to maintain the flow and air power required. Take f =0.005. **[10]**

OR

Q6) a) Explain fan laws and any two types of fans used in air distribution system. **[8]**

b) In the air duct system, as shown figure below, the branch BE is 20 m long and delivers air at 120 m^3/min. The branch at CF is 15m long and delivers air at 140 m^3/min. At the end D of the main duct, the air delivered is 220 m^3/min. Take velocity in main duct AB is 600 m/min. Using a friction chart and equal pressure drop method, determine the diameter and velocity in AB, BC, CD, BE, CF Duct sections. Also calculate maximum pressure drop in the duct system. **[10]**

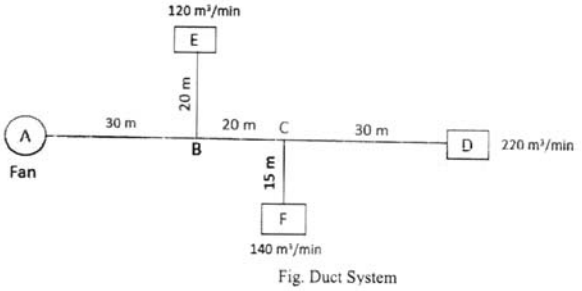


Fig. Duct System

Q7) a) Explain with neat sketch, air water system. **[6]**

b) Write a short note on "Sorbents and Desiccants. **[6]**

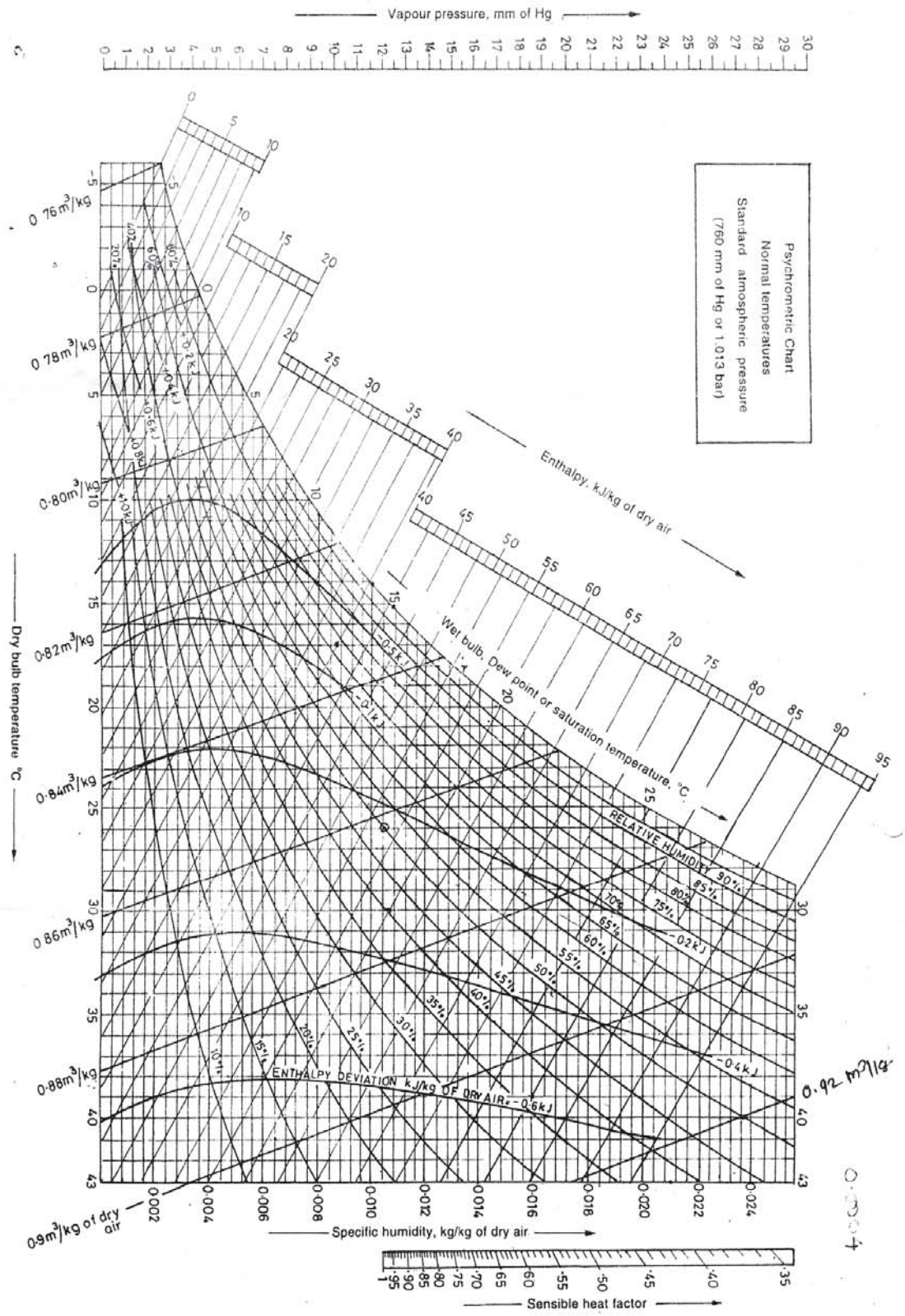
c) Explain any one circuit of heat pump. **[5]**

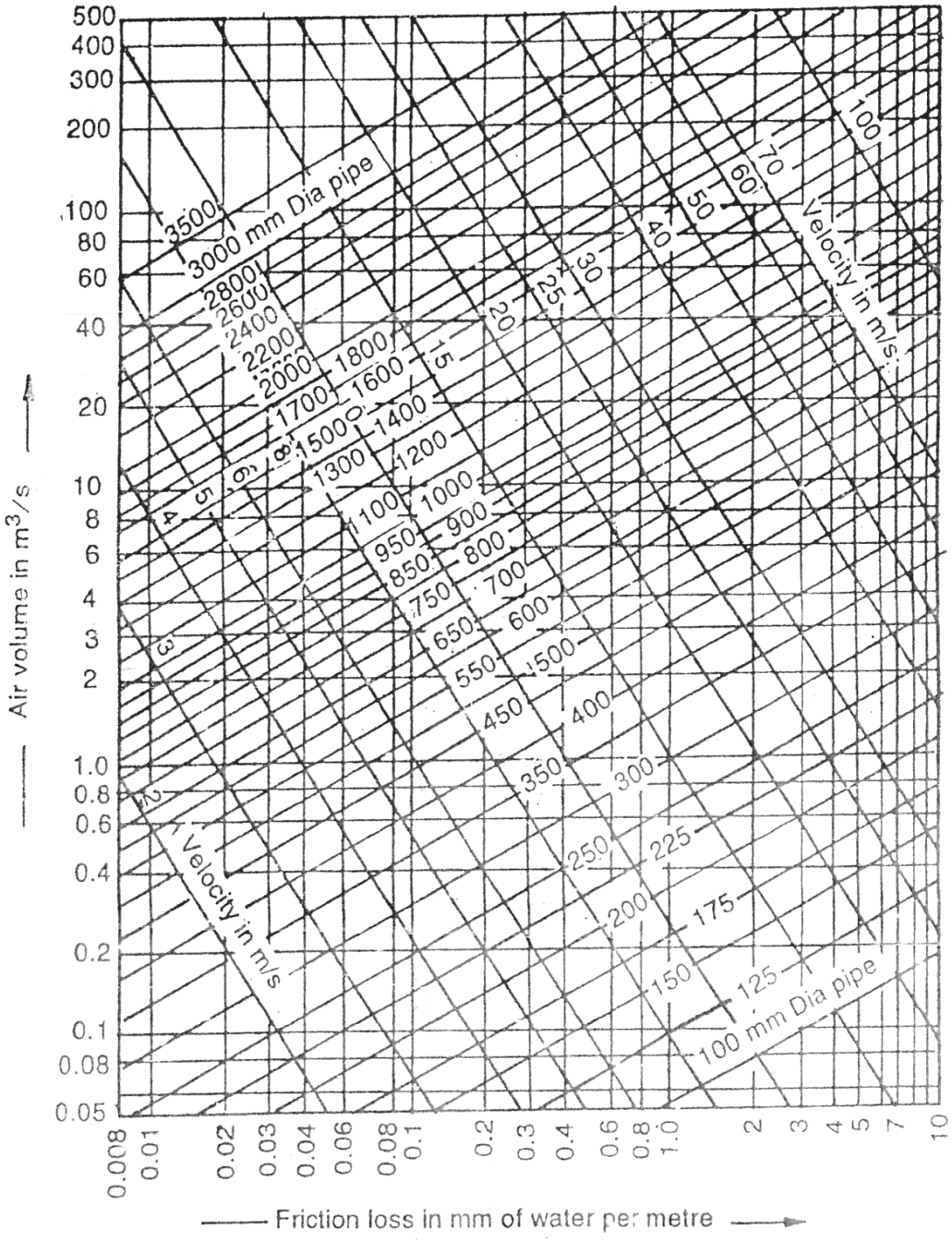
OR

Q8) a) Explain with neat sketch variable refrigerant flow system. **[6]**

b) Explain liquid spray tower. **[6]**

c) Explain thermal storage Air Conditioning systems. **[5]**


Vapour pressure, mm of Hg
Psychrometric Chart
Normal temperatures
Standard atmospheric pressure
(760 mm of Hg or 1.013 bar)
Enthalpy, kJ/kg of dry air
Wet bulb, Dew point or saturation temperature, °C
Dry bulb temperature °C
RELATIVE HUMIDITY
ENTHALPY DEVIATION kJ/kg OF DRY AIR
Specific humidity, kg/kg of dry air
Sensible heat factor
0·76m³/kg
0·78m³/kg
0·80m³/kg
0·82m³/kg
0·84m³/kg
0·86m³/kg
0·88m³/kg
0·9m³/kg of dry air
0.92 m³/kg


Air volume in m³/s
Friction loss in mm of water per metre
3000 mm Dia pipe
100 mm Dia pipe
Velocity in m/s
Velocity in m/s

Total No. of Questions : 8]

SEAT No. : ____

PE2309

[Total No. of Pages : 3

[6584]-218

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 diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data wherever necessary.***

Q1) a) For the spring mass system shown in Fig. 1a),
If K_1 = 2 N/mm, K_2 = 1.5 N/mm, K_3 = 3 N/mm, K_4 = K_5 = 1.5 N/mm,
Determine mass 'm' if the system has a natural frequency of 12 Hz. **[9]**

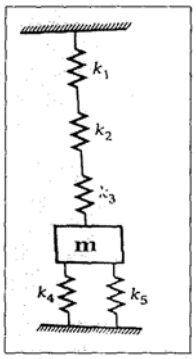


Fig. 1a)

b) Enlist elements of a vibratory system and explain with neat diagram mathematical modeling of a bicycle. **[8]**

OR

Q2) a) In a Single Degree of Freedom vibratory system, a suspended mass of 16 kg makes 30 oscillations in 22 seconds. The amplitude of oscillations decreases to 0.25 of initial value after 5 oscillations. **[9]**
Determine the
i) Stiffness of the spring
ii) Logarithmic decrement
iii) Damping factor
iv) Damping Coefficient

b) Discuss importance of damping in vibratory system. Explain various categories of damping based on damping ratio (ξ). **[8]**

P.T.O.

Q3) a) An electric motor running at 500 rpm is supported on a spring and a dashpot. The spring has the stiffness of 6400 N/m and dashpot offers a resistance of 400 N at 4.0 m/sec. The unbalanced mass of 0.6 kg rotates at 5 cm radius and the total mass of vibratory body is 16 kg. **[10]**

Calculate:

i) Damping factor

ii) Amplitude of vibration and phase angle

iii) Resonant speed and resonant amplitude

iv) Force exerted by spring and dashpot on motor

v) Resultant force

b) Explain in detail with neat sketch forced vibration due to rotating unbalance. **[8]**

OR

Q4) a) A machine having mass of 200 kg is mounted on spring and damper. The total stiffness of spring is 7.84×10^5 N/m while damping ratio of damper is 0.15. A vertical harmonic force F = 392sin (314.15t) N acts on the machine. For the steady state vibrations of the system, **[10]**

Calculate,

i) amplitude of vibration

ii) the transmissibility

iii) transmitted Force

iv) phase difference between transmitted force and excited force

b) Explain quality factor and half power bandwidth. **[8]**

Q5) a) For the vibratory system shown in Fig. 5 a), determine two natural frequencies and corresponding modes of vibration. **[10]**

Given, $m_1 = 2$ kg, $m_2 = 3$ kg

$K_1 = K_2 = K = 30$ N/m

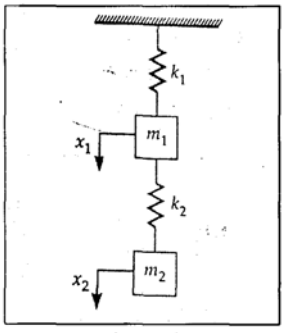


Fig. 5 a)

b) Explain the concept of torsionally equivalent shaft and derive equation for its equivalent length. **[7]**

OR

Q6) a) For the Spring mass system shown in Fig. 6 a), find Eigen values and Eigen vectors by matrix method **[10]**

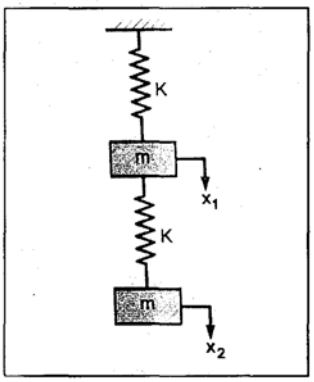


Fig. 6 a)

b) Explain the torsional vibrations of geared system neglecting inertia of gears. **[7]**

Q7) a) Explain time domain and frequency domain techniques for vibration monitoring. **[10]**

b) List the vibration measuring instruments. Explain any one in detail. **[8]**

OR

Q8) a) Explain in detail various types of sound filed in the vicinity of a sound source. **[10]**

b) What is the need of vibration control? Explain any two methods of vibration control. **[8]**



Total No. of Questions : 8]

SEAT No. :

PE2310

[Total No. of Pages : 3

[6584]-219
B.E. (Mechanical)
TURBO MACHINERY
(2019 Pattern) (Semester - VII) (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.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Use of steam table/Mollier chart is allowed.***
4) ***Use of non programmable calculator is allowed.***
5) ***Figures to the right indicates full marks.***

Q1) a) Show that the efficiency of a free jet striking normally on a series of flat plates mounted on the periphery of a wheel can never exceed 50%. **[6]**

b) A double jet Pelton wheel has a specific speed of 14 and is required to deliver 1000 kW. The turbine is supplied through pipeline from a reservoir whose level is 400 m above the nozzles. Allowing 5% frictional loss in the pipe,

Calculate:

i) Speed of the turbine

ii) Diameter of jets and

iii) Mean diameter of bucket circle.

Take C_v = 0.98, speed ratio = 0.46, and overall efficiency of turbine = 85%. The specific speed is based on power output per jet. **[8]**

OR

Q2) a) Explain the functions of following **[6]**

i) casing of Pelton wheel

ii) Notch of bucket

iii) Governing mechanism.

b) A Francis turbine with an overall efficiency of 80% is required to produce 130 kW. It is working under a head of 10 m. The peripheral velocity is $0.24\sqrt{2gH}$ and the radial velocity of flow at inlet is $0.9\sqrt{2gH}$. The wheel runs at 150 rpm and the hydraulic losses in the turbine are 10% of

P.T.O.

the available energy. Assuming radial discharge, **[8]**

determine-

i) The guide blade angle

ii) The wheel vane angle at inlet

iii) Diameter of the wheel at inlet and

iv) Width of the wheel at inlet

Q3) a) Why governing of steam turbines is necessary? Explain with neat sketch throttle governing of Steam turbine. **[6]**

b) In an impulse turbine (with a single row wheel) the mean diameter of the blades is 1.05 m and the speed is 3000 rpm. The nozzle angle is 18º, the ratio of blade speed to steam speed is 0.42 and the ratio of the relative velocity at outlet from the blades to that at inlet is 0.84. The outlet angle of the blades is to be made 3° less than the inlet angle. The steam flow rate is 10 kg/sec. Draw the velocity diagrams for the blades and **[6]**

Calculate :

i) Tangential thrust on the blades

ii) Axial thrust on the blades and

iii) Resultant thrust on the blades.

OR

Q4) a) Explain degree of reaction in steam turbines? Why 100% reaction steam turbine is not possible? **[6]**

b) In a reaction steam turbine, the blade tips are inclined at 35º and 20º in the direction of motion. The guide blades are of the same shape as the moving blades, but reversed in direction. At a certain place in the turbine, the drum diameter is 1 m and the blades are 10 cm high. At this place, the steam has a pressure of 1.75 bar and dryness 0.935. If the speed of this turbine is 250 rpm and the steam passes through the blades without shock, find the mass of steam flow and power developed in the ring of moving blades. Velocity of flow is 10.8 m/sec and remains constant from inlet to outlet. Specific volume of dry saturated steam at a pressure of 1.75 bar is 1.004 m^3/kg. **[6]**

Q5) a) What do you mean by cavitation? Explain the phenomenon of cavitation in centrifugal pump. **[6]**

b) A centrifugal pump has effective areas of flow of 15 cm^2 and 17.5 cm^2 at outlet and inlet respectively. Water enters the impeller radially with 5 m/sec. The vanes are set back at 25º to the tangent at outlet. The

peripheral velocities of vane tips at outlet and inlet are 30 m/sec and 15 m/sec respectively. The manometric efficiency is 80%. Neglecting impeller losses, Determine- **[6]**

i) Percentage of outlet velocity head recovered in the diffuser passage.

ii) Inlet angle of diffuser vanes.

OR

Q6) a) Discuss various methods of priming of centrifugal pump. **[6]**

b) A centrifugal pump discharges water at the rate of 0.60 m^3/sec against a head of 20 m. It runs at 1000 rpm. Water enters the impeller radially and the velocity of flow remains constant throughout at 3 m/sec. The manometric efficiency of the pump is 80% and the loss of head due to friction over the impeller is $0.025\ V_2^2$ m of water. Assume inner diameter as half the outer diameter. **[6]**

Determine -

i) Vane angles at inlet and outlet

ii) Diameter of impeller and

iii) Area of flow at outlet.

Q7) a) The following data is used for a centrifugal compressor. **[6]**

Diameter of inlet eye of the compressor impeller = 35 cm, Mass flow rate =10 kg/sec, Total pressure ratio = 3.6, Axial velocity at inlet = 140 m/sec, Velocity in delivery pipe = 120 m/sec, Tip speed of impeller = 460 m/sec, Speed of compressor = 18000 rpm, Total head isentropic efficiency = 85% Ambient condition = 1.013 bar and 15ºC.

Find -

i) Static pressure and temperature at inlet and outlet

ii) Static pressure ratio

iii) Work done per kg and

iv) Theoretical power

b) What is prewhirl in a centrifugal compressor? Why is it necessary? **[6]**

OR

Q8) a) Explain the phenomenon of surging and stalling in an axial flow compressor. **[6]**

b) Explain various losses in axial flow compressor. **[6]**



Total No. of Questions : 8]

SEAT No. :

PE2311

[Total No. of Pages : 3

[6584]-220

B.E. (Mechanical Engineering)

AUTOMOBILE DESIGN

(2019 Pattern) (Semester - VII) (402044A) (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 Non-programmable scientific calculators is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Describe the working of power steering unit with neat diagram. **[9]**

b) 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. **[9]**

OR

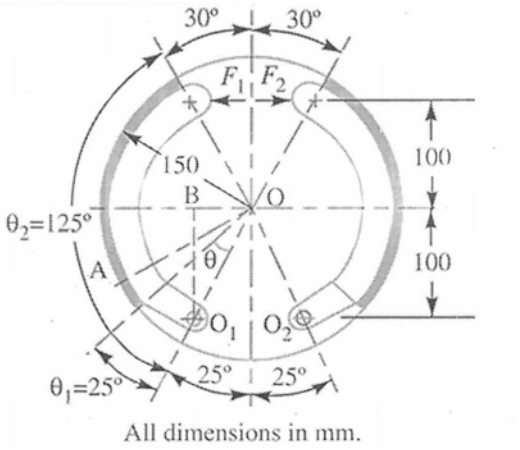
Q2) a) A pair of straight bevel gears is mounted on shafts, which are intersecting at right angles. The number of teeth on the pinion and gear are 21 and 28 respectively. The pressure angle is 20°. The pinion shaft is connected to an electric motor developing 5 kW rated power at 1440 rpm. The service factor can be taken as 1.5. The pinion and the gear are made of steel (Sut=750 N/mm^2) and heat-treated to a surface hardness of 380 BHN. The gears are machined by a manufacturing process, which limits the error between the meshing teeth to 10 mm. The module and face width are 4 mm and 20 mm respectively. Determine the factor of safety against bending failure. **[10]**

b) Difference between live axle and dead axle. **[8]**

P.T.O.

Q3) a) Differentiate between conventional tyre and tubeless tyre. **[7]**

b) Determine the braking torque and the magnitude of the forces F_1 and F_2. The figure shows the arrangement of two brake shoes which act on the internal surface of a cylindrical brake drum. The braking force F_1 and F_2 are applied as shown and each shoe pivots on its fulcrum O_1 and O_2. The width of the brake lining is 35 mm. The intensity of pressure at any point A is 0.4 sin θ N/mm^2, where θ is measured as shown from either pivot. The coefficient of friction is 0.4. **[10]**



All dimensions in mm.

OR

Q4) a) Explain with neat sketch construction and working of hydraulic brake system. State its applications. **[9]**

b) A circular road course track has a radius of 500 m and is banked to 10º. If the coefficient of friction between the road and tyre is 0.25. Compute (i) the maximum speed to avoid slipping and (ii) the optimum speed to avoid wear and tear on the tyres. **[8]**

Q5) a) It is required to design a helical compression spring subjected to a maximum force of 1250 N. The deflection of the spring corresponding to the maximum force should be approximately 30 mm. The spring index can be taken as 6. The spring is made of patented and cold-drawn steel wire. The ultimate tensile strength and modulus of rigidity of the spring material are 1090 and 81370 N/mm^2 respectively. The permissible shear stress for the spring wire should be taken as 50% of the ultimate tensile strength. Design the spring and calculate: (i) wire diameter; (ii) mean coil diameter; (iii) number of active coils; (iv) total number of coils. **[10]**

b) What is independent suspension system? Explain any one type and their advantages. **[8]**

OR

Q6) a) Explain with neat sketch multi link suspension. **[8]**

b) 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. Determine (i) the width and thickness of the leaves; (ii) the initial nip; and (iii) the initial pre-load required to close the gap C between extra fulllength leaves and graduated-length leaves. **[10]**

Q7) a) Discuss standard practices used in vehicle packaging. **[8]**

b) Explain steps in driver package development. **[9]**

OR

Q8) a) Write a note on applications of biomechanics in vehicle. **[8]**

b) What is anthropometry? Explain use of anthropometry in designing vehicles. **[9]**



Total No. of Questions : 8]

SEAT No. : ____

PE2312

[Total No. of Pages : 2

[6584]-221
B.E. (Mechanical)
DESIGN OF HEAT TRANSFER EQUIPMENTS
(2019 Pattern) (Semester - VII) (402044B) (Elective - III)

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

Instructions to the candidates:

1) ***Attempt 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, wherever necessary.***

Q1) a) Discuss the Bell-Delaware Method for evaluation of shell-side heat transfer coefficient. **[9]**

b) Elaborate the parameters for selection criteria of a shell and tube heat exchanger. Discuss the assumptions considered in the process of design of a heat exchanger. **[9]**

OR

Q2) a) Explain the method for calculation of shell side pressure drop and Tube side pressure drop of STHE. **[9]**

b) Discuss the basic design procedure of a shell and tube heat exchanger in brief. **[9]**

Q3) a) Elaborate design and operational considerations considered during selection of condensers. **[9]**

b) What different types are of evaporators used in refrigeration and air conditioning applications. Discuss anyone with diagram, working, merits, demerits. **[8]**

OR

Q4) a) Discuss Evaporative condenser with diagram, working, merits, demerits and applications. **[9]**

b) Elaborate the design considerations of heat exchangers for an air conditioning application. **[8]**

P.T.O.

Q5) a) Explain mini and micro channel heat exchangers with diagram, working, merits, demerits and applications. **[9]**

b) Discuss thermal design process of plate fin heat exchanger. **[8]**

OR

Q6) a) Explain Tube fin heat exchanger with diagram, working, merits, demerits and applications. **[9]**

b) What are factors affecting design of heat exchanger? Explain in brief. **[8]**

Q7) a) Elaborate Classification of cooling towers. Discuss construction and working of forced draft cooling tower with diagram. **[9]**

b) Elaborate design methodology for a counter flow direct contact heat exchanger. **[9]**

OR

Q8) a) Explain different performance indicative parameters of cooling towers. **[9]**

b) Discuss heat Balance of cooling tower and Determination of the number of diffusion units. **[9]**



Total No. of Questions : 8]

SEAT No. : [ ]

PE2313

[Total No. of Pages : 2

[6584]-222
B.E. (Mechanical Engineering)
MODERN MACHINING PROCESSES
(2019 Pattern) (Semester - VII) (402044C) (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 indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Illustrate the operational principles of Electrochemical Machining, accompanied by a well-drawn diagram, elucidating the intricacies of the process parameters. Additionally, enumerate the various applications of Electrochemical Machining. **[8]**

b) Explain with neat sketch working Principal of Electrostream drilling (ESD) with its process Parameters. Also state its applications. **[9]**

OR

Q2) a) Elaborate on the operational principles of electrochemical grinding (ECG), accompanied by a precise illustration, detailing the advantages, limitations, and diverse applications of this machining process. **[8]**

b) Analyze and differentiate between Photochemical Machining (PCM) and Chemical Machining (CHM), investigating in their respective methodologies and applications. **[9]**

Q3) a) With the help of neat diagram discuss the basic principle of machining by spark erosion. Also State its applications. **[9]**

b) What are the selection criteria for choosing between conventional machining and EDM? Which of the following work materials are suitable for EDM, ECDM? State Why? **[9]**

i) Stainless steel
ii) ceramics
iii) quartz
iv) thermoset plastic
v) copper
vi) diamond

OR

P.T.O.

Q4) a) Elucidate with neat sketch Wire Electric Discharge Machining (WEDM) procedure, encompassing its fundamental principles, structural components, operational mechanisms, and diverse applications. **[9]**

b) Describe with neat sketch working principle of Electro-Chemical Discharge Machining (ECDM) with its advantages, limitations and applications. **[9]**

Q5) a) Broadly classify the advanced micro-manufacturing processes and state the importance of these processes in the miniaturization of the products.**[9]**

b) With a schematic of diamond turn machine (DTM) name the various components of DTM based on their functionality? **[9]**

OR

Q6) a) Explain effect of various process parameters on oversize and aspect ratio during micro electro discharge machining Process (μ-EDM). **[9]**

b) Explain the process parameters which influence the process performance of micro turning process using cause and effect diagram. **[9]**

Q7) a) Explain in detail. **[8]**

i) Wet Chemical Etching

ii) Dry Etching

b) State four types of lithographic approaches used in semiconductor processing. Explain in detail photolithography processing steps. **[9]**

OR

Q8) a) Explain with neat sketch Abrasive Flow Finishing Process. **[8]**

b) With neat sketch explain the process parameters of magnetorheological finishing (MRF) hat affects the process performance. **[9]**



Total No. of Questions : 8]

SEAT No. : ____

PE2314

[Total No. of Pages : 2

[6584]-223
B.E. (Mechanical)
INDUSTRIAL ENGINEERING
(2019 Pattern) (Semester - VII) (402044D) (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) ***Figures to the right indicate full marks.***
3) ***Use of electronics calculator is allowed.***
4) ***Assume suitable data, if necessary.***

Q1) a) Sketch and explain in brief Material flow patterns & the Selection criterion for material handling. **[9]**

b) Explain in detail factors affecting selection of location for the industrial plant. **[8]**

OR

Q2) a) Enlist material handling equipment and describe any three of them & Define material handling. **[9]**

b) Compare Product layout and Process Layout and explain factors affect while selecting plant Layout. **[8]**

Q3) a) What is Line balancing? Explain Assembly line balancing in detail. **[8]**

b) Calculate the forecast for February to July for trading firm Rudra industries which uses exponential smoothing with smoothing constant 0.18 for estimating a demand. Following table shows the demand for 6 months. The forecast for January is 550 units. **[9]**

Month	Actual Demand
January	480
February	520
March	525
April	498
May	477
June	564

OR

P.T.O.

Q4) a) Write a short on **[8]**

i) Master production schedule

ii) Capacity Planning

b) Explain the need for forecasting. **[9]**

Past data on the sale of Diesel engines for the last 12 years is given below. By the method of three yearly moving averages establish the trend values and forecast demand for 13th year. If the actual demand for 13th year is 540 nos. what shall be the forecast of 14th year. Take value of smoothing constant is 0.25

Year	1	2	3	4	5	6	7	8	9	10	11	12
Sale numbers	335	350	330	340	380	410	430	440	430	460	500	560

Q5) a) Explain any three selective control techniques of inventory. **[9]**

b) Explain the term EOQ. **[9]**

A production company requires 9500 units per year. Ordering cost is Rs. 130 per order & carrying cost is 21%. Purchase price per unit is Rs. 48. Determine

i) EOQ

ii) Optimum no. of orders

iii) Total cost including acquisition of material.

OR

Q6) a) Explain the role of material management in Cost Reduction & Value Improvement. Explain the term "MRP-I". **[9]**

b) The rajesh enterprises use EOQ logic to determine the order quantity for its. various components and are planning its orders. The Annual consumption is 90,000 units, Cost to place one order is Rs.1200, Cost per unit is Rs.50 and carrying cost is 7% of Unit cost. Find, **[9]**

i) EOQ & No. of order per year,

ii) Ordering Cost and Carrying Cost

iii) Total Cost of Inventory.

Q7) a) Explain Key result area in detail. What is value engineering? Explain steps in value analysis. **[10]**

b) What is Performance Appraisal? Explain Performance Appraisal methods. **[8]**

OR

Q8) a) What is Merit Rating? Enlist and explain the methods of Merit Rating in Performance appraisal. **[9]**

b) Explain the-terms Rapid Upper Limb Assessment (RULA) and Rapid Entire Body Assessment (REBA). **[9]**

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Total No. of Questions : 8]

SEAT No. : ____

PE2315

[Total No. of Pages : 2

[6584]-224
B.E. (Mechanical Engineering)
COMPUTATIONAL FLUID DYNAMICS
(2019 Pattern) (Semester - VII) (402044F) (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 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) Show that for two dimensional convective - diffusive equation shown below, the CFL condition should be less than or equal to 0.5 for system to remain stable. **[12]**

$$\frac{\partial \phi}{\partial t} + u\frac{\partial \phi}{\partial x} + v\frac{\partial \phi}{\partial y} = v\left[\frac{\partial^2 \phi}{\partial x^2} + \frac{\partial^2 \phi}{\partial y^2}\right]$$

b) Write a short note on Peclet number. **[6]**

OR

Q2) a) Describe and illustrate the solution of two-dimensional unsteady heat convection-diffusion equation. **[10]**

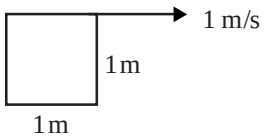
b) Explain the significance of 1-D transient convection-diffusion system. **[8]**

Q3) a) Explain the applications of CFD for external flow over aerfoil simulation. **[8]**

b) Discuss the challenges in solving Navier-Stokes Equations numerically? Suggest two remedies to overcome these challenges. **[9]**

OR

Q4) a) Using SIMPLE algorithm to solve a two-dimensional Lid driven cavity flow using following data : **[9]**



b) Explain the importance of Pressure correction method in SIMPLE algorithm. **[8]**

P.T.O.

Q5) a) What is turbulence modeling? Classify turbulence modeling and its advantages and disadvantages. **[10]**

b) Explain Eddy viscosity and its relevance with turbulence modeling. **[8]**

OR

Q6) a) Explain Reynolds Average Navier Stokes (RANS) in details. **[10]**

b) Write k-ω model in details. Give suitable example where k-ω turbulence model is applicable. **[8]**

Q7) a) Describe and illustrate the coupled fluid-structure system with a deformed structure and the deformed fluid domain. **[8]**

b) Describe applications of Fluid - Structure Interaction with illustrations. **[9]**

OR

Q8) a) What is continuum mechanics of fluid and solid with respect to Fluid-Structure Interaction formulation? **[9]**

b) Write a short note on application of ALE formulation for FSI Equations. **[8]**

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Total No. of Questions : 8]

SEAT No. :

PE2316

[Total No. of Pages : 2

[6584]-225

B.E. (Mechanical Engineering)

PRODUCT DESIGN AND DEVELOPMENT

(2019 Pattern) (Semester - VII) (Elective - IV) (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 indicates full marks.***
4) ***Use of electronic pocket calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) Explain Idea Generation and Idea Generation Approaches. **[7]**

b) Write a short note on SWOT analysis for a selection of profitable product. **[6]**

c) Explain in detail 'Product Architecture'. **[4]**

OR

Q2) a) Explain Pugh's chart with example. **[7]**

b) Describe in detail Concept Selection Process. **[6]**

c) Write a short note on 'Economic Analysis'. **[4]**

Q3) a) Explain BOM with example. **[7]**

b) Describe in detail Design review/part Print Analysis. **[6]**

c) What are the various elements of Production Drawing? **[4]**

OR

Q4) a) What is the need for Engineering Drawing? Classify Engineering Drawing. **[7]**

b) Explain Design for Assembly and Design for Manufacturing. **[6]**

c) Write a short note on Tolerance. **[4]**

P.T.O.

Q5) a) Explain Production Part Approval Process Tools in detail. **[8]**

b) Explain Product Testing and its Validation. **[6]**

c) Describe Organization Structure in detail. **[4]**

OR

Q6) a) Describe in detail Legal Product of Design Patents. **[8]**

b) Define Purchase Order and Product Costing in vendor development. **[6]**

c) Explain Drawing Office procedure in detail. **[4]**

Q7) a) List down types of FMEA and explain steps of FMEA. **[8]**

b) What is the importance of PLM and PDM for a Designer? **[6]**

c) Enlist Industrial Safety to be consider in product design. **[4]**

OR

Q8) a) Write a short note on Advance Product Quality Planning. **[8]**

b) Explain Aesthetic and Aesthetics Consideration in product design. **[6]**

c) What are guidelines for Design for Robustness? Discuss. **[4]**

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Total No. of Questions : 8]

SEAT No. : ____

PE2317

[Total No. of Pages : 2

[6584]-226

B.E. (Mechanical Engineering)

EXPERIMENTAL METHODS IN THERMAL ENGINEERING

(2019 Pattern) (Semester - VII) (Elective - IV) (402045B)

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, wherever necessary.***

Q1) a) Sketch a typical radiation pyrometer, explain its working and list its notable characteristics. **[9]**

b) What is Thermocouple? Explain the type of thermocouple with significance applications? **[8]**

OR

Q2) a) What is RTD? Explain different methods of construction of RTD. **[9]**

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

i) Thermistor

ii) Thermopile

iii) Liquid crystal thermography

Q3) a) Types of Sensors used in pressure measurement with its applications? **[10]**

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

i) McLeod gauge

ii) Pirani gauge and

iii) Ionization gauge

OR

Q4) a) Difference between high pressure measurement and low-pressure measurement? How to measure the pressure in combustion? **[10]**

b) Describe Transient response of pressure transducers in detail? **[8]**

P.T.O.

Q5) a) How the flow measurement techniques used to validate CFD results? **[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) Micro channel flow measurement

iii) 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) Explain procedure of finding statistical parameter such as ANOVA (Analysis of Variance) and its Correlation. **[9]**

OR

Q8) a) Describe predication of measurement parameter using ML Approaches such as Regression. **[8]**

b) Describe data transmission with - A/D & D/A conversion - Data storage and Display. **[9]**

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Total No. of Questions : 8]

SEAT No. :

PE2318

[Total No. of Pages : 2

[6584]-227

B.E.(Mechanical)

ADDITIVE MANUFACTURING

(2019 Pattern) (Semester -VII) (402045C) (Elective-IV) (Theory)

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) ***Assume suitable data wherever necessary.***

Q1) a) Explain process Fused Filament Fabrication (FFF) with suitable sketch. **[9]**

b) Explain process Direct Ink Writing (DIW) and Robocasting with suitable sketch. **[9]**

OR

Q2) a) Explain process Direct Metal Deposition (DMD) with suitable sketch. **[9]**

b) Write short notes on Extrusion. Give its advantages and disadvantages. **[9]**

Q3) a) What are the different types of post processing techniques in AM? Why post processing is necessary in additive manufacturing. **[9]**

b) Explain different quality considerations in A.M. **[8]**

OR

Q4) a) Explain use of Metals in Additive Manufacturing with important process parameters, benefits, drawbacks, Limitations and appropriate applications. **[9]**

b) Explain Robocasting and Bio printing with suitable example. **[8]**

P.T.O.

Q5) a) Explain function of Filament, Frame, Build Platform, Extruder Design, Nozzles, Print Bed, Heated build/Base Plate, Heater, Dispenser, Optical system in additive manufacturing machine. **[9]**

b) Explain the Construction, Layout, sub-system and sub-type of Extruder Design used in Polymer based 3D printer Construction **[8]**

OR

Q6) a) Explain the Construction, Layout and sub-system of Selective Laser Sintering [SLS] process based 3D Printers. **[9]**

b) Explain the design considerations of different types of nozzles used in polymer based 3D printers. **[8]**

Q7) a) Explain how additive manufacturing is used in Electronics Industries. Also write merits, demerits and practical feasible applications with illustrations. **[9]**

b) Write a short note on 4D printing and 5D printing and its applications. **[9]**

OR

Q8) a) Explain how additive manufacturing is used in Fashion, Jewelry with suitable case study. Also write merits, demerits and practical feasible applications with illustrations. **[9]**

b) Explain applications of AM in Food-Processing, Food & Consumer Applications with suitable case study. **[9]**

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Total No. of Questions : 8]

SEAT No. :

PE2319

[Total No. of Pages : 5

[6584]-228
B.E. (Mechanical)
OPERATIONS RESEARCH
(2019 Pattern) (Semester - VII) (402045 D) (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) ***Answers in One Answer Books.***
3) ***Figures to the right indicate full Marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) What do you mean by primal and dual in LPP. **[5]**

b) Use the simplex method to solve the following LP problem. **[12]**

Maximize $Z = 3x_1 + 5x_2 + 4x_3$

Subject to the constraints

i) $2x_1 + 3x_2 \leq 8$,

ii) $2x_2 + 5x_3 \leq 10$,

iii) $3x_1 + 2x_2 + 4x_3 \leq 15$ and $x_1, x_2, x_3 \geq 0$

OR

Q2) a) Discuss importance and limitation of graphical and simplex method of solving LPP. **[7]**

b) Use the graphical method to solve the following LP problem. **[10]**

Maximize $z = 15x_1 + 10x_2$

subject to the constraints

i) $4x_1 + 6x_2 \leq 360$,

ii) $3x_1 + 0x_2 \leq 180$,

iii) $0x_1 + 5x_2 \leq 200$ and $x_1, x_2, \geq 0$.

P.T.O.

Q3) a) Discuss the method used to solve the assignment problem with the help of flow chart. **[8]**

b) A department of a company has five employees with five jobs to be performed. The time (in hours) that each man takes to perform each job is given in the effectiveness matrix. **[10]**

		Employees				
		I	*II*	*III*	*IV*	*V*
Jobs	*A*	10	5	13	15	16
	B	3	9	18	13	6
	C	10	7	2	2	2
	D	7	11	9	7	12
	E	7	9	10	4	12

OR

Q4) a) Explain the generalized syntax of assignment and transportation problems. **[8]**

b) Find the initial basic feasible solution by using Vogel's Approximation Method. **[10]**

W→ F ↓	W_1	W_2	W_3	W_4	Factory Capacity
F_1	19	30	50	10	7
F_2	70	30	40	60	9
F_3	40	8	70	20	18
Warehouse Requirement	5	8	7	14	34

Q5) a) Explain the different types of floats involved in CPM analysis of network and how it is calculated? **[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 diagram 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) Describe the problem of replacement of items whose maintenance cost increase with time. Assume that the value of money remains constant. **[6]**

b) A firm is considering the replacement of a machine, whose cost price is Rs. 12,200, and its scrap value 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) Explain Monte Carlo Simulation. **[5]**

b) A dentist schedules all his patients for 30-minute appointments. Some of the patients take more 30 minutes some less, depending on the type of dental work to be done. The following summary shows the various categories of work, their probabilities and time actually needed to complete the work. **[12]**

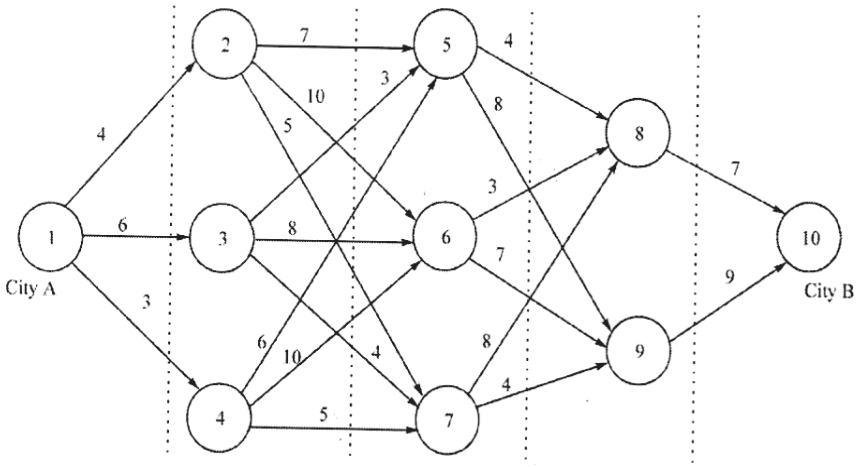
Category of Service	Time Required (minutes)	Probability of Category
Filling	45	0.40
Crown	60	0.15
Cleaning	15	0.15
Extraction	45	0.10
Checkup	15	0.20

Simulate the dentist's clinic for four hours and determine the average waiting time for the patients as well as the idleness of the doctor. Assume that all the patients show up at the clinic at exactly their scheduled arrival time starting at 8.00 a.m. Use the following random numbers for handling the above problem: 40 82 11 34 25 66 17 79

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 city1. The destination city B, is city 10. Other cities through which the sales man 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 covers all the selected cities from A to B. **[12]**



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Total No. of Questions : 8]

SEAT No. :

PE2320

[Total No. of Pages : 2

[6584]-229

B.E.(Mechanical)

AUGMENTED REALITY AND VIRTUAL REALITY

(2019 Pattern) (Semester -VII) (402045E) (Elective-IV)

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) Explain and illustrate linear and non-linear interpolation used in animating the virtual environment. **[8]**

b) Explain the types of sensors used in VR input/Output devices for movement capture. **[10]**

OR

Q2) a) Explain and illustrate head-mounted displays used in VR technology.**[10]**

b) Explain and illustrate simple steerable wheel used in physical simulations.**[8]**

Q3) a) Explain and illustrate the taxonomy of Augmented Reality (AR). **[10]**

b) Explain and classify tracking systems and sensors in Augmented Reality (AR) devices. **[7]**

OR

Q4) a) What are the similarities and differences between Augmented Reality (AR) with Virtual Reality (VR). **[10]**

b) Compare Optical see-through display and video see-through display.**[7]**

P.T.O.

Q5) a) Explain human eye's features and characteristics relevant to the design of display of VR systems. **[8]**

b) Explain following features and characteristics of human's somatic senses: Somatic sensations, pain, Tactile sensations, proprioceptive senses.**[10]**

OR

Q6) a) 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. **[8]**

b) Explain the steps of starting of a VR session till the exhibition of a steady-state behavior. **[10]**

Q7) a) Explain any one augmented reality application in engineering domain. **[8]**

b) Explain how VR can be subjected to Computational Fluid Dynamics (CFD) techniques to discover air of fluid flow around the object, and surface temperature profiles? **[9]**

OR

Q8) a) Explain any one augmented reality application in training domain. **[9]**

b) Explain how VR can be used in medical simulation before operation?**[8]**

● ● ●

Total No. of Questions : 8]

SEAT No. :

PE2321

[Total No. of Pages : 4

[6584]-230

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 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) Explain in brief the following **[3+3]**

i) Compare ball and roller bearing.

ii) Designation of rolling contact bearing.

b) 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 50000 hrs, Apply the concept of design and select the suitable bearing from manufacturer's catalogue. Use following table

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.**[12]**

OR

P.T.O.

Q2) a) A single row deep grove ball bearing is subjected to the following work cycle

Sr. No.	Element time (%)	Radial load (Fr) in KN	Thrust load (Fa) in KN	Radial factor (X)	Thrust factor (Y)	Race rotating	Service factor	Speed (rpm)
1	50	3.0	1.0	0.56	1.4	Inner	1.5	720
2	20	2.5	1.0	0.56	1.6	Outer	2.0	1440
3	Remaining	No load	No load	----	----	Outer	----	720

Apply the concept of design and select the suitable bearing: The expected life of the bearing is 15000 hrs with reliability 95%. Calculate the basic dynamic load rating of the bearing so that it can be selected from the manufacturer's catalogue based on 90% reliability. If there are six such bearings in a system, what is the probability that all bearings will survive for 15000 hrs. **[12]**

b) Derive the Petroff's equation to find out the coefficient of friction in Journal bearing. **[6]**

Q3) a) A single block brake with a braking torque of 225 N-m is as shown in figure. The brake drum rotates at 500 r.p.m. and coefficient of friction between the brake drum and the block is 0.3. The permissible intensity of pressure between the brake drum and the block is 0.5 N/mm^2. Calculate

i) The actuating force and the hinge-pin reaction for clockwise rotation of the drum.

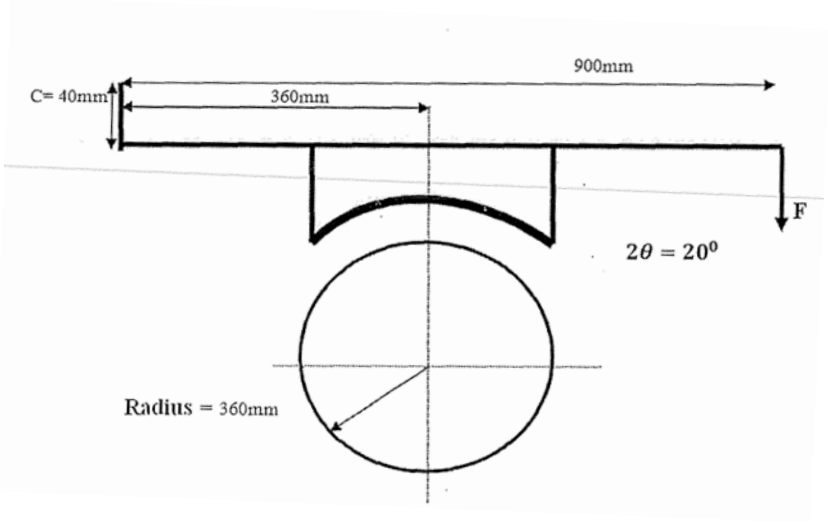
ii) The actuating force and the hinge-pin reaction for anti-clockwise rotation of the drum.

iii) The dimensions of the block

iv) The dimension 'C' required for the brake to be self-locking

v) The rate of heat generated at the beginning of braking

(Assume : Radius of Drum = 360 mm and including angle (2θ=20 degree) **[12]**



b) Explain with the help of neat sketch construction and working of centrifugal clutch. **[5]**

OR

Q4) a) Explain with the help of neat sketch construction and working of internal expanding shoe brake. **[5]**

b) An oil-immersed multi plate clutch is used to transmit 20 KW power at 2400 r.p.m. the pressure plates are made of steel, while the friction plates are provided with asbestos lining for which the coefficient of friction is 0.07. The permissible intensity of pressure is limited to 0.20 N/mm^2. The external diameter if the friction lining is 150 mm and the ratio of external and internal diameter is 1.25. Determine **[12]**

i) The numbers of steel and asbestos plates and

ii) Axial force required to transmit the power According to

1) The uniform pressure theory

2) The uniform wear theory

Q5) a) Find the speed steps arranged in geometric progression for the multi speed gear box **[12]**

- Minimum spindle speed = 100 r.p.m.
- Maximum spindle speed 1800 r.p.m.
- Number of speed steps = 8

Calculate

i) Range ratio

ii) Geometric progression ratio

iii) Find out various spindles speeds

iv) Number of stages

v) Draw the following possible Structure diagram and select the optimum structure diagram using node method of optimization

- Z=2(1) 2(2) 2(4)
- Z=2(1) 2(4) 2(2)
- Z=2(2) 2(4) 2(1)
- Z=2(2) 2(l) 2(4)
- Z=2(4) 2(1) 2(2)
- Z=2(4) 2(2) 2(1)

vi) Draw speed diagram, and calculate input speed if the motor speed is 1440 rpm

b) Compare 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(1) 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) State and explain the various parameters required in kinematic design of multi-speed gear box of a machine tool. **[6]**

Q7) a) In e-rickshaw the battery 20 AHS at 24 volts. It has a maximum speed of 25kmph and motor has a power 250 watts. Calculate how much distance it will cover ? Assume suitable data

Case 1: Use lead acid battery (Assume max speed 25 kmph and 50% battery rating)

Case 2 : Using Li-ion battery. How much range will increase (Assume max speed 25 kmph and 95% battery rating) **[10]**

b) Discuss Basic elements and working of Series hybrid 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) What is PSB (Power Split Device). Explain construction and working with near sketch. Also state different types of PSB. **[7]**

✪ ✪ ✪

Total No. of Questions : 8]

SEAT No. :

PE2322

[Total No. of Pages : 3

[6584]-231

B.E. (Mechanical-Sandwich)

MACHINE DYNAMICS AND VIBRATION

(2019 Pattern) (Semester-VIII) (402067)

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) ***Draw neat diagrams wherever necessary.***
3) ***Use of scientific calculator is allowed.***
4) ***Assume suitable data wherever necessary.***
5) ***Figures to the right indicate full marks.***

Q1) a) Describe the energy method to derive differential equation of motion for simple spring- mass system. **[6]**

b) A rod of uniform circular cross section having diameter 60 mm and length 100 cm is fixed at one end and oriented with axis in vertical direction. A disc of mass 420 kg and radius of gyration 220 mm is coaxially attached at the other end of the rod. Take modulus of elasticity and rigidity as 220 GPa and 80 GPa respectively. Find the natural frequencies of axial (longitudinal), transverse (lateral) and torsional vibrations in Hz. **[11]**

OR

Q2) a) Draw the neat labeled time-displacement graph for free vibration of Coulomb damped 1-dof system. Also state the expression for determining the loss of amplitude per cycle. **[6]**

b) In a damped free vibration system mass is 10 kg and spring stiffness is 1000 N/m. It is observed that initial amplitude of 100 mm is reduced to 1 mm in 4 oscillations. Find the damping coefficient, natural frequency and frequency of free vibration of the system. **[11]**

Q3) a) Explain with neat sketch the transient state and steady state of vibration related to forced vibration. **[6]**

b) An electric motor of mass 50 kg produces a static deflection of 25 mm when it is supported on isolation mounts. The motor has rotating unbalance of 54 kg-mm. At a speed of 1300 rpm the motor vibrates in vertical direction with steady state amplitude of 1.1 mm. Calculate stiffness and damping coefficient of the mount. **[11]**

OR

P.T.O.

Q4) a) What are frequency response curves? State any four observations from these plots drawn for different damping conditions. **[6]**

b) A rotor of 12 kg mass is mounted midway on a horizontal shaft of diameter 3 cm which is simply supported with a span of 1 m in bearings at both the ends. The center of gravity of the rotor is 0.5 mm offset from its axis of rotation. The modulus of elasticity of shaft material is 200 GPa. Determine- **[11]**

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.

Q5) a) Explain two degree of freedom system with any two practical examples. **[6]**

b) Two discs A and B of mass MI J_A=2 kg-m^2 and J_B = 3 kg-m^2 are mounted on a shaft of torsional stiffness K_t = 100 N-m/rad as shown in the figure. The shaft can freely rotate in the end support bearings. **[12]**

i) Draw FBD of each disc and derive the differential equations of motion in terms of angular displacement θ_A and θ_B of the discs.

ii) Derive the frequency equation and find natural frequencies of the rotor.

iii) Find the mode shapes corresponding to each natural frequency and

iv) Describe mode shapes graphically.

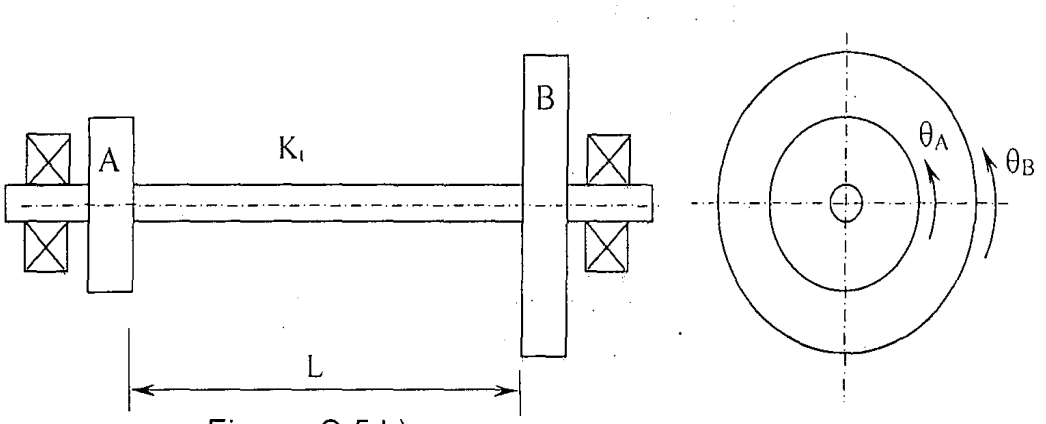


Figure: Q 5 b)

OR

Q6) a) Explain the significance of natural frequency and mode shape of a two degree of freedom system with suitable example. **[4]**

b) For the system of spring and masses shown in the figure, **[14]**

i) Derive the differential equations of motion in terms of displacement X_1 and X_2 of masses

ii) Derive the frequency equation and find natural frequencies

iii) Find the mode shapes corresponding to each natural frequency and

iv) Describe the mode shapes graphically.

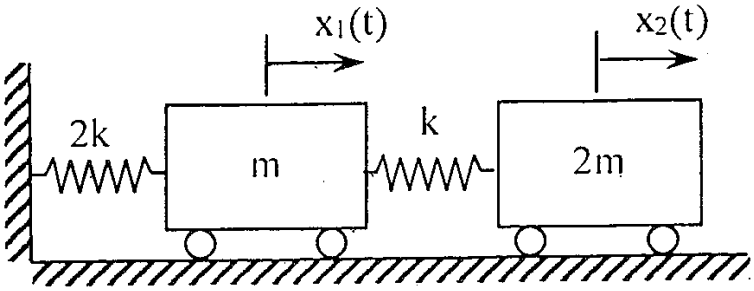


Figure : Q.6 b)

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) Write a short note on Vibration Isolators. Explain any 4 isolating material along with their industrial applications. **[6]**

OR

Q8) a) What are the different types of vibration pickups? Explain any two in detail. **[6]**

b) What is Dynamic vibration absorber? Explain working principle of undamped dynamic vibration absorber. **[6]**

c) What are vibration exciters? Explain the types of mechanical vibration exciters. **[6]**

Total No. of Questions : 8]

SEAT No. : [ ]

PE2323

[Total No. of Pages : 3

[6584]-232

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 Q6, 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) Explain following terms: (any 3) **[6]**

i) Accuracy

ii) Precision

iii) Recall

iv) F-1 Score

b) What is the difference between KNN and K means? Also State advantages and limitations of KNN and K means? **[6]**

c) Enlist and explain steps involved in development of regression model. **[5]**

OR

Q2) a) What is Support Vector Machine? How does the SVM work. **[6]**

b) Explain following terms in decision tree: **[6]**

i) Entropy

ii) Information gain

iii) Gini index

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

P.T.O.

Q3) a) Explain the steps involved in development of classification ML model. **[8]**

b) Quality Engineer wants to solve a two-class classification problem for predicting whether a product is defective. The actual number of products containing no defect are 50 (Truly predicted positives = 560), the actual number defective products are 60 (Truly predicted negatives=330). So, calculate accuracy, precision, recall and fl score.**[10]**

OR

Q4) a) Write a short notes on **[10]**

i) Classification algorithm in ML

ii) Clustering algorithm in ML

b) State advantages and disadvantages of random forest. **[8]**

Q5) a) What is the Bellman Equation? How is it helpful in RL? **[8]**

b) What is activation Functions? Explain any one in details **[4]**

Explain **[6]**

i) Positive Learning

ii) Negative Learning with respect to Reinforcement Learning

OR

Q6) a) Explain the concept of Reinforcement learning with suitable example.**[8]**

Define following terms in Reinforcement learning:

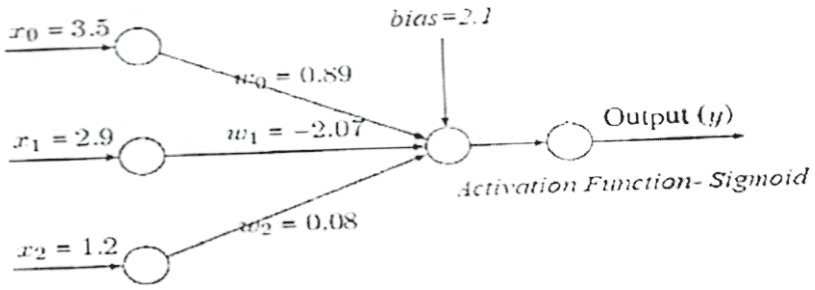
i) Agent

ii) State

iii) Environment

iv) Reward

b) Compute the output of the following neuron if the activation function is sigmoid. Assume bias to be 2.1. **[4]**



c) Explain with Neat diagram equivalence of biological neuron and artificial neuron. **[6]**

Q7) a) Write short note on use of AIML in Material inspection. **[5]**

b) Explain in details different applications of AIML. **[6]**

c) Explain fault diagnosis (of any suitable machine element) using ML. **[6]**

OR

Q8) a) What are different types of sensors used in human Machine Interactions? **[5]**

b) What are the advantages of using Fault detection in Automobile cars? **[6]**

c) Make a list of maintenance and explain in brief. Discuss the scope of AIML. **[6]**

Total No. of Questions : 8]

SEAT No. : ____

PE2324

[Total No. of Pages : 2

[6584]-233

B.E. (Mechanical Sandwich)

AUTOMOBILE ENGINEERING

(2019 Pattern) (Semester - VIII) (402069A) (Elective - 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) Explain the essential requirements of a good tyre. Describe with a neat sketch the constructional details of a pneumatic tyre. **[9]**

b) What are the requirements of a good brake fluid? Explain the functions and importance of brake fluid in a hydraulic braking system. **[9]**

OR

Q2) a) Write short notes on ESP. Explain their functions and advantages in vehicle safety. **[9]**

b) What do you understand by tyre specifications? Explain various tyre markings and what information they convey. **[9]**

Q3) a) Explain the working of a charging circuit in an automobile. How does the voltage regulator control the generator output? **[8]**

b) Discuss the principle of automobile illumination. Explain headlamp mounting and construction with a neat diagram. **[9]**

OR

Q4) a) With the help of a diagram, explain the function and operation of a solenoid switch in a starting system. **[8]**

b) Explain the principle and testing method of a lead-acid battery. How is its capacity rated? **[9]**

P.T.O.

Q5) a) Explain the steps involved in overhauling the differential and propeller shaft assembly. **[8]**

b) Compare Euro I, II, III, and IV norms with reference to emission ‘ limits. How do Bharat Stage norms relate to these standards? **[9]**

OR

Q6) a) Differentiate between preventive, predictive, and breakdown maintenance practices. Give suitable examples of each. **[9]**

b) Describe various automotive emission. control techniques used to control crankcase and evaporative emissions. **[8]**

Q7) a) Discuss the merits and demerits of hybrid electric vehicles. **[5]**

b) Discuss the safety concerns and challenges involved in electric vehicles.**[4]**

c) Draw and explain the layout of a battery electric vehicle (BEV), highlighting major components. **[9]**

OR

Q8) a) Differentiate between series and parallel hybrid electric drive train architectures. **[5]**

b) Explain the design considerations involved in a hybrid electric drive train.**[4]**

c) Describe the working of EV chargers and the types of charging methods.**[9]**

Total No. of Questions : 8]

SEAT No. : [ ]

PE2325

[Total No. of Pages : 2

[6584]-234

B.E. (Mechanical Sandwich)

REFRIGERATION AND AIR CONDITIONING

(2019 Pattern) (Semester - VIII) (402069B) (Elective - 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) ***Figure to the right indicate full marks.***

Q1) a) How does Claude cycle is differ from Linde cycle in the context of liquefaction of air? **[9]**

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) State the function of flash intercooler provided in a compound vapour compression refrigeration system. **[9]**

b) State the role of liquid intercooler, water intercooler and liquid subcooler in a multi stage vapour compression system. **[9]**

Q3) a) Describe briefly the physical hazards occurs due to extreme cold and Hot on human body. **[9]**

b) Which are the main factors affecting the human comfort, and how can these be categorized? **[8]**

OR

Q4) a) Define and explain the following terms **[9]**

i) Bypass factor of coil,

ii) ADP and

iii) GSHF & ESHF.

b) Explain with neat sketch the process of Chemical dehumidification. **[8]**

P.T.O.

Q5) a) Write short notes on "All water air conditioning system". **[9]**

b) Explain with neat sketch working of evaporative condensers. **[8]**

OR

Q6) 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 TXV and EXV expansion devices. **[8]**

Q7) a) Present a brief account of duct shape, duct material and duct construction. **[9]**

b) Write short notes on fan law. Write explanation of fan characteristic curves. **[9]**

OR

Q8) a) How ducts are classified? Define the duct aspect ratio, should it have a large or small value, why? **[9]**

b) Give classification of the air filters. Explain in brief the different types of filters used in the air conditioning system. **[9]**



Total No. of Questions : 8]

SEAT No. :

PE2326

[Total No. of Pages : 2

[6584]-235

B.E. (Mechanical Sandwich)

FLUID POWER CONTROL

(2019 Pattern) (Semester - VIII) (402069C) (Elective - I)

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) ***Figure to the right indicates full marks.***
3) ***Neat Diagram must be drawn wherever necessary.***
4) ***Assume Suitable data if necessary.***

Q1) a) With Neat Sketch, Explain Operation of Poppet check valve and state its advantages & disadvantages. **[9]**

b) With neat sketch, Explain construction, working and applications of Sequence valve Pressure Reducing Valve. **[8]**

OR

Q2) a) With neat diagram & ISO symbol, explain construction, working and application (circuit diagram) of Temperature Compensated Flow Control Valve. **[9]**

b) Draw neat sketch and explain the following with their applications in circuit. **[8]**

i) Three Way, Two Position Direction Control Valve

ii) Four Way, Three Position Direction Control Valve (Closed Centre)

Q3) a) Explain counter balance valve circuit with neat sketch. **[9]**

b) Differentiate between meter in circuit and meter out circuit. **[8]**

OR

Q4) a) With neat circuit diagram explain Regenerative circuit. **[9]**

b) Explain Sources of Contamination in Hydraulic Systems with their effects on Hydraulics system. **[8]**

P.T.O.

Q5) a) Explain with neat sketch working of "AND" valve and with the help of circuit diagram explain any one typical application of it. **[9]**

b) Explain with neat sketch typical compressed air generation and distribution system. Also Write the advantages, disadvantages and applications of pneumatic system. **[9]**

OR

Q6) a) Draw & Explain circuit for **[9]**

i) Controlling speed of pneumatic double acting cylinder.

ii) Speed control of pneumatic motor.

b) With neat diagram & ISO symbol, explain construction, working and application (circuit diagram) of Time Delay Valve. **[9]**

Q7) a) Explain an Electro-hydraulic servo system with neat sketch. **[9]**

b) i) How does a limit switch differ from a push-button switch.

ii) What is an electrical relay? How does it works.

[9]

OR

Q8) a) Draw and explain, Pneumatic and electrical ckt. for continuous forward and return cycle of double acting cylinder using 2 limit switches in electro pneumatics. **[9]**

b) Compare the use of PLCs and traditional relays in hydraulic system control. **[9]**

Total No. of Questions : 8]

SEAT No. : ____

PE2327

[Total No. of Pages : 2

[6584]-236

B.E. (Mechanical Sandwich)

ADDITIVE MANUFACTURING

(2019 Pattern) (Semester - VIII) (402069D) (Elective - 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) Explain Fused Deposition Modeling (FDM) process with suitable sketch. List its Benefits, Limitations & Applications. **[9]**

b) Explain Direct Metal Deposition. List its Benefits and Limitations. **[8]**

OR

Q2) a) Explain Robocasting process in detail. **[4]**

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

i) Plasma Are Deposition

ii) Binder Jetting

c) Explain Multi-Jet Modeling (MJM). What are the advantages and limitations of MJM. **[7]**

Q3) a) What are the different types of post processing techniques in AM? Why post processing is necessary in additive manufacturing? Explain any two post processing techniques. **[9]**

b) Explain DFAM. What are the rules and recommendations for DFAM. **[9]**

OR

Q4) a) What are the Specific Process Parameters for the selection of AM Materials? **[4]**

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

i) Shape Memory Alloys

ii) Biomimetic materials

c) Discuss the significance of Surface enhancement Techniques in AM. Explain any two Surface enhancement Techniques. **[8]**

P.T.O.

Q5) a) Explain the functions of Cooling system, Powder Handling System, Laser controller in additive manufacturing machine. **[9]**

b) Describe any four Preparatory function [G code] and any four Miscellaneous function [M code] used in additive manufacturing. **[8]**

OR

Q6) a) What are the different Types of In-fill pattern? Describe in details. **[6]**

b) What are the different types of slicing and path planning? Describe in details. **[6]**

c) Explain function of Loading/Unloading System, Moving Parts and end stops, Sensors, Power supply, in additive manufacturing machine. **[5]**

Q7) a) Explain the applications of AM in Health care industry, Food-Processing and consumer application industry with suitable case study. **[9]**

b) Explain the applications of AM in Automotive, Aerospace and Construction industry with suitable case study. **[9]**

OR

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

i) 4D/5D Printing

ii) Bio-printing

b) Explain Mass Customization and Future trends in AM. **[6]**

c) Explain the applications of AM in Fashion, Jewelry and toy industry. **[4]**

Total No. of Questions : 8]

SEAT No. : [ ]

PE2328

[Total No. of Pages : 2

[6584]-237

B.E. (Mechanical Sandwich)

AUTOMATION AND ROBOTICS

(2019 Pattern) (Semester - VIII) (402069E) (Elective - 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) ***Use of Calculator is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) a) State the Salient Features and application A.C. Servo Motors. **[6]**

b) Explain Gear Ratio for Robot. **[5]**

c) Comparison between Hydraulic, Pneumatic and Electrical drive. **[7]**

OR

Q2) a) Explain Micro actuators with example. **[6]**

b) What are the selection criteria of electrical drives? **[6]**

c) State the application of Variable Speed Arrangements. **[6]**

Q3) a) Explain the working of Capacitive Proximity with neat sketch. **[7]**

b) What are Design Considerations of Transducers? **[6]**

c) Explain Tooling Interface used in robotics application. **[4]**

OR

Q4) a) Discuss various type of End-Effectors used in robotics. **[6]**

b) Explain the Vacuum cup Gripper with neat sketch. **[7]**

c) Write the Difference Between Active and Passive Compliance. **[4]**

P.T.O.

Q5) a) Derive an equation of motion for serial manipulators using Eularian formulation. **[6]**

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}. **[7]**

c) Write notes on: Composite Rotation matrix. **[4]**

OR

Q6) a) Write notes on Direct Dynamics. **[7]**

b) With the help of suitable illustration explain the significance of D-H parameters. **[4]**

c) Explain Robotic Manipulator Joint Coordinate System. **[6]**

Q7) a) Explain Motion Programming with example. **[8]**

b) Write a short notes on **[10]**

i) Material Handling.

ii) Autonomous Underwater Vehicles.

OR

Q8) a) Write a Programming for Material Loading and Unloading. **[8]**

b) Write a short notes on **[10]**

i) Robotic Assistive Technologies for Rehabilitation of Humans.

ii) Hybrid Terrestrial Mobile Robots.

Total No. of Questions : 8]

SEAT No. : ____

PE2329

[Total No. of Pages : 2

[6584]-238

B.E. (Mechanical Sandwich)

INTERNET OF THINGS

(2019 Pattern) (Semester - VIII) (402044 E) (Elective - II)

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

Instructions to the candidates:

1) ***Solve Q.l 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 the basics of Embedded C programming. **[7]**

b) What are the main design principles and needed capabilities in IoT? **[6]**

c) Explain the IoT Input-Output Interface. **[5]**

OR

Q2) a) Explain the Motion Sensor interfacing with any board. **[6]**

b) Explain Output Sensors. **[4]**

c) Describe IoT Architecture Outline. **[8]**

Q3) a) Explain in detail IoT Communication APIs. **[5]**

b) Discuss any four popular IoT Platforms used today. **[7]**

c) Explain Global Positioning System (GPS) communication. **[5]**

OR

Q4) a) State the difference between Wired vs Wireless Communication. **[5]**

b) Explain M2M (Machine-to-Machine) and WSN (Wireless Sensor Network) Protocols in detail. **[7]**

c) What are the advantages and disadvantages of Cloud Computing? **[5]**

P.T.O.

Q5) a) Describe and illustrate the structure of Representational State Transfer (REST) protocol. **[9]**

b) Write a short note on:

i) IoT security for consumer devices **[4]**

ii) Security levels in IoT **[4]**

OR

Q6) a) Compare Message Queueing Telemetry (MQTT) protocol with Hyper Text Transport Protocol (HTTP). **[8]**

b) Describe and illustrate the structure of Hyper Text Transport Protocol (HTTP). **[9]**

Q7) a) Explain any two Future Factory Concepts. **[10]**

b) Explain Home automation with an example. **[8]**

OR

Q8) a) What are the legal challenges in implementing IoT applications? **[10]**

b) Describe IoT Applications in Environmental Protection in Modern Day. **[8]**



Total No. of Questions : 8]

SEAT No. : ____

PE2330

[Total No. of Pages : 2

[6584]-239

B.E. (Mechanical Engineering Sandwich)

PRODUCT DESIGN AND DEVELOPMENT

(2019 Pattern) (Semester - VIII) (402045 A) (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.***
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 the TRIZ method for idea generation. How does it differ from traditional brainstorming techniques? **[8]**

b) What is benchmarking in product development, and how can it influence the idea generation process? **[9]**

OR

Q2) a) Describe the process of brainstorming. What are its key principles, and how can it be made more effective? **[8]**

b) Define alternate thinking and provide examples of how it can be applied in product development? **[9]**

Q3) a) What is solid modeling, and how does it aid in the design of parts and assemblies in product development? **[8]**

b) Explain the concept of product architecture. How does it influence the design and manufacturing processes? **[9]**

OR

Q4) a) Describe the role of digital product design in creating parts and assemblies. How is it integrated with engineering drawing definitions? **[8]**

b) Classify different types of engineering drawings and explain their specific uses in product design and manufacturing. **[9]**

P.T.O.

Q5) a) What is Finite Element Analysis (FEA), and how is it applied in product design and validation? **[9]**

b) Explain Computational Fluid Dynamics (CFD) and its significance in engineering simulations. **[9]**

OR

Q6) a) Describe Multi-Body Dynamics (MBD) and provide examples of its applications in product development. **[9]**

b) A company manufactures and sells a product with the following cost structure: **[9]**

Fixed Costs (FC): Rs.500,000 per year

Variable Cost (VC) per unit: Rs.200

Selling Price (SP) per unit: Rs.300

i) Calculate the break-even point in units.

ii) Calculate the break-even point in sales value.

iii) How many units must be sold to achieve a profit of Rs.200,000.

Q7) a) What is Advanced Product Quality Planning (APQP), and how does it contribute to robust product design and development? **[9]**

b) Explain the steps involved in Design Failure Mode and Effects Analysis (DFMEA). Why is it critical in product design? **[9]**

OR

Q8) a) Define Value Analysis (VA) and Value Engineering (VE). How do they improve product design and cost-effectiveness? **[9]**

b) What is Product Lifecycle Management (PLM), and what are its main stages? **[9]**



Total No. of Questions : 8]

SEAT No. :

PE2331

[Total No. of Pages : 4

[6584]-240
B.E. (Mechanical Sandwich)
OPERATIONS RESEARCH
(2019 Pattern) (Semester - VIII) (402045D) (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.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Write the generalized syntax of LPP. Discuss the following terms related to LPP. **[5]**

i) Objective function

ii) Feasible solution

iii) Constraints

b) Anita Electric Company produces two products P1 and P2. Products are produced and sold on a weekly basis. The weekly production cannot exceed 25 for product P1 and 35 for product P2 because of limited available facilities. The company employs total of 60 workers. Product P1 requires 2 man-weeks of labor, while P2 requires one man-week of labor. Profit margin on P1 is Rs. 60 and on P2 is Rs. 40. Formulate this problem as an LP problem and solve that using graphical method. **[12]**

OR

Q2) a) Explain the various steps of the simplex method involved in the computation of an optimum solution to a linear programming problem.**[5]**

b) Use the simplex method to solve the following LP problem. **[12]**

Maximize $Z = 3x_1 + 5x_2 + 4x_3$

subject to the constraints

i) $2x_1 + 3x_2 \leq 8$

ii) $2x_2 + 5x_3 \leq 10$

iii) $3x_1 + 2x_2 + 4x_3 \leq 15$

and $x_1, x_2, x_3 \geq 0$

P.T.O.

Q3) a) Explain the generalized syntax of assignment and transportation problems. **[8]**

b) A department of a company has five employees with five jobs to be performed. The time (in hours) that each man takes to perform each job is given in the effectiveness matrix. **[10]**

		Employees				
		I	II	III	IV	V
Jobs	A	10	5	13	15	16
	B	3	9	18	13	6
	C	10	7	2	2	2
	D	7	11	9	7	12
	E	7	9	10	4	12

OR

Q4) a) Discuss the Hungarian method with the help of flow chart for assignment problem. **[8]**

b) Find the initial basic feasible solution by using Vogel's Approximation Method. **[10]**

$W \rightarrow$ $F \downarrow$	W_1	W_2	W_3	W_4	Factory Capacity
F_1	19	30	50	10	7
F_2	70	30	40	60	9
F_3	40	8	70	20	18
Warehouse Requirement	5	8	7	14	34

Q5) a) Describe the problem of replacement of items whose maintenance cost increase with time. Assume that the value of money remains constant. **[6]**

b) A firm is considering the replacement of a machine, whose cost price is Rs. 12,200, and its scrap value is Rs. 200. From experience the running (maintenance and operating) costs are found to be as follows:

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

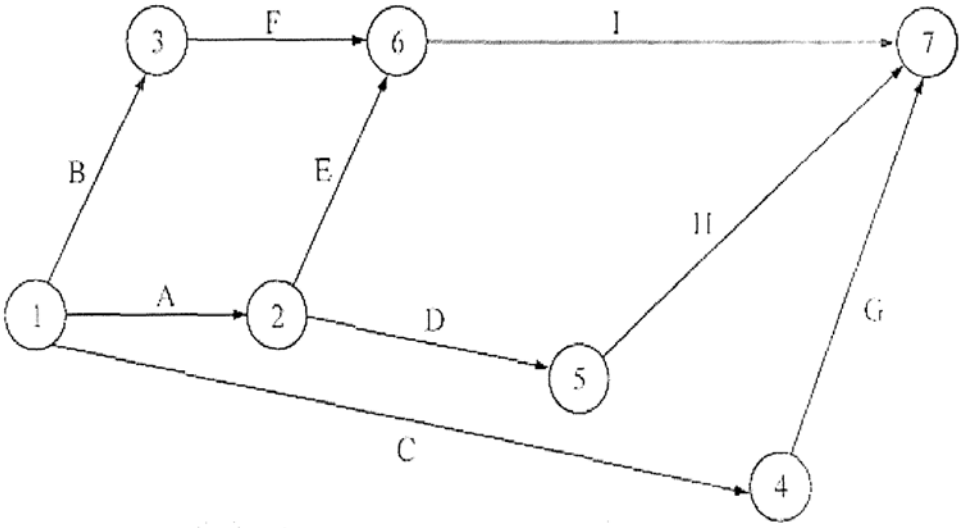
When should the machine be replaced? **[12]**

OR

Q6) a) Discuss the basic differences between PERT and CPM. **[6]**

b) The following network diagram represents activities associated with a project : **[12]**

Activities:	A	B	C	D	E	F	G	H	I
Optimistic time, t_0:	5	18	26	16	15	6	7	7	3
Pessimistic time, t_p:	10	22	40	20	25	12	12	9	5
Most likely time, t_m:	8	20	33	18	20	9	10	8	4



Determine the following:

i) Expected completion time and variance of each activity

ii) The earliest and latest expected completion times of each event.

iii) The critical path.

iv) The probability of expected completion time of the project if the original scheduled time of completing the project is 41 .5 weeks.

v) The duration of the project that will have 95 percent chance of being completed.

Q7) a) What is Monte Carlo simulation? Describe the idea of experimentation (Random sampling) in simulation. **[5]**

b) The management of ABC company is considering the question of marketing a new product. The fixed cost required in the project is Rs. 4,000. Three factors are uncertain, viz., the selling price, variable cost and the annual sales volume. The product has a life of only one year. The management has the data on these three factors as under: **[12]**

Selling Price (Rs.)	Probability	Variable Cost (Rs.)	Probability	Sales Volume (Units)	Probability
3	0.2	1	0.3	2,000	0.3
4	0.5	2	0.6	3,000	0.3
5	0.3	3	0.1	5,000	0.4

Considering the following sequence of thirty random numbers: 81, 32, 60, 04, 46, 31, 67, 25, 24, 10, 40, 02, 39, 68, 08, 59, 66, 90, 12, 64, 79, 31, 86, 68, 82, 89, 25, 11, 98, 16.

Using the sequence (First 3 random numbers for the first trial, etc.) simulate the average profit for the above project on the basis of 10 trails.

OR

Q8) a) Discuss dynamic programming with suitable examples. **[5]**

b) An electronic device consists of four components, each of which must be functional for the system to function. The system reliability can be improved by installing parallel units in one or more components. The reliability of components, R, with one, two, or three parallel units, and the corresponding cost, C are given below. The maximum amount available for this device is 100. The problem is to determine the number of parallel units in each component. **[12]**

Number of Parallel Units	Components							
	1		2		3		4	
	R	C	R	C	R	C	R	C
1	0.70	10	0.50	20	0.70	10	0.60	20
2	0.80	20	0.70	40	0.90	30	0.70	30
3	0.90	30	0.80	50	0.95	40	0.90	40

✪ ✪ ✪

Total No. of Questions : 8]

SEAT No. :

PE2332

[Total No. of Pages : 4

[6584]-241
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.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 the following terms **[8]**

i) Failure density

ii) Hazard Rate

iii) Failure rate

iv) Mean time to failure

b) 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. **[9]**

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 performance what is the probability that the sensor in actuator was supplied by A_1, A_2 and A_4?

OR

P.T.O.

Q2) a) Explain the following regions of Bath Tub Curve

i) Infant Mortality or Burn in period.

ii) Normal operation period.

iii) Wear out or Aging period. List the reasons of occurrence of failure in three regions of bath tub curve. **[8]**

b) 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 **[9]**

i) Getting just 3 defective components.

ii) Getting exactly 7 good components

iii) 5 or more of them being good.

Q3) a) Write a note on Active, passive and standby redundancy. **[8]**

b) Determine the system reliability of the system shown in fig. 1. **[10]**

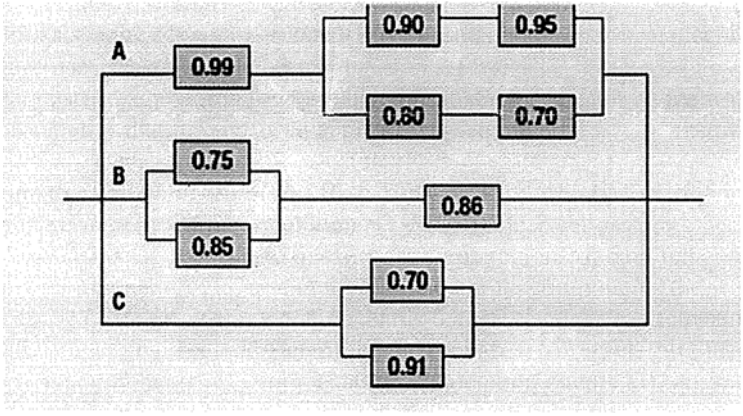


Fig. 1

OR

Q4) a) What is equal apportionment technique in reliability? Explain ARINC Apportionment Technique. **[8]**

b) State the assumptions to be made while using AGREE method. Find out the failure rates of the component so that the system reliability becomes 0.99 using AGREE method. The data being **[10]**

Subsystem (i)	Number of component module (N)	Operating Time (t_i)	Importance factor(t_i)
1	25	10	1.0
2	80	09	0.97
3	45	10	1.0
4	60	07	0.95
5	70	10	1.0
6	20	10	0.95
	N=300		

Q5) a) Explain the process of FMECA with example. **[7]**

b) Find the reliability of the system shown in figure 2 using cut set method. Also draw an equivalent block diagram using minimal cut set element.**[10]**

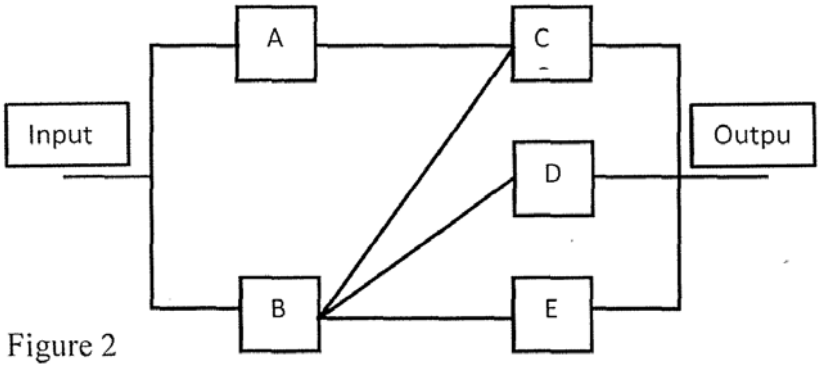


Figure 2

OR

Q6) a) Explain Ishikawa diagram for Failure representation with suitable example.**[7]**

b) For the block diagram shown in figure 3,Calculate the reliability of the system using cut set method. Also draw an equivalent block diagram for the minimal cut set element. **[10]**

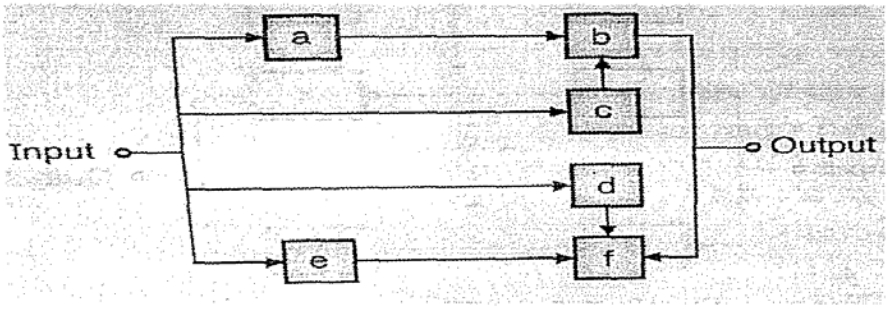


Fig 3.

Q7) a) The stress developed in an engine component is known to be normally distributed with a mean of 350MPa and standard deviation of 35MPa.The material strength distribution based on the expected temperature range and various other factors, is known to be normal with a mean of 820MPa and standard deviation of 80MPa. Calculate factor of safety and reliability of component. If poor heat treatment and large variation in environmental temperature cause the standard deviation for strength of component increases to 150 MPa. Calculate reliability. **[10]**

b) In a short sample "accelerated life testing" of a system based on Weibull distribution. The following data is recorded. **[8]**

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 System Down time and availability. **[8]**

b) Write short Note on(Any Two) **[10]**

i) Accelerated test methods for reliability evaluation.

ii) Factor of safety and Margin of safety.

iii) Reliability Growth Testing.

iv) Reliability Centered Maintenance



Total No. of Questions : 8]

SEAT No. : ____

PE2333

[Total No. of Pages : 2

[6584]-242

B.E. (Mechanical Sandwich)

ELECTRICAL AND HYBRID VEHICLE

(2019 Pattern) (Semester - VIII) (402051 E) (Elective - II)

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 indicate full marks.***
4) ***Use of non-programmable electronic calculator is permitted.***
5) ***Assume Suitable/Standard data if necessary.***

Q1) a) Describe temporary Energy Storage System Types and explain battery energy storage system (BESS). **[8]**

b) Explain the Application of three types of Motors and their Design with Examples. **[9]**

OR

Q2) a) Two wheeler weight is 100 kg, load is 70 kg. Minimum speed required is 50 Kmph. Suggest the rating of the motor, and battery to cover the distance of 90 kms per charge. Assume suitable data wherever required. Road friction: 0.01, Coefficient of drag: 0.9, Density of air: 1.2 kg/m^3, frontal area of Vehicle, A = 0.6 m^2, wheel radius: 0.28 m. **[9]**

b) Describe and Illustrate the BCU, their types. **[8]**

Q3) a) Explain and illustrate Fuel Efficiency Analysis. **[8]**

b) Describe and Illustrate the Effect of Rolling, Pitch & Yaw on velocity and movements. **[9]**

OR

Q4) a) Describe and Illustrate the Brake System and its types. **[8]**

b) Differentiate between Mechanical Differential and Electric Differential.**[9]**

P.T.O.

Q5) a) Describe crash test done on e-vehicles? **[9]**

b) What are different types of loads acting on the chassis and frame of the E-Vehicles? **[9]**

OR

Q6) a) Describe and illustrate the Driving dynamics and Comfort as well as the Anatomy and Terminology of Car Package. **[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) What are the requirements of Charging system. **[9]**

OR

Q8) a) Explain the Boost Converter for Power Factor Correction with Examples. **[9]**

b) Write detail note on End of life management of EVs and their batteries. **[9]**



Total No. of Questions :8]

SEAT No. : ____

PE2334

[Total No. of Pages : 2

[6584]-243

B.E. (Mechanical Sandwich)

ENERGY ENGINEERING AND MANAGEMENT (Self-Study-III)

(2019 Pattern) (Semester-VII) (402064)

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

Instructions to the candidates:

1) ***Answer Q. No. 1 or 2, Q. No. 3 or 4, Q. No. 5 or 6. Q.No. 7 or 8.***
2) ***Figures to the right indicate full marks.***
3) ***Use Graph Paper for Graphical Solution.***
4) ***Uses of all thermodynamics tables are permitted.***
5) ***Assume suitable data if necessary.***

Q1) a) What are the components of solar PV systems to take on AC loads? Draw a schematic layout of solar PV system. **[9]**

b) Discuss the method of site selections for locating the wind mills. **[9]**

OR

Q2) a) Discuss open cycle OTEC system with the help of a neat sketch. **[9]**

b) Enumerate advantages and disadvantages of Fuel cells compare to conventional power plants. **[9]**

Q3) a) Explain current energy scenario in India. Discuss environmental impacts due to conventional energy use. **[10]**

b) What is energy management? What are the various steps in implementation of energy management in an organization? **[7]**

OR

Q4) a) Discuss different aspects of Energy Policy and strategy in Energy conservation systems **[10]**

b) Write short notes on **[7]**

i) Commercial energy and Non-Commercial energy

ii) Renewable and non-renewable energy

P.T.O.

Q5) a) Explain stepwise procedure to carry out detailed energy audit **[10]**

b) Enlist and discuss the energy saving methods for the pumping system **[7]**

OR

Q6) a) Elaborate with the help of different examples, the importance of analysis and recommendation of energy audit **[9]**

b) Write various energy conservation opportunities in furnace. **[8]**

Q7) a) Explain IRR and give advantages and disadvantages of IRR **[9]**

b) Explain applications of a shell and tube heat exchanger? **[9]**

OR

Q8) a) Describe the factors influencing costing and typical cost of steam, compressed air, Natural gas and electricity. **[9]**

b) Write short note on Recuperator and regenerator **[9]**



Total No. of Questions : 8]

SEAT No. :

PE2335

[Total No. of Pages : 2

[6584]-244

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) ***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 wherever necessary.***

Q1) a) What is dynamic plant layout? **[4]**

b) Explain Relationship between layout and Material handling with suitable examples? **[8]**

c) What are analytical tools of plant layout? Explain with neat sketch layout of manufacturing shop floor? **[8]**

OR

Q2) a) Explain Multi-facility location? **[4]**

b) Explain Layout planning? List out Quantitative methods of Plant layout and relationship diagrams? **[8]**

c) Explain Layout of (any two) **[8]**

i) Repair Shop

ii) Services Sectors

iii) Process plant.

Q3) a) Explain the following (any two) **[8]**

i) Enterprise Resource Planning (ERP)

ii) Just-in-Time system (JIT)

iii) Supply Chain Management (SCM)

b) Explain the concept of Inventory control based on its classification and objectives. **[8]**

OR

P.T.O.

Q4) a) Explain the production planning control with the stepwise terminologies involved in it. **[8]**

b) Explain the following (any two) **[8]**

i) Causal and time series models

ii) Moving average and Exponential smoothening

iii) Trend and Seasonality.

Q5) a) What is line balancing? Explain with different methods and applications. **[8]**

b) Explain the procedure for Process Planning and Process Selection with suitable example. **[8]**

OR

Q6) a) What is group technology? Explain with advantages, disadvantages and applications? **[8]**

b) Differentiate critical path method and Program Evaluation Review Technique based on its advantage, limitations and applications. **[8]**

Q7) a) Explain Value engineering with its Concepts, Principles, Methodologies and Standards. **[10]**

b) Define and explain Rapid Upper Limb Assessment (RULA) and Rapid Entire Body Assessment (REBA). **[8]**

OR

Q8) a) Explain methods of merit rating for Performance appraisal along with wage and wage incentive plans. **[10]**

b) Explain industrial legislation with its advantages, disadvantages and applications. **[8]**



Total No. of Questions :8]

SEAT No. :

PE3241

[Total No. of Pages : 2

[6584]-245

B.E. (Printing Technology)

OPERATIONS 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) Find an optimal sequence for following sequencing problem. Also find total elapsed time **[18]**

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

Q2) 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 **[18]**

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

P.T.O.

Q3) What are functions of production planning and control, explain with suitable case study **[17]**

OR

Q4) What are stages of production planning and control, explain in greater details **[17]**

Q5) What is product life cycle, what is its impact on production planning and control **[18]**

OR

Q6) State about Batch and mass production systems their features, advantages, limitations if any **[18]**

Q7) State Continuous or flow production system its features, advantages, limitations if any **[17]**

OR

Q8) Compare and contrast between product breakdown structure and work breakdown structure **[17]**



Total No. of Questions :8]

SEAT No. :

PE3242

[Total No. of Pages : 2

[6584]-246

B.E. (Printing Technology)

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 importance of adhesive testing in packaging, specifically focusing on adhesion strength and stability. How do these tests influence the packaging process? **[9]**

b) Describe the different types of adhesives used for tapes in packaging, such as rubber- based, acrylic-based, and silicone-based, and their applications. **[8]**

OR

Q2) a) What are the different types of adhesive applications in food-grade packaging? Discuss how adhesive selection impacts food safety and product integrity. **[10]**

b) Explain the role of adhesives in combination packaging, particularly in terms of multi-material packaging structures. **[7]**

Q3) a) What are the key challenges in achieving the desired coating properties, such as sagging and slumping, in flexible packaging applications? **[9]**

b) Discuss the impact of coating rheology on the performance of coating machines, and explain how it affects the uniformity and quality of the final coating. **[9]**

OR

P.T.O.

Q4) a) Explain the process of reverse metallization coating and its application in packaging materials. What are the advantages of using this coating technique? **[10]**

b) Discuss the significance of water-based coatings in food packaging materials. What are the selection criteria for choosing water-based coatings for food safety? **[8]**

Q5) a) What is the role of slot die coating for low-viscosity fluids in packaging, and what are its advantages over other coating methods? **[9]**

b) Describe the rotary screen coating process and its application in packaging. How does it affect the coating quality and efficiency? **[8]**

OR

Q6) a) Explain the importance of the coat weight test and how it is conducted to measure the coating efficiency on packaging materials. **[10]**

b) Discuss the different drying methods used in coating applications and their impact on the quality of the finished product. **[7]**

Q7) a) Discuss the significance of BIS and ASTM standards in the packaging industry, especially concerning adhesive performance and safety. **[9]**

b) How do adhesion testing methods like the breaking strength and elongation at break contribute to ensuring packaging material durability? **[9]**

OR

Q8) a) What are the critical migration tests for evaluating the safety of food packaging materials? Discuss how these tests help ensure consumer safety. **[9]**

b) Explain the different types of coating formulations used in the packaging industry and their relevance to product performance and shelf life. **[9]**



Total No. of Questions :8]

SEAT No. : ____

PE3243

[Total No. of Pages : 2

[6584]-247

B.E. (Printing Technology)

FOOD AND PHARMACEUTICAL PACKAGING

(2019 Pattern) (Semester-VIII) (Elective-V) (408288 A)

Time : 2 ½ 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) a) Explain the operating principals for hot foil stamping with applications. **[9]**

b) Explain Co-extrusion Process and explain its benefits. **[9]**

OR

Q2) a) Explain Hot foil stamping process & its types with applications. **[9]**

b) What are the challenges packaging industry facing with Co-extruding process of dissimilar polymers? **[9]**

Q3) a) Explain the concept of Bottle filling System. **[8]**

b) Explain the working principle of Multi-head weighers and draw a labelled diagram. **[9]**

OR

Q4) a) Explain four different types of sealing systems. **[8]**

b) Explain the concept of Capping with its types. **[9]**

Q5) a) Differentiate blister packaging and strip packagingwith advantages and disadvantages. **[9]**

b) Explain Bag-in-Box technology and its benefits. **[9]**

OR

P.T.O.

Q6) a) What are the Steps involved in Retort Pouch Processing explain them? **[9]**

b) What is strip Packaging Process and write down the procedure of making strip packaging? **[9]**

Q7) a) Which are Factors affecting Product Quality and Shelf Life explain. **[8]**

b) What Qualification and Quality Control need for Pharmaceutical Packaging Components? **[9]**

OR

Q8) a) What type of material and structure required for food packaging with examples? **[8]**

b) Explain Quality Specification required for food packaging. **[9]**



Total No. of Questions : 8]

SEAT No. :

PE5092

[Total No. of Pages : 2

[6584]-249

B.E. (Printing Technology)

SUSTAINABLE PACKAGING

(2019 Pattern) (Semester - VIII) (408289A) (Elective - VI)

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) a) Explain Design Considerations and Material Alternatives for sustainable packaging. **[9]**

b) Explain the Impact of material selection on packaging. **[9]**

OR

Q2) a) What is Effective Packaging and what are the Bio-Based and Biodegradable Food Packaging material? **[9]**

b) Explain the concept of Renewable Packaging materials. **[9]**

Q3) a) Explain key concepts and terminology of circular Economy. **[9]**

b) What are the benefits and need for Circular Economy. **[8]**

OR

Q4) a) Explain 3R's of Circular Economy and Negative Impacts of Plastics disposals. **[9]**

b) Explain the concept of Waste Management and Plastics in Circular Economy. **[8]**

P.T.O.

Q5) a) Explain Life Cycle Assessment in sustainable Packaging. **[9]**

b) Explain the Need for Life Cycle Assessment and functions of Green Packaging. **[8]**

OR

Q6) a) Explain the Life Cycle Assessment Tools from Cradle-to-Grave. **[9]**

b) What are the Issues related to Air Pollution and Landfills? **[8]**

Q7) a) Explain the Regulatory and Supply Chain management for sustainable packaging. **[9]**

b) Explain the Understanding of global regulatory landscapes for sustainable Packaging. **[9]**

OR

Q8) a) Explain the Brand Positioning and Marketing Strategy for sustainable packaging. **[9]**

b) Explain the Consumer Education and understanding of standard signs and symbols. **[9]**



Total No. of Questions : 8]

SEAT No. :

PE-5093

[Total No. of Pages : 2

[6584]-251
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, if necessary.***
4) ***Neat diagrams must be drawn wherever necessary***

Q1) a) Explain the hybrid gravure process. **[6]**

b) Discuss the advantages and disadvantages of sheet-fed gravure. **[6]**

c) Describe the evaluation of solvent retention in printed substrates. **[5]**

OR

Q2) a) Explain the role of slow-drying and fast-drying solvents in gravure inks. **[6]**

b) What are NTNK inks and Discuss their importance. **[6]**

c) Explain the factors affecting solvent compatibility with resin. **[5]**

Q3) a) Describe the viscosity control mechanisms used in gravure printing. **[6]**

b) Explain the electron beam dryer and its principal. **[6]**

c) Discuss the OSHA standards. **[6]**

OR

Q4) a) Explain hot air dryer and UV in gravure **[6]**

b) Describe solvent recovery system with suitable diagram. **[6]**

c) What is the 3T concept in drying? Explain. **[6]**

P.T.O.

Q5) a) Explain the types of impression systems used in gravure printing. **[6]**

b) Describe the making of an impression roller. **[6]**

c) Explain the testing properties and specifications for impression rollers. **[5]**

OR

Q6) a) Explain the working of ESA system with a labeled diagram. **[6]**

b) Discuss merits and demerits of ESA. **[6]**

c) Explain the specification of impression roller. **[5]**

Q7) a) Explain the working principle of web viewing systems. **[6]**

b) What is web aligner? Explain its components. **[6]**

c) Discuss the purpose of roller balancing and roller deflection **[6]**

OR

Q8) a) Explain splicing mechanism in gravure printing. **[6]**

b) Discuss electronic line shaft and its advantages. **[6]**

c) Explain the function of chucks and air shafts in web transport. **[6]**

♦ ♦ ♦

Total No. of Questions : 8]

SEAT No. : ____

PE-3244

[Total No. of Pages : 2

[6584]-252
B.E. (Printing)
DIGITAL PRINTING TECHNIQUES
(2019 Pattern) (Semester - VII) (408284)

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.***

Q1) a) Explain anti-aliasing, interpolation and dithering in image quality improvement. **[10]**

b) Differentiate between postscript (ps) and PDF formats. **[8]**

OR

Q2) a) Discuss the role of quality control in digital workflow. **[10]**

b) Explain file standards like PDF/X-1a, PDF/X-3, and PDF/X-4. **[8]**

Q3) a) Differentiate between soft proof & hard proof. **[10]**

b) Explain inkjet, electro-thermography and nanotech proofing technologies. **[7]**

OR

Q4) a) Compare RAW, TIFF and JPEG formats in camera workflow. **[10]**

b) What are ICC profiles? How do they help achieve WYSIWYG output.**[7]**

P.T.O.

Q5) Describe RIP and its role in digital printing workflow. **[18]**

OR

Q6) Explain QR and Barcodes with diagrams. Enlist the uses. **[18]**

Q7) a) Explain transition from analog to digital imaging. **[10]**

b) Differentiate once imagible and re-imagible master technologies. **[7]**

OR

Q8) a) What is POD -Draw workflow for T-Shirt printing. **[10]**

b) Explain print on demand (POD) models and their advantages. **[7]**



Total No. of Questions : 8]

SEAT No. : ____

PE3245

[Total No. of Pages : 2

[6584]-253

B.E. (Printing Technology)

PAPER BOARD AND CORRUGATION PACKAGE TECHNOLOGY

(2019 Pattern) (Semester - VII) (408281A) (Elective - III)

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

Instructions to the candidates:

1) ***Attempt 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 whenever necessary.***

Q1) a) Explain in detail the process of manufacturing glue applied labels along with its applications. **[10]**

b) Explain "In mold labels" with applications and diagram. **[7]**

OR

Q2) a) Explain in detail the process of manufacturing composite cans along with its applications. **[10]**

b) Explain "Shrink Sleeves" 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]**

Q5) Explain in detail the manufacturing of double wall corrugation board along with neat diagram of machine. **[17]**

OR

P.T.O.

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 testing methods of corrugation cartons for food packaging. **[9]**



Total No. of Questions : 8]

SEAT No. :

PE-3246

[Total No. of Pages : 2

[6584]-254
B.E. (Printing Engineering)
POLYMER SCIENCE
(2019 Pattern) (Semester - VII) (408281B) (Elective III)

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

Instructions to the candidates :

1) ***Solve Q1 or Q2, Q3 or Q4, Q5 or Q6 and 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***

Q1) a) Discuss heat fusion and explain heat fusion in amorphous polymers. **[6]**

b) Interpret the impact strength of a materials and explain the method to measure it. **[6]**

c) Discuss the surface energy of a polymer and calculate it by considering one polymer. **[6]**

OR

Q2) a) Illustrate thermal expansion coefficient and relate the reason for higher thermal expansion coefficient in polymers than metals. **[6]**

b) Describe blocking of polymers thin films and explain the method to control it. **[6]**

c) Demonstrate the method of evaluating the gloss of different polymers.**[6]**

Q3) a) Analyzed different types of additives are used during compounding to enhance polymer properties. **[6]**

b) Illustrate UV stabilizers protect polymers from degradation. **[6]**

c) Discuss the role of heat stabilizers play in preventing thermal degradation of polymers **[5]**

OR

P.T.O.

Q4) a) Describe the dispersive and distributive mixing of additives. **[6]**

b) Summarized the role of fillers in polymeric materials with two examples. **[6]**

c) Discuss factors influence the effectiveness of stabilizers in various applications. **[5]**

Q5) a) Illustrate the fluorination, Bromination, chlorination and sulfonation in the chemical modification for surface of polymers. **[12]**

b) Describe the Crosslinking of polymer films in mechanical modification. **[6]**

OR

Q6) a) Describe the plasma treatment and its importance and advantages for polymer substrate. **[6]**

b) Interpret the thermal stability in mechanical modification of polymer films. **[6]**

c) Summarized the most common surface modification techniques for improving the adhesion properties of polymer films. **[6]**

Q7) a) Illustrate the effect of humidity on the properties of polymers. **[6]**

b) Justify solubility and explain the Henry law of solubility. **[6]**

c) Distinguish difference between 'sorption' and 'migration'. **[5]**

OR

Q8) a) Discuss the Fick's low of diffusion with first and second low of diffusion. **[5]**

b) Interpret 'permeation' in Polymeric Packaging and factors affect the permeant molecule. **[6]**

c) The oxygen permeability of amorphous PET at 250C has been found to be 14 cc mil/d 100 in 2 atm. Calculates the value of P at 500C? Ep=38KJ/mol. **[6]**

Total No. of Questions : 8]

SEAT No. :

PE-3247

[Total No. of Pages : 2

[6584]-255
B.E. (Printing Technology)
MULTIMEDIA ADVERTISING
(2019 Pattern) (Semester - VII) (408282 A) (Elective - IV)

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

Instructions to the candidates :

1) ***Attempt Q1 or Q2, Q3 or Q4, 05 or 06,07 or 08.***
2) ***Figures on right in bracket indicate marks.***

Q1) Compare and contrast between following media with their features, advantages, limitations if any **[18]**

a) Television media

b) Outdoor Media

OR

Q2) What is media research? Explain media research with suitable case study **[18]**

Q3) Explain following types of campaign: **[17]**

a) Launching campaign

b) Pioneering campaign

c) Reminder campaign

OR

Q4) What is Brand building? Explain the stages involved, explain with suitable case study **[17]**

P.T.O.

Q5) Explain the execution of AIDA model with respect to different elements used in construction of print media advertisement **[18]**

OR

Q6) What is "copy" in advertisement? Explain types of copy used in print advertisement. **[18]**

Q7) How is content marketing used effectively for advertising purpose? Explain with suitable example. **[17]**

OR

Q8) Explain social media campaigning **[17]**

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Total No. of Questions : 8]

SEAT No. : ____

PE-5948

[Total No. of Pages : 2

[6584]-256

B.E. (Printing Technology)

PROCESS OPTIMIZATION AND TOTAL QUALITY MANAGEMENT IN PRINTING

(2019 Pattern) (Semester - VII) (408282 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) ***Use of Calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Define Standard Operating Procedure (SOPs). **[8]**

b) Explain the importance of SOPs in printing and packaging operations. And List the key elements of an effective SOP for a printing machine.**[9]**

OR

Q2) a) Explain the concept of 5S in manufacturing and describe the implementation of 5S in a printing or packaging plant. **[9]**

b) State the benefits of 5S with respect to quality, safety, and productivity.**[8]**

Q3) a) Explain the plate-making and engraving process. **[6]**

b) Discuss the influence of the following parameters on print quality. **[12]**

i) Line screen

ii) Cell shape and angle

iii) Cell depth

iv) Imaging resolution

OR

P.T.O.

Q4) a) Explain the concept of Color Management in pre-press. **[6]**

b) Identify CTP and CTQ parameters related to color management. **[6]**

c) Explain the importance of color space conformity in maintaining print quality. **[6]**

Q5) a) What is G7 methodology? Explain the principle of grayscale calibration in G7. **[8]**

b) State the advantages of implementing G7 in printing processes. **[9]**

OR

Q6) a) Explain the concept of calibration in printing processes. Describe the need for calibration while implementing ISO standards in printing. **[8]**

b) Explain how calibration supports process consistency and repeatability. **[9]**

Q7) a) Explain the need for process optimization in printing. Define Linear Regression Model. **[9]**

b) Explain how linear regression can be used to study the effect of ink viscocity or press speed on dot gain. **[9]**

OR

Q8) In a printing experiment, the following data is obtained: **[18]**

Ink Viscosity (Pa's)	Dot Gain (%)
8	18
10	22
12	26

a) Identify independent and dependent variables.

b) State the nature of the relationship between viscosity and dot gain.

c) Write a simple linear regression equation form for this data.



Total No. of Questions : 8]

SEAT No. : ____

PE2336

[Total No. of Pages : 2

[6584]-257

B.E. (Production Engg.)

COMPUTER INTEGRATED DESIGN AND MANUFACTURING

(2019 Pattern) (Semester - VIII) (411088-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 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 diagram solid ground curing process of RP. **[9]**

OR

Q2) a) Explain the role of CIM in manufacturing industries? **[8]**

b) Explain with neat sketch fused deposition method. **[9]**

Q3) a) Explain with neat sketch tool magazine in CNC M/c tool. **[6]**

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]**

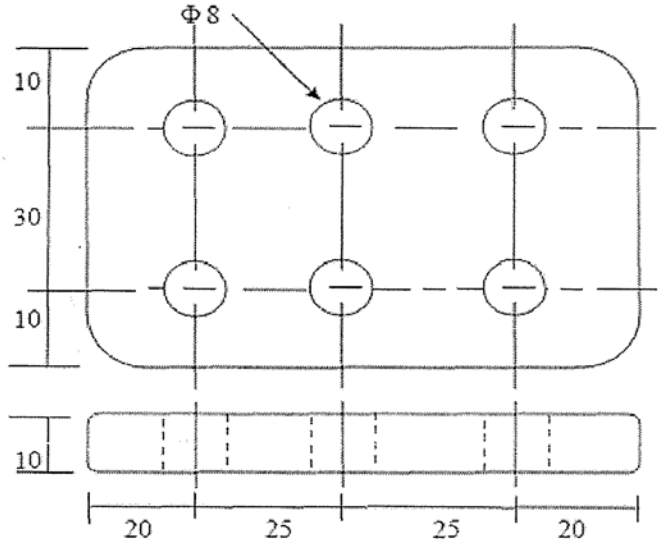


Fig. No. 1(All dimension are in MM)

OR

P.T.O.

Q4) a) Compare the absolute and incremental method of programming in NC machines. **[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]**

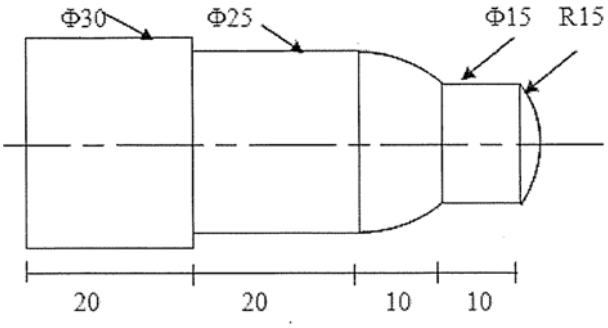


Fig. No. 2(All dimension are in MM)

Q5) a) With neat sketch write Matrix analysis for force, load and displacement of 1-dimensional two step rod element. **[9]**

b) Explain different coordinate reference systems used in FEA. **[9]**

OR

Q6) a) Fig. No.3 shows three springs, having stiffness 15, 25 and 40 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]**

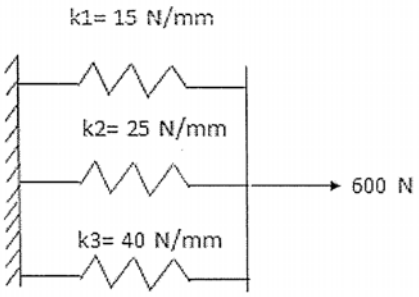


Fig.No.3 (All dimensions are in MM)

b) Explain Penalty Approach in FEA for problem solving. **[6]**

Q7) a) Explain monocode and ploy code system for coding the parts in GT.**[9]**

b) What is meant by ASRS? What are the advantages of AGVS over the other material handling system? **[8]**

OR

Q8) a) Explain with suitable example how production flow analysis helps in cell formation in grouping of parts. **[8]**

b) Explain opitz part classification and coding system with suitable example.**[9]**

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Total No. of Questions : 8]

SEAT No. :

PE2337

[Total No. of Pages : 3

[6584]-258
B.E. (Production)
INDUSTRIAL ROBOTICS
(2019 Pattern) (Semester-VIII) (411089)

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) ***Draw neat labeled diagrams wherever necessary.***
3) ***Figures to the right side indicate full marks.***

Q1) a) Discuss partitioned control scheme used in robot joint control. **[8]**

b) For a 1 DOF planar robot, link moves from initial position to final position (θ_1=0º) to final position at 55º. Determine the inertia tensor of link in base coordinate system if link length 1=0.12 m and mass of link m=2 kg. Assume that the link is of circular cross section. **[10]**

OR

Q2) 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 10 cm and 15 cm and the masses as 1.5 kg and 2 kg respectively. Determine the joint torques or forces acting on the gripper. **[10]**

Q3) a) Explain the role of sensors in robotics and also give the detail classification of sensors. **[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]**

$$\begin{vmatrix} 110 & 100 & 86 & 75 \\ 120 & 105 & 56 & 80 \\ 90 & 85 & 60 & 75 \\ 100 & 70 & 90 & 80 \end{vmatrix}$$

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

P.T.O.

Q4) a) Discuss the components of robotic vision system with neat block diagram. **[6]**

b) The 8×8 array of pixels indicating each element as the gray level of pixel is given below. **[12]**

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 8×8 array of pixels indicating each element as the gray level of pixel is given below.

1) Construct the histogram and find threshold value.

2) Convert it into black and white image.

3) Perform shape analysis (first and second order moments, centroids, run length encoding, principal angle).

9	12	13	12	11	11	13	11
12	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
9	13	12	16	16	12	11	12
8	9	6	10	12	10	8	8
6	7	8	9	10	13	12	11

Q5) a) Explain 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) Referencing

ii) TCP

iii) Payload capacity

iv) Work object

v) Robot teaching

OR

Q6) a) State and explain Algorithms used for motion planning. **[8]**

b) Explain following: MOVE, WAIT, SIGNAL, DELAY with an PnP example. **[8]**

Q7) Write short notes on: **[18]**

a) Machining robots

b) Robot material handling systems

c) AI in Robotics

OR

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

a) Inspection robots

b) ANN

c) Material handling automation



Total No. of Questions : 8]

SEAT No. : [ ]

PE2338

[Total No. of Pages : 2

[6584]-259

B.E. (Production)

E-MOBILITY IN AUTOMOBILE

(2019 Pattern) (Semester - VIII) (411090(A)) (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) How motors are significant in EV?Explain in detail. **[9]**

b) What are types of Electrical Vehicle motors? **[8]**

OR

Q2) a) How electricalvehicles motors are different from industrial motors? **[9]**

b) Explain principle and construction of BLDC and PMSM. **[8]**

Q3) a) What are power transfer mediums for Electrical Vehicles? **[9]**

b) Discuss BMS in electric vehicle. **[9]**

OR

Q4) a) What is significance of selection of components for charging stations? **[9]**

b) Explain earth protection system for charging stations in EV. **[9]**

P.T.O.

Q5) a) What are the working principle of V2V and V2G? **[9]**

b) Write note on the configuration of EV. **[8]**

OR

Q6) a) What are purpose to built EV and discuss components of EV system. **[9]**

b) Which type of charging strategy is utilized for V2G? **[8]**

Q7) a) Discuss the propulsion motor control strategies. **[9]**

b) What do you understand from fuels controlling? **[9]**

OR

Q8) a) Explain APU control system. **[9]**

b) What is fuel cell hybrid Electric Vehicles? **[9]**



Total No. of Questions : 8]

SEAT No. :

PE2339

[Total No. of Pages : 2

[6584]-260

B.E. (Production)

SMART MANUFACTURING

(2019 Pattern) (Semester - VIII) (411090(B)) (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.***

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 equations 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. :

PE2340

[Total No. of Pages : 2

[6584]-261

B.E. (Production Engineering)

MANUFACTURING SYSTEM DESIGN

(2019 Pattern) (Semester - VIII) (411090C) (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 indicate full marks.***

Q1) a) What are different steps followed in designing a manufacturing system? **[8]**

b) What is a Need of Manufacturing System? **[8]**

c) What is a Line Balancing? **[3]**

OR

Q2) a) Write factor which considered in Station Level Design. **[8]**

b) What do you understand about Manufacturing system design Configuration? **[8]**

c) Write short note on Hybrid Manufacturing System. **[3]**

Q3) a) What is Cellular Manufacturing? Write it's advantages and disadvantages. **[8]**

b) Write Advantage, Disadvantage and applications of FMS. **[8]**

c) List out advantages and limitation of Group Technology. **[3]**

OR

Q4) a) Write short note on Group technology. **[8]**

b) Explain Different type of codes in Design and Manufacturing Attributes. **[8]**

c) Mentioned Methods for Part Family Formation. **[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) Which are the process plan activities. **[8]**

b) What do you understand about Aggregate Production Planning? **[8]**

OR

Q8) a) What are different steps in Process planning? **[8]**

b) What are material selection parameter in process planning. **[8]**

Total No. of Questions : 8]

SEAT No. : [ ]

PE2341

[Total No. of Pages : 2

[6584]-262

B.E. (Production)

ERGONOMICS AND WORK MANAGEMENT

(2019 Pattern) (Semester - VIII) (411090 D) (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) Describe in detail Design of Work Surface Height. **[9]**

b) Discuss in short Design for Extreme positions and Adjustable Range. **[8]**

OR

Q2) a) Describe in detail different types of noise control. **[9]**

b) Principles of Seat design from Ergonomics. **[8]**

Q3) a) Explain different productivity measures. **[9]**

b) Total work content is given as a sum of basic work content' and 'excess time'. Explain the factors leading to the "excess time". **[9]**

OR

Q4) a) Define work study and Write down the basic procedure of work study. **[9]**

b) Define Productivity and explain in detail factors influencing on productivity. **[9]**

P.T.O.

Q5) a) What is meant by method study, its objectives and steps involved (i.e. procedure of method study). **[9]**

b) Explain **[9]**

i) Economic Factors

ii) Technical Factors

iii) Human Factors related to method study

OR

Q6) a) Write a brief note on the following: **[9]**

i) Flow process chart,

ii) Multiple activity charts.

b) List objectives, advantages and limitations of method study. **[9]**

Q7) a) What is work measurement? Describe in detail basic procedure of work measurement. **[8]**

b) Describe in detail Procedure for conducting a Work Sampling Study. **[9]**

OR

Q8) a) Explain **[9]**

i) fatigue allowance

ii) Delay Allowance

iii) Contingency allowance

b) Explain briefly different techniques of work measurement.Define work sampling and mention its advantages. **[8]**

x x x

Total No. of Questions : 8]

SEAT No. : ____

PE2342

[Total No. of Pages : 2

[6584]-263

B.E. (Production Engineering)

FACILITY PLANNING

(2019 Pattern) (Semester - VIII) (411091A) (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 whenever necessary.***
3) ***Use of electronic pocket calculator is allowed.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain in detail Order Picking Operations of the Warehouse. **[8]**

b) Discuss in detail Fixed Automation System with advantages and limitations. **[10]**

OR

Q2) a) Explain in detail Receiving and Shipping Operations in Warehouse. **[8]**

b) Discuss in detail Flexible Manufacturing Systems. **[10]**

Q3) a) Explain in detail Facilities Maintenance Management Systems. **[8]**

b) Discuss in detail Atmospheric Systems used in any manufacturing organization. **[10]**

OR

Q4) a) Explain in detail significance of Electrical and Lighting Systems in manufacturing organization. **[10]**

b) Discuss in detail Structural System Performance. **[8]**

Q5) a) Write a short note on Automated Storage and Retrieval Systems. **[7]**

b) Discuss in detail Fixed-Path Material Handling Model. **[10]**

OR

P.T.O.

Q6) a) Discuss in detail Machine Layout Model. **[10]**

b) Explain in detail Special Facility Layout Model. **[7]**

Q7) a) Explain the factors to be considered for implementing Facility Layout. **[8]**

b) Discuss in detail Agglomeration and Degglommeration of any type of "facility. **[9]**

OR

Q8) a) Explain in detail Center-of-Gravity Method of facility location. **[8]**

b) Discuss any one method of evaluating locaction decision. **[9]**



Total No. of Questions : 8]

SEAT No. :

PE2343

[Total No. of Pages : 2

[6584]-264

B.E. (Production Engineering)

ADDITIVE MANUFACTURING

(2019 Pattern) (Semester - VIII) (411091B) (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-programmable 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-fabrication 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]**

OR

P.T.O.

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. :

PE2344

[Total No. of Pages : 2

[6584]-266

B.E. (Production Engineering)

DATA ANALYTICS

(2019 Pattern) (Semester - VIII) (411091-D) (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 the purpose of using Regression Modelling in Data Analysis and what kind of inferences it provides. **[10]**

b) Compare Big Data with Conventional Data and indicate some of the importance of Big Data Analysis. **[8]**

OR

Q2) a) Why is predictive analytics important? **[10]**

b) Write a short note on clustering techniques and its applications. **[8]**

Q3) a) What are the three characteristics of Big Data, and what are the main considerations in processing Big Data? **[10]**

b) How to choose the correct data analysis techniques? **[8]**

OR

Q4) a) Describe the challenges of the current analytical architecture for data scientists. **[10]**

b) Compare Which is better - Random Forest vs Support Vector Machine.**[8]**

Q5) a) What is Prescriptive Analytics? How it works? **[10]**

b) What is decision tree analysis? **[7]**

OR

P.T.O.

Q6) a) What do you mean by principal component analysis? **[10]**

b) What is a Genetic Algorithm? **[7]**

Q7) a) What is Reinforcement Learning? **[10]**

b) What is Markov analysis? Explain with example. **[7]**

OR

Q8) a) What is a Monte Carlo simulation? **[10]**

b) What is the type of Q-learning? **[7]**



Total No. of Questions :8]

SEAT No. : ____

PE2345

[Total No. of Pages : 3

[6584]-267

B.E. (Production)

AUTOMATION AND CONTROL ENGINEERING

(2019 Pattern) (Semester-VII) (411081)

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

Instructions to the candidates:

1) ***Attempt 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) A single stage air compressor running at 80 RPM, compress air from a pressure of 1 bar and temperature of 15° to a pressure of 5 bar. The clearance volume is 5 % of swept volume which is 0.42 m^3. Assuming that the compression and expansion to follow the law $PV^{1.3}$ = constant, determine the power required to drive the compressor. **[10]**

b) Explain fluidic 'NOR/OR' and 'AND/NAND' gates with suitable sketch. **[8]**

OR

Q2) a) Difference between the Hydraulic System and the Pneumatic System: **[8]**

b) Draw a pneumatic circuit for a machine operated either by manual switch or automatic switch and to ensure that the workpiece is properly clamped and door of the machine is not open. **[10]**

Q3) a) Write the program to perform following functions: **[9]**

- Load the number 3CH in register C
- Load the number D4H in register D
- Increment the content of register D by one
- Add the content of register C and D and display the sum at port 1.

b) Draw the flow chart and write the program to multiply two 8 bit numbers. **[8]**

OR

P.T.O.

Q4) a) Explain 8051 microcontroller's External memory and I/O addressing modes. **[10]**

b) Explain the function of ALE unit in microprocessor. **[7]**

Q5) a) Draw PLC Ladder logic diagram for the following sequence of operation: **[9]**

- Start the motor
- Start the pump after 10 seconds
- Stop the pump after 5 seconds
- Stop the motor after 10 seconds

b) Explain the performance characteristics of PI controller. **[8]**

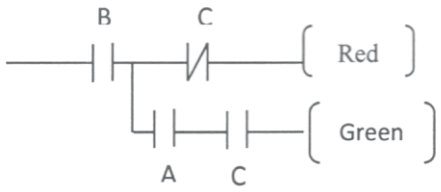
OR

Q6) a) In the following fig. input devices are push buttons A, B, C and output devices are Red LED and Green LED. **[7]**

i) Which push buttons should be pressed to make Red LED ON?

ii) Which push buttons should be pressed to make Green LED ON?

iii) What will be the output if B and C are pressed?



b) Explain the following terms related to controllers and state one application of each. **[10]**

i) Open loop controller

ii) Closed loop controller

iii) Proportional controller

iv) ON/OFF control

v) Proportional Integral controller

Q7) a) Discuss following features of the SCADA **[9]**

- Alarm Handling
- Recipe Management
- Report Generation
- Security Management

b) What are some different levels of SCADA machines and systems? Why SCADA systems are Implemented? **[9]**

OR

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

a) Advantages and limitations of RTU over PLC

b) Dynamic data exchange

c) Remote terminal unit



Total No. of Questions : 8]

SEAT No. :

PE2346

[Total No. of Pages : 4

[6584]-268
B.E. (Production Engineering)
OPERATIONS RESEARCH
(2019 Pattern) (Semester - VII) (411082)

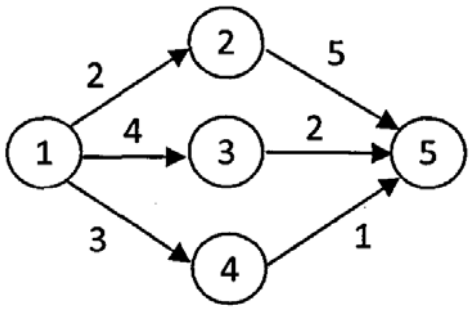
Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt questions 1 or 2, 3 or 4, 5 or 6 and 7 or 8.***
2) ***Draw neat sketches, if needed.***
3) ***Figures to the right indicate full marks.***

Q1) a) Explain zero-one implicit enumeration technique of solving 0-1 programming problem. **[7]**

b) Find the optimal path by using dynamic programming for the following Network path. **[10]**



OR

Q2) a) What is Goal programming? Distinguish it from linear programming. **[7]**

b) Consider the following N.L.P.P. **[10]**

$$\text{Minimize} = 2x_1^2 - 24x_1 + 2x_2^2 - 8x_2 + 2x_3^2 - 12x_3 + 200$$

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.

P.T.O.

Q3) a) The fleet owner finds from his past record, that the maintenance cost per year of an auto whose purchase price is ₹60,000 is given below: **[10]**

Consider cost of money as 10% per year.

Year	1	2	3	4	5	6	7	8
Maintenance	1000	1200	1400	1800	2300	2800	3400	4000

What is the optimum replacement plan?

b) Discuss individual and group replacement policies. **[7]**

OR

Q4) a) Find the cost per period of individual replacement policy of an installation of 300 light bulb, given the following : **[10]**

i) Cost of replacing an individual bulb is ₹2.

ii) Conditional probability of failure is given below:

Week No.:	0	1	2	3	4
Conditional probability of failure	0	0.1	0.3	0.7	1.0

b) Explain how theory of replacement is used in replacement of items whose maintenance cost varies with time. **[7]**

Q5) a) The following matrix gives the payoff of different strategies S_1, S_2, S_3, against different conditions N_1, N_2, N_3 and N_4. **[10]**

	N_1	N_2	N_3	N_4
S_1	4000	–100	60000	18000
S_2	20000	5000	400	0
S_3	20000	15000	–2000	1000

Indicate the decision taken under the following approach:

i) Pessimistic

ii) Optimistic

iii) Regret and

iv) Equal probability.

b) Discuss Minimax and Maximin rule with saddle point. **[8]**

OR

Q6) a) What is decision making? Explain and differentiate this under the conditions of certainty and uncertainty. **[8]**

b) Solve the game: **[10]**

	Strategies	Player B		
		b_1	b_2	b_3
Player A	a_1	20	25	10
	a_2	6	10	15
	a_3	40	18	30

Q7) a) A company trading motor car spares wishes to determine the level of stock it should carry for the items in its range. Demand is not certain and there is lead time for stock replenishment. For one item, the following information is obtained : **[10]**

Demand (units/day)	3	4	5	6	7
Probability	0.1	0.2	0.3	0.3	0.1

Carrying cost /unit/ day =20 paise

Ordering cost per order = ₹5.

Lead time = 3 days.

Stock in hand at the beginning of the simulation process is 20 units. You are required to carry out a simulation run over a period of 10 days if the ordering policy is to order 15 units when the stock in hand falls to 15 units.

Calculate the total cost of operating this inventory for 10 days using the following sequence of random numbers :

00, 90, 10, 10, 50, 10, 80, 60, 30, 50, 70, 10, 20 and 90

b) Discuss Assumptions and limitations of queueing theory. **[8]**

OR

Q8) a) Arrival rate of the customers at the banking counter follows Poisson distribution with mean 15 per hour. The service rate of the counter also follows Poisson distribution with mean of 25 per hour. **[10]**

Find:

i) Probability of having zero customers in the system

ii) Probability of having 3 customers in the system

iii) Probability that customer have to spend 30 minutes in bank

iv) Mean customers in queue

v) Average waiting time in queue

b) Write note on Monte Carlo Simulation. **[8]**

Total No. of Questions : 8]

SEAT No. : ____

PE2347

[Total No. of Pages : 2

[6584]-269
B.E. (Production Engineering)
SIMULATION, MODELING AND DIGITAL TWIN
(2019 Pattern) (Semester - VII) (411083A) (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 whenever necessary.***
3) ***Assume suitable data, if necessary.***
4) ***Use of non - programmable scientific Calculator is allowed.***
5) ***Figures to the right indicate full marks.***

Q1) a) Using an example, describe how the simulation models were created. **[8]**

b) Give a brief explanation of the statistics from simulation runs. **[9]**

OR

Q2) a) Summarize the following briefly. **[8]**

i) Model Confidence Interval Accreditation

ii) Testing Hypotheses

b) How can the three-step technique be used to validate the model? **[9]**

Q3) a) Give an explanation of the digital twin. Enumerate the various industries that employ it. **[9]**

b) What sorts of instruments and techniques are used by different sectors to make it possible to use digital twins? **[9]**

OR

Q4) a) Describe the importance of DTT in industry innovation. Provide an appropriate example to illustrate. **[9]**

b) Give a suitable example to illustrate how digital twins are used in product-based industries. **[9]**

P.T.O.

Q5) a) Describe the processes and current developments in the process industry in brief. **[8]**

b) Briefly describe the following topics: **[9]**

i) Automation Simulation

ii) Digital enterprise

OR

Q6) a) Describe the digital twin of a plant in short. **[8]**

b) Briefly explain the usage of digital thread in a process business. **[9]**

Q7) a) Explain how using digital twins might improve the quality of the product. **[9]**

b) In what ways might the application of digital twins lead to production flexibility? **[9]**

OR

Q8) a) Write a brief remark about the ongoing simulation-based manufacturing process forecast and adjustment. **[9]**

b) Explain how using digital twins might improve the quality of the product.**[9]**



Total No. of Questions : 8]

SEAT No. :

PE2348

[Total No. of Pages : 2

[6584]-270
B.E. (Production Engineering)
TOTAL QUALITY MANAGEMENT
(2019 Pattern) (Semester - VII) (411083B) (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 whenever necessary.***
3) ***Figures to the right 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 JIT, Kanban concepts used in TQM. **[9]**

OR

Q2) a) Explain QFD Process and discuss benefits of QFD. **[9]**

b) Explain Ishikawa Fishbone diagram with suitable sketch. **[9]**

Q3) a) Describe Bath Tub curve with suitable sketch. **[9]**

b) How to achieve higher reliability in the system? **[8]**

OR

Q4) a) Discuss reliability of system when components are in parallel with suitable sketch. **[9]**

b) Describe concept of maintainability and availability in detail. **[8]**

Q5) a) Explain the concept of six sigma. **[9]**

b) Explain the importance of developing a Check-List in conducting an Audit. **[9]**

OR

P.T.O.

Q6) a) How to organize for quality implementation? **[9]**

b) Explain how to plan for an audit? **[9]**

Q7) a) Describe quality system 9000. **[9]**

b) Explain ISO 14000 series standards. **[8]**

OR

Q8) a) Discuss the benefits of EMS. **[8]**

b) Describe ISO 9001:2000 QMS Requirements. **[9]**



Total No. of Questions : 8]

SEAT No. : ____

PE2349

[Total No. of Pages : 2

[6584]-271
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 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.***

Q1) a) Explain the simple cycle of stages of GA using block diagram. **[10]**

b) Explain briefly the role of different operators, namely reproduction, crossover and mutation used in GA. **[8]**

OR

Q2) a) The performance of GA depends on the balance between selection pressure and population diversity – justify the statement. **[10]**

b) Explain elitist strategy used in GA. **[8]**

Q3) a) Explain in brief various types of neural networks. **[10]**

b) What is the difference between a feed forward and back propagation network. **[8]**

OR

Q4) a) Explain the five steps in the back propagation learning algorithm. **[10]**

b) What is associative memory in neural network? Explain. **[8]**

Q5) a) What is AI-based monitoring? Explain. **[10]**

b) Why AI is Critical to the Future of the Manufacturing World? **[7]**

OR

P.T.O.

Q6) a) What are the different types of Monitoring and Evaluation (M&E)? **[10]**

b) What is process monitoring in manufacturing? **[7]**

Q7) a) Explain the role of Artificial Intelligence in Robotics. **[10]**

b) How AI will alter product design and manufacturing? **[7]**

OR

Q8) a) What is AI-based visual inspection and why is it better? **[10]**

b) What are the Applications of Artificial Intelligence? **[7]**



Total No. of Questions : 8]

SEAT No. : ____

PE2350

[Total No. of Pages : 2

[6584]-272

B.E. (Production Engineering)

WORLD CLASS MANUFACTURING

(2019 Pattern) (Semester - VII) (411083D) (Elective - III)

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

Instructions to the candidates:

1) ***Attempt 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.***

Q1) a) List various functions of store. **[6]**

b) List various steps in purchase cycle. **[6]**

c) List the 5S used in Visual management. **[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 example. **[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]**



Total No. of Questions : 8]

SEAT No. : [ ]

PE2351

[Total No. of Pages : 2

[6584]-273

B.E. (Production Engineering)

PLANT MAINTENANCE AND INDUSTRIAL SAFETY

(2019 Pattern) (Semester - VII) (Elective - IV) (411084(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.***
5) ***Use of logarithmic tables, slide rules, mollier charts, electronic pocket calculator and steam table is allowed.***

Q1) a) Explain the wear debris analysis. **[5]**

b) What are the causes of machine vibration? **[6]**

c) What is condition monitoring and equipment health monitoring? **[6]**

OR

Q2) a) What is thermal monitoring? Explain in brief about work of temperature sensitive tapes. **[7]**

b) Discuss the various techniques used in condition monitoring. **[10]**

Q3) a) Explain safety committees and its structure. **[8]**

b) Explain the History and development of Industrial safety. **[10]**

OR

Q4) a) Explain the implementation of Factories Act-1948. **[8]**

b) What do you mean by safety? Discuss how Safety Engineering helps in improving productivity of an organization. **[10]**

Q5) a) Explain following terms: **[7]**

i) Housekeeping

ii) First AID

b) Explain role of Safety Education and training in Industry. **[10]**

OR

P.T.O.

Q6) a) Explain accident reporting and investigation procedures. **[7]**

b) Explain various factors affecting the selection of plant location. **[10]**

Q7) a) Discuss in detail the control of industrial noise and protection against it. **[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) Discuss salient features of Factory Act, 1948. **[10]**

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Total No. of Questions : 8]

SEAT No. : ____

PE2352

[Total No. of Pages : 1

[6584]-274

B.E. (Production Engineering)

SURFACE ENGINEERING

(2019 Pattern) (Semester - VII) (Elective - IV) (411084(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.***

Q1) a) Describe anodic coatings. **[10]**

b) What is difference between anodic and cathodic coating. **[8]**

OR

Q2) a) What is the Principle of Nitriding? Explain gas nitriding process. **[10]**

b) State the advantages of metal cladding process. **[8]**

Q3) a) What is influence of manufacturing processes on various surface properties of an engineering component? Discuss. **[10]**

b) Describe physical vapor deposition process with its advantages. **[8]**

OR

Q4) a) Which are surface engineering problems related to substrate characteristics? **[10]**

b) Explain any Plasma-based surface engineering processes for wear and corrosionprotection. **[8]**

Q5) a) Describe Stylus-Based Approach of surface roughness measurement. **[10]**

b) Describe measurement of Thickness of Coatings and Films by weight measurement of coating deposited. **[7]**

OR

Q6) a) How do you measure the adhesion strength of coating? **[10]**

b) Which are the conventional methods of surface testing? Explain in brief. **[7]**

Q7) a) How do you measure mechanical properties of nanomaterials? **[10]**

b) Write note on simulation of actual application environment in tribometer. **[7]**

OR

Q8) a) Which coating is best for high temperature application? Discuss. **[10]**

b) Sate popular types of wear resistant coatings. Describe one. **[7]**

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Total No. of Questions : 8]

SEAT No. : ____

PE2353

[Total No. of Pages : 2

[6584]-275

B.E. (Production Engineering)

REVERSE ENGINEERING

(2019 Pattern) (Semester - VII) (Elective - IV) (411084C)

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) ***Assume suitable data if necessary.***
4) ***Use of non-programmable scientific calculators is allowed.***
5) ***Figures to the right indicate full marks.***

Q1) a) Give a brief explanation of the basic RE processes in each of the four phases of the RE data processing chain. **[8]**

b) Write short notes on: **[9]**

i) Polygon phase

ii) Nurbs surface phase

OR

Q2) a) With suitable sketch, explain straightforward geometric triangulation to determine the surface coordinates of an object. **[8]**

b) Write a brief remark on reverse engineering's destructive strategy. **[9]**

Q3) a) Describe the contact and non-contact devices that reverse engineers employ to collect data. **[9]**

b) How to pick a reverse engineering system taking into account the commercial potential and technical needs. **[9]**

OR

Q4) a) Explain structured-light and stereoscopic imaging systems. **[9]**

b) Write short note on: **[9]**

i) Internal Measurement Systems

ii) X-ray Tomography

P.T.O.

Q5) a) Write a comment about the use of data processing in reverse engineering. **[8]**

b) Compose a brief note on cloud data modeling using the adaptive slicing approach. **[9]**

OR

Q6) a) How is the integration of RP and RE carried out for layer-based model generation? **[8]**

b) Explain how the cloud data is modeled in reverse engineering. **[9]**

Q7) a) Briefly describe the application of reverse engineering in the automotive sector using appropriate examples. **[9]**

b) What are the legal aspects of reverse engineering? **[9]**

OR

Q8) a) What are the barriers to putting reverse engineering into practice? **[9]**

b) How the reverse engineering concepts can be applied in Medical device industries? **[9]**



Total No. of Questions : 8]

SEAT No. :

PE2354

[Total No. of Pages : 2

[6584]-276

B.E. (Production Engineering)

ENTREPRENEURSHIP AND INNOVATIONS

(2019 Pattern) (Semester - VII) (Elective - IV) (411084-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) ***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) What Is Entrepreneurship? Why is entrepreneurship important? **[9]**

b) What are the factors of entrepreneurship? **[9]**

OR

Q2) a) What are the Problems of entrepreneurship development in India? **[9]**

b) List and explain the stages in the entrepreneurship development process. **[9]**

Q3) a) What are the 5 stages of the accounting process? **[8]**

b) What is the importance of conceiving a good of project idea? **[9]**

OR

Q4) a) What are the steps involved in project identification and selection? **[9]**

b) **[8]**

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.

P.T.O.

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:

1) Current Ratio

2) Debtors Turnover Ratio

3) Gross profit ratio

Q5) a) What are the 5 project management tips? **[8]**

b) What is project control Example? **[9]**

OR

Q6) a) Why are planning performance and control important in the execution of projects? **[8]**

b) Why is planning and control essential for a project? **[9]**

Q7) a) What are the main features of Workmen Compensation Act? **[9]**

b) What are the general types of taxes? **[9]**

OR

Q8) a) What are the characteristics elements of partnership? **[9]**

b) What are the five most important business issues that can lead to legal problems for global marketers? **[9]**

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Total No. of Questions : 8]

SEAT No. : [ ]

PE2355

[Total No. of Pages : 2

[6584]-277

B.E. (Production Engineering Sandwich)

SUPPLY CHAIN MANAGEMENT

(2019 Pattern) (Semester - VIII) (411134A) (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.***
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) Write a short note on Economics of Scale Exploit Quantity Discounts. **[8]**

b) Discuss the impact of inventory optimization techniques, such as Just-In-Time (JIT), lean inventory and agile inventory, on supply chain performance. **[9]**

OR

Q2) a) Discuss the concept of supply chain resilience in the context of inventory management. **[8]**

b) Explain how safety inventory can be estimated and managed in practice. **[9]**

Q3) a) Explain role of IT in transportation. **[8]**

b) Describe the role of cross-functional collaboration in supply chain design. **[9]**

OR

Q4) a) What are the factors influencing network design decisions? **[8]**

b) Discuss the impact of regulatory requirements on supply chain design. **[9]**

P.T.O.

Q5) a) What are the obstacles for achieving coordination in Supply chain? **[9]**

b) Describe the role of supply chain risk management in enhancing coordination. **[9]**

OR

Q6) a) Discuss the impact of E-Business on customer service in mobiles, laptops industry. **[9]**

b) Discuss the ethical considerations in supply chain coordination. **[9]**

Q7) a) Explain the concept of value-based pricing in supply chain management. **[9]**

b) Discuss the financial implications of supply chain disruptions and risks. **[9]**

OR

Q8) 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]**

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Total No. of Questions : 8]

SEAT No. :

PE2356

[Total No. of Pages : 2

[6584]-278

B.E. (Production Sandwich Engineering)

PLANT ENGINEERING AND MAINTENANCE

(2019 Pattern) (Semester - VIII) (411134 B) (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 indicate full marks.***

Q1) a) Define the concept of maintenance. Explain the objectives of maintenance. **[9]**

b) What is preventative maintenance? How does preventative maintenance work? Types of preventive maintenance give examples of preventive maintenance. **[9]**

OR

Q2) a) What's the difference between preventive maintenance and predictive maintenance? What are the benefits of preventive maintenance? **[9]**

b) How does preventive maintenance compare to reactive maintenance? The future of preventive maintenance with AI AND IOT. **[9]**

Q3) a) Explain 4 phases of the project management life cycle. Discuss project management steps for the each phase. **[9]**

b) What is the main focus of life cycle costing? What are the three types of life cycle costing? Why is life cycle costing important? Purpose of life cycle cost analysis. **[9]**

OR

Q4) a) What do you mean by reliability? What are the 4 components of reliability? **[9]**

b) Which manufacturer has the most reliable product? Explain Methods of estimating reliability. **[9]**

P.T.O.

Q5) a) How mechanical hazards can be prevented? What are the safety precautions for chemical hazards? What are the 5 types of mechanical hazards? What is the first rule of chemical safety? What are 3 types of chemical hazards? **[9]**

b) Explain process of identifying hazards it is useful to categorize hazards in different ways like by topic, explain with example. **[8]**

OR

Q6) a) Definition & objectives of energy management energy audit: types and methodology need for energy audit type of energy audit preliminary energy audit methodology. **[8]**

b) Explain Corporate governance and process safety management Explain Hazard identification and risk assessment (hira) process. **[9]**

Q7) a) What is vibration based condition monitoring? What are the types of maintenance in vibration? What is the basic principle of on condition maintenance? **[8]**

b) Explain adaptive filtering of sound pressure signals for monitoring machinery in noisy environments. **[9]**

OR

Q8) a) Explain approach to fault diagnosis of machinery using wear debris and vibration analysis. **[8]**

b) What is ferrography used for? What are the different types of ferrography? What is analytical ferrography? **[9]**



Total No. of Questions : 8]

SEAT No. : [ ]

PE2357

[Total No. of Pages : 2

[6584]-279

B.E. (Production Engineering) (Sandwich)

INDUSTRIAL RELATION & HUMAN RESOURCE MANAGEMENT

(2019 Pattern) (Semester - VIII) (411134 C) (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.***
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 Manufacturing Industry? **[9]**

OR

Q2) a) Enlist and brief Main resources of recruitment. **[8]**

b) What are the Assessment Devices follow in IT Industry? **[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]**

P.T.O.

Q5) a) Why it is necessary to follow Ethics in appraisal system? **[9]**

b) Explain in brief Concepts of Performance Management. **[9]**

OR

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 Dismissal? What measures Industry has to follow to avoid dismissal? **[9]**

b) What are the main aspects responsible for Suspension? What will be the solution to overcome this issue? **[8]**

OR

Q8) a) Write note on Industrial Democracy and Industrial Peace. **[9]**

b) What is the Role of HRD in developing Industrial Relations? **[8]**

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Total No. of Questions : 8]

SEAT No. : [ ]

PE2358

[Total No. of Pages : 2

[6584]-280

B.E. (Production-Sandwich Engineering)

MARKETING MANAGEMENT

(2019 Pattern) (Semester - VIII) (411134D) (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 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 calculator is allowed.***

Q1) a) Explain Gathering marketing in formation. **[8]**

b) Explain segmenting markets and positioning products. **[9]**

OR

Q2) a) Explain formulating marketing strategies. **[9]**

b) Explain planning marketing programmes. **[8]**

Q3) a) Explain Establishing and managing prices. **[8]**

b) Explain designing and managing product promotions. **[9]**

OR

Q4) a) Explain Developing new products. **[8]**

b) Explain managing market logistics. **[9]**

P.T.O.

Q5) a) Explain Managing sales force and sales territories. **[9]**

b) Explain Services marketing. **[9]**

OR

Q6) a) Explain designing and managing product promotions. **[9]**

b) Explain Managing sales force and sales territories. **[9]**

Q7) a) Explain Marketing research and its importance. **[9]**

b) Explain Marketing research scope structure and methods. **[9]**

OR

Q8) a) Explain role of quantitative techniques. **[9]**

b) Explain Marketing research and its importance. **[9]**

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Total No. of Questions :8]

SEAT No. : ____

PE2359

[Total No. of Pages : 3

[6584]-281

B.E. (Production Engineering Sandwich)

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 whenever necessary.***
3) ***Figures to the right indicate fill marks.***
4) ***Assume suitable data, if necessary and mention it clearly.***
5) ***Use of non-programmable calculator is allowed.***

Q1) a) Explain construction and working of Twin pressure/dual pressure valve with schematic diagram used in pneumatics., application for Twin pressure/dual pressure valve as AND logic gate. **[9]**

b) Explain construction and working of time delay valve with schematic diagram used in pneumatics. Explain the application with circuit. **[9]**

OR

Q2) a) What is a quick exhaust valve?. Explain construction and working of quick exhaust valve with schematic diagram used in pneumatics. Explain the application with circuit. **[9]**

b) Design and Testing of Pneumatic Circuit for Single Cycle Automation of Multi cylinders In the Sequence Of A+ B+ B- A- **[9]**

Q3) a) Explain Concepts of 8051 microcontroller, Draw the block diagram of Internal architecture of 8051, Explain functional blocks in detail. **[9]**

b) Compare any three derivatives of 8051 microcontroller on the basis of RAM, ROM, Timer and Interrupts. **[9]**

OR

P.T.O.

Q4) a) List different timer modes of 8051 microcontroller and describe mode 2 with neat sketch. **[6]**

b) Explain Concepts of 8051 microcontroller, Draw the block diagram of Internal architecture of 8051, Explain functional blocks in detail. **[6]**

c) Define the term BUS related to microprocessor/controller and list different buses used in microcontroller. **[6]**

Q5) a) Explain the following type with block diagram Dial Indexing Machine, Carousel Assembly System, Single-Station Assembly Cell Multi-station assembly machine or line. **[6]**

b) A rotary indexing table is driven by a five-slotted Geneva mechanism. The driver rotation is 50 revolutions per minute. Determine: NUMLIST **[6]**

i) The total cycle time of the indexing table

ii) The available processing time for the indexing table

c) Why we choose ASRS. What are the Problems of conventional storage system. Define AS/RS. Mention Reasons for selecting AS/RS, what are the functions of storage systems. **[5]**

OR

Q6) a) Explain configuration of Manual assembly line technology what is the difference between manual assembly line and mixed-model line what are its advantages. **[6]**

b) List principal components of automatic identification technologies, List AIDC technologies six categories. **[6]**

c) A rotary indexing table is driven by a five-slotted Geneva mechanism. The driver rotation is 50 revolutions per minute. Determine: **[5]**

i) The total cycle time of the indexing table

ii) The available processing time for the indexing table The time lost each cycle to index the table (repositioning time) Express all answers in seconds.

Q7) a) Definition of SCADA. What is SCADA? Explain the features and Applications of SCADA system,what are the SCADA systems consisting, Difference Between SCADA and HMI. **[9]**

b) Explain the Elements of Digital Communication Systems, Advantages, disadvantages of digital communication, what is the need for Pulse Modulation. **[8]**

OR

Q8) a) Define **[9]**

i) Linguistic Variable

ii) Fuzzy Conditional Statements

iii) Fuzzy Algorithm

b) Define ANN, what are the Concept of (ANN) Artificial Neural Networks? Show the Essential components of a neuron, Explain learning situations in neural networks, and its Applications. **[8]**



Total No. of Questions : 8]

SEAT No. :

PE-5804

[Total No. of Pages : 3

[6584]-282
B.E. (Production Sandwich Engineering)
OPERATION RESEARCH
(2019 Pattern) (Semester - VII) (411122)

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 indicate full marks.***

Q1) a) What is Goal programming? State its assumptions. **[6]**

b) Solve the following integer programming problem using Gomory's Cutting plane algorithm. **[12]**

Maximize $z = 3x_1 + 12x_2$

Subjected to constraints

$2x_1 + 4x_2 \leq 7$

$5x_1 + 3x_2 \leq 15$

and $x_1, x_2 \geq 0$ and are integers.

OR

Q2) a) Describe recursive equation approach to solve dynamic programming problem. **[9]**

b) Write short note on Kuhn-Tucker conditions for nonlinear programming problem. **[9]**

Q3) a) What are the assumption of replacement theory? **[3]**

b) Machine A costs Rs. 45,000 and the operating costs are estimated at Rs. 1,000 for the first year increasing by Rs. 10,000 per year in the second and subsequent years. Machine B costs Rs. 50,000 and operating costs are Rs. 2,000 for the first year, increasing by Rs. 4,000 in the second and subsequent years. We now have a machine of type A, should we replace it with B? If so when? Assume that both machines have no resale value and future costs are not discounted. **[14]**

OR

P.T.O.

Q4) a) What are the two types of failure in replacement theory? **[5]**

b) A computer contains 10,000 resistors. When any resistor fails, it is replaced. The cost of replacing a resistor individually is Re 1 only. If all the resistors are replaced at the same time, the cost per resistor would be reduced to 35 paise. The percentage of surviving resistors say S(t) at the end of month t and the probability of failure P(t) during the month t are : **[12]**

t	0	1	2	3	4	5	6
S(t)	100	97	90	70	30	15	0
P(t)		0.03	0.07	0.20	0.40	0.15	0.15

What is the optimal replacement plan?

Q5) a) What is Game Theory? Give some applications? **[9]**

b) Solve the following Game Problem by method of Subgame. **[8]**

		Player B			
		B1	B2	B3	B4
Player A	A1	1	0	-1	0
	A2	-3	-2	1	2

OR

Q6) a) Explain Maximin and Minimax principle with respect to game theory. **[5]**

b) What do you understand by dominance in the game? Solve the following game by dominance and find the game value. **[12]**

		Player B			
		I	II	III	IV
	I	3	2	4	0
Player A	II	3	4	2	4
	III	4	2	4	0
	IV	0	4	0	8

Q7) a) Draw the sketch of queuing system and explain various components of it. **[6]**

b) In a departmental store one cashier is there to serve the customers. And the customers pick up their needs by themselves. The arrival rate is 9 customers for every 5 minutes and the cashier can serve 10 customers in 5 minutes. Assuming Poisson arrival rate and exponential distribution for service rate, find : **[12]**

i) Average number of customers in the system.

ii) Average number of customers in the queue or average queue length.

iii) Average time a customer spends in the system.

iv) Average time a customer waits before being served.

OR

Q8) a) What is Monte Carlo method of simulation? What are advantages and limitations of simulation technique? State areas of applications of simulation. **[9]**

b) Arrival rate of telephone calls at a telephone booth is according to Poisson distribution, with an average time of 9 minutes between consecutive arrivals. The length of telephone call is exponentially distributed with a man of 3 minutes. Find : **[9]**

i) Determine the probability that a person arriving at the booth will have to wait.

ii) Find the average queue length that forms from time to time.

iii) The telephone company will install a second booth when conveniences that an arrival would expect to have to wait at least four minutes for the phone. Find the increase in flow of arrivals, which will justify a second booth.

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Total No. of Questions : 8]

SEAT No. :

PE-5094

[Total No. of Pages : 2

[6584]-283

B.E. (Production Engineering) (Sandwich)

ADDITIVE MANUFACTURING (Elective - III)

(2019 Pattern) (Semester - VII) (411123(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 side indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) What is Stereolithography Apparatus (SLA)? Write down its Principle, process, advantages and applications. **[9]**

b) What are the steps in Additive Manufacturing? Explain each step. **[8]**

OR

Q2) a) What is Solid Ground Curing (SGC) Process? Explain in detail. **[9]**

b) Elaborate on how rapid prototyping is transforming the jewellery industry. **[8]**

Q3) a) What is the working principle of Laminated Object Manufacturing? What are the applications of Laminated Object Manufacturing? **[9]**

b) What is Fused Deposition Modelling (FDM)? Write down its Principle, process, advantages and applications. **[8]**

OR

Q4) a) With a neat diagram, explain Melted Extrusion Modelling (MEM). **[9]**

b) Write a short note on Multi-Functional RPM Systems (M-RPM). **[8]**

P.T.O.

Q5) a) List out Solid Based Additive Manufacturing Systems and explain any one method in detail. **[9]**

b) What is Three Dimensional Printing? 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 Selective Laser Sintering (SLS)? Write down its Principle, process, advantages and applications. **[9]**

Q7) a) Categorize the applications of Additive Manufacturing in the areas of customized implants and prosthesis. **[9]**

b) What is cranial implant? Explain in detail. **[9]**

OR

Q8) a) Write Short notes on Computer Aided Tissue Engineering (CATE). **[9]**

b) Discuss with a cases study how design and production of medical devices are done by Additive Manufacturing. **[9]**

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Total No. of Questions : 8]

SEAT No. : ____

PE2360

[Total No. of Pages : 2

[6584]-284
B.E. (Production Sandwich Engineering)
INDUSTRIAL ROBOTICS
(2019 Pattern) (Semester - VII) (411123B) (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 whenever necessary.***
3) ***Assume suitable data, if necessary.***
4) ***Use of logarithmic table, slide rule is Electronic pocket calculator is allowed.***
5) ***Figures to the right indicate full marks.***

Q1) a) With neat sketch explain the working of following sensors in robots. **[9]**

i) Variable Pressure Light Converting Sensor

ii) Tactile Sensors

iii) Electro optical sensors

b) Explain any three temperature measuring sensors. **[9]**

OR

Q2) a) Explain the working of potentiometer with application. **[9]**

b) Explain the working of slip sensor with neat sketch. **[9]**

Q3) a) Explain the following types of magnetic grippers with neat sketch. **[8]**

i) Permanent Magnetic gripper

ii) Electro Magnetic gripper

b) With neat sketch explain vacuum grippers **[9]**

OR

Q4) a) Explain force analysis of mechanical grippers. **[8]**

b) Contrast between open loop and closed loop control system. **[9]**

P.T.O.

Q5) a) Differentiate between high level programming language and machine language. **[9]**

b) Write a note on VAL-I and VAL-II. **[9]**

OR

Q6) a) Explain following Programming methods. **[9]**

i) Computer Terminal

ii) Offline

iii) Walk Through

b) Explain the steps in development of program for robot system. **[9]**

Q7) a) Explain any two medical applications of robot. **[9]**

b) Explain any two manufacturing operations performed by robots. **[8]**

OR

Q8) a) Explain the role of artificial intelligence in robotics. **[9]**

b) Write a note on:- **[8]**

i) Pick & Place Robots

ii) Welding Robots

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Total No. of Questions : 8]

SEAT No. :

PE2361

[Total No. of Pages : 2

[6584]-285
B.E. (Production Engineering) (Sandwich)
RELIABILITY ENGINEERING
(2019 Pattern) (Semester - VII) (411123C) (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 whenever necessary.***
3) ***Assume suitable data, if necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Use of Logarithmic Table, Slide rule is Electronic pocket calculator is allowed.***

Q1) a) Discuss the challenges associated with failure data analysis for repairable systems. **[9]**

b) Suppose we have a system consisting of 10 identical components. The components operate independently, and each component has an average time between failures of 200 hours. Calculate the MTTF for the entire system. **[8]**

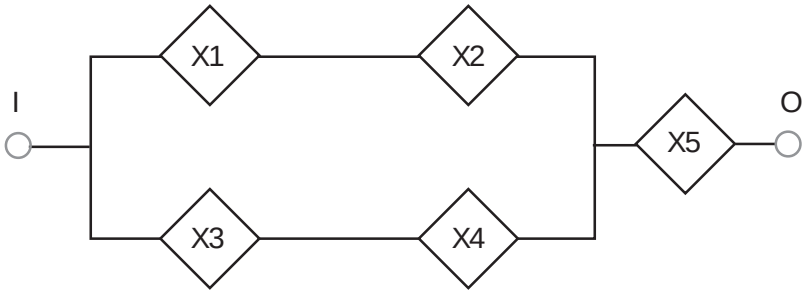
OR

Q2) a) Describe the use of failure mode and effects analysis (FMEA) in repairable system analysis. **[9]**

b) Explain the concept of failure data analysis in the context of reliability engineering. **[8]**

Q3) a) Describe the key components of a Fault Tree diagram. **[9]**

b) For a logic diagram shown in figure. Construct fault tree. **[9]**



OR

P.T.O.

Q4) a) A fire broke out at unit 1 of XYZ cable manufacturing company despite the safety system in place. The General Manager was very concerned about the accident and requested the Safety Officer in charge to evaluate the system. However, as part of the initial analysis of the existing system, the safety team used FTA to identify the different causes of the accident. Draw the fault tree diagram for the system. **[9]**

b) Explain the difference between qualitative and quantitative Fault Tree analysis. **[9]**

Q5) a) Explain the concept of failure data analysis in reliability estimation. **[9]**

b) Describe the importance of reliability growth modeling in reliability estimation. **[8]**

OR

Q6) a) Discuss the relationship between reliability estimation and maintenance planning. **[9]**

b) Describe difference between reliability prediction and reliability estimation. **[8]**

Q7) a) Explain the concept of reliability optimization and its importance in engineering and system design. **[9]**

b) Discuss the key objectives of reliability optimization. **[9]**

OR

Q8) a) Describe common approaches used for reliability optimization. **[9]**

b) Discuss the role of Standby redundant systems. **[9]**



Total No. of Questions : 8]

SEAT No. : ____

PE2362

[Total No. of Pages : 2

[6584]-286
B.E. (Production Sandwich Engineering)
MICRO ELECTRO MECHANICAL SYSTEMS
(2019 Pattern) (Semester - VII) (411123D) (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 whenever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Discuss the concept of Thermo mechanics. **[8]**

b) What do you mean by Thin Film Mechanics in MEMS? Discuss its importance with MEMS. **[9]**

OR

Q2) a) Explain the concept of Thermo Mechanics. How is it related with FEM? **[9]**

b) What do you understand by Mechanical Vibrations. Explain in brief. **[8]**

Q3) a) Write a short note on Scaling in Heat Transfer. **[9]**

b) What do you understand by Electrostatic Forces in MEMS? Discuss in relation with Scaling. **[9]**

OR

Q4) a) Discuss the concept of Scaling laws in Miniaturization in brief. **[9]**

b) Scaling in Rigid-Body Dynamics : Discuss in Brief. **[9]**

Q5) a) Describe in brief advantages and limitations of Micromachining processes. **[8]**

b) Discuss any 2 types of Micro Machining processes in brief. **[9]**

OR

P.T.O.

Q6) a) What are significant issues related with surface Micro – Machining. **[9]**

b) Write a note on LIGA process or Micromachining. **[8]**

Q7) a) What are sensors? Explain in brief the Mechanism of Sensing used in MEMS. **[9]**

b) Write a short note on Principle of Sensing with a suitable example. **[9]**

OR

Q8) a) What are the different types of Membrane Transducer Materials Used? **[9]**

b) Discuss any 2 of following. **[9]**

i) CLOC

ii) E Nose

iii) Chemotransistors

iv) Mass sensitive Chemosensors



Total No. of Questions : 8]

SEAT No. : [ ]

PE2363

[Total No. of Pages : 2

[6584]-287

B.E. (Production Engineering Sandwich)

CREATIVE PRODUCT DESIGN

(2019 Pattern) (Semester - VII) (Elective - IV) (411124A)

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) ***Use of a programmable calculator is not allowed.***
4) ***Write all necessary steps.***

Q1) a) Explain the process of executing Morphological analysis and give example with the help of Diagram. **[10]**

b) Draw a Memory (Mind) Map for any potential problem. **[7]**

OR

Q2) a) What are the key points of Traditional Brainstorming. **[10]**

b) Write short note on Function Trees. **[7]**

Q3) a) What is Product Portfolio Architecture. Discuss with example. **[7]**

b) Discuss your views on SOP. **[7]**

c) What do you understand about Benchmarking. **[4]**

OR

Q4) a) Explain the Subtract and Operate Procedure of teardown. **[10]**

b) What do you understand as “Develop a Redesign”. **[8]**

Q5) a) Discuss Potential Conflicts between DFA and DFM with the help of Example. **[10]**

b) Mention Material Selection Guidelines and reasons in DFE. **[7]**

OR

P.T.O.

Q6) a) Discuss Global, Regional and Local Issues related to Environment. **[10]**

b) Write short notes on Cost Modeling. **[7]**

Q7) a) Explain the various stages of Product Life Cycle with the help of Diagram. **[8]**

b) Define Product Lifecycle Management (PLM) & Product Lifecycle Management System (PLM System). **[5]**

c) Discuss the Key Areas of Product Lifecycle Management. **[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) State the Benefits of product lifecycle management. **[6]**

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Total No. of Questions : 8]

SEAT No. : [ ]

PE2364

[Total No. of Pages : 2

[6584]-289

B.E. (Production Engineering)/(Sandwich)

CAD/CAM

(2019 Pattern) (Semester - VII) (Elective - IV) (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]**

Q5) a) Discuss Computer Aided Process Planning. **[9]**

b) Computer integrated production management system, inventory material requirement planning. **[9]**

OR

P.T.O.

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]**

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Total No. of Questions : 8]

SEAT No. :

PE-5949

[Total No. of Pages : 2

[6584]-290

B.E. (Production Sandwich)

DATA ANALYTICS (Elective - IV)

(2019 Pattern) (Semester - VII) (411124D)

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 side indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) What regression technique could be used when the dependent variable is not linearly dependent on the independent variable? Explain using an example. **[10]**

b) Write a short note on Data Analysis and its Importance. **[8]**

OR

Q2) a) Explain the structure of neural networks and the mathematical functions used in the data analysis process. **[10]**

b) Explain the differences between BI and Data Science. **[8]**

Q3) a) What are the three main types of data analysis for businesses? **[10]**

b) Describe the challenges of the current analytical architecture for data scientists. **[8]**

OR

Q4) a) A data science team is working on a classification problem in which the dataset contains many correlated variables, and most of them are categorical variables.Which classifier should the team consider using? Why? **[10]**

b) Compare Which is better — Random Forest vs Neural Network. **[8]**

P.T.O.

Q5) a) Briefly explain types of data analytics. **[10]**

b) What are expert systems? **[7]**

OR

Q6) a) What is decision tree analysis? **[10]**

b) State advantages and disadvantages of principal component analysis? **[7]**

Q7) a) Which are the benefits of Reinforcement Learning? What's the Future of Reinforcement Learning? **[10]**

b) How does Q-learning work? **[7]**

OR

Q8) a) What is SARSA? How does the SARSA algorithm work? **[10]**

b) What is difference between SARSA and Q-learning? **[7]**

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Total No. of Questions : 8]

SEAT No. :

PE-5095

[Total No. of Pages : 2

[6584]-291

B.E. (Artificial Intelligence and Machine Learning)

NATURAL LANGUAGE PROCESSING

(2019 Pattern) (Semester - VIII) (418550)

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 diagrans must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume Suitable data if necessary.***

Q1) a) Explain the Log-Liner Models models of language. **[6]**

b) Explain with an example process of smoothing. **[6]**

c) 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

Compute TF-IDF Score of "Term 1" in "Document 1"

OR

Q2) a) Explain the Non Negative Matrix Factorization and its application in topic modeling. **[9]**

b) Describe the process of building a simple Markov model for predicting the next word in a sentence with the help of an example. **[9]**

Q3) a) Explain Relation Extraction process with suitable diagram. **[6]**

b) Illustrate reference resolution with example. **[6]**

c) Discuss Cross lingual information Retrieval. **[5]**

OR

Q4) a) Explain NER System Building Process in Natural Language Processing. **[9]**

b) Describe Cross Lingual Information Retrieval with suitable diagram. **[8]**

P.T.O.

Q5) a) List the tools available for the development of NLP applications? Write features of spacy and TextBlob. **[6]**

b) Describe linguistic resources. **[6]**

c) Explain Indian Language WordNet (IndoWordnet) **[6]**

OR

Q6) a) Discuss types of tasks are performed by the Gensim library with suitable example. **[9]**

b) Explain Lesk algorithm for word sense disambiguation. **[9]**

Q7) a) Explain Sentiment Analysis. **[6]**

b) Describe various Machine Translation Approaches. **[6]**

c) Explain Discourse processing. **[5]**

OR

Q8) a) Explain Statistical Machine Translation (SMT) with suitable diagrams and example. **[9]**

b) Explain Natural Language Generation with reference architecture. **[8]**

Total No. of Questions : 8]

SEAT No. :

PE2365

[Total No. of Pages : 2

[6584]-292

B.E. (Artificial Intelligence and Machine Learning)

DISTRIBUTED SYSTEM

(2019 Pattern) (Semester - VIII) (418551A) (Elective - V)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, 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 Inter-process Communication in Distributed Systems? List and explain any four main functions of IPC. **[9]**

b) Explain the working principle of the Bully Algorithm with the help of an example. **[9]**

OR

Q2) a) What is shared memory in the context of inter-process communication? How does communication between processes occur using shared memory? **[9]**

b) What is NTP (Network Time Protocol) and why is it important in distributed systems? Describe the working mechanism of NTP. **[9]**

Q3) a) What is Replication in Distributed System? Explain the advantages and challenges of replication in distributed environments. **[9]**

b) What is a primary-based consistency protocol in distributed systems? Explain the working of primary-backup protocol with suitable diagram.**[8]**

OR

Q4) 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 the distributed commit problem in distributed systems? Explain the working of the Two-Phase Commit protocol used to solve the distributed commit problem. **[8]**

P.T.O.

Q5) a) What is Distributed File System? Explain the key design goals and features of a Distributed File System. **[9]**

b) What are web services? Describe with a suitable diagram the general organization of the Apache web server. **[9]**

OR

Q6) a) Describe the architecture of Sun Network File System in details. **[9]**

b) What Does Web Proxy Cache Mean? What is the role of proxy server? Discuss the advantages and limitations of using web proxy caching in distributed systems. **[9]**

Q7) a) What is Service Oriented Architecture (SOA)? What are the key components of a typical SOA system? Discuss their roles. **[9]**

b) Explain the following in brief: **[8]**

i) Wearable devices

ii) PVM

iii) JINI

OR

Q8) a) Explain in brief, the key features of Zabbix. **[9]**

b) What are the different Wearable devices available in market? Explain the Key challenges of Wearables. **[8]**

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Total No. of Questions : 8]

SEAT No. :

PE2366

[Total No. of Pages : 2

[6584]-293

B.E. (Artificial Intelligence and Machine Learning)

SOFTWARE PROJECT & MANAGEMENT

(2019 Pattern) (Semester - VIII) (418551B) (Elective - V)

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

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, 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 are the primary components of a Use Case diagram in UML and how do they facilitate project design? **[8]**

b) Describe the role of Sequence diagrams in modeling system interactions. How do they differ from Deployment diagrams in their focus? **[6]**

c) What is the GQM Paradigm and how does it aid in process measurement? **[4]**

OR

Q2) a) How do Class diagrams in UML contribute to understanding the structure of a system? Explain with a suitable example. **[8]**

b) Explain how Cost Benefit Evaluation techniques can be utilized to justify project investments. **[6]**

c) How can risks to the project schedule be evaluated and mitigated using Risk Strategies? **[4]**

Q3) a) Describe the four steps in project cost management. How do they integrate with earned value analysis? **[7]**

b) What are the different types of contracts in software project management, and what are the benefits of each? **[6]**

c) What are four features of a good status report and how do they contribute to project management? **[4]**

OR

P.T.O.

Q4) a) Discuss the different factors influencing the Change Control Process and the role of a Change Process Flow Diagram. **[7]**

b) How do tools like Git, Team Foundation Server, and Ansible support software configuration management? **[6]**

c) What are the key components of monitoring and control processes in project management? **[4]**

Q5) a) What are considered the best methods for staff selection, and how do they impact organizational performance? **[8]**

b) What are the key strategies for managing stress in the workplace to maintain high levels of employee health? **[6]**

c) What are the unique challenges and benefits of managing dispersed and virtual teams? **[4]**

OR

Q6) a) How does the Oldham-Hackman Job Characteristic Model influence job design and employee satisfaction? **[8]**

b) How do different organizational structures affect decision-making processes within a company? **[6]**

c) What are the key principles of effective people management in a modern organizational setting? **[4]**

Q7) a) What role do metrics play in Agile practices and how are they implemented? **[7]**

b) What are the main differences between Microsoft Team Foundation Server (TFS) and Azure DevOps? **[6]**

c) What are the key features of Application Lifecycle Management (ALM) in Azure DevOps? **[4]**

OR

Q8) a) Discuss the tools and features in Azure DevOps that support visibility and collaboration among project teams. **[7]**

b) What features does TFS offer for managing Agile projects, and how do they compare to those in Azure DevOps? **[6]**

c) How can Azure DevOps be integrated with other tools and systems to enhance project management? **[4]**



Total No. of Questions : 10]

SEAT No. :

PE5096

[Total No. of Pages : 2

[6584]-294

B.E. (Artificial Intelligence and Machine Learning)

COMPUTER VISION

(2019 Pattern) (Semester - VIII) (418551 C) (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, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Draw neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***

Q1) a) Propose a method combining thresholding and edge detection for segmenting medical images. **[6]**

b) Explain the concept of pixel connectivity to classify regions in an image sample. **[4]**

OR

Q2) a) Design a workflow for processing satellite images using basic image enhancement and texture analysis methods. **[6]**

b) Analyze the role of elements of visual perception in improving image understanding. **[4]**

Q3) a) Describe object labelling and counting. Discuss its importance in binary image analysis. **[6]**

b) Compare the accuracy of centroidal profiles and boundary tracking procedures. **[4]**

OR

Q4) a) Design a boundary tracking algorithm that can handle complex, overlapping shapes. **[6]**

b) How to tackle the problems of Occlusion? **[4]**

P.T.O.

Q5) a) Propose a pipeline for detecting rectangles using vanishing points. **[10]**

b) Demonstrate edge linking by showing how detected edges are connected to form meaningful shapes. **[8]**

OR

Q6) a) Develop a hybrid feature detection framework combining points, patches, and edges. **[10]**

b) Analyze the problems faced during feature matching when illumination changes. **[8]**

Q7) a) Compare translational alignment and parametric motion estimation for video sequences. **[8]**

b) Evaluate different surface representations (point-based verses volumetric) for 3D modeling. **[8]**

OR

Q8) a) Analyze the effectiveness of shape-from focus verses shape-from-texture methods. **[8]**

b) Design a basic 3D reconstruction pipeline using active range finding. **[8]**

Q9) a) Show how license plate detection can be performed using classical computer vision methods. **[8]**

b) Assess the effectiveness of in-vehicle vision systems for detecting road markings and signs. **[8]**

OR

Q10)a) Demonstrate particle filters for tracking objects in surveillance footage.**[8]**

b) Discuss the role of Eigenfaces in face recognition. **[8]**



Total No. of Questions : 8]

SEAT No. : ____

PE2367

[Total No. of Pages : 2

[6584]-296

B.E. (Artificial Intelligence & Machine Learning)

BIG DATA ANALYTICS

(2019 Pattern) (Semester - VIII) (418552B) (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) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Describe the key elements of the MapReduce framework and the way they interact with one another. **[6]**

b) What is MongoDB? Explain the need of MongoDB. **[6]**

c) What is MapReduce? How does it facilitate distributed data processing. **[6]**

OR

Q2) a) What is MapReduce? In what way does it enable the processing of data across multiple distributed systems? **[6]**

b) Elaborate on the various types and formats of MapReduce. **[6]**

c) Explain in details the characteristics of MongoDB. **[6]**

Q3) a) Describe the key elements of Apache Hive and the way they connect with one another. **[6]**

b) Describe the main attributes and qualities of HBase that set it apart from conventional relational databases. **[6]**

c) What does PIG refer to in the Hadoop ecosystem? Describe the various execution modes of PIG. **[5]**

OR

Q4) a) Distinguish between HBase and RDBMS. **[6]**

b) Explain the main components of Apache Hive, and how do they interact with each other? What is Pig Latin? **[6]**

c) Explain the following terms : **[5]**

i) Hive Services

ii) Hive Metastore

P.T.O.

Q5) a) Explain the different types of visualization techniques available in R for exploratory data analysis. **[6]**

b) Explain the following terms with example : **[6]**

i) Scatter Plot

ii) Histogram

c) What part does graphical data analysis play in the data science process, and how crucial is it for informing stakeholders? **[6]**

OR

Q6) a) Explain the concept of statistical modelling in R. **[6]**

b) Explain various types of plots drawn in R programming. **[6]**

c) What is conditional independence in Graph? How conditional independence is typically examined in graphical models using R. **[6]**

Q7) a) Analyze the rise of AI in big data analytics. Discuss its impact with examples and potential ethical concerns. **[6]**

b) Explain the advantages of Cassandra over traditional relational databases. **[6]**

c) What is Xplenty and what type of data operations it is commonly used for? **[5]**

OR

Q8) a) What is Dark Data? Explain the different types of Dark Data. **[6]**

b) Write two use - cases of Cassandra in industry. **[6]**

c) Explain DataOps in the context of big data workflows. **[5]**



Total No. of Questions :8]

SEAT No. :

PE2368

[Total No. of Pages : 2

[6584]-298

B.E. (Artificial Intelligence & Machine Learning)
INFORMATION RETRIEVAL IN AI
(2019 Pattern) (Semester-VII) (418541)

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

Instructions to the candidates:

1) ***AnswerQ.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 are the various techniques used to specify query in information visualization? **[9]**

b) Explain in detail the term NDCG. Explain with suitable example. **[9]**

OR

Q2) a) Explain averaging techniques contribute to the performance evaluation of algorithms. **[9]**

b) Write short note on Query Specification in detail. **[9]**

Q3) a) What are Query Languages with respect to multimedia IR? Explain it in detail. **[9]**

b) Describe the architecture of Distributed IR. Why is Distributed Information Retrieval necessary? **[8]**

OR

Q4) a) Explore the significance of automated methods for extracting features from multimedia content, and discuss how these extracted features enhance the efficiency and effectiveness of multimedia search and retrieval systems. **[9]**

b) Explain in detail Generic Multimedia Indexing Approach with example. **[8]**

P.T.O.

Q5) a) How does web crawling play a crucial role in the functioning of search engines? Describe the key processes involved in web crawling. **[9]**

b) What is hyperlink-based searching in Information Retrieval (IR)? Explain how hyperlinks are used to enhance search effectiveness, and mention any two popular algorithms that utilize hyperlink structure. **[9]**

OR

Q6) a) Explain any four characteristics of the Web that affect Information Retrieval (IR), and describe the challenges they create for search engines. **[9]**

b) What is a centralized architecture in search engines? Explain how it works in Information Retrieval systems, and mention two advantages and two limitations of using this architecture. **[9]**

Q7) a) Explain in detail Real Life Examples of metasearch engines **[9]**

b) What is the fundamental concept behind Meta-search, and what are the essential reasons and significance that drive the use of Meta-search engines in the digital landscape. **[8]**

OR

Q8) a) Describe Need and Significance of Metasearch in Information Retrieval for AI. **[9]**

b) Difference between simple search and Metasearch **[8]**



Total No. of Questions : 8]

SEAT No. : [ ]

PE2369

[Total No. of Pages : 2

[6584]-299

B.E. (Artificial Intelligence and Machine Learning)

CLOUD COMPUTING

(2019 Pattern) (Semester - VII) (418542)

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) Describe platform as a service (Paas), who are the subscribers for Paas environments. **[10]**

b) Compare and contrast the advantages and disadvantages of adopting Software as a Service (SaaS) compared to traditional software licensing models. **[8]**

OR

Q2) a) Define Infrastructure as a Service (IaaS) and outline its key components. **[10]**

b) Describe the procedural steps required to initiate the launch of an EC2 instance within the AWS Cloud environment. **[8]**

Q3) a) Explain the key concepts of Big Table and HBase in cloud computing, highlighting their respective functionalities and characteristics. **[9]**

b) Describe components of HDFS and Virtual storage containers. **[8]**

OR

Q4) a) Describe creation of Cloud Storage Systems and challenges involved in it. **[9]**

b) List the key features of Dynamo Cloud data stores and explain cloud storage system of Dynamo in detail. **[8]**

P.T.O.

Q5) a) Explain the importance of implementing cloud security mechanisms and provide examples of common security measures adopted by cloud service providers. **[9]**

b) Describe different risk and threats involved in cloud security mechanism.**[8]**

OR

Q6) a) Explain risk in cloud security and importance of security policies. **[9]**

b) Explain integrity, Authenticity, availability and Threat in cloud security.**[8]**

Q7) a) Explain following Standards for Security **[10]**

i) SAML OAuth

ii) SSL/TLS

b) How does Docker work, and provide an example to illustrate its functionality? **[8]**

OR

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

i) Standards for Application Developers

ii) Standards for Messaging in cloud computing

b) Explain open cloud consortium. **[8]**

Total No. of Questions : 8]

SEAT No. :

PE2370

[Total No. of Pages : 2

[6584]-300

B.E. (Artificial Intelligence and Machine Learning)

DEEP LEARNING FOR AI

(2019 Pattern) (Semester - VII) (418543)

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 marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Compare Feed forward Neural Networks Vs Recurrent Neural Networks. **[9]**

b) What's the significance of Gates in Recurrent Neural Networks? What is the difference between LSTMs and GRUs. **[9]**

OR

Q2) a) Explain Encoder Decoder architecture in detail? **[9]**

b) What is the Recursive Neural Networks (RvNN). Describe Benefits of RvNNs for Natural Language Processing. **[9]**

Q3) a) How under complete autoencoders work? Illustrate with example. **[6]**

b) Elaborate How to train autoencoders. **[6]**

c) Explain Various types autoencoders. **[5]**

OR

Q4) a) Explain how to use autoencoders in Dimensionality Reduction. **[6]**

b) Explain the concept of stochastic autoencoders. **[6]**

c) How regularization is achieved in autoencoders using sparsity constraints. **[5]**

P.T.O.

Q5) a) State and Justify Role of Representation Learning. **[9]**

b) Discuss why is the network called Greedy Layer Wise Pretraining Network? **[9]**

Q6) a) Describe distributed representation with example. **[9]**

b) What is domain adaptation? Explain various types of transfer learning. **[9]**

Q7) a) Explain GAN with example. **[6]**

b) Explain generative and discriminative models in GANs. **[6]**

c) What are the advantages and disadvantages of the GAN model. **[5]**

OR

Q8) a) Write a note on IMAGEN. **[6]**

b) How does Dall-E work? **[6]**

c) Write short note on Denoising and Sparcity. **[5]**



Total No. of Questions : 8]

SEAT No. :

PE5759

[Total No. of Pages : 2

[6584]-301

B.E. (Artificial Intelligence & Machine Learning)

QUANTUM COMPUTING

(2019 Pattern) (Semester - VII) (418544 (A)) (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 indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Explain any 2 postulates of quantum mechanics with examples. **[8]**

b) Describe Quantum measurement with suitable examples. **[9]**

OR

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

i) Quantum Computation

ii) Quantum Algorithms

iii) Quantum information and Quantum information processing.

b) Compare between classical and quantum computing with suitable example. **[8]**

Q3) a) Write short note on discrete Fourier Transform and Fast Fourier Transform. **[9]**

b) Explain Quantum Fourier Transform and explain Shore's Factorization Algorithm in detail. **[9]**

OR

Q4) a) Explain Quantum simulation algorithm with examples. **[9]**

b) Write short note on : **[9]**

i) Quantum circuits

ii) Quantum algorithms and qubit operations.

P.T.O.

Q5) a) Write short note on Quantum Fourier Transform. **[8]**

b) Explain phase estimation performance and requirements with example. **[9]**

OR

Q6) a) Explain different types of Quantum Fourier Transform Applications in all domains. **[9]**

b) Discuss Discrete algorithms in detail. **[8]**

Q7) a) Explain Quantum Machine Learning and Quantum AI in detail with suitable example. **[9]**

b) What is Machine Learning? Explain different Applications Domains for Quantum Machine Learning. **[9]**

OR

Q8) a) Explain Quantum Cryptography in detail. **[9]**

b) Write short note on : **[9]**

i) Quantum Machine Learning and Quantum AI.

ii) Quantum Neural Networks and Natural Language.



Total No. of Questions : 8]

SEAT No. :

PE2371

[Total No. of Pages : 2

[6584]-302
B.E. (Artificial Intelligence & Machine Learning)
BLOCKCHAIN TECHNOLOGY
(2019 Pattern) (Semester - VII) (418544B) (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 indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain Ethereum as a General purpose Blockchain. **[7]**

b) Write a short note on block & blockchain. **[6]**

c) Explain consensus model in detail. **[5]**

OR

Q2) a) What is Ethereum? Give it's comparison with Bitcoin. **[7]**

b) What is Ethereum Virtual Machine : EVM. **[6]**

c) Explain Ethereum programming language in detail. **[5]**

Q3) a) What is Hyper ledger and how does it work? **[6]**

b) Explain the differences between Ethereum and Hyper ledger blockchain. **[6]**

c) What are the applications of Hyperledger Fabric. **[5]**

OR

Q4) a) What is Hyperledger technology? **[6]**

b) Hyperledger a public or private blockchain technology Elaborate. **[6]**

c) Explain the advantages of Hyperledger. **[5]**

P.T.O.

Q5) a) What is principals of Tokenization. **[7]**

b) Explain drawbacks of tokenization. **[6]**

c) Describe the Consensus mechanism in brief. **[5]**

OR

Q6) a) Why there is a need of tokenization. **[7]**

b) What are common issues with tokenization. **[6]**

c) What is Tokenization? Explain its benefits? **[5]**

Q7) a) Explain role of blockchain in logistics and supply chain tracking. **[6]**

b) Explain privacy aspect of blockchain. **[6]**

c) Explain different aspects of Risks and limitations of blockchain. **[5]**

OR

Q8) a) Write a short note on blockchain for enterprise. **[6]**

b) What are the selection criteria for Blockchain platform for applications? Explain. **[6]**

c) Explain how data security is done in health care using blockchain. **[5]**



Total No. of Questions : 8]

SEAT No. : ____

PE2372

[Total No. of Pages : 2

[6584]-303
B.E. (Artificial Intelligence and Machine Learning)
AI IN DRONES
(2019 Pattern) (Semester - VII) (418544C) (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 whenever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) What is Payload? Describe importance of dispensable payload in drone. **[9]**

b) What are the communication methods used by drones? **[9]**

OR

Q2) a) What is Mid-air collision avoidance? Explain in detail. **[9]**

b) Illustrate the difference categories of antenna. **[9]**

Q3) a) What is Global Positioning System? Explain in detail. **[9]**

b) Explain inertial navigation in detail. **[8]**

OR

Q4) a) Describe the radio tracking with example. **[8]**

b) What is path planning in drone? How does path planning work? **[9]**

Q5) a) What is flight control in drone? Explain in detail. **[9]**

b) Describe the use of transmitter and receiver in a drone. **[9]**

OR

P.T.O.

Q6) a) Explain Electronic Speed Controllers in detail. **[9]**

b) What is flight controllers in drone? Explain with example. **[9]**

Q7) a) What do you mean by aerial photography? Explain with example. **[9]**

b) Describe survey and mapping using drone. **[8]**

OR

Q8) a) What are the applications of drones in Infrastructure Inspection? **[9]**

b) Illustrate the use of drone for search and rescue. **[8]**



Total No. of Questions : 8]

SEAT No. :

PE2373

[Total No. of Pages : 2

[6584]-304

B.E. (Artificial Intelligence and Machine Learning)
ETHICAL HACKING AND CYBER FORENSICS
(2019 Pattern) (Semester - VII) (418545(A)) (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) ***Assume suitable data if necessary.***

Q1) a) Explain Metaspoint with reconnaissance example. **[9]**

b) How to identify E-mail with malicious attachments with example. **[9]**

OR

Q2) a) Explain compromising windows host with metasploit in details. **[9]**

b) Describe different social engineering toolkit and password cracking tools. **[9]**

Q3) a) What are the different web attacks and Vulnerabilities. **[9]**

b) Explore stenography techniques for hiding information. **[8]**

OR

Q4) a) List and explain wireless network vulnerabilities. **[9]**

b) Describe Crystallographic attacks and Counter measures. **[8]**

Q5) a) How to collect and analyze digital evidence in Forensics. **[9]**

b) Define Digital forensics and explain forensics analysis techniques. **[9]**

OR

P.T.O.

Q6) a) What are different network forensics tools and analyze network based attack. **[9]**

b) Describe mobile device forensics procedures. **[9]**

Q7) a) Short note on : **[9]**

i) Cloud based digital forensics

ii) Internet of things (IoT) forensics

b) Describe legal and regulatory aspects of Ethical Hacking. **[8]**

OR

Q8) a) Investigate different ethical guideline with example. **[8]**

b) Identify and explain forensics analysis of three social media application. **[9]**



Total No. of Questions : 8]

SEAT No. :

PE2374

[Total No. of Pages : 2

[6584]-305

B.E. (Artificial Intelligence and Machine Learning)
AUGMENTED REALITY AND VIRTUAL REALITY
(2019 Pattern) (Semester - VII) (418545(B)) (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) ***Assume suitable data if necessary.***

Q1) a) Explain the mechanism behind perceiving depth. Support your explanation with diagrams. **[9]**

b) Discuss the approach to synthesizing multiple sources for enhanced visual representation. **[8]**

OR

Q2) a) Explain how concepts of Ray tracing and shading differs with suitable applications and eg? **[8]**

b) What is tracking? Explain 3D tracking system. **[9]**

Q3) a) Describe the building blocks of Augmented Reality and explain how it contrasts with Virtual Reality. **[8]**

b) Describe Augmented Reality and explain three significant applications it has in everyday life. **[9]**

OR

Q4) a) Describe historical developmental phases of Augmented Reality. **[9]**

b) Explain the concept of tracking taking place between rendering virtual contents and real contents. **[8]**

P.T.O.

Q5) a) Discuss the use of tactile (haptic) feedback in AR hardware. How does it contrast with visual output? **[9]**

b) Outline the specifications and traits of spatial models used in immersive displays. **[9]**

OR

Q6) a) Explain the role of processor and processor system architecture in Augmented Reality. **[9]**

b) Explain the process of calibration and registration. In what aspects both of them are different? **[9]**

Q7) a) Discuss the tools and languages preferred in AR/VR app development. **[9]**

b) Discuss the role of VR in enhancing gaming and entertainment experiences. **[9]**

OR

Q8) Write short notes on (Any 3) : **[18]**

a) VR applications development using unity.

b) Legal and social factors in AR application development

c) Sensor Fusion

d) Applications of AR and VR in Defence and Aerospace

Total No. of Questions : 8]

SEAT No. :

PE2375

[Total No. of Pages : 2

[6584]-306

B.E. (Artificial Intelligence and Machine Learning)
DevOps IN MACHINE LEARNING
(2019 Pattern) (Semester - VII) (418545(C)) (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) ***Assume suitable data if necessary.***

Q1) a) How would you define continuous deployment? Discuss its advantages and compare it with continuous monitoring. **[9]**

b) Explain different steps involved in Test Driven Deployment with eg. **[8]**

OR

Q2) a) Explain various deployment pipeline practices and commit stage with suitable case studies. **[8]**

b) Describe BDD in detail. What are its phases, and how does it compare with TDD? **[9]**

Q3) a) What are the key differences between Microservices and Containerization? How does Orchestration differ from Automation? **[8]**

b) Explain how containerization can be achieved using Dockers. **[9]**

OR

Q4) a) Explain how Jenkins enables continuous integration in software development. **[8]**

b) Explain the role of Ansible in automating continuous deployment. **[9]**

P.T.O.

Q5) a) Explain with suitable eg. solutions and future trends in MLOPs. **[9]**

b) Enlist and explain various tools to create ML pipelines. **[9]**

OR

Q6) a) Explain MLOPs maturity model levels with suitable diagram/case study. **[9]**

b) Explain with suitable diagram components of MLOPs. **[9]**

Q7) a) Explain the process of creating and deploying ML models with MLOPs. **[9]**

b) Using an appropriate case study, explain how MLOPs ensures data quality and integrity. **[9]**

OR

Q8) Write short notes on (Any 3) : **[18]**

a) JIRA

b) Different roles involved in MLOPs

c) Git as a version control system

d) Machine learning life cycle

Total No. of Questions : 8]

SEAT No. :

PE-5097

[Total No. of Pages : 2

[6584]-307

B.E. (Automation and Robotics)

EMBEDDED SYSTEM INROBOTS

(2019 Pattern) (Semester - VIII) (402549)

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) Compare Serial vs. Parallel communication with advantages, disadvantages & applications. Explain how serial communication is used in Embedded Systems. **[9]**

b) Write a short note on IrDA protocol with applications. **[9]**

OR

Q2) a) Explain TCP/IP model with neat diagram. **[9]**

b) Write a short note on: (short notes should have respective diagram) **[9]**

i) RS232 (Serial Communication Standard)

ii) SPI

Q3) a) Draw and explain the architecture of ATmega8 AVR microcontroller. **[9]**

b) Explain the working of the 6-channel ADC of ATmega8. **[8]**

OR

P.T.O.

Q4) a) Mention any 5 features and 5 applications of: **[9]**

i) PIC microcontroller

ii) ARM microcontroller

b) Write down the difference between: (at least 4 differences) **[8]**

i) RISC & CISC processors

ii) Microprocessor & Microcontroller

Q5) a) Describe the structure of an Arduino sketch (program) and explain the purpose of setup() and loop() functions with a basic_example. **[9]**

b) Discuss the difference between Arduino Uno, Arduino Mega & Arduino Nano in terms of specifications and capabilities, with application examples. (at least 7) **[9]**

OR

Q6) a) Explain the purpose of the following Arduino subsystems : **[9]**

i) Power supply & voltage regulator

ii) USB-to-serial converter

iii) Reset circuit

iv) Quartz crystal oscillator

b) Explain the concept of serial communication and how it is used in Arduino projects. Also mention which pins handle serial communication. **[9]**

Q7) a) Develop an Arduino UNO code to interface RF Tx and RF Rx modules for wireless communication. **[8]**

b) Write the Arduino program code for interfacing a Relay Driver with Arduino & draw the interfacing diagram. **[9]**

OR

Q8) a) Explain the working principle of the L293D Motor Driver and write an Arduino program to interface the L293D with a DC motor. **[9]**

b) Explain interfacing of ULN2803 with Arduino for driving high-current loads. **[8]**

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Total No. of Questions : 8]

SEAT No. :

PE2376

[Total No. of Pages : 2

[6584]-308

B.E. (Automation and Robotics)

FUNDAMENTALS OF AUTONOMOUS SYSTEMS

(2019 Pattern) (Semester-VIII) (Theory) (402550)

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) Discuss the trade-offs between reactive and deliberative decision-making approaches in autonomous systems. When is each approach preferred, and why? **[10]**

b) What are the fundamental principles guiding decision-making in autonomous systems, and how do these systems assess and select actions based on their environment and goals? **[8]**

OR

Q2) a) Provide an overview of decision-making architectures commonly used in autonomous systems. What are the key components and their respective roles within these architectures? **[8]**

b) Describe the role of reinforcement learning in decision making for autonomous systems. How do algorithms learn optimal decision policies through interaction with the environment? **[10]**

Q3) a) Describe the process of training and validation of machine learning models for autonomous systems. What are the key considerations in ensuring model accuracy and reliability? **[10]**

b) How do feedback control systems and machine learning complement each other in enhancing the overall capabilities of autonomous systems?**[7]**

OR

P.T.O.

Q4) a) How are machine learning techniques integrated into perception modules of autonomous systems? Provide examples of how they enhance sensory data processing. **[10]**

b) Explain the concept of learning control in autonomous systems. How does it differ from traditional control methods? Provide examples of its practical applications. **[7]**

Q5) a) Explain how communication requirements differ between various types of autonomous systems, such as self-driving cars, drones, and industrial robots. How do these differences influence the choice of communication technologies and protocols? **[10]**

b) Describe the integration of simulated environments with real-world systems for testing and evaluation. What are the benefits and challenges of this integration? **[8]**

OR

Q6) a) Explain safety considerations and regulations for human-robot interaction in autonomous systems. How do these regulations ensure the safety of users and bystanders? **[9]**

b) Provide examples of successful human-robot interaction implementations in realworld autonomous systems. What lessons can be learned from these examples? **[9]**

Q7) a) Describe the role of regulatory frameworks and standards in governing the development and deployment of autonomous systems. How do these regulations ensure compliance with safety, ethical, and privacy requirements? **[8]**

b) Discuss the potential economic impacts of autonomous systems on various industries and sectors. How can organizations leverage autonomy to drive innovation and competitiveness? **[9]**

OR

Q8) a) Analyze the ethical implications of autonomous systems, particularly in scenarios involving human safety and decision-making. What ethical considerations should be addressed to ensure responsible deployment of autonomous technologies? **[9]**

b) Provide examples of emerging trends and applications in specific domains of autonomy, such as healthcare, agriculture, or space exploration. How are autonomous systems revolutionizing these domains? **[8]**



Total No. of Questions : 8]

SEAT No. :

PE-5774

[Total No. of Pages : 2

[6584]-309

B.E. (Automation and Robotics Engineering)

PRODUCT DESIGN AND DEVELOPMENT

(2019 Pattern) (Semester - VIII) (402045 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) ***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 Engineering Drawing definition. **[7]**

b) What is Concept Selection? **[6]**

c) Explain Benchmarking and Brainstorming. **[4]**

OR

Q2) a) Describe Product Policy of an organization. List down various Product Policies. **[7]**

b) Describe in detail Reverse Engineering in idea generation. **[6]**

c) Explain Marketing Aspect in concept analysis. **[4]**

Q3) a) What is the need for Engineering Drawing? Classify engineering drawing. **[7]**

b) Explain Design for Assembly and Design for manufacturing. **[6]**

c) Explain Value Analysis in detail. **[4]**

P.T.O.

OR

Q4) a) What is Dimensioning? Describe Arrangement of Dimensioning. **[7]**

b) What are the different steps in Product Design? **[6]**

c) Explain Value Engineering in detail. **[4]**

Q5) a) Write a short note on Advance Product Quality Planning. **[8]**

b) Explain Aesthetic and Aesthetics Consideration in Product Design. **[6]**

c) What are guidelines for Design for Robustness? Discuss. **[4]**

OR

Q6) a) List down types of FMEA and explain steps of FMEA. **[8]**

b) What is the importance of PLM and PDM for a Designer? **[6]**

c) Enlist industrial Safety to be consider in Product Design. **[4]**

Q7) a) Describe in detail Legal Product of Design Patents. **[8]**

b) Explain. Product Testing and its Validation. **[6]**

c) Explain Drawing Office procedure in detail. **[4]**

OR

Q8) a) Explain production part Approval Process tools in detail. **[8]**

b) Define Purchase Order and Product Costing in vendor development. **[6]**

c) Describe Organization Structure in detail. **[4]**

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Total No. of Questions : 8]

SEAT No. :

PE2378

[Total No. of Pages : 2

[6584]-312

B.E. (Automation and Robotics)

INDUSTRIAL ROBOTICS & MATERIAL HANDLING SYSTEMS

(2019 Pattern) (Semester - VIII) (402551A) (Elective - V)

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 how the classification of grippers influences their selection for specific tasks in robotics. **[10]**

b) What are the key factors that influence the selection of a robot for a specific industrial application. **[8]**

OR

Q2) a) Discuss the role of material properties like thermal conductivity and corrosion resistance in the selection of materials for robotic grippers. **[8]**

b) Explain the working principles of pneumatic grippers and how they differ from hydraulic and electric motor-driven grippers. **[10]**

Q3) a) Explain the differences between gray scale, RGB, and HSV color models. How does the choice of color model affect the performance of image processing algorithms in robotic vision applications. **[10]**

b) Explore the role of machine learning and deep learning in improving object recognition and visual perception in robots. **[7]**

OR

Q4) a) Describe various feature extraction techniques (e.g., edges, corners, blobs) used in robotic vision. How are these features matched between frames or templates, and what role do they play in tasks like object tracking and mapping? **[10]**

b) Describe how pixel-based image representation works. What is the significance of resolution, bit depth, and image size in robotic vision? **[7]**

P.T.O.

Q5) a) Explain how robotic systems equipped with vision and sensory technology can perform both assembly and quality inspections. **[10]**

b) Explain the role of robotic systems in underwater exploration, maintenance, and construction, such as oil rig inspection or shipwreck exploration.**[8]**

OR

Q6) a) Discuss the advantages of using robots for continuous are welding as compared to traditional manual methods? **[9]**

b) Explain how robotics contribute to increased efficiency and reduced errors in manufacturing operations. **[9]**

Q7) a) Why is cyber security important in robotic systems? Mention common threats and describe methods to secure industrial robots and their networks. **[8]**

b) Explain the role of mobile robots and autonomous systems in industrial logistics and material handling. What technologies enable their navigation and obstacle avoidance? **[9]**

OR

Q8) a) Explain how machine learning algorithms improve object recognition and adaptive behavior in industrial robots. **[9]**

b) Define collaborative robots (cobots). How do they ensure safe human-robot interaction in shared workspaces, and where are they most commonly used? **[8]**

Total No. of Questions : 8]

SEAT No. :

PE2379

[Total No. of Pages : 2

[6584]-313

B.E. (Mechanical/Automation & Robotics)

SUPPLY CHAIN MANAGEMENT

(2019 Pattern) (Semester - VIII) (402551B) (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.***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data if necessary.***

Q1) a) What is Data Mining? How is it different from Data Warehousing? Explain the role of Data Marts in decision-making. **[8]**

b) Describe different types of ERP models. What are the common perceptions and challenges faced during ERP implementation? **[9]**

OR

Q2) a) Explain the concept of Electronic Data Interchange (EDI). Discuss its advantages and applications in business transactions. **[8]**

b) Define SCM & explain in details ERP. **[9]**

Q3) a) Explain in Brief **[8]**

i) Structuring the Logistic chain

ii) Concept of Mathematical Modeling

b) What are the different types of models used in SCM? Explain with suitable examples. **[9]**

OR

Q4) a) Define the concept of modeling in the context of SCM. What are the key features and benefits of using models in decision-making? **[8]**

b) Discuss the major challenges faced during the modeling of supply chains. How can these challenges be overcome? **[9]**

P.T.O.

Q5) a) Define Reverse Supply Chain. How does it differ from traditional supply chain management? **[9]**

b) What are the different types of reverse flows in a supply chain? Explain their significance with examples in food chain. **[9]**

OR

Q6) a) Differentiate between Forward Supply Chain and Reverse Supply Chain with appropriate examples. **[9]**

b) What are the key imperatives for building a successful integrative supply chain? Discuss with examples. **[9]**

Q7) a) Describe the supply chain of a newspaper. What makes it unique compared to other supply chains? **[9]**

b) What is an Agile Supply Chain? Explain its importance in today's dynamic business environment. **[9]**

OR

Q8) a) Explain the key stages involved in the supply chain of book publishing. What challenges are commonly faced? **[9]**

b) What are the major sources of variability in a supply chain? How do they affect supply chain performance? **[9]**

Total No. of Questions : 8]

SEAT No. : ____

PE2380

[Total No. of Pages : 2

[6584]-316
B.E. (Automation and Robotics Engineering)
DATA SCIENCE
(2019 Pattern) (Semester - VIII) (402552A) (Elective - VI)

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 indicate full marks.***
4) ***Use of non programmable electronic calculator is permitted.***
5) ***Assume Suitable/Standard data if necessary.***

Q1) a) What is the primary goal of the Discovery phase in data analytics? **[8]**

b) How does the data analytic lifecycle contribute to effective decision-making in organizations? **[9]**

OR

Q2) a) What role does model planning play in the data analytic lifecycle? **[8]**

b) What does it mean to operationalize findings in the context of the data analytic lifecycle? **[9]**

Q3) a) What is Python and why is it widely used in the field of data science, and list some essential Python libraries for data science and explain their roles? **[9]**

b) How would you replace values in a dataset, and why is this step necessary in data preprocessing? **[9]**

OR

Q4) a) Compare and contrast linear regression and logistic regression, and when is logistic regression more appropriate than linear regression? **[9]**

b) Explain the Naïve Bayes classification algorithm, and its assumptions. **[9]**

P.T.O.

Q5) a) What is the purpose of an elbow plot in clustering, and how is it generated? **[8]**

b) What is the importance of text preprocessing in natural language processing (NLP) and explain the concept of Bag of Words in text analysis. **[9]**

OR

Q6) a) What information does an AUC-ROC curve provide, and how is it interpreted? **[8]**

b) Explain the K-Means clustering algorithm and its steps and what are the advantages and disadvantages of K-Means clustering? **[9]**

Q7) a) Why is data visualization important in the field of data science and differentiate between categorical and numerical data visualizations. **[9]**

b) Explain the purpose of a line plot in data visualization. Provide an example scenario where a line plot is effective in conveying trends or patterns.**[9]**

OR

Q8) a) Discuss the benefits of using a combination of line plots, scatter plots, histograms, density plots, and box plots in a comprehensive data visualization strategy. **[9]**

b) Define a histogram and explain its utility in visualizing the distribution of numerical data. **[9]**



Total No. of Questions :8]

SEAT No. : ____

PE2381

[Total No. of Pages : 2

[6584]-319

B.E. (Automation and Robotics)

INDUSTRIAL AUTOMATION AND CONTROL SYSTEMS

(2019 Pattern) (Semester-VII) (402541)

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 indicate full marks.***
4) ***Use of non programmable electronic calculator is permitted.***
5) ***Assume Suitable/Standard data if necessary.***

Q1) a) Discuss the characteristic features of Proportional-Derivative (PD) controller and Proportional-Integral (PI) controller with neat sketch. **[10]**

b) Explain the working of "AND" logic gates in pneumatic system with a neat sketch. **[8]**

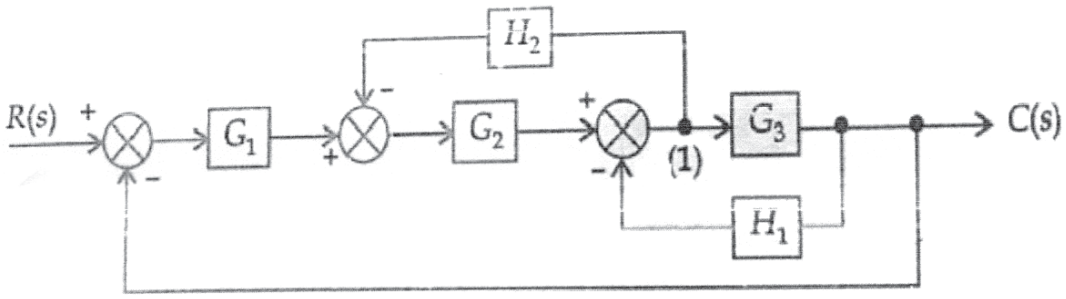
OR

Q2) a) Explain the working of "OR" logic gates in pneumatic system with a neat sketch. **[8]**

b) Explain the construction and working of sequencing pneumatic circuit with a neat sketch. **[10]**

Q3) a) Explain the working principle of open and closed loop control systems with the help of neat sketch. Give examples for open and closed loop control systems. **[10]**

b) Determine C/R for the block diagram shown in Fig. **[7]**



OR

P.T.O.

Q4) a) Using the following set of equations, construct a signal flow graph. **[7]**

$x_2 = x_1 + ax_5$

$x_3 = bx_2 + cx_4$

$x_4 = dx_2 + ex_3$

$x_5 = fx_4 + gx_3$

$x_6 = x_5$

b) Explain the various components used in control system. Describe how these components are necessary in the proper functioning of the system. **[10]**

Q5) a) Derive the relation of relay function for stability analysis in non-linear systems. **[9]**

b) Explain the functions of relay, deadzone and saturation non-linearities. **[9]**

OR

Q6) a) Define asymptotic stability and instability. Explain the singular points and give their classification. **[10]**

b) Explain the characteristics of non-linear system and discuss their applications. **[8]**

Q7) a) Explain the functions of various types of HMI. List their advantages and disadvantages. **[9]**

b) Explain the function of Digital Communication Unit. Explain how the automation is beneficial in large scale control system. **[8]**

OR

Q8) a) Explain the functions of HMI. Give the major differences between SCADA and HMI. **[8]**

b) Explain SCADA with neat block diagram and define each level involved in it. **[9]**



Total No. of Questions : 8]

SEAT No. : [ ]

PE2382

[Total No. of Pages : 2

[6584]-320

B.E. (Automation and Robotics)

ROBOTIC PROCESS AUTOMATION AND DEVELOPMENT

(2019 Pattern) (Semester - VII) (402542)

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) What are some common data manipulation activities that RPA bots can perform in business automation? **[8]**

b) Describe the RPA idea of data scraping. Which kinds of data sources are available for scraping? **[9]**

OR

Q2) a) What are the key advantages of using RPA for data manipulation tasks compared to manual methods? **[8]**

b) Distinguish between Desktop and Web Recording. **[9]**

Q3) a) What are Citrix recording methods in RPA, and when would you use each of them? **[9]**

b) Explain the concept of “Anchors” in the context of data extraction. How are they used in RPA processes? **[9]**

OR

Q4) a) Write a sequence of a project for extracting input data from a excel sheet which needs to be filled on a web portal of a company. **[9]**

b) What are the primary benefits of incorporating AI and ML capabilities into RPA workflows? **[9]**

P.T.O.

Q5) a) Explain the different types of bots used in Robotic Process Automation (RPA). Provide a brief description of each type and highlight their specific functions and applications. **[8]**

b) Define the terms "image trigger" and "element trigger" in the context of RPA. Explain how they differ and provide a real-world scenario where each type of trigger might be preferred over the other? **[9]**

OR

Q6) a) Outline the best practices for effectively utilizing debugging tools to streamline RPA development processes? **[8]**

b) "Exceptions are a critical aspect of Robotic Process Automation (RPA) development. Discuss the role of exceptions in RPA, and provide examples of common exceptions that RPA developers encounter. **[9]**

Q7) a) Explain the steps involved in deploying RPA bots within an organization. Discuss how these steps ensure a smooth integration with existing systems and processes. **[9]**

b) Explain the concept of "Bot Orchestration" and how it impacts the deployment of RPA bots in an enterprise. **[9]**

OR

Q8) a) What are the scalability challenges in RPA? How can an organization effectively scale its RPA bot deployment? **[9]**

b) What emerging technologies or trends are likely to impact the deployment and maintenance of RPA bots in the near future? Provide examples and potential implications. **[9]**



Total No. of Questions : 6] **SEAT No. :**

PE2383 **[Total No. of Pages : 2**

[6584]-321
B.E. (Automation & Robotics)
ARTIFICIAL NEURAL NETWORK & DEEP LEARNING
(2019 Pattern) (Semester - VII) (402543) (Theory)

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.***
2) ***Draw neat labeled diagrams wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of non programmable electronic calculator is permitted.***
5) ***Assume Suitable/Standard data if necessary.***

Q1) a) Describe the neural network's design and provide comments regarding its width and depth. **[8]**

b) When deep learning models use the back-propagation methodology, and what techniques for learning are related with back propagation? **[8]**

OR

Q2) a) What precisely is a description of a neural network? How many levels are required for that to be classified as a deep neural network? **[8]**

b) Construct a comparison of Binary Neural Networks (BNN) and Artificial Neural Networks (ANN). **[8]**

Q3) a) Describe the design of a Boltzmann machine and how Boltzmann learning is used in training. **[8]**

b) What exactly is an Adaptive Resonance Theory (ART) network, and how does it differ from a traditional Competitive Learning (CL) network with regard to of learning and adaptability? **[9]**

OR

Q4) a) What is associative learning differ from other types of learning in neural networks? **[8]**

b) What is the underlying concept of associative learning, and how does it distinguish from other neural network learning methods? **[9]**

P.T.O.

Q5) a) What's the purpose of SoftMax regression and how does it work in the output layer of a CNN? **[8]**

b) Describe the use of artificial neural networks (ANNs) to recognize consonant-vowel (CV) segments in speech signals. What are the main aspects employed in this work. **[9]**

OR

Q6) a) What exactly are residual networks, and how can they solve the vanishing gradient problem in deep networks? **[8]**

b) What is the purpose of NET Talk, and how does it transform English text to speech with Artificial Neural Networks (ANN)? **[9]**



Total No. of Questions : 8]

SEAT No. :

PE2384

[Total No. of Pages : 2

[6584]-322
B.E. (Automation and Robotics)
ROBOTICS - COGNITIVE & MEDICAL
(2019 Pattern) (Semester - VII) (402544A) (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) ***Assume suitable data, if necessary.***
4) ***Use of Non-prgammable scientific calculator is allowed.***
5) ***Figures to the right indicate full marks.***

Q1) a) Explain the purpose and functionality of physically assistive robots? **[9]**

b) List and briefly explain the key characteristics of medical robots. **[8]**

OR

Q2) a) What is the difference between laparoscopic and endoscopic surgery with regard to robotic systems? **[9]**

b) What are the primary types of robotic systems used in surgery? **[8]**

Q3) a) What are the key differences between traditional surgical techniques and robotic MIS? **[9]**

b) How does robot design for MIS differ from design for other types of surgeries? **[9]**

OR

Q4) a) Outline the steps involved in designing a robot for minimally invasive surgery. **[9]**

b) Identify the key principles involved in cooperative manipulation during surgery. **[9]**

P.T.O.

Q5) a) What are the primary functions of assistive controllers in wearable robotic systems? **[9]**

b) List the key components of a framework for neuro-rehabilitation robotics.**[8]**

OR

Q6) a) Explain the role of virtual environments in enhancing the effectiveness of neuro-rehabilitation through robotic integration. **[9]**

b) List examples of software platforms used to integrate robots and virtual environments for neuro-rehabilitation. **[8]**

Q7) a) How do biologically inspired robots enhance biomedical engineering applications? **[9]**

b) Describe the primary function of neural engineering in rehabilitation. **[9]**

OR

Q8) a) How do biologically inspired robots differ from traditional robots in terms of functionality and design? **[9]**

b) Identify the key clinical applications of biomedical engineering in gynaecology. **[9]**



Total No. of Questions : 8]

SEAT No. : ____

PE2385

[Total No. of Pages : 2

[6584]-323
B.E. (Automation and Robotics Engineering)
MICROPROCESSORS AND MICROCONTROLLERS
(2019 Pattern) (Semester - VII) (402544B) (Elective - III)

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 indicate full marks.***
4) ***Use of Non-programmable electronic calculator is permitted.***
5) ***Assume suitable / standard data, if necessary.***

Q1) a) Explain the 8 steps of interrupt process in 8085. **[8]**

b) Draw and explain main types of 8085 interrupts and respective vector locations. **[9]**

OR

Q2) a) Explain SIM & RIM instruction. **[8]**

b) Explain the Multiple Interrupts and Priority Encoder with neat Diagram. **[9]**

Q3) a) Explain Basic concept of 3-bit ADC and 3-bit DAC converter using neat diagrams. **[9]**

b) Design a multiplexed seven-segment LED display system schematic using the 8085 Microprocessor along with the 8255 programmable peripheral interface (PPI). Provide a detailed explanation of the circuit diagram and components used. **[9]**

OR

Q4) a) Write a program to display the message μp-rdy (microprocessor-ready) using 8255 PPI and MPU and describe it. **[9]**

b) Explain the principles of analog-to-digital conversion. Describe the key features and characteristics of ADC 0808. Provide a detailed schematic diagram illustrating the interfacing of an ADC 0808 with a microprocessor 8085, highlighting all essential connections and components. **[9]**

P.T.O.

Q5) a) Provide a labeled diagram of the pin configuration for an 8051 Microcontroller. Explain the functions of at least five essential pins. **[8]**

b) Provide an overview of the instruction set of the 8051 Microcontroller. How do instructions differ in terms of their functionality? **[9]**

OR

Q6) a) Write at least 8 differences between a microprocessor and a microcontroller. **[8]**

b) Draw and explain 8051 Block diagram. Also write features of 8051. Microcontroller. **[9]**

Q7) a) Explain the interrupt structure of the 8051 Microcontroller. How do different types of interrupts work? **[9]**

b) Write in detail about the interfacing of LCD with 8051 Microcontroller and draw its neat connection diagram. **[9]**

OR

Q8) a) Explore the various modes of operation for the parallel port in the 8051 Microcontroller. How do these modes allow the Microcontroller to interact with external devices? **[9]**

b) Explain the role of the "IE" (Interrupt Enable) and "IP" (Interrupt Priority) registers in the 8051. **[9]**



Total No. of Questions : 8]

SEAT No. :

PE2386

[Total No. of Pages : 2

[6584]-324
B.E. (Automation & Robotics)
MODERN MACHINING PROCESSES
(2019 Pattern) (Semester - VII) (402544C) (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 whenever necessary.***
3) ***Assume suitable data, if necessary.***
4) ***Use of Non-prgammable scientific calcualtor is alloowed.***
5) ***Figures to the right indicate full marks.***

Q1) a) Explain maskant technique in Chemical Machining. **[6]**

b) Explain advantages, disadvantages and applications of Electrochemical grinding. **[6]**

c) Explain working principle of Chemical Machining Process. **[5]**

OR

Q2) a) Explain Electrochemical Grinding with neat sketch. **[5]**

b) Explain working principle of Electrochemical Machining. **[6]**

c) Explain advantages, disadvantages and applications of Photochemical machining. **[6]**

Q3) a) Explain Heat Affected Zone in Electrical Discharge Machining. **[6]**

b) Write applications of Electric Discharge Diamond Grinding. **[6]**

c) Explain process parameters of electric discharge machine. **[6]**

OR

Q4) a) Explain wire EDM machining with neat sketch. **[6]**

b) Write short note on Dielectric Fluid used in EDM Machining. **[6]**

c) Explain the working principle of EDM Machining. **[6]**

P.T.O.

Q5) a) Write a short note on Economics of Machining. **[6]**

b) Explain the applications of micro engraving. **[5]**

c) Explain Micro drilling, its working principle and material removal mechanism. **[6]**

OR

Q6) a) Explain Micro Engraving, its working principle and material removal mechanism. **[6]**

b) Explain the applications of micro turning. **[5]**

c) Explain the applications of micro milling. **[6]**

Q7) a) Write short note on Microelectronics. **[6]**

b) Explain the Magnetorheological Finishing (MRF) and its working principle. **[6]**

c) Explain dry etching in Micro and Nano fabrication. **[6]**

OR

Q8) a) Explain the effect of material aspects in Nano Machining. **[6]**

b) Write short note on LIGA process. **[6]**

c) Write short note on MEMS (Micro-Electro-Mechanical Systems) and NEMS (Nano-Electro-Mechanical Systems). **[6]**



Total No. of Questions : 8]

SEAT No. : ____

PE2387

[Total No. of Pages : 2

[6584]-325
B.E. (Automation and Robotics Engineering)
INDUSTRIAL ENGINEERING
(2019 Pattern) (Semester - VII) (402544D) (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 whenever necessary.***
3) ***Assume suitable data, if necessary.***
4) ***Use of Non-programmable scientific calculator is allowed.***
5) ***Figures to the right indicate full marks.***

Q1) a) What do you mean by plant Location? Mr. Vishal wants to start his new plant, for this suggests which are the different factors that he should consider while selecting location for his new plant? **[6]**

b) Explain process layout with suitable sketch. **[6]**

c) Explain types of material flow patterns to achieve optimum flow of material in the plant. **[5]**

OR

Q2) a) Explain the term material handling equipment's. Elaborate any four different types of material handling equipment's with suitable applications. **[9]**

b) Compare product layout and Process Layout and explain factors affect while selecting plant layout. **[8]**

Q3) a) Explain the term Line Balancing with its objectives. Compare Job Production and Batch Production. (any 4 points) **[9]**

b) List any six functions of production planning and control. **[9]**

Past data on the sale of Diesel engines for the last 12 years is given below. By the method of three yearly moving averages establish the trend values and forecast demand for 13th year. If the actual demand for 13th year is 540 nos. What shall be the forecast of 14th year? Take value of smoothing constant is 0.3.

Year	1	2	3	4	5	6	7	8	9	10	11	12
Sale numbers	335	350	330	340	380	410	430	440	430	460	500	560

OR

P.T.O.

Q4) a) What is demand forecasting? What are applications of demand forecasting? Explain Moving average method of demand forecasting. **[9]**

b) Explain functions of Production Planning and Control. **[9]**

Q5) a) Elaborate role of materials management in cost reduction and value improvement? Also explain the term "ABC analysis". **[9]**

b) Explain vendor rating system with vendor rating criteria? Also explain objectives of JIT. **[9]**

OR

Q6) a) What is inventory control? **[9]**

Explain

i) MRP - I

ii) ERP with different module

b) Explain at least 3 inventory control modules in detail. **[9]**

Q7) a) What is "value analysis"? Explain types of value. **[6]**

b) Explain Rapid Entire Body Assessment (REBA) with level of MSD risk. **[6]**

c) Write a short note on "KRA". **[5]**

OR

Q8) a) Elaborate the term "merit rating"? Explain any 4 methods of merit rating. **[9]**

b) Define job evaluation. What are its objectives? Explain procedure of job evaluation. **[8]**



Total No. of Questions : 8]

SEAT No. : ____

PE2388

[Total No. of Pages : 2

[6584]-326
B.E. (Automation and Robotics)
COMPUTATIONAL FLUID DYNAMICS
(2019 Pattern) (Semester - VII) (402544E) (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) ***Draw neat labeled diagrams wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of non programmable electronic calculator is permitted.***
5) ***Assume suitable data, if necessary.***

Q1) a) How does the one-dimensional transient convection-diffusion equation differ from its two-dimensional counterpart in terms of complexity and solution techniques? **[8]**

b) How does the treatment of boundary conditions differ in steady and unsteady cases of the convection-diffusion equation for slug flow? **[9]**

OR

Q2) a) The one dimensional convection and diffusion of a scalar ϕ is described by central differencing ϕ_w and ϕ_e being 100 and 200 respectively, with usual notation. Let $F = \rho u$ and $D = \Gamma/\Delta x$, where Γ is the diffusion coefficient and Δx is the mesh spacing. Obtain the value of ϕ_p for $F_e = F_w = 4$ and $D_e = D_w = 1$ and comment on the result. **[8]**

b) How does a high Peclet number impact the behaviour of the solution and what adjustments are needed in numerical schemes to handle it? **[9]**

Q3) a) What is the role of pressure-velocity coupling in the SIMPLE algorithm, and how is it achieved? **[9]**

b) Why are residuals and convergence criteria important in the solution of the lid – driven cavity flow and how are they monitored? **[9]**

OR

P.T.O.

Q4) a) How does the SIMPLE algorithm handle pressure and velocity corrections in external flow problems like flow over a cylinder. **[9]**

b) What is the significance of the boundary layer development and transition to turbulence in airfoil simulations? **[9]**

Q5) a) Explain the difference turbulence models namely standard k-ε and standard k-ω, SST k-ω and RSM models. **[8]**

b) What is turbulence motion and how it could be captured with DNS, LES and RANS models? **[9]**

OR

Q6) a) Explain Reynold's time averaging concept of turbulence. Derive RANS equation. **[8]**

b) In what types of applications is LES preferred over RANS or DNS and why? **[9]**

Q7) a) What are the advantages and limitations of weak coupling versus strong coupling in fluid – solid interactions? **[9]**

b) How is fluid – solid coupling used to analyze the performance and safety of structures like bridges, buildings and aircraft under wind loading. **[9]**

OR

Q8) a) What is the Arbitrary Lagrangian – Eulerian (ALE) formulation, and how does it combine elements of both Lagrangian and Eulerian methods? **[9]**

b) How are coupled fluid-structure equations validated to ensure realistic simulation results? **[9]**



Total No. of Questions : 8]

SEAT No. :

PE2389

[Total No. of Pages : 2

[6584]-327

B.E. (Automation and Robotics Engineering)

LEAN MANUFACTURING

(2019 Pattern) (Semester - VII) (Elective - IV) (402545A)

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) ***Assume suitable data if necessary.***
4) ***Use of non-programmable scientific calculators is allowed.***
5) ***Figures to the right indicate full marks.***

Q1) a) Implementation of TPM for improved equipment reliability. Discuss. **[8]**

b) Briefly explain different types of poka-yoke devices. **[9]**

OR

Q2) a) Describe the actions required to establish a continuous improvement culture. **[8]**

b) Discuss PDCA cycle and Kaizen events. **[9]**

Q3) a) Describe the ways in which cellular layout design and implementation can be influenced by the principles of cellular manufacturing. **[9]**

b) Write short note Lean principles in logistics and distribution. **[9]**

OR

Q4) a) Briefly discuss benefits and characteristics of cellular manufacturing. **[9]**

b) Write a short note on basics of lean supply chain management. **[9]**

Q5) a) Briefly explain Team dynamics and collaboration in lean environments. **[8]**

b) Discuss different Lean Performance Measurement techniques. **[9]**

OR

P.T.O.

Q6) a) Creating cross-functional teams for lean projects. Discuss with suitable example. **[8]**

b) Write short note on Key Performance Indicators (KPIs) in lean manufacturing. **[9]**

Q7) a) Talk about the takeaways from real-world use of lean case studies. **[9]**

b) Write a short note on Developing a lean implementation plan. **[9]**

OR

Q8) a) Talk briefly about the issues that arise with applying lean. **[9]**

b) Describe Lean Implementation Strategies in detail. **[9]**

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Total No. of Questions : 8]

SEAT No. :

PE2390

[Total No. of Pages : 2

[6584]-328

B.E. (Automation and Robotics Engineering)

PROJECT MANAGEMENT

(2019 Pattern) (Semester - VII) (Elective - IV) (402545B)

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) ***Assume suitable data if necessary.***
4) ***Use of non-programmable scientific calculators is allowed.***
5) ***Figures to the right indicate full marks.***

Q1) a) Explain the significance of performance measurement and reporting in project management. **[9]**

b) State the principles of quality management in project environments. **[8]**

OR

Q2) a) Discuss the purpose of network techniques like PERT and CPM in project management. **[9]**

b) Compare and contrast PERT and CPM models in terms of their applications and assumptions. **[8]**

Q3) a) Explain the importance of legal and ethical aspects in project management. **[9]**

b) Identify the tools used in project cost estimation techniques. **[9]**

OR

Q4) a) Summarize the relationship between project financial management and cash flow forecasting. **[9]**

b) State the benefits of activity-based costing in project management. **[9]**

Q5) a) Explain the significance of project closure in the overall project lifecycle. **[9]**

b) Differentiate between project success measurement and project evaluation methods. **[8]**

OR

P.T.O.

Q6) a) Describe the process of conducting project audits and reviews. **[9]**

b) What are the different techniques used in project evaluation? **[8]**

Q7) a) Identify the challenges of project risk management in uncertain environments. **[9]**

b) Describe how Agile project management differs from traditional project management? **[9]**

OR

Q8) a) State the principles of sustainability and green project management. **[9]**

b) Discuss the importance of sustainability in project management. **[9]**

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Total No. of Questions : 8]

SEAT No. :

PE2391

[Total No. of Pages : 2

[6584]-329

B.E. (Automation and Robotics)

ADDITIVE MANUFACTURING

(2019 Pattern) (Semester - VII) (402545C) (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) ***Assume suitable data, if necessary.***

Q1) a) Explain the working principle of electron beam melting with neat sketch. **[8]**

b) Explain the working principle of direct metal deposition. List their advantages. **[10]**

OR

Q2) a) Explain the post processing steps followed in fused deposition modeling. **[8]**

b) Explain the construction and working principle of fused deposition modeling with neat sketch. List their advantages and limitations. **[10]**

Q3) a) Explain the quality considerations required for additively manufactured parts. **[7]**

b) Explain the various design considerations/rules involved in additive manufacturing with the help of figures. **[10]**

OR

Q4) a) Explain how the material selection can be made for fabricating different components with the help of examples. **[7]**

b) Explain the strategies involved in selecting the suitable 3D printing process for various applications. **[10]**

P.T.O.

Q5) a) Explain the functions of sensors, actuators, motors and control electronics used in construction of 3D printers. **[8]**

b) Explain the construction details of SLA printers with neat sketch. **[10]**

OR

Q6) a) Explain the steps followed while slicing a CAD model in slicing software.**[8]**

b) Explain the various infill strategies used for area filling the sliced model.**[10]**

Q7) a) How additive manufacturing can influence the mass customization? Explain in detail mentioning its future trends. **[9]**

b) Discuss the application of 3D printing in art, fashion and jewelry industry.**[8]**

OR

Q8) a) Discuss the reasons on how additive manufacturing influenced the growth in the production of stents used in biomedical applications. **[8]**

b) Explain the advantages and challenges involved in adopting the additive manufacturing technology Various industries. **[9]**



Total No. of Questions : 8]

SEAT No. : ____

PE2392

[Total No. of Pages : 2

[6584]-331

B.E. (Automation & Robotics)

AUGMENTED REALITY AND VIRTUAL REALITY

(2019 Pattern) (Semester - VII) (402545E) (Elective - IV)

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.***

Q1) a) What are trackers? Enumerate some importance tracker characteristics (Make drawings to illustrate your concepts). **[6]**

b) How is depth perceived by the human vision system? Make a drawing and explain. **[6]**

c) What is object intelligent behavior in VR? **[5]**

OR

Q2) a) What are the advantages/disadvantages of ultrasonic trackers? **[6]**

b) What hardware is necessary to take the output of a PC graphics accelerator and display it on a monoscopic HMD? **[6]**

c) How does the Pinch Glove work? **[5]**

Q3) a) What is taxonomy in augmented reality? **[6]**

b) What are the technologies behind augmented reality? **[6]**

c) What are the challenges of virtual reality? **[5]**

OR

Q4) a) What are the different types of Augmented Reality? **[6]**

b) What is augmented reality and its features? **[6]**

c) Which are the evaluation methods of AR? **[5]**

P.T.O.

Q5) a) What are human factor studies? Why are they important to VR? What are their main stages? **[6]**

b) What is integrated VR system? **[6]**

c) How to develop VR applications? **[6]**

OR

Q6) a) What is virtual acoustics in VR? **[6]**

b) What is object intelligent behavior in VR? **[6]**

c) Explain VRTK toolkit in VR. **[6]**

Q7) a) Explain any one medical application of VR. **[6]**

b) What is the Visible human database and how was it created? Describe some of its applications. **[6]**

c) Describe the system architecture and use of the BioSimMER system. **[6]**

OR

Q8) a) What are the most important VR application domains and geographic areas, according to the Cyber Edge Information systems [2002] survey? **[6]**

b) What is the digital anatomist project, and why is it increasing access for students? **[6]**

c) Describe the prostate palpation trainer. Comment on its human factors testing results. **[6]**



Total No. of Questions : 8]

SEAT No. :

PE2393

[Total No. of Pages : 2

[6584]-332
B.E. (Robotics and Automation)
FIELD AND SERVICE ROBOTS
(2019 Pattern) (Semester - VIII) (411508)

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) Describe in brief about the significance of planning within uncertainty in strengthening the reliability of health care robotics. **[9]**

b) Provide a detailed explanation of the concept behind lightweight autonomous climbing robots designed to assist elderly and disabled individuals. **[9]**

OR

Q2) a) Explain briefly how the creation of a Personal Service Robot with easy-to-use interfaces improves the experience for users. **[9]**

b) Provide a detailed explanation of the enhanced robotic library system designed for off-site shelving facilities. **[9]**

Q3) a) Explain briefly how utilizing teams of robots and sensors for distributed search and rescue enhances efficiency during emergency situations. **[9]**

b) Discuss the role of spraying robots in grape production for promoting sustainable agriculture practices. Evaluate the environmental and economic advantages of using these robots compared to conventional spraying techniques. **[9]**

OR

Q4) a) Provide a detailed explanation of the concept behind the development of a pneumatically controlled expandable arm designed for searching in environments with restricted access. Additionally, describe key characteristics of the Distal Expandable Tube. **[9]**

b) Explain in detail the concept behind the creation of mobile robots designed for search and rescue operations. **[9]**

P.T.O.

Q5) a) Describe the significance of real-time navigation, guidance, and control systems in UAVs. Discuss the methods employed to enable real-time capabilities using affordable sensors and analyze how these methods affect UAV performance. **[9]**

b) Outline the process of acquiring helicopter control knowledge from human pilots for autonomous flight. Emphasize the primary experimental methods utilized in this field and the results they have yielded. **[8]**

OR

Q6) a) Examine the importance of compact millimetre-wave radar sensors for UAVs. Provide a concise overview of their characteristics and practical uses, highlighting how they enhance UAV operations. **[9]**

b) Discuss the difficulties involved in autonomously landing a helicopter on a moving target. Offer a concise summary of the strategies deployed to overcome these obstacles and evaluate their efficiency. **[8]**

Q7) a) Discuss the significance of a multi-purpose eight-legged robot for evaluating neural interfaces. Give a brief overview of its design and functions, and evaluate its potential applications in assessing neural interface technologies. **[9]**

b) Briefly explain the concept of real-time interactive presence construction and its importance in human-robot interaction. Describe the techniques employed for constructing online presence and explore their effects on designing immersive virtual environments. **[8]**

OR

Q8) a) Discuss briefly how merging road scene monitoring with vehicle control enhances road safety. Highlight the primary technologies and methodologies utilized in this integration. **[9]**

b) Explain the significance of efficient human-robot interaction when utilizing an interactively operated service robot for skilled tasks. Explore the obstacles encountered and potential remedies for improving cooperation between humans and robots in skilled work environments. **[8]**



Total No. of Questions : 8]

SEAT No. :

PE2394

[Total No. of Pages : 2

[6584]-333

B.E. (Robotics & Automation Engineering)

PLC AND SCADA PROGRAMMING

(2019 Pattern) (Semester-VIII) (411509)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***All questions are compulsory i.e. Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q7 or Q8.***
2) ***Assume suitable data, if necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Neat diagrams must be drawn wherever necessary.***

Q1) a) State the rules for PLC Ladder Diagram Programming & explain the modes of operations in PLC. **[9]**

b) What is memory mapping and Input/output addressing in PLC? Explain with an example. **[8]**

OR

Q2) a) What are programming languages of PLC? Explain any three in short. **[9]**

b) Represent NO - NC switch Coil, Timer & Counter, Latching and Interlocking with Ladder. **[8]**

Q3) a) Write Short Notes on- **[9]**

i) Field bus

ii) Process bus

iii) Modbus

b) Describe the Architecture of DCS? Write down the Features and Applications. **[8]**

OR

P.T.O.

Q4) a) Explain the networking Protocols - Ethernet, CANopen and HART. **[9]**

b) How SCADA and DCS are used in Industry 4.0? Write its advancements compared to conventional systems. **[8]**

Q5) a) Mention the needs, Functions and Architecture of SCADA system. **[9]**

b) How SCADA can be implemented to monitor the Railways, Traffic signals and Sugar Factories? **[9]**

OR

Q6) a) What is SCADA? Explain its role in Thermal Power Stations. **[9]**

b) Explain the components of SCADA: **[9]**

i) MTU

ii) RTU

iii) HMI

Q7) a) Using Proximity sensors, Electromagnetic Control Relays design Ladder Logic design for opening and closing of the lights in 3 consecutive rooms & explain each rung. **[9]**

b) Explain the Following; **[9]**

i) Electromagnetic Control Relay

ii) Manually Operated Switch

iii) Proximity Sensor

OR

Q8) a) Design the Ladder logic for Pneumatic Cylinder control for counting the number of boxes and rejecting the faulty ones. **[9]**

b) Design a system using PLC for Motor interlocking with the help of Ladder logic Program. **[9]**



Total No. of Questions : 8]

SEAT No. :

PE2395

[Total No. of Pages : 2

[6584]-334
B.E. (Robotics & Automation)
REVERSE ENGINEERING
(2019 Pattern) (Semester - VIII) (411510 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) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume suitable data if necessary.***
4) ***Use of Logarithmic Table, Slide rule is Electronic pocket calculator is allowed.***
5) ***Figures to the right indicate full marks.***

Q1) a) With neat sketch explain reverse engineering phases. **[9]**

b) Classify reverse engineering software based on application. **[9]**

OR

Q2) a) Define non-contact type reverse engineering methods and classify it with neat sketch. **[9]**

b) Write a note on reverse engineering hardware and software. **[9]**

Q3) a) With neat sketch explain the concept of X-ray tomography. **[9]**

b) Explain the concept "Time-of-flight" or Ranging Systems. **[8]**

OR

Q4) a) Explain the concept of detailed vendor assessment and benchmarking in selection process of reverse engineering. **[8]**

b) Explain Structured-light and Stereoscopic Imaging Systems. **[9]**

Q5) a) Explain Modeling of Cloud Data in Reverse Engineering. **[9]**

b) Explain the Integration of Reverse Engineering and Rapid Prototyping for Layer-based Model Generation. **[9]**

OR

Q6) a) Explain data processing in rapid prototyping. **[9]**

b) Write a note on Adaptive Slicing Approach for Cloud Data Modeling. **[9]**

P.T.O.

Q7) a) Explain the barriers in adopting reverse engineering. **[8]**

b) Explain with neat sketch application of Reverse engineering in automotive industry. **[9]**

OR

Q8) a) Explain the legal aspects of reverse engineering. **[8]**

b) Explain any one application of Reverse engineering in medical device industry. **[9]**



Total No. of Questions : 8]

SEAT No. :

PE2396

[Total No. of Pages : 5

[6584]-335
B.E. (Robotics and Automation)
DATA ANALYTICS
(2019 Pattern) (Semester - VIII) (Elective - V) (411510 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) ***Assume suitable data, if necessary.***
3) ***Use of electronic pocket calculator is allowed.***
4) ***Neat diagrams must be drawn wherever necessary.***

Q1) a) A study was conducted to evaluate consumer preferences for personal robotic assistants based on specific attributes and levels: **[9]**

Attributes	Level 1	Level 2	Level 3
Mobility Type	Wheeled	Legged	Flying
Task Capability	Household Tasks	Companion/Social Tasks	Advanced Technical Tasks
Size(cm)	Small(30 cm)	Medium (50 cm)	Large (80 cm)
Battery Life (hours)	4 hours	8 hours	12 hours
Price (in USD)	$200	$500	$800

After analyzing the data and conducting regression analysis, the following utility equation was derived to predict consumer preference (U) based on these attributes:

U = 15+(5×Legged Mobility) + (8×Flying Mobility) + (6×Companion/ Social Tasks) + (10×Advanced Technical Tasks) + (4×Medium Size) + (7×Large Size) + (2×8 hour Battery Life) + (3×12 hour Battery Life) – (0.5×$500 Price) – (0.8 ×$800 Price)

P.T.O.

i) Calculate the part-worth utility score for each level of every attribute.

ii) Determine the importance of each attribute.

iii) Calculate the predicted utility (U) for a personal robotic assistant with the following attributes: Mobility Type: Legged, Task Capability: Advanced Technical Tasks, Size: Large (80 cm), Battery Life: 12 hours, Price : $500

iv) How much more valuable (in dollars) is a Flying robot compared to a Legged robot.

b) Suppose you are analyzing the performance of a manufacturing process based on two independent variables: The temperature (in degree celsius) and the time duration (in hours) of the process. You collected data from several runs of the process and recorded the following observations: **[9]**

Process Run	Temperature (ºC)	Time (hours)	Yield (%)
1	150	2	85
2	160	3	78
3	140	1.5	92
4	170	4	72
5	155	1.8	80

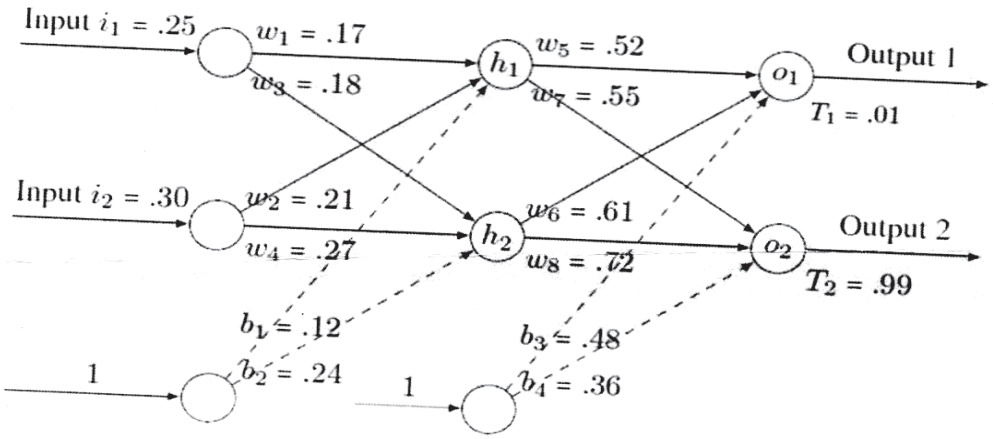
i) Write the General equation for the multi linear regression model representing the relationship between yield (Y), temperature (X1), and time (X2).

ii) Use the given data to calculate the coefficients (intercept and slopes) of the regression model.

iii) If the temperature for a new process run is 165ºC and the time is 2 hours, predict the yield using your regression model.

OR

Q2) a) Given the following network, compute the outputs from o1 and o2 (assume that the activation function is the sigmoid function). Also calculate mean squared error (MSE) **[9]**



b) You are working with a dataset representing feature vectors extracted from objects detected by a robot's sensors. The dataset consists of 6 feature vectors: **[9]**

{(0.5, 0.8), (1.2,1.5), (2.0,2.5), (3.2,3.3), (4.0,4.5), (5.0,5.5)}

Use $k = 2$

Choose initial cluster centroids: $C1 = (1,1)$, $C2 = (4,4)$

Apply k-means algorithm to assign feature vectors to clusters and update the centroids.

Q3) a) Explain Logistic Regression in detail with example. **[8]**

b) Suppose a robot is using a camera to classify objects as either "plants" or "machines". Here are the results for 10 observations: **[9]**

Observation	Expected	Predicted
1	Plant	Machine
2	Machine	Machine
3	Plant	Plant
4	Plant	Plant
5	Machine	Plant
6	Machine	Machine
7	Plant	Plant
8	Plant	Plant
9	Machine	Machine
10	Plant	Plant

i) Compute the confusion matrix for the data.

ii) Compute the accuracy, precision, recall, sensitivity and specificity of the data.

OR

Q4) a) Explain Quadratic Discriminant Analysis (QDA) with example. **[8]**

b) Use a support vector machine to classify the following training set: **[9]**

X1	X2	Class
3	1	+
3	–1	+
6	1	+
6	–1	+
1	0	–
0	1	–
0	–1	–
0	–1	–
–1	0	–

i) Determine the vector w and intercept b.

ii) Plot Decision boundary with training points on an x1-x2 axis.

iii) Find the class of point (3,0)

Q5) a) Explain the Expert system with an example. **[8]**

b) Consider the following set of training examples: **[9]**

Instance	Classification	a1	a2
1	–	T	F
2	+	T	T
3	–	F	T
4	+	F	F
5	+	T	T
6	–	F	T

i) What is the entropy of this collection of training examples with respect to the traget function “classification”?

ii) What is the information gain of a1 and a2 relative to these training examples?

OR

Q6) a) Explain the Decision tree with an example. **[8]**

b) Use PCA to reduce the dimension from 2 to 1 from given data: **[9]**

x	2	3	7
y	11	14	26

Q7) a) What is Reinforcement Learning? What are the key components of reinforcement learning? **[10]**

b) Explain Monte Carlo simulation in detail. **[8]**

OR

Q8) a) Write a short note on **[10]**

i) Q learning

ii) SARSA Learning

b) What are the different approaches to implementing Reinforcement Learning? What are the key features of Reinforcement Learning? **[8]**

❋ ❋ ❋

Total No. of Questions : 8]

SEAT No. :

PE2397

[Total No. of Pages : 3

[6584]-336

B.E. (Robotics & Automation)

ENTREPRENEURSHIP AND INNOVATIONS

(2019 Pattern) (Semester - VIII) (411510 C) (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 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 role does innovation play in driving the competitive edge of entrepreneurs, and could you share instances of startups that have leveraged innovation effectively to establish themselves in the market? **[8]**

b) In what ways do government interventions to promote entrepreneurship shape the landscape of the startup ecosystem, and what criteria should be used to gauge their effectiveness and efficiency? **[9]**

OR

Q2) a) How does the practice of entrepreneurship facilitate the creation of employment opportunities and stimulate economic advancement in less developed regions? **[8]**

b) What are the implications of government initiatives designed to foster entrepreneurship on the overall health and growth of the startup ecosystem, and what key factors should be considered in their evaluation? **[9]**

Q3) a) What strategies do Indian companies employ for risk management during project formulation? Can you cite an example? **[9]**

b) Can you explain the criteria used in project evaluation to assess feasibility and potential returns? **[9]**

OR

Q4) a) How does market research contribute to project formulation for entrepreneurs? Can You share an example from India? **[9]**

b) How do different types of project evaluation methodologies contribute to strategic planning and risk mitigation? **[9]**

Q5) a) Explain the significance of calculating the cost of capital for a company's investment projects. **[4]**

P.T.O.

b) Total debt = ₹60,00,000 **[4]**

Interest expense = ₹4,00,000

Equity = ₹1,80,00,000

Beta coefficient = 1.4

Risk-free rate = 6%

Market return = 16%

Expected dividend per share next year = ₹7

Current market price per share = ₹110

Growth rate of dividends = 9%

Calculate:

i) The cost of debt (rD)

ii) The cost of equity (rE) using both the Capital Asset pricing Model (CAPM) and the Dividend Discount Model (DDM).

iii) The Weighted Average Cost of Capital (WACC) assuming the weights of debt and equity are 35% and 65% respectively.

c) Explain the concept of production planning and control in the context of profit planning. **[9]**

OR

Q6) a) Total debt = ₹80,00,000

Interest expense = ₹3,20,000

Equity = ₹1,00,00,000

Beta coefficient = 1.1

Risk-free rate = 4.5%

Market return = 14.5%

Expected dividend per share next year = ₹4

Current market price per share = ₹80

Growth rate of dividends = 6% **[4]**

Calculate:

i) The cost of debt (rD)

ii) The cost of equity (rE) using both the Capital Asset pricing Model (CAPM) and the Dividend Discount Model (DDM).

iii) The Weighted Average Cost of Capital (WACC) assuming the weights of debt and equity are 50% and 50%, respectively.

b) Explain how financial functions contribute to effective product planning and control, providing examples where applicable. **[4]**

c) How do public enterprises in India manage production planning and control to align with market demand and optimize resource utilization?**[9]**

Q7) a) How do laws influence entrepreneurship in India? Provide examples.**[9]**

b) How do recent amendments to the Workmen's Compensation Act aim to enhance benefits for workers and address challenges related to compliance and enforcement? **[9]**

OR

Q8) a) Discuss how tax incentives and exemptions drive growth in specific Indian industries. How do these government policies influence investment decisions? **[9]**

b) Explain the fair competition in Indian startups & laws related to it with suitable example. **[9]**

Total No. of Questions : 8]

SEAT No. :

PE2398

[Total No. of Pages : 2

[6584]-338

B.E. (Robotics and Automation)

ADDITIVE MANUFACTURING

(2019 Pattern) (Semester - VIII) (411511 (A)) (Elective - VI)

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 Fused Filament Fabrication (FFF) process with suitable sketch. List its Benefits, Limitations & Applications. **[8]**

b) Explain Robocasting process in detail. **[5]**

c) Explain Bio-printing process in detail. **[5]**

OR

Q2) a) Explain Plasma deposition process with suitable sketch. List its Benefits, Limitations & Applications. **[9]**

b) Explain Multi-Jet Modeling (MJM). What are the advantages and limitations of MJM. **[9]**

Q3) a) Explain use of Polymers in Additive Manufacturing with important process parameters, benefits, Limitations and appropriate applications. **[9]**

b) Explain use of Shape-Memory Alloys in Additive Manufacturing with important process parameters, benefits, Limitations and appropriate applications. **[9]**

OR

Q4) a) Write short note on Bio-active materials. **[8]**

b) Write short note on 4D printing. **[5]**

c) Write short note on Acetone treatment. **[5]**

P.T.O.

Q5) a) Explain the Construction, Layout and sub-system of Material Jetting process based 3D Printers with illustrations. **[8]**

b) Explain 3D printer design considerations for **[9]**

i) Print bed

ii) Heater

iii) Nozzles

OR

Q6) a) Explain function of Laser controller and Gas Filtration System in AM. **[8]**

b) What are the different types of slicing? Describe in details. **[9]**

Q7) a) Write short note on **[8]**

i) 5D Printing

ii) Bio-printing

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 how additive manufacturing is used in Automotive Industries. Also write merits, demerits and practical feasible applications with illustrations. **[8]**

b) Explain Mass Customization and Future trends in AM. **[9]**



Total No. of Questions : 8]

SEAT No. : ____

PE2399

[Total No. of Pages : 2

[6584]-339
B.E. (Robotics and Automation)
INDUSTRY 4.0
(2019 Pattern) (Semester - VIII) (411511 (B)) (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, Q.7 or Q.8.***
2) ***Figures 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) Explain term: **[8]**

i) Cyber physical system

ii) Impact of Digital Twin

b) What do you mean Digital twin? **[10]**

OR

Q2) a) What do you mean by Process Automation and Optimization? **[8]**

b) What is mean by Predictive maintenance and Anomaly Detection in Industry? **[10]**

Q3) a) Explain the following: **[9]**

i) Role of cloud Computing in IoT and Industry 4.0

ii) Virtualization

b) Explain Different Cloud deployment Techniques? **[9]**

OR

Q4) a) Write in brief about Fog Computing? **[9]**

b) Draw and Explain Architecture of cloud applications? **[9]**

P.T.O.

Q5) a) Explain terms Data Communication and Networking with its characteristic. **[8]**

b) Explain Cyber Laws and cyber policies in Industry 4.0? **[9]**

OR

Q6) a) Write short note on Digital Forensics. **[8]**

b) What is Security system and its function? **[9]**

Q7) a) What is AI, explain in brief. **[8]**

b) Explain the term Industry 4.0 laboratories. **[9]**

OR

Q8) a) Explain IIoT with its benefits and Disadvantages? **[9]**

b) Write note on IoT And IIoT case Studies. **[8]**



Total No. of Questions : 8]

SEAT No. :

PE2400

[Total No. of Pages : 2

[6584]-340

B.E. (Robotics & Automation Engineering)

VLSI DESIGN FOR ROBOTICS

(2019 Pattern) (Semester - VIII) (411511 (C)) (Elective - VI)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***All questions are compulsory i.e. Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q7 or Q8***
2) ***Assume suitable data, if necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Neat diagrams must be drawn wherever necessary.***

Q1) a) Differentiate between CPLD and FPGA Architecture. **[8]**

b) What is FPGA synthesis and implementation? Describe in short along with proper diagram. **[9]**

OR

Q2) a) Describe the Design Flow for PLD Architectures and give its applications. **[8]**

b) Write short note on: **[9]**

i) Clock management techniques

ii) Simulation Tools

iii) Synthesis Tools

Q3) a) Describe the terms CMOS Inverter and Device sizing with suitable circuit diagrams. **[8]**

b) Describe the Hot electron effect and Velocity saturation. Give proper example with diagram. **[9]**

OR

Q4) a) Differentiate between P-MOS and N-MOS systems. **[8]**

b) Write short notes on; **[9]**

i) CMOS combinational logic design

ii) Power dissipations

iii) Power delay product

P.T.O.

Q5) a) Design Issues like Antenna effect, Electro migration effect, and Timing analysis. **[9]**

b) What is AC and DC analysis? Write about Transfer Characteristics and its Transient responses. **[9]**

OR

Q6) a) Explain the Post-layout Simulation and Parasitic extraction along with Electrical Rule Check. **[9]**

b) Explain the Following; **[9]**

i) Fabrication methods of circuit elements

ii) Layout of cell

iii) Circuit Extraction

Q7) a) What is a Built In Self Test, JTAG & Boundary scan? Explain with neat diagram. **[9]**

b) Explain the following for VLSI Testing; **[9]**

i) Types of fault

ii) Need of Design For Testability (DFT)

iii) DFT Guideline

OR

Q8) a) Describe the Test pattern generation, Sequential circuit test and Built In Self Test for VLSI circuit. **[9]**

b) Write in short about DFT Guideline, Testability, Fault models in VLSI. **[9]**



Total No. of Questions : 8]

SEAT No. :

PE2401

[Total No. of Pages : 2

[6584]-341

B.E. (Robotics and Automation)

INTELLIGENT ROBOTICS SYSTEMS

(2019 Pattern) (Semester - VIII) (411511 (D)) (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) ***Figures to the right indicate full marks.***
4) ***Assume Suitable data if necessary***

Q1) a) What are the main types of actuators used in micro-robotics? Explain their working principle and typical applications. **[9]**

b) Compare the performance of electrostatic actuators and piezoelectric actuators in micro-robotics. Discuss the advantages and limitations of each. **[8]**

OR

Q2) a) What are the challenges associated with the scaling down of conventional actuators (such as DC motors) to the micro-scale for robotic applications? **[9]**

b) Explain procedure for graph based optimization techniques. **[8]**

Q3) a) Discuss how optic flow can aid in collision avoidance for autonomous robots in dynamic environments. **[9]**

b) How does the concept of optic flow differ in robots that use monocular vision versus stereo vision systems? **[8]**

OR

Q4) a) How does visual feedback contribute to precision and adaptation in robotic manipulation tasks such as object grasping or assembly. **[9]**

b) Explain the role of visual perception in robot localization and mapping (e.g., in SLAM-Simultaneous Localization and Mapping). **[8]**

P.T.O.

Q5) a) Discuss the role of real-time feedback in networked tele robotics. How do time delays and data loss impact the operator's ability to control a remote robot effectively? **[9]**

b) What are the security and safety challenges in networked tele robotics, especially when robots are operated over the internet or in sensitive environments? **[9]**

OR

Q6) a) What communication protocols are typically used in networked telerobotics systems, and how do they support real-time data transfer and remote control of robots? **[9]**

b) Discuss the design considerations for ensuring scalability and flexibility in a networked telerobotic system. **[9]**

Q7) a) Elaborate procedure for adaptive aggregation. **[9]**

b) Explain various models for collective decision making process. **[9]**

OR

Q8) a) How swarm robotics is helpful in automation? Explain. **[9]**

b) Why study of modeling swarm system is important? Brief on it. **[9]**



Total No. of Questions : 8]

SEAT No. : ____

PE2402

[Total No. of Pages : 2

[6584]-342
B.E. (Robotics and Automation)
MACHINE VISION SYSTEM
(2019 Pattern) (Semester - VII) (411501)

Time : 2½ Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Answer all questions.***
2) ***Figures to the 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) For the below given 5×4 image find out following: **[10]**

Image :

1	2	3	3	6
6	5	7	7	2
0	0	1	5	1
2	0	1	0	0

i) Probability Density Function (PDF) of each pixel value.

ii) Huffman's Code for each pixel value.

What is the Huffman's code length for highest & lowest probability for pixel and why? Justify your answer.

b) What do you understand by the term image restoration and explain band pass and band reject filters with relevant graphs. **[8]**

OR

Q2) a) Write a short note on wavelet coding technique for lossy compression. **[8]**

b) Below is the 5×5 binary image. **[10]**

P.T.O.

Image :

0	0	1	1	1
1	1	1	0	0
0	0	1	1	1
1	0	1	1	0
0	1	0	0	1

For the given image calculate following

i) Total number of Run length vectors.

ii) Compression ratio.

iii) Predict if data is compressed? Justify your answer.

Q3) a) What do you understand by term clustering in image segmentation? Explain in detail with considering examples. **[9]**

b) Write a short note on boundary-based segmentation technique in detail. **[9]**

OR

Q4) a) How is the image segmented with technique-based approach? And explain structural technique in detail. **[9]**

b) Write a short note on shape based image segmentation. **[9]**

Q5) a) What is rotation & scale motion estimation technique explain with relevant example. **[9]**

b) Write a note on windowed correlation in motion estimation technique (expression is mandatory). **[8]**

OR

Q6) a) Explain in detail parametric motion estimation. **[9]**

b) Write a short note on incremental refinement and parametric motion. **[8]**

Q7) a) What are convolutional neural networks explain how it is feasible to use in robotics applications. **[9]**

b) Explain supervised learning algorithm and explain in detail. **[8]**

OR

Q8) a) Explain in detail unsupervised learning and explain in detail. **[9]**

b) What do you understand by Principle Component Analysis (PCA)? Explain in detail. **[8]**

* * *

Total No. of Questions : 8]

SEAT No. : ____

PE2403

[Total No. of Pages : 4

[6584]-343

B.E. (Robotics & Automation Engg.)

ROBOT SYSTEM RELIABILITY AND SAFETY

(2019 Pattern) (Semester - VII) (411502)

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) ***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) A computer used for controlling robot consists of three sub- system having consecutive failure rates $\lambda 1 = 0.015$, $\lambda 2 = 0.018$, $\lambda 3 = 0.023$ failures per month. Select the requirements of reliability through 36 months in service to achieve total reliability as 0.98 using ARINC Method of Reliability Allocation. Also, check if the total reliability goal of computer is achieved. **[9]**

b) Explain the concept of redundancy. Explain any two methods of redundancy. Also, find reliabilities of these methods. **[8]**

OR

Q2) a) Apply the AGREE allocation method to a robotic system containing the following components : **[9]**

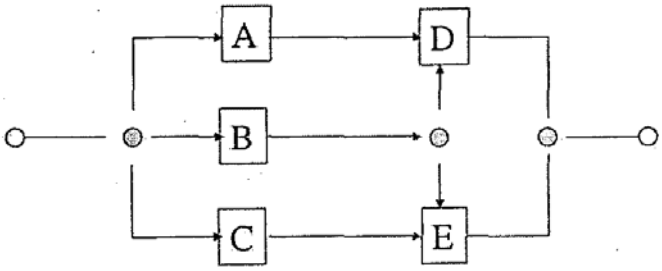
Component = C. Parts count = PC Importance index = IND Operating time hr/yr = OT

C: Control System.	PC : 153	IND : 0.95	OT : 2000
C: Motor drive.	PC : 28	IND : 0.90	OT : 1000
C: Actuation System	PC : 34	IND : 1.00	OT : 2000

The warranty program requires a reliability of 0.99 over the first year of use.

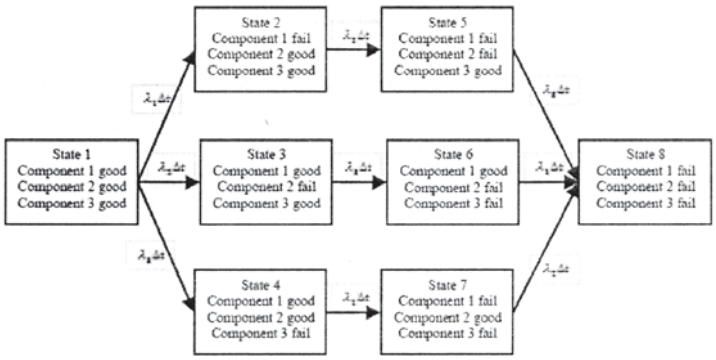
P.T.O.

b) Consider below System. Use inspection technique and find an equation for the reliability of the system if all chunks are identical and independent. **[8]**



Find the reliability of the following system if the probability of success of each component is 0.8.

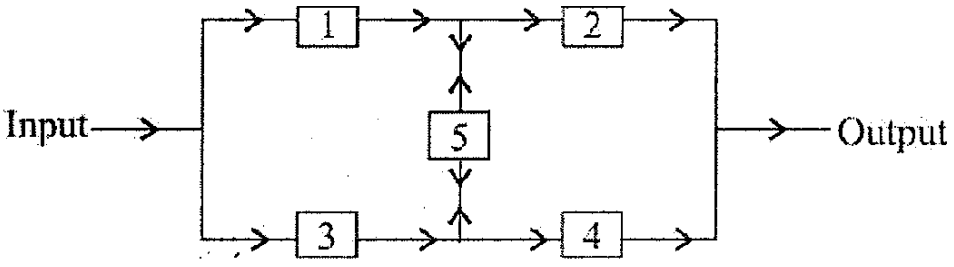
Q3) a) Find an expression of reliability using Markov Analysis Method for the 3-unit system having following transition state diagram: **[9]**



b) Find the mean time between failure for the above problem (Q.3 A) using Markov Analysis. **[9]**

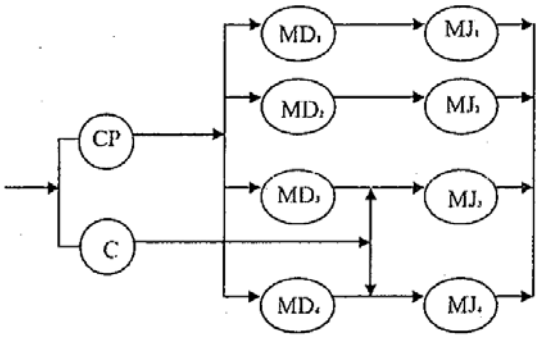
OR

Q4) a) Using the decomposition method or conditional probability approach, evaluate the reliability of the system having reliability block diagram shown in figure below: **[9]**



Assume that each component has a reliability of 0.95 for a mission of 1000 hours. Also assume that the components are independent.

b) A robotic motor system consists of a motor drive and motor joint assembly as subsystems controlling motor system. Both the subsystem must fail in order for the failure of the system. The robot control system will fail if the control panel (CP) (which includes the motor drives) or all four-motor joints fail. The motor subsystem will fail if the motor drive fails (MD_1, MD_2, MD_3, and MD_4) or the Motor Joint assembly fails (events MJ_1, MJ_2, MJ_3, MJ_4). The robotic motor system will fail if the cable system fails (event C) or both arm and wrist motor joint assemblies fail (events MJ_3, MJ_4). Find the reliability relation using decomposition method, if the reliability block diagram of the system is as shown below: **[9]**



The reliability of the cable is 0.9 and the control panel is 0.92. Find the reliability of the robotic motor system if each subsystem of motor drives has the reliability of 0.95 and of motor joints as 0.85.

Q5) a) If sampling was conducted for a worker working with for air contaminant containing heptane for two cases as below: **[9]**

Case-1 The worker worked for seven hours and the concentration for that seven hour was 500 parts per million (ppm) for a shift of 8 hours.

Case-2 The worker worked for one workspace for 2 hours with 100 ppm exposure and in another workspace for 3 hours with 200 ppm for a shift of 8 hours.

Find time weighted average for both the cases according to OSHA specification. Also check is this exposure is within the safe range if safe range of time weighted average for heptane is 400 ppm as per OSHA.

b) Explain RULA and REBA to evaluate musculoskeletal disorder. **[9]**

OR

Q6) a) Explain in detail about ISO45001 : 2018. **[9]**

b) Explain in detail about Electrical Hazards. **[9]**

Q7) a) What are Unsafe Conditions and Unsafe Act? Explain with relevant examples and case study. **[8]**

b) Explain various types of Toxicity. **[9]**

OR

Q8) a) What are various methods to avoid, control and measure hazards? Explain with relevant case study. **[8]**

b) What are Material Safety Data Sheet (MSDS) according to 29 CFR 1910.1200(g) regulation (revised 2012) of Occupational Safety and Health Administration (OSHA)? **[9]**



Total No. of Questions : 8]

SEAT No. : ____

PE5973

[Total No. of Pages : 2

[6584]-344

B.E. (Robotics & Automation)

ADVANCED COMPUTATIONAL TECHNIQUES

(2019 Pattern) (Semester - VII) (411503(A)) (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) ***Figures to the right indicate 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) Explain Shooting method for solving for solving boundary value problems with Example. **[8]**

b) An axially loaded wooden column has the following characteristics : $E = 10 \times 10^9$ pa, $I = 1.25 \times 10^{-5}$ m^4, and L = 3m. Employ the polynomial method to determine the eigenvalues for the axially loaded column using (a) one, (b) two, (c) three and (d) four interior nodes. **[10]**

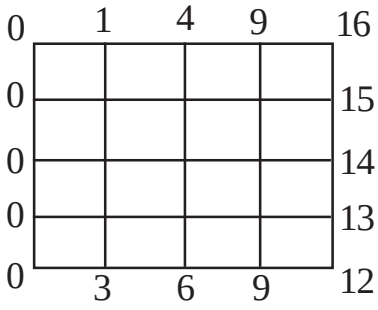
OR

Q2) a) An axially loaded wooden column has the following characteristics : $E = 10 \times 10^9$ pa, $I = 1.25 \times 10^{-5}$ m^4, and L = 3m. Determine the first eight eigen values and the corresponding buckling loads. **[12]**

b) Explain LR & QR methods with example. **[6]**

Q3) a) A steel plate of 750 × 750 mm has its two adjacent sides maintained at 100ºC. While the two other sides are maintained at 0ºC. What will be the steady state temperature at interior assuming a grid size of 250 mm. **[9]**

b) Find by Liebmann's Method the values at the interior lattice points of a square plate of the harmonic function *u* whose boundary values are given in the figure. **[8]**



OR

P.T.O.

Q4) a) Use the simple implicit finite-difference approximation to solve for the temperature distribution of a long, thin rod with a length of 10 cm and the following values : k' = 0.49 cal/(s.cm, ºC), Δx = 2 cm, and Δt = 0.1 s. At t = 0, the temperature of the rod is zero and the boundary conditions are fixed for all times at T(0) = 100ºC and T(10) = 50ºC. Note that the rod is aluminum with C = 0.2174 cal/(g.ºC) and ρ = 2.7 g/cm^3. There fore, k = 0.49/ (2.7. 0.2174) = 0.835 cm^2/s and λ = 0.835(0.1)/(2)2 = 0020875. **[10]**

b) Explain Lax Friedrichs method with example. **[7]**

Q5) a) Write a note on hp-FEM (high performance Finite Element Method). **[6]**

b) Describe the various terminologies used in the semi-implicit Moving Particle technique. Give a relevant example to illustrate. **[12]**

OR

Q6) a) Explain Smoothed-particle hydrodynamics with Example. **[10]**

b) Write a note on Moving particle semi-implicit method. **[8]**

Q7) a) Minimize $f(x) = x_1^3 + 2\,x_2^2 - 8\,x_1\,x_2$ subjected to $h(x)$; $x_2^2 - 1 = 0$ & $g(x)$; $x_1\,x_2 - 4 < 0$. **[12]**

b) Write a note on Genetic Algorithm to solve inverse Kinematic problems.**[5]**

OR

Q8) a) Solve the function of maximizing the function $f(x) = x^2$, Where x is permitted to vary between 0 & 31. **[12]**

b) Write a short note on Sequential quadratic programming method. **[5]**



Total No. of Questions : 8]

SEAT No. : ____

PE5974

[Total No. of Pages : 2

[6584]-345

B.E. (Robotics & Automation Engineering)

WIRELESS SENSOR NETWORK

(2019 Pattern) (Semester-VII) (Elective-III) (411503(B))

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

Instructions to the candidates:

1) ***All questions are compulsory i.e. Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Assume suitable additional data, if necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Neat diagrams must be drawn wherever necessary.***

Q1) a) Write a short note on physical Layer, application Layer and MAC layer in detail. **[9]**

b) Explain the terms wibree, ANT, BLE, Zwave in detail with respect to wireless sensors network. **[9]**

OR

Q2) a) Explain IEEE802.15.4 low rate wpan in detail with suitable diagram. **[9]**

b) What is zigbee? Why we need it? Explain zigbee architecture in detail. **[9]**

Q3) a) What is mean by routing? Explain link state routing in detail. **[9]**

b) Write notes on: **[9]**

i) Distance Vector Routing Protocols

ii) Proximity Schemes

OR

Q4) a) Explain the following terms in detail: **[9]**

i) Received Signal Strength Indicator (RSSI)

ii) Time of Flight (ToF)

iii) Time Difference of Arrival (TDoA)

iv) Multilateration

b) Explain location based routing in detail along with example. **[9]**

P.T.O.

Q5) a) Which kind of security requirements do we need in WSN? **[8]**

b) Explain different security issues present in WSN. **[9]**

OR

Q6) a) What is mean by in network processing? Explain data aggregation in detail. **[8]**

b) What is threat model? Why we need threat model in WSN? Explain any 5 components of threat model in detail. **[9]**

Q7) a) Explain various stages involved while designing and deploying WSN applications. **[8]**

b) Explain general testing and validation process for WSN applications in detail. **[9]**

OR

Q8) a) Explain Bottom-Up Implementation Process in detail along with diagram. **[8]**

b) Write notes on Home automation. **[9]**



Total No. of Questions : 8]

SEAT No. : ____

PE2404

[Total No. of Pages : 2

[6584]-346

B.E. (Robotics & Automation Engineering)

MICROPROCESSOR AND MICROCONTROLLER

(2019 Pattern) (Semester - VII) (411503C) (Theory) (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) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable data, if necessary.***

Q1) a) Define Baud rate of 8051. Explain Memory organization with RAM & ROM. **[8]**

b) Explain the Features of 8051 microcontroller. Write down all instruction set of 8051 and explain with example. **[9]**

OR

Q2) a) Analyze the architecture of 8051 microcontroller along-with a suitable block diagram. **[8]**

b) Illustrate the addressing modes of 8051 microcontroller. Support your answer with suitable examples. **[9]**

Q3) a) Analyze the architecture of PIC18FXX microcontroller along-with a suitable block diagram. **[9]**

b) Comparison of the PIC family. **[8]**

OR

Q4) a) Explain **[8]**

i) Configuration registers and oscillator options (CONFIG)

ii) Bank selection using BankSelect Register.

b) Illustrate the Instruction set of PIC18FXX microcontroller. Support your answer with suitable examples. **[9]**

P.T.O.

Q5) a) Draw the interfacing diagram of Seven segment LED with Cortex M4 based microcontroller. Also write basic algorithm used for this interfacing. **[9]**

b) Explain STM32F4xx : Timer and Delay Generation. **[9]**

OR

Q6) a) Explain STM32F4xx : On chip ADC and On chip DAC for waveform generation. **[9]**

b) Write down concept of GPIO programming. **[9]**

Q7) a) Write down short note on Home automation Design Using Microcontroller. **[9]**

b) Explain in details Mobile Robot Analysis and control for Pipe Line Inspection. **[9]**

OR

Q8) a) What is interrupt driven data transfer? Is it a form of programmed data transfer or not? While writing an interrupt service subroutine, what special features are usually incorporated extra in comparison to a normal subroutine? Justify. What is the difference in execution of RET and IRET instructions? **[9]**

b) Write down application of Multipath Servo in Industrial Robot Control System & Explain the any one application with Example. **[9]**



Total No. of Questions : 8]

SEAT No. : ____

PE2405

[Total No. of Pages : 2

[6584]-347

B.E. (Robotics & Automation Engineering)

ERGONOMICS AND WORK MANAGEMENT

(2019 Pattern) (Semester - VII) (411503D) (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) ***Figures to the right side 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) Describe the principles of applied anthropometry and illustrate how these principles are used in the ergonomic design of a workstation. **[9]**

b) What are the major types of anthropometric measurements? How are these used in the design of industrial workspaces? **[9]**

OR

Q2) a) Describe various types of displays with neat sketch. **[9]**

b) Discuss the effect of the following on human performance in work: **[9]**

i) Illumination

ii) Dust

Q3) a) Explain the stages of design research and their importance in consumer product development. **[9]**

b) How human factors and ergonomics is addressed in design process? **[8]**

OR

Q4) a) Explain the framework for integrating environmental issues in ergonomics. **[9]**

b) Write short notes on the importance of addressing cultural ergonomics in consumer product design. **[8]**

P.T.O.

Q5) a) What is Lean Manufacturing? Discuss its core principles and explain how it helps in eliminating waste in production. **[9]**

b) What is method study? Describe its steps and explain how it contributes to work simplification and efficiency improvement. **[8]**

OR

Q6) a) Define Kanban. How does it function in a pull production system? Explain its benefits and limitations. **[9]**

b) Explain micro-motion study in detail. How does it differ from time study? **[8]**

Q7) a) What are the various types of personal protective equipment (PPE)? Discuss how appropriate selection and use of PPE can prevent workplace injuries. **[9]**

b) Write detailed notes on accident prevention, causes of accidents, and the economic and human costs associated with industrial accidents. **[9]**

OR

Q8) a) Elaborate on the roles of management and government in ensuring industrial safety. How do their actions complement each other? **[9]**

b) Explain the structure and function of a safety committee in an industrial organization. How does it contribute to accident prevention? **[9]**



Total No. of Questions : 8]

SEAT No. : ____

PE2406

[Total No. of Pages : 2

[6584]-348
B.E. (Robotics and Automation)
COMPUTATIONAL FLUID DYNAMICS
(2019 Pattern) (Semester - VII) (411504A) (Elective - IV)

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

Instructions to the candidates:

1) ***Answer the Q1. or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Use of scientific calculator is allowed.***
3) ***Figures to the right indicate full marks.***

Q1) a) Explain the basic concepts of the Finite Volume Method (FVM) and its advantages over other numerical methods such as the Finite Difference Method (FDM)? **[9]**

b) Develop the finite volume discretization for a 2-D steady-state diffusion problem with a non-uniform mesh. Highlight how the flux balance is maintained across all control volumes in the domain? **[9]**

OR

Q2) a) Illustrate the process of setting up the Finite Volume Method for a 2-D steady-state diffusion problem. Include a discussion on how the fluxes across control volume faces are treated in the formulation? **[9]**

b) Describe the types of boundary conditions encountered in FVM and how each type (Dirichlet, Neumann, and mixed) is implemented in a computational grid. Provide suitable examples for each type? **[9]**

Q3) a) Compare the Primitive Variable approach with the Stream Function-Vorticity approach for solving fluid flow problems. **[9]**
Discuss the circumstances under which each method is more appropriate.

b) **[8]**

OR

Q4) a) Explain the process of discretizing the momentum equation in the context of the Finite Volume Method. Discuss the significance of ' integrating the equation over control volumes and handling convective and diffusive fluxes? **[9]**

b) Explain the PISO (Pressure-Implicit with Splitting of Operators) algorithm and how it improves upon the SIMPLE and SIMPLEC algorithms for unsteady flow problems. Discuss its iterative steps and how it handles pressure-velocity coupling? **[8]**

P.T.O.

Q5) a) Discuss the process and advantages of automatic generation of unstructured grids. What are some of the challenges associated with using unstructured grids in CFD. **[9]**

b) Explain the concept of a multi-block grid system. How does it help in managing complex geometries and ensuring grid quality in CFD simulations? **[8]**

OR

Q6) a) Define a computational grid in the context of CFD and explain its role in the numerical solution of fluid flow and heat transfer problems. Why is grid quality important for accurate simulations? **[9]**

b) List and describe different types of grid elements (e.g.. hexahedral. tetrahedral. prismatic). Discuss how the choice of grid element affects the accuracy and computational cost of a CFD simulation? **[8]**

Q7) a) Describe how CFD is applied for heat transfer and thermal management simulations. Discuss its importance in designing systems with efficient cooling and heating mechanisms, providing examples of relevant applications. **[9]**

b) What are the current limitations of CFD in terms of simulation accuracy and computational cost? Discuss potential future developments that may help overcome these limitations and improve CFD's effectiveness in engineering analysis? **[9]**

OR

Q8) a) Discuss the use of CFD in simulating the flow and pressure dynamics in pipes and valves. Explain how this application can be used to optimize the design of fluid transport systems and ensure their operational safety?**[9]**

b) Explain the application of CFD in simulating electronics cooling, focusing on how it helps manage thermal loads in devices such as data centers. computers. and consumer electronics. What are the main challenges and solutions in these simulations? **[9]**



Total No. of Questions : 8]

SEAT No. :

PE2407

[Total No. of Pages : 2

[6584]-349
B.E. (Robotics & Automation Engineering)
INTERNET OF THINGS AND MACHINE LEARNING
(2019 Pattern) (Semester - VII) (Elective - IV) (411504B)

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) ***Figures to the right indicate full marks.***
4) ***Neat diagrams must be drawn wherever necessary.***

Q1) a) Explain role of API in IOT Data Storage & Retrieval. **[9]**

b) Explain the concept of Databases connectivity with IOT along with its uses. **[9]**

OR

Q2) a) Explain the terms : data integration, Data storage, data retrieval, data transformation in detail with respect to API. **[9]**

b) What is Ipython Module? Why we need it in IOT? Explain various steps involved in it in detail. **[9]**

Q3) a) Explain various Association Rules while Learning ML. **[9]**

b) Enlist in detail different clustering techniques used in ML. **[9]**

OR

Q4) a) Explain difference between Artificial Intelligence and Machine Learning in detail. **[9]**

b) Explain steps involved while gathering and pre-processing of data in ML. **[9]**

Q5) a) Explain how we post sensors data to web server in detail. **[8]**

b) What is ESP8266? Explain working flow of ESP8266 Wi-Fi Module in detail. **[9]**

OR

P.T.O.

Q6) a) Explain various Wi-Fi library components that we used in ESP8266 WiFi module. **[8]**

b) Explain processing of Arduino IDE while Networking with ESP8266 WiFi module in detail. **[9]**

Q7) a) Explain concept of smart metering with respect to IOT in detail. **[8]**

b) Explain the working of e-Health Body Area Networks with respect to patient movement trackers in detail. **[9]**

OR

Q8) a) Explain role of Iot/IIoT in smart City in detail. **[8]**

b) Explain role of IOT in Agriculture - crop health monitoring and automating the irrigation system. **[9]**



Total No. of Questions : 8]

SEAT No. :

PE2408

[Total No. of Pages : 2

[6584]-350

B.E. (Robotics & Automation)

ARTIFICIAL NEURAL NETWORKS AND FUZZY SYSTEM

(2019 Pattern) (Semester - VII) (411504C) (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) ***Assume suitable data, if necessary.***

Q1) a) Explain convergence rule in neural network. Why its study is essential. **[9]**

b) Differentiate single layer and multi-layer feed forward network. **[8]**

OR

Q2) a) Discuss various factors affecting on back propagation training. **[9]**

b) Explain hetroassociative memory. How it is different from autoassociative memory. **[8]**

Q3) a) Write development stages of fuzzy logic. **[9]**

b) Brief on fuzzy set theory and its operations in detail. **[8]**

OR

Q4) a) Classify various properties of fuzzy sets. **[9]**

b) Explain fuzzy to crisp relations. **[8]**

Q5) a) What are fuzzy if then rules? Explain it. **[9]**

b) Why membership functions are important? Explain types of membership function. **[9]**

OR

P.T.O.

Q6) a) Elaborate fuzzification. Elaborate it in detail. **[9]**

b) Brief on stages of generating fuzzy algorithm. **[9]**

Q7) a) What is fuzzy rule base and approximate reasoning? How to impellent it? **[9]**

b) Explain implementation of fuzzy logic in washing machine. **[9]**

OR

Q8) a) What is fuzzy interference system? Explain in detail. **[9]**

b) Why concept of Operations of Fuzzy Relation is essential? Elaborate it. **[9]**



Total No. of Questions : 8]

SEAT No. :

PE2409

[Total No. of Pages : 2

[6584]-351
B.E. (Robotics & Automation)
POWER ELECTRONICS AND DRIVES
(2019 Pattern) (Semester - VII) (411504D) (Elective - IV) (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.***
2) ***Assume suitable data, if necessary.***
3) ***Figures to the right side indicates full marks.***
4) ***Neat diagrams must be drawn wherever necessary.***

Q1) a) A step-up chopper has input voltage of 220 V and output voltage of 660 V. If the non-conducting time of thyristor-chopper is 100μs, compute the pulse width of output voltage. **[9]**

b) With the help of a neat circuit diagram and associated waveforms, discuss the operation of Multiphase Chopper. **[9]**

OR

Q2) a) Explain in detail control strategies of DC-DC Chopper **[9]**

b) A Step Down DC chopper has a resistive load of R=15 ohm and Input voltage Edc=200V. When the chopper remains ON, its voltage drop is 2.5V.The chopper frequency is 1kHz.If the duty cycle is 50%, determine: **[9]**

i) Average Output Voltage
ii) RMS Output Voltage
iii) Chopper Efficiency

Q3) a) Explain the definition of Inverter also explain in- detail classification of thyristor Inverters according to method of commutation & According to the connections. **[9]**

b) With the help of neat circuit diagram and associated waveforms, explain the operation of single-phase half bridge Voltage Source Inverter with (i) Resistive Load and **[9]**

OR

Q4) a) Compare between Voltage Source Inverter & Current Source Inverter.**[9]**

b) A single phase bridge inverter delivers power to a series connected RLC load with R=2Ω, and wL=10Ω.The periodic time T=0.lmsec. What value of C should the load have in order to obtain load commutation for the SCRs. The thyristors turn off time is 10 μsec. Take circuit turn off time as 1.5tq.Assume that load current contains only fundamental component. **[9]**

P.T.O.

Q5) a) Describe the operation of single-phase Half -wave A.C voltage regulator with R Load, the help of voltage and current waveforms. **[8]**

b) Describe the operation of single phase to single phase step Down cyclo-converter for Discontinuous Load current & with neat power-diagram and voltage and current waveforms. **[9]**

OR

Q6) a) A single phase voltage controller feeds power to a resistive load of 3Ω from 230 V, 50 Hz Source. Calculate: **[9]**

i) the maximum values of average and rms thyristor currents for any firing angle α,

ii) the minimum circuit turn-off time for any firing angle α,

iii) the ratio of third-harmonic voltage to fundamental voltage for $\alpha=\pi/3$.

b) Describe the operation of single-phase Full-wave A.C voltage regulator with R Load, the help of voltage and current waveforms. Also derive the expression for average value of output voltage. **[8]**

Q7) a) Draw & Explain the operation of single-phase, semi- converter drive. Also, draw the voltage and current waveforms with average output voltage equation. **[9]**

b) Explain in detail classification of Electrical Drives. **[8]**

OR

Q8) a) Draw & Explain the operation of single-phase, Full- converter drive. Also, draw the **[9]**

i) Circuit diagram

ii) Two Quadrant diagram

iii) Output waveforms

b) Explain with diagram different methods of speed control Three phase Induction motor through Voltage source Inverter. **[8]**

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Total No. of Questions : 8]

SEAT No. :

PE5099

[Total No. of Pages : 2

[6584]-353
B.E. (Electronics and Computer)
VLSI DESIGN & TECHNOLOGY
(2019 Pattern) (Semester - VIII) (410351)

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 whenever necessary.***
3) ***Assume suitable data, if necessary.***
4) ***Use of non-programmable scientific calcutator is allowed.***

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) What is clock skew and clock jitter? Explain clock distribution techniques. **[9]**

b) Explain in detail about the Block Placement and channel definition. **[8]**

OR

Q4) a) Explain Global Routing and Switchbox Routing in detail. **[9]**

b) Explain in detail about I/O Architectures and Pad Design. **[8]**

Q5) a) Explain fast carry chains and cascade carry chains in FPGA with neat sketch. **[9]**

b) Describe the need of boundary scan? Explain boundary scan techniques in detail. **[9]**

OR

Q6) a) Explain with suitable example how to use the Shannon's decomposition to implement function. **[9]**

b) Sketch the block diagram of TAP controller and explain it in detail. **[9]**

P.T.O.

Q7) a) Draw stick diagram and layout of 2 input NAND gate. List down different layout editors/tools available in VLSI Design. **[9]**

b) What is Scaling? Explain the effect of any one type of scaling on various parameters like channel length, width power dissipation, capacitances.**[9]**

OR

Q8) a) Describe design rules available in Layout Design. Explain design rules for NMOS. **[9]**

b) Implement 4 :1 multiplexer using **[9]**

i) CMOS Logic

ii) Pass Transistor logic



Total No. of Questions : 8]

SEAT No. :

PE2410

[Total No. of Pages : 2

[6584]-354

B.E. (Electronics & Computer Engineering)

CLOUD COMPUTING

(2019 Pattern) (Semester - VIII) (410352 - A) (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, Q.7 or Q.8,***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data, if necessary.***

Q1) a) Write a note on LAMP, LAPP, XML and JSON. **[8]**

b) Describe the OAuth authentication framework and its role in secure access to web APIs and other services. **[8]**

OR

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

Google AppEngine

Amazon web services

b) What are the key features of SQL Azure and how does it differ from traditional SQL? **[8]**

Q3) a) Describe the design principles and performance characteristics of DynamoDB. **[9]**

b) Write a note on cloud file system with architectures. **[9]**

OR

Q4) a) Describe the importance of business continuity and disaster recovery (BCDR) planning in cloud environments. **[9]**

b) Explain Bigdata architecture with suitable diagram. **[9]**

Q5) a) With neat suitable conceptual diagram explain the smart power grid application of IoT. **[9]**

b) Write a note on Online Social and Professional Networking. **[9]**

OR

P.T.O.

Q6) a) Write a note on Supply-Chain Management -application of IoT. **[9]**

b) Explain any three enabling technologies of IoT **[9]**

Q7) Write a short note on: **[18]**

a) The Future of Cloud TV

b) Autonomic Cloud Engine

c) Energy Aware Cloud Computing

OR

Q8) a) Write a note on Location-Aware Applications & Intelligent Fabrics, Paints application of cloud. **[9]**

b) Draw the Docker architecture and explain the components. **[9]**

Total No. of Questions : 8]

SEAT No. :

PE5100

[Total No. of Pages : 2

[6584]-356

B.E. (Electronics & Computer Engineering)

SOFTWARE TESTING AND QUALITY ASSURANCE

(2019 Pattern) (Semester - VIII) (410352 C) (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 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 design and architecture for Automation. **[7]**

b) What is Test Automation and Terms used in Automation? **[6]**

c) What are the differences in testing automation in agile and waterfall model? **[4]**

OR

Q2) a) Explain the challenges in Automation and data driven testing. **[7]**

b) What are some of the challenges in automating the testing of GUI portions of an application? Compare backend testing and frontend testing. **[6]**

c) What is the Generic requirement for the Test Tool? **[4]**

Q3) a) Explain the test design considerations. **[5]**

b) What is Selenium? What are the different selenium components? **[7]**

c) Write a short note on **[6]**

i) Selenium RC

ii) Selenium Web-driver

OR

P.T.O.

Q4) a) Describe Selenium Web driver architecture with the help of a neat diagram. List the advantages of web driver over selenium server. **[9]**

b) Why should one select selenium as a test tools? What are selenium test design considerations? **[9]**

Q5) a) Explain the formal Approaches of SQA. **[4]**

b) What is six sigma? Explain the terms DMAIC and DMADV. **[7]**

c) Explain the ISO 9000 Quality Standards and SQA Plan. **[6]**

OR

Q6) a) Define software quality assurance, list various objectives of SQA and explain elements of SQA. **[9]**

b) What is ISO standard? What are advantages and limitations of ISO standard? **[8]**

Q7) a) What are Ishikawa's 7 basic tools for quality improvement? Provide a brief overview of each tool and its application. **[9]**

b) Explain total quality management (TQM). List out benefits of TQM. **[9]**

OR

Q8) a) Explain with example software maintenance metric: **[9]**

i) Fix backlog and backlog maintenance index

ii) Percent Delinquent fixes

b) List out in process quality Metrics. Explain any two quality metrics in detail. **[9]**

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Total No. of Questions : 8]

SEAT No. :

PE5101

[Total No. of Pages : 2

[6584]-359

B.E. (Electronics & Computer Engineering)

ELECTRIC VEHICLE TECHNOLOGY

(2019 Pattern) (Semester - VIII) (410353B) (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) ***Figures to the right indicate full marks.***
4) ***Use of Calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Describe the architecture of electric drive trains and compare various electric drivetrain topologies. Explain how power flow is managed in these topologies for effective vehicle performance. **[9]**

b) Compare the working principles of DC motors, induction motors and BLDC motors used in EVs. **[8]**

OR

Q2) a) Explain the function of controllers in electric vehicle drives. How do controllers contribute to optimizing performance, efficiency and safety in EVs? **[9]**

b) Compare various electric drivetrain topologies such as series, parallel and series - parallel. **[8]**

Q3) a) Explain the energy storage requirements in electric vehicles. Why is energy storage essential for EVs, and what major performance criteria determine the choice of suitable energy storage systems? **[9]**

b) Explain the concept and importance of a Vehicle Battery Management System (BMS). Draw a block diagram and discuss its functions in ensuring battery safety, efficiency, and longevity. **[9]**

OR

Q4) a) Describe different types of battery cells used in EVs, - Lead Acid, Lithium-ion and NiMH. Compare their specifications, advantages and limitations for electric vehicle applications. **[9]**

b) Describe the necessity, advantages and specifications of super capacitors and hydrogen fuel cells in EVs. **[9]**

P.T.O.

Q5) a) Explain the basics of battery charging in electric vehicles. Discuss the types of charging, their functions and key factors to be considered in charger design. **[9]**

b) Describe the significance of electrical protection and system requirements in electric vehicles (EVs). What key factors must be considered to ensure safety, reliability and efficiency in EV electrical systems? **[8]**

OR

Q6) a) Explain over-current, over-voltage, short-circuit, isolation, and thermal protections used in electric vehicle architecture. Why are these protections essential for safe EV operation? **[9]**

b) Describe the design of photovoltaic solar-based electric vehicles. Explain how solar energy is integrated into EVs and its impact on performance and energy efficiency? **[8]**

Q7) a) Analyze common troubleshooting methods in EV drive trains and batteries. Explain the maintenance practices necessary to ensure reliability and longevity of electric vehicles. **[9]**

b) Analyze the role of maintenance, Safety measures, and technological advances in addressing EV challenges. Explain how innovations in batteries, chargers, and power systems improve efficiency and user experience? **[9]**

OR

Q8) a) Explain how power semiconductors are selected for EV charging and infrastructure applications. What role do reliability, efficiency, and thermal management play in choosing suitable semiconductor devices for high-power systems? **[9]**

b) Draw and explain the single-line diagram (SLD) of a typical EV charging infrastructure, highlighting the power flow and protection devices. **[9]**



Total No. of Questions : 8]

SEAT No. : ____

PE2411

[Total No. of Pages : 2

[6584]-360
B.E. (Electronics & Computer Engineering)
SOFTWARE DEFINED RADIO
(2019 Pattern) (Semester - VIII) (410353 C) (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.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain the need of channelization & sample rate conversion. **[6]**

b) Explain interpolation & Decimation in Multi - Rate signal processing. **[6]**

c) Explain applications of Multirate DSP. **[6]**

OR

Q2) a) Draw & explain block diagram of digital up conversion used in SDR. **[6]**

b) Describe the benefits & need of multirate signal processing. **[6]**

c) What is multistage decimator? Explain its benefit in large sampling rate. **[6]**

Q3) a) Explain elastic spectrum management & its benefits. **[5]**

b) Define spectrum efficiency. How it depends on various aspects of CR? **[6]**

c) Justify : Cognitive Radio Network will be the way to the next generation communication network. **[6]**

OR

Q4) a) How the cognitive radio is admitted as future of wireless sensor network. **[6]**

b) What is cognitive radio? Explain how it works. **[5]**

c) Describe the applications of cognitive radio. **[6]**

P.T.O.

Q5) a) Explain the term "Statistical characterisation of node locations". **[5]**

b) Give the details of spatial statistics of spectrum usage in existing communication system. **[6]**

c) Draw & explain public - subscribe CRN architecture. **[6]**

OR

Q6) a) Explain architecture of spectrum sensing. **[6]**

b) Draw and explain cognitive radio network architecture. **[5]**

c) How network utilization can be achieved by using cognitive radio. **[6]**

Q7) a) Explain the challenges & issues in implementation of SDR. **[6]**

b) Explain the effect of environment & location on the estimation of parameters of SDR. **[6]**

c) Explain advance communication system with SDR. **[6]**

OR

Q8) a) Explain modes of public safety cognitive radio. **[6]**

b) Present case study of beagle board based SDR. **[6]**

c) Explain network interoperability with reference to SDR. **[6]**



Total No. of Questions : 8]

SEAT No. : [ ]

PE5102

[Total No. of Pages : 2

[6584]-361

B.E. (Electronics & Computer Engineering)

WIRELESS SENSOR NETWORK

(2019 Pattern) (Semester - VIII) (410353D) (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 wherver necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Compare contention-based and schedule-based MAC protocols. Explain their operation, advantages, disadvantages, and typical applications in WSN environments. **[9]**

b) Explain the concept of the Cross-Layer Protocol Stack in WSNs. Discuss how cross-layer design improves energy efficiency, throughput, and routing reliability in sensor network. **[9]**

OR

Q2) a) Discuss the IEEE 802.15.3 high-rate WPAN standard. Explain its superframe structure, channel access mechanisms, and applications in comparison with IEEE 802.15.4. **[9]**

b) Explain the Wireless HART standard. Discuss its network architecture, communication model, reliability, and suitability for industrial WSN applications. **[9]**

Q3) a) Define Localization in WSN. Explain the need for localization, and discuss its major challenges and essential properties. **[9]**

b) Differentiate between Range-Based and Range-Free Localization techniques. Discuss their advantages, limitations, and typical use cases.**[8]**

OR

P.T.O.

Q4) a) Explain the Collection Tree Protocol (CTP) used in WSNs. Discuss its working principle, routing metrics, and advantages for data collection applications. **[9]**

b) Explain Hierarchical Routing in WSN. Discuss its benefits in terms of scalability, energy efficiency, and network lifetime. **[8]**

Q5) a) Explain the major security issues and challenges faced by WSNs due to limited resources, mobility, and hostile deployment environments. **[9]**

b) Explain the defensive measures used to protect WSNs from security attacks. Discuss cryptographic techniques, key management, secure routing, and intrusion detection methods. **[9]**

OR

Q6) a) Describe any four types of security attacks in WSNs. Explain their working, impact on network performance, and possible detection methods. **[9]**

b) What is a WSN threat model? Describe different threat levels, attacker capabilities, and security assumptions used when designing secure WSN systems. **[9]**

Q7) a) Differentiate between Ad-hoc Networks and Wireless Sensor Networks in terms of architecture, goals constraints, and applications. **[9]**

b) Discuss the use of WSNs in Military and Smart Home Applications. Highlight the architecture and importance of sensor nodes in each case.**[8]**

OR

Q8) a) Explain the application of WSN in Air Pollution Monitoring. Draw the block diagram and describe its working. **[9]**

b) Explain following WSN applications in detail with block diagrams : **[8]**

i) Patient Health Monitoring.

ii) Weather Sensing & Monitoring



Total No. of Questions : 8]

SEAT No. :

PE2412

[Total No. of Pages : 2

[6584]-362
B.E. (Electronics & Computer Engg.)
DATA SCIENCE AND VISUALIZATION
(2019 Pattern) (Semester - VII) (410341)

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) ***Assume suitable data, if necessary.***

Q1) a) What is classification. Explain the Naïve Bayes classifier with example **[8]**

b) What is clustering. Compare Clustering and Regression in details. **[9]**

OR

Q2) a) Explain the simple linear regression model in detail with suitable example. **[8]**

b) What is Clustering. Explain DBSCAN in Detail and compare it with K-means Clustering. **[9]**

Q3) a) Write a short Note on: **[8]**

i) GiNi Index
ii) Entropy
iii) Random forest

b) What is Decision Tree. Construct Decision Tree with suitable example. **[9]**

OR

Q4) a) Write a short note on: **[8]**

i) Feed forward and Back Propagation
ii) MapReduce

b) What is CAPTCHA? Explain CAPTCHA Defeat and techniques to prevent automated CAPTCHA Defeat. **[9]**

Q5) a) Explain Box plot in details and how it is used in outliers detection and removal. **[9]**

b) Explain following plots: **[9]**

i) Histogram
ii) Bar Graph
iii) Scatter Plot
iv) Heatmap

OR

P.T.O.

Q6) a) Explain Need of Dashboards and designing principles of dashboards. **[9]**

b) What is Heatmap. Explain its uses and compare it with correlation and covariance. **[9]**

Q7) a) What is Multidimensional Explain advantages and disadvantages of multidimensional data modeling. **[9]**

b) Explain following: **[9]**

i) Principal Components Analysis

ii) Sammon's mapping,

OR

Q8) a) Explain Clustering High dimension data and its various types. **[9]**

b) Explain following techniques of multivariate data visualization **[9]**

i) Scatter Plot Matrix

ii) Permulation matrix

iii) Parallel Coordinates Chart.

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Total No. of Questions : 8]

SEAT No. : [ ]

PE2413

[Total No. of Pages : 2

[6584]-363

B.E. (Electronics and Computer Engineering)

WEB TECHNOLOGY

(2019 Pattern) (Semester - VII) (410342)

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) ***Assume suitable data, if necessary.***

Q1) a) Explain features of Java script. How to create array and read elements in Java script. **[9]**

b) What are the various JavaScript objects? Explain any one with an example. **[8]**

OR

Q2) a) What are the different DOM Levels? Explain Document Object Model (DOM) with suitable example? **[9]**

b) What are Jquery Events, explain with example. **[8]**

Q3) a) Write a JSP program to demonstrate use of page directive, Scriplet Expression and Comment. **[8]**

b) Explain various JSP scripting elements, actions and Templates in JSP. **[9]**

OR

Q4) a) Write advantages of JSP over servlet and explain lifecycle of JSP. **[8]**

b) Explain the Strut architecture with neat diagram and also explain the benefits of Strut. **[9]**

P.T.O.

Q5) a) Explain how session and cookies are used for session management in PHP? **[9]**

b) What are the features of PHP? Explain the function with respects to PHP. **[9]**

OR

Q6) a) What is Associate arrays in PHP? Explain it with simple PHP code. **[9]**

b) What is purpose of AJAX? Explain with relevant example? **[9]**

Q7) a) Write short note on Bootstrap? Write a program to demonstrate button styles (warning, danger, Default, Primary, link, success)? **[9]**

b) Draw and explain each tier of three tiers architecture using EJB. **[9]**

OR

Q8) a) List the difference between entity bean and session bean? Explain the callback method? **[9]**

b) What are the different types of EJB? Identify and explain situations about when to use session beans. **[9]**



Total No. of Questions : 8]

SEAT No. :

PE2414

[Total No. of Pages : 2

[6584]-364

B.E. (Electronics & Computer Engineering)

INTERNET OF THINGS

(2019 Pattern) (Semester - VII) (410343)

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) What is WSN? Elaborate challenges of WSN? **[6]**

b) Explain in detail Amazon development environment for services. **[6]**

c) Compare IaaS, PaaS and SaaS. **[8]**

OR

Q2) a) Draw and explain the basic architecture of cloud computing. **[6]**

b) Explain in detail Azure development environment for services. **[6]**

c) List out the applications of WSN. With the help of neat diagram explain any one application of WSN. **[8]**

Q3) a) Write a program for interfacing of LCD sensor with Arduino board along with its interfacing diagram. **[8]**

b) What is Raspberry Pi. Write a program for interfacing of LED to Raspberry Pi along with its interfacing diagram. **[8]**

OR

Q4) a) What is PIR Sensor. Draw interfacing diagram and write a program for PIR sensor interfacing to Arduino board. **[8]**

b) What is Ultrasonic sensor. Write a program for interfacing of ultrasonic sensor to Raspberry Pi along with its interfacing diagram. **[8]**

Q5) a) Along with diagram explain Hadoop technology in detail. Also list out its features. **[8]**

b) Explain in detail data analytics using any open source platform. **[8]**

OR

P.T.O.

Q6) a) Draw and explain in detail architecture of Big data Solution. **[8]**

b) Elaborate the term Big Data along with its types. Explain in detail modern corporate need of BD strategy. **[8]**

Q7) a) Explain case study of Smart Healthcare monitoring using IoT with neat diagram. **[9]**

b) Along with diagram explain how IoT is playing an important role for Smart Cities development. **[9]**

OR

Q8) a) Write short note on Industrial standards in IoT. **[9]**

b) Explain case study of Air pollution monitoring using IoT with neat diagram. **[9]**



Total No. of Questions : 8]

SEAT No. : ____

PE2415

[Total No. of Pages : 2

[6584]-365

B.E. (Electronics & Computer Engineering)

BIG DATA & ANALYTICS

(2019 Pattern) (Semester - VII) (410344A) (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) ***Figures to the right side indicate full marks.***
3) ***Assume suitable data, if necessary.***

Q1) a) Explain Hadoop distributed file system. **[8]**

b) Compare SQL and NoSQL Databases with example. What is the need to develop big data applications using NoSQL data bases? **[9]**

OR

Q2) a) What is Hadoop architecture? Explain each component with the help of diagram. **[8]**

b) What is Map reduce? Explain the working of mapper and reducer with example. **[9]**

Q3) a) Why is R used? Write a user defined function to calculate a cube of a given number in R. **[8]**

b) List and explain the steps in discovery phase of data analytics life cycle. **[9]**

OR

Q4) a) Explain different steps in Data Analytics Project Life cycle. **[8]**

b) Explain the terms data cleaning and data transformation with the help of example. **[9]**

P.T.O.

Q5) a) Describe different types of data visualization. **[9]**

b) Write a short note on : **[9]**

i) Google chart API

ii) Scatter plot

iii) Gephi

iv) cloudera

OR

Q6) a) List the conventional Data Visualization Tools. Explain any two. **[9]**

b) Explain challenges in Big data visualization. Write two data visualization functions from matplotlib. **[9]**

Q7) a) How does social media Analytics help in value creation? Explain with suitable example. **[9]**

b) Explain roles and responsibilities of big data analyst and data scientist.**[9]**

OR

Q8) a) Explain the text mining process with examples. **[9]**

b) What is social media analytics? Explain its need with sample case study. Explain Data Scientist role and responsibilities with suitable diagrams.**[9]**



Total No. of Questions : 8]

SEAT No. : [ ]

PE2416

[Total No. of Pages : 2

[6584]-366

B.E. (Electronics and Computer Engineering)

MOBILE APPLICATION DEVELOPMENT

(2019 Pattern) (Semester - VII) (410344B) (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 wherver necessary.***
3) ***Assume suitable data, if necessary.***
4) ***Figures to the right indicate full marks.***

Q1) a) What are the key considerations when designing user interfaces for mobile devices compared to desktop or web platforms? **[9]**

b) Describe the process of drawing in Android applications. How can custom drawing be implemented, and what are its advantages? **[8]**

OR

Q2) a) Define what User Interface (UI) Screen elements are in the context of Android development. Provide examples of commonly used UI screen elements. **[9]**

b) Explain the importance of designing user interfaces with layouts in Android development. Describe at least three different types of layouts and when they are typically used. **[8]**

Q3) a) Describe the purpose and usage of Android preferences in application development. How can developers implement user preferences using Shared preferences and Preference Activity? **[9]**

b) Discuss the concept of managing application resources in a hierarchy in Android development. Explain the role of resource qualifiers and how they enable developers to provide different resources for different device configurations. **[9]**

OR

P.T.O.

Q4) a) What are the key steps involved in testing an Android application before its release? Describe at least three different types of testing methodologies commonly used in Android development. **[9]**

b) Explain the significance of publishing Android applications on the Google Play Store. What are the prerequisites and steps involved in publishing an app on the Play Store? **[9]**

Q5) a) Explain the concept of content providers in Android and how they facilitate data sharing between applications. Provide an example scenario where a content provider would be used to share data between two apps. **[9]**

b) Discuss the various Android networking APIs available for handling network communication in Android applications. Compare and contrast the usage of Http URL Connection, Volley, and Retrofit for making requests. **[8]**

OR

Q6) a) Describe the role of Android Data and storage APIs in application development. Explain the differences between internal storage, external storage, and shared preferences. **[9]**

b) Describe the role of Android Data and Storage APIs in application development. Explain the differences between internal storage, external storage, and shared preferences. **[8]**

Q7) a) Describe the steps involved in creating a new Android project. What are the key components of an Android project structure, and how do they contribute to the development process? **[9]**

b) Explain the process of obtaining a Maps API key for integrating Google Maps into an Android application. What are the prerequisites for obtaining the API key, and how is it used in the project? **[9]**

OR

Q8) a) Discuss the role of SMS telephony in Android applications. How can developers utilize SMS features to enhance user experience or enable communication within their apps? **[9]**

b) Explain the concept of Location-Based Services (LBS) in Android development. Provide examples of how LBS can be used to deliver location-specific content or functionality to users. **[9]**



Total No. of Questions : 8]

SEAT No. :

PE2417

[Total No. of Pages : 2

[6584]-367

B.E. (Electronics and Computer Engineering)

INFORMATION AND CYBER SECURITY

(2019 Pattern) (Semester - VII) (410344C) (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 wherver necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain with Diagram functioning of SHA - 1 Algorithm. **[8]**

b) Explain man-in-the-middle attack in Diffie-Hell man key exchange. **[6]**

c) Determine value of X using Chinese remainder theorem. **[4]**

X = 1(mod 5) X = 6(mod 7) X = 8 (mod 11)

OR

Q2) a) What is digital signature? Which security goals are met by signing a document using digital signature? **[8]**

b) Perform encryption and decryption using RSA algorithm for following values p = 17, q = 11, e = 17, M = 8. **[6]**

c) What is Chinese remainder theorem? Explain with example. **[4]**

Q3) a) Define Cyber security and information security with example. **[7]**

b) Explain Social Engineering attacks. **[6]**

c) Differentiate Risk Management vs. Risk Assessment. **[4]**

OR

Q4) a) Write a short note on Indian legal perspective. **[7]**

b) Explain Qualitative Risk Analysis. **[6]**

c) Differentiate between Law and Ethics. **[4]**

P.T.O.

Q5) a) Describe briefly how IPSec works and enlist its application. Distinguish between tunnel and transport mode in IPSec. **[8]**

b) Explain X.509 standard for Digital Certificate. **[6]**

c) Differentiate between SSL and IPSec. **[4]**

OR

Q6) a) What problem was Kerberos designed to address? Describe Kerberos realm. **[8]**

b) Explain Authentication Header with Diagram. **[6]**

c) Write short note on Web Security. **[4]**

Q7) a) What is DoS and DDoS attacks? Explain with suitable example. **[7]**

b) Define and differentiate virus and worms. **[6]**

c) Write short note on phishing attack. **[4]**

OR

Q8) a) Explain Intrusion Detection System with Diagram. **[7]**

b) Write short note on keyloggers and spywares. **[6]**

c) Write short note on different ways of password cracking. **[4]**



Total No. of Questions : 8]

SEAT No. :

PE2418

[Total No. of Pages : 2

[6584]-368

B.E. (Electronics and Computer Engineering)

DIGITAL IMAGE PROCESSING

(2019 Pattern) (Semester - VII) (410344D) (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) ***Assume suitable data, if necessary.***
4) ***Figures to the right indicate full marks.***

Q1) a) Explain the MPEG compression standard and its application in video compression. How does it achieve efficient compression while maintaining video quality? **[9]**

b) Describe the process of Huffman coding and provide an example to illustrate its operation. **[8]**

OR

Q2) a) Discuss the importance of fidelity criteria in image compression and how they influence the compression process. **[9]**

b) Describe the Wavelet transform and its significance in image compression. How does it differ from the DCT? **[8]**

Q3) a) Describe thresholding techniques in image segmentation, including global and adaptive thresholding. What are their advantages and limitations? **[9]**

b) Explain the Hit-or-Miss transform and its application in detecting specific patterns or shapes within an image. **[9]**

OR

Q4) a) Discuss boundary detection techniques used in image segmentation. How do they extract the boundaries of objects in an image? **[9]**

b) Discuss point detection techniques used in image segmentation. How are the applied, and what types of features do they detect? **[9]**

P.T.O.

Q5) a) Describe notch filters and their role in removing specific frequency components from an image. How do they differ from bandpass and band reject filters? **[9]**

b) Discuss the principles of inverse filtering in image restoration. What are the limitations of inverse filtering, and how can they be addressed? **[8]**

OR

Q6) a) Describe image signatures and their role in image representation. How are signatures used to characterize image content? **[9]**

b) Discuss polygonal approximation as a method for representing image boundaries. What are its advantages and limitations. **[8]**

Q7) a) Explain the medical applications of image processing. **[9]**

b) Provide examples of applications where biometric authentication is used. How does image processing contribute to biometric authentication systems. **[9]**

OR

Q8) a) Describe different methods for representing pattern classes. What are the advantages and limitations of each representation method? **[9]**

b) Explain the concept of patterns and pattern classes. How are patterns classified based on their features? **[9]**



Total No. of Questions : 8]

SEAT No. :

PE2419

[Total No. of Pages : 2

[6584]-369
B.E. (Electronics & Computer Engineering)
ROBOTICS & AUTOMATION
(2019 Pattern) (Semester - VII) (410345A) (Elective - IV)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer the Q1. or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
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) Provide an example to illustrate the application of D-H parameters in a simple robotic manipulator with two joints. **[6]**

b) Explain the process of obtaining the forward kinematics solution for a PUMA robot. **[6]**

c) Provide a numerical example to demonstrate the application of the forward kinematics equations for a specific configuration of a SCARA robot with given joint angles and link lengths. **[8]**

OR

Q2) a) Define the key terms involved, including joint variables, end-effector position, and orientation. **[6]**

b) Provide a numerical example to illustrate the application of forward kinematics in determining the end-effector position and orientation for specific joint angles. **[6]**

c) Provide a numerical example to demonstrate the application of the forward kinematics equations for a specific configuration of a PUMA robot with given joint angles and link lengths. **[8]**

Q3) a) Discuss the significance of Inverse Kinematics and describe the challenges associated with solving inverse kinematics problems. **[8]**

b) Explain the concepts of kinetic and potential energy in the context of robot dynamics. Define the equations for kinetic energy (T) and potential energy (U) for a robotic system. **[8]**

OR

P.T.O.

Q4) a) Describe the inverse kinematics solution for a simple SCARA (Selective Compliance Assembly Robot Arm) robot. Define the robot's kinematic structure, joint variables, and end-effector pose. **[8]**

b) Explain Lagrange's Equation and its significance in the context of robot dynamics. Define the key terms : kinetic energy, potential energy, and generalized coordinates. **[8]**

Q5) a) Define the Jacobian matrix J in the context of a manipulator with revolute joints. **[4]**

b) How can the angular velocity be expressed or derived from the transformation matrix, and what role does it play in describing the rotational motion of a rigid body? **[6]**

c) Identify and define the key parameters in the trapezoidal velocity profile, such as acceleration time, constant velocity time, and deceleration time.**[6]**

OR

Q6) a) Explain the implications of a singularity on the manipulator's ability to perform certain tasks. **[4]**

b) Derive the mathematical model that relates the motor torque τ to the arm joint angle θ and the motor current I. **[6]**

c) Explore how RMPC and RMRC can be integrated to enhance the overall performance of a robotic manipulator. **[6]**

Q7) a) Explain selection criteria for Hydraulic, Pneumatic drive technology. **[9]**

b) What are the roles and advantages of Resolver, Rotary shaft encoders, Potentiometers in servo control system? **[9]**

OR

Q8) a) Explain selection criteria for stepper motor and D.C. servo motor in electric drive technology. **[9]**

b) Explain selection criterion of sensors, selection of drives and actuators, methods of control for Handling of rotary tools robot. **[9]**



Total No. of Questions : 8]

SEAT No. :

PE2420

[Total No. of Pages : 2

[6584]-370
B.E. (Electronics and Computer Engineering)
HUMAN COMPUTER INTERFACE
(2019 Pattern) (Semester - VII) (410345B) (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 whenever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain WIMP interface elements. State advantages and disadvantages of WIMP interface. **[6]**

b) Explain the execution and evaluation cycle. **[6]**

c) Describe different interaction styles used to accommodate dialog between user and computer. **[6]**

OR

Q2) a) Explain theory of user experience by Honeycomb Model. **[6]**

b) Explain paradigms of interaction design. **[6]**

c) Explain the context of interaction with an example. **[6]**

Q3) a) Explain the constraints of the software design process framework in HCI. **[9]**

b) What is prototype? Explain prototyping with hill climbing approach. **[8]**

OR

Q4) a) Explain UI layer and its execution framework. **[9]**

b) What are different types of scenarios? Write scenario for music player design. **[8]**

Q5) a) Discuss Shneiderman's 8 golden rules of interface design with an example. **[9]**

b) What are the goals of evaluation? Explain Evaluation through Expert Analysis. **[8]**

OR

P.T.O.

Q6) a) What is Usability? Explain the principles that support usability. **[9]**

b) Explain User Interface Management System (UIMS) conceptual architecture. **[8]**

Q7) a) Explain Keystroke-Level-Model (KLM). **[9]**

b) Describe a linguistic model in detail. **[9]**

OR

Q8) a) A Hierarchical Task Analysis (HTA) provides an understanding of the tasks users need to perform to achieve a certain goal. Perform HTA of the task to cook food (rice). Illustrate using diagram. **[9]**

b) Discuss applications meant for computer – mediated communication.**[9]**



Total No. of Questions : 8]

SEAT No. :

PE2421

[Total No. of Pages : 2

[6584]-371
B.E. (Electronics and Computer Engineering)
DIGITAL SYSTEM DESIGN
(2019 Pattern) (Semester - VII) (410345 C) (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.***
3) ***Assume suitable data, if necessary.***
4) ***Neat diagrams must be drawn whenever necessary.***

Q1) a) Sketch Y-Chart representation of Verilog construct supporting synthesis activity. Explain the logical synthesis in detail. **[9]**

b) $F = abc + abd + a'c'd' + b'c'd'$

Apply Espresso operation of decomposition in the above Boolean equation of F. Also sketch the schematic of function F before decomposition and after decomposition. **[8]**

OR

Q2) a) Explain the synthesis of Static loops without embedded timing controls and with embedded timing controls. **[9]**

b) Explain with suitable example about Registered logic. **[8]**

Q3) a) Sketch the state machine controllers for a datapath. Explain in detail about partitioning sequential machines into a datapath. **[9]**

b) Sketch architecture and state transition graph of a synchronous 4-bit binary counter with proper explanation. **[8]**

OR

Q4) a) Explain in detail about RISC stored-program machine. **[9]**

b) Explain in detail about UART. **[8]**

Q5) a) Explain in detail about various storage devices used in Programmable logic devices. **[9]**

b) Sketch the design flow for algorithm based synthesis of sequential machine. Explain in detail about Pipelined Adder. **[9]**

OR

P.T.O.

Q6) a) Sketch the circuit diagram and explain the operation of Programmable Logic Array (PLA). **[9]**

b) Explain in detail about Programmable ROM. Compare the various types of ROMs. **[9]**

Q7) a) Explain in detail about Postsynthesis Design Validation with example. **[9]**

b) Explain the boundary scan and JTAG ports. Also explain the operation of JTAG modes of operation. **[9]**

OR

Q8) a) Explain in details System Tasks for Timing Verification. **[9]**

b) Explain with suitable example of Circuit defect and faults. **[9]**



Total No. of Questions : 8]

SEAT No. : ____

PE2422

[Total No. of Pages : 2

[6584]-372
B.E. (Electronics and Computer Engineering)
AUGMENTED AND VIRTUAL REALITY
(2019 Pattern) (Semester - VII) (Elective - IV) (410345 D)

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) ***Assume suitable data, if necessary.***
4) ***Neat diagrams must be drawn whenever necessary.***

Q1) a) What are the problems with haptic technology. **[5]**

b) Explain the main objectives of virtual worlds? **[6]**

c) List and explain the feature of the virtual world? **[6]**

OR

Q2) a) What is representation of virtual world explain in detail? **[5]**

b) What are the two types of rendering? Explain any one in details? **[6]**

c) Explain the commonly used haptic devices in details. **[6]**

Q3) a) What is the importance of virtual reality in our daily life? **[5]**

b) What are the different substance of the Virtual World? **[6]**

c) Explain the following terms **[6]**

i) Interacting with Others - Shared Experience

ii) Collaborative Interaction

OR

Q4) a) How will virtual reality change the way we interact with the world? **[5]**

b) List and explain the device in used to experience virtual reality? **[6]**

c) Explain how to Interacting with the VR System. **[6]**

Q5) a) Explain the concepts of marker-based and marker less tracking in AR. **[5]**

b) List and explain the main benefits of AR? **[6]**

c) How does AR works? Explain. **[7]**

OR

P.T.O.

Q6) a) Compare between virtual reality and AR? **[5]**

b) Explain, what are the different constraints affect a mobile AR experience? **[6]**

c) Explain why augmented reality is the best? **[7]**

Q7) a) Explain Mobile Augmented Reality. **[5]**

b) Explain how does augmented reality work on mobile? **[6]**

c) Explain how does virtual reality help to make work experiences more? **[7]**

OR

Q8) a) Explain the different software component of Augmented system required for reality systems. **[5]**

b) Explain Software Tools for content creation. **[6]**

c) Explain in brief description of how virtual reality works? **[7]**



Total No. of Questions : 8]

SEAT No. : ____

PE2423

[Total No. of Pages : 2

[6584]-373
B.E. (Artificial Intelligence and Data Science)
COMPUTATIONAL INTELLIGENCE
(2019 Pattern) (Semester - VIII) (417530)

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 indicate full marks.***
4) ***Use of non programmable electronic calculator is permitted.***
5) ***Assume Suitable/Standard data if necessary.***

Q1) a) Define Swarm Intelligence and Explain Ant Colony Optimization algorithm. **[8]**

b) Write short note on: **[10]**

i) Evolutionary Computation versus Classical Optimization

ii) Ant Colony Optimization algorithm

OR

Q2) a) Write short note on: **[10]**

i) Tournament selection method

ii) Constraint Handling

b) What are genetic operators, and what is their role in evolutionary algorithms? **[8]**

Q3) a) Explain following Terminologies of Genetic Algorithm: **[10]**

i) Search space

ii) Genes

iii) Allele

iv) Trait

v) Genotype and Phenotype

b) Write short note on : **[7]**

i) Selection operator in Genetic Algorithm.

ii) Stopping conditions used in genetic algorithms

OR

Q4) a) What are types of mutation and cross over techniques? Explain in brief. **[6]**

b) Explain Messy Genetic Algorithms. **[6]**

c) Explain - Binary Representations, Floating Point Representations used in Genetic Algorithms. **[5]**

P.T.O.

Q5) a) Explain following Word embedding Techniques: **[8]**

i) Bag of Words

ii) TF-IDF

iii) Word2Vec

iv) GloVe

b) Explain the process of Neural Style Transfer and discuss its applications. **[5]**

c) Discuss the significance of pre-trained NLP BERT models and provide examples of their applications. **[5]**

OR

Q6) a) Describe the architecture of a Neural Machine Translation (NMT) model and discuss the role of Seq2Seq in NMT. **[9]**

b) Define BLEU Score and BERT Score as metrics for evaluating machine translation. Compare traditional metrics with neural metrics in machine translation evaluation. **[9]**

Q7) a) Describe the Network Theory Model in artificial immune systems. **[6]**

b) Describe the working of the Artificial Immune System Algorithm. **[5]**

c) Explain the concept of danger theory in the context of artificial immune systems. **[6]**

OR

Q8) a) Explain how the Clonal Selection Theory Model contributes to the development of artificial immune systems? **[6]**

b) Explain the concept of the natural immune system. Compare it with artificial immune models. **[5]**

c) Discuss the role of dendritic cells in the artificial immune system. How are dendritic cell-based models utilized in problem-solving and optimization tasks? **[6]**



Total No. of Questions : 8]

SEAT No. :

PE2424

[Total No. of Pages : 2

[6584]-374
B.E. (AIDS)
DISTRIBUTED COMPUTING
(2019 Pattern) (Semester-VIII) (417531)

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 Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicates full marks.***
4) ***Use of electronic pocket calculator is allowed.***

Q1) a) Explain ZAB in detail in the context of distributed computing. **[6]**

b) Define the concept of consensus. Explain its challenges and its importance in distributed computing. **[6]**

c) Describe the principles behind Dynamic Load Balancing in detail with benefits and challenges. **[6]**

OR

Q2) a) Compare Paxos & Raft with its use cases. **[6]**

b) Discuss the concept of fault tolerance, its types in distributed systems. Why is it important? **[6]**

c) Explain the concept of predictive load balancing in detail with its advantages and challenges. **[6]**

Q3) a) Explain in detail the concept of gradient descent algorithm with its types and its challenges in distributed computing. **[9]**

b) Explain the Data Parallelism and Model Parallelism approach with its benefits and limitations. **[8]**

OR

P.T.O.

Q4) a) Explain the motivation behind Elastic Averaging Stochastic Gradient Descent (EASGD), describe its working in detail, and discuss its applications. **[9]**

b) Write note on: **[8]**

i) Spark

ii) GraphLab

iii) TensorFlow

iv) Parallel ML system- Petuum

Q5) a) Explain Single Instruction Single Data (SISD), Multiple Instruction Single Data (MISD) and Multiple Instruction Multiple Data (MIMD). **[6]**

b) Describe the working of Apache Storm and Apache Samza. **[6]**

c) Explain Scalable Data Ingestion with advantages and challenges. **[6]**

OR

Q6) a) Define real time analytics and explain its types. **[6]**

b) Define Single Instruction Multiple Data (SIMD) and compare it with other parallel processing techniques. **[6]**

c) Describe the architecture and working of Apache Spark and Apache Hive. **[6]**

Q7) a) Explain Secure Multi-Party Computation (SMPC) with its working and its privacy preserving technique in detail. **[9]**

b) Discuss the roles and functionalities of AMQP, VPN, PKI and TLS/SSL in secure communication systems. **[8]**

OR

Q8) a) Describe the concept of anomaly detection and behaviour-based detection techniques for identifying malicious behaviour. **[9]**

b) What are the primary security challenges in distributed systems? Discuss the challenges of ensuring consistency and data integrity in a distributed environment. **[8]**



Total No. of Questions : 8]

SEAT No. :

PE2425

[Total No. of Pages : 2

[6584]-375

B.E. (Artificial Intelligence and Data Science)
VIRTUAL REALITY AND GAME DEVELOPMENT
(2019 Pattern) (Semester - VIII) (417532 - A) (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, Q.7 or Q.8.*
2) *Figures to the right indicate full marks.*
3) *Neat diagrams must be drawn whenever necessary.*
4) *Make suitable assumptions whenever necessary.*

Q1) a) Explain the various human factors involved in Virtual Reality. **[9]**

b) Evaluate the importance of testbed evaluation of universal VR tasks in assessing user performance. **[9]**

OR

Q2) a) Discuss the role of the eye, the ear, and somatic senses in human perception and how they influence the design of VR environments. **[9]**

b) What are the social implications of VR? **[9]**

Q3) a) What is level design and how does it relate to gameplay, story, and character development? **[9]**

b) Compare and contrast designer-centric and player-centric design goals in video game development. **[8]**

OR

Q4) a) Write short notes on **[8]**

i) Game Genres

ii) Gaming Platforms and Player Modes

P.T.O.

b) Detail the procedure of the game testing and what are various methods of playtesting. **[9]**

Q5) a) Illustrate the steps to install and configure blender software on Windows environment. **[9]**

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

i) Transforming objects in 2D with blender

ii) Object modifiers in blender

OR

Q6) a) Explain the process of creating a 3D animation in Blender. **[9]**

b) Distinguish with three examples of different shading techniques used in Blender. **[9]**

Q7) a) Describe the key features that distinguish virtual reality (VR) games from traditional gaming. **[9]**

b) Explain the impact of hardware limitations on the development and adoption of VR games. **[8]**

OR

Q8) a) Explain the advantages and disadvantages of VR gaming experiences compared to conventional gaming platforms. **[9]**

b) Differentiate between heuristic and non heuristic search methods of AI. **[8]**

Total No. of Questions : 8]

SEAT No. :

PE2426

[Total No. of Pages : 2

[6584]-376

B.E. (Artificial Intelligence and Data Science)

BIG DATA ANALYTICS

(2019 Pattern) (Semester - VIII) (417532 -B) (Elective-V)

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 indicate full marks.***
4) ***Use of non-programmable electronic calculator is permitted.***
5) ***Assume Suitable/Standard data if necessary.***

Q1) a) With the help of neat diagram explain the phases of Data Analytics life cysle. **[8]**

b) What are the different attribute types in data analysis, and how are they categorized? How does R handle various data types, such as numeric, character, logical, and factors? **[10]**

OR

Q2) a) What is the difference between K-means and hierarchical clustering? Which function in R is used for K-means clustering? Explain in detail. **[8]**

b) How can data analysts detect and address dirty data using visualizations and statistical techniques in R. **[5]**

c) How is MapReduce integrated with R for big data processing? **[5]**

Q3) a) How do ensemble methods such as bagging, boosting, AdaBoost, and Random Forest contribute to improving classification accuracy in machine learning models? **[10]**

b) How does the utilization of a confusion matrix aid in the evaluation and selection of Models: **[7]**

OR

P.T.O.

Q4) a) What R functions can you use to summarize a dataset? **[5]**

b) Name three common steps in data exploration. **[5]**

c) Identify signs of model overfitting based on cross-validation performance metrics. **[7]**

Q5) a) What are the challenges associated with visualizing big data, and how do these challenges impact the effectiveness and efficiency of data analysis and decision-making processes? **[10]**

b) Analyze the limitations of conventional data visualization tools when applied to Big Data. **[8]**

OR

Q6) a) Identify the key challenges faced while integrating real-time Big Data into a visualization dashboard **[8]**

b) How does Tableau facilitate effective data visualization, and what are some advanced techniques or features within Tableau that can be utilized to create insightful and interactive visulizations for complex datasets?**[10]**

Q7) a) How does the Semantria tool stremline the data collection process, and what features or capabilities does it offer that make it a valuable asset for businesses seeking to gather and analyze large volumes of unstructured data from various sources? **[10]**

b) What are the key causes of delays in a supply chain network, and how can big data analytics help isolate and address these issuse? **[7]**

OR

Q8) a) In what ways does financial data analytics leverage big data technologies to drive insights. mitigate risks and enhance decision-making processes within the financial industry? Top of Form **[10]**

b) Analyze the differences between Apache HBase and Couch DB in terms of scalability and use cases. Which scenarios favor one over the other? **[7]**

Total No. of Questions : 8]

SEAT No. :

PE2427

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[6584]-377

B.E. (Artificial Intelligence and Data Science)
SOFTWARE DEVELOPMENT FOR PORTABLE DEVICES
(2019 Pattern) (Semester - VIII) (417532 C) (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, Q.7 or Q.8.*
2) *Neat diagrams must be drawn whenever necessary.*
3) *Assume suitable data, if necessary.*
4) *Figures to the right indicate full marks.*

Q1) a) Write short Note on **[9]**

i) Location Based Services

ii) Reverse Geocoding

iii) Forward Geocoding

b) What is the use of location provider and the LocationManager class? Discuss the Finding Location Providers by Specifying Criteria. **[9]**

OR

Q2) a) Which factors we can consider while using location within the application? Using the Geocoder? **[9]**

b) What are AudioEffect subclasses are available for audio output of any Audio Track or Media Player? Explain SoundPool class is used to manage audio. **[9]**

Q3) a) Describe how to establish a connection between an Android handheld and Wear device for debugging using the Android SDK. **[9]**

b) Explain how to set up and use the Android Emulator with Wear AVD What are its limitations and advantages over real devices? **[8]**

OR

P.T.O.

Q4) a) Discuss the role of Google Play services in Android Wear development. How does it enable network communication between devices? **[9]**

b) Compare and contrast Wear debugging via Bluetooth and USB. Which method is preferable and why? **[8]**

Q5) a) Explain different Storage Options available in Android. **[9]**

b) Explain various Content Providers with example. **[9]**

OR

Q6) a) What is Google Fit and explain various applications of Google Fit. **[9]**

b) Explain Google Permission Groups and Fitness Scopes? **[9]**

Q7) a) Explain the concept of Real-world Application for Fitness, Health and Medical with an example. **[9]**

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

i) Predictive Consumer health Applications

ii) Wearable Technology with Example

OR

Q8) a) Write a detailed note on home automation as a real-world application of portable devices. Provide an Example. **[9]**

b) Write short note on Handheld Application with example. **[8]**

Total No. of Questions : 8]

SEAT No. :

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[Total No. of Pages : 2

[6584]-378
B.E. (AI & DS)
DEEP LEARNING
(2019 Pattern) (Semester - VIII) (417532 D) (Elective-V)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer four questions. 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 whenever necessary.***
3) ***Assume suitable data, if necessary.***

Q1) a) How is a Convolutional Neural Network (CNN) architecturally structured, and what specific role does each core component play within that architecture? **[9]**

b) What do the terms padding and strides refer to in CNNs, and how do they influence the size of feature maps produced by convolutional layers? **[8]**

OR

Q2) a) What is the function of the ReLU activation layer in CNNs? How does ReLU compare to other activation functions, and why is it oflen favored in convolutional architectures? **[9]**

b) Can you explain the pooling operation in CNNs and how it aids in reducing spatial dimensions? What are some typical pooling techniques, and how do they vary from one another? **[8]**

Q3) a) How are Recurrent Neural Networks (RNNs) structured, and what is meant by unfolding a computational graph? In what ways do RNNs process sequential data, and what difficulties do they encounter with long-term dependencies? **[9]**

b) What are Bidirectional RNNs and Encoder-Decoder Sequence-to-Sequence models, and how do they improve RNNs' capacity to handle intricate sequence-based tasks? **[9]**

OR

Q4) a) What are the practical approaches used to assess the performance of RNN models? Which performance metrics, baseline models, and hyperparameter tuning strategies are commonly employed in RNN evaluation? **[9]**

b) What function do Long Short-Term Memory (LSTM) networks and other gated RNN variants serve in overcoming the drawbacks of traditional RNNs? How do LSTMs preserve long-range dependencies. and what alternative methods exist for managing various time scales? **[9]**

P.T.O.

Q5) a) How is a dee generative model defined, and in what ways does it contrast with discriminative models? Could you give examples of deep generative models and their real- world applications? **[9]**

b) What is the architecture and operational principle of a Boltzmann Machine (BM)? How does the concept of energy influence learning in a Boltzmann Machine? **[8]**

OR

Q6) a) Can you describe how Generative Adversarial Networks (GANs) work, particularly the interaction between the generator and discriminator components during training? What roles do each of these networks play? **[9]**

b) What are the different types of GAN architectures available, and in which application areas have GANs shown notable effectiveness? **[8]**

Q7) a) What does deep reinforcement learning involve, and how does it build upon conventional reinforcement learning approaches? Why is it significant in intelligence and real-world problem-solving? **[6]**

b) What is a Markov Decision (MDP), and what are its essential components? How does an MDP provide the theoretical framework for reinforcement learning? **[6]**

c) Could you outline the fundamental elements of the reinforcement learning framework, including concepts such as agent, environment, actions, states, rewards, and policies? **[6]**

OR

Q8) a) What are some major obstacles in reinforcement learning, and what techniques are frequently applied to address these issues? **[6]**

b) How does Q-Learning operate, and in what ways do Deep Q-Neorks (DQNs) enhance standard Q-Learning for tackling complex tasks? **[6]**

c) How can reinforcement learning be utilized to develop a strategy for playing a basic game like Tic-Tac-Toe? What does the training and learning process entail in such a scenario? **[6]**

Total No. of Questions : 8]

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PE2429

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B.E. (Artificial Intelligence & Data Science)

AUGMENTED REALITY

(2019 Pattern) (Semester - VIII) (417533 (A)) (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) ***Make suitable assumptions if necessary.***
4) ***Figures to the right indicate full marks.***

Q1) a) Describe the working principles of Augmented Reality. Explain the key components and processes involved in creating an AR experience. **[9]**

b) Elaborate on the relationship between Augmented Reality and other technologies, including various media and enabling technologies. Provide specific examples to illustrate these interconnections. **[9]**

OR

Q2) a) Elaborate on the concepts of tracking, calibration and registration in Augmented Reality. Discuss the critical characteristics of effective tracking technology and provide examples of different stationary tracking systems.**[9]**

b) Categorize and explain the different types of Augmented Reality devices available today, highlighting their key features, functionalities and target applications. **[9]**

Q3) a) Explain the concept of Natural Feature Tracking by Detection in the context of Augmented Reality. **[9]**

b) Elaborate on Marker Tracking and Multiple-Camera Infrared Tracking techniques, highlighting their principles, advantages and limitations. **[8]**

OR

P.T.O.

Q4) a) Explain the concept of "marker camera pose" in the context of marker-based AR. **[9]**

b) Describe how location-based Augmented Reality applications work. Provide an example. **[8]**

Q5) a) Explain the role of the Monitoring System in the context of Augmented Reality. **[9]**

b) Explain the principle behind Projection Displays in Augmented Reality. **[9]**

OR

Q6) a) Discuss the working principles, advantages and disadvantages of Optical See-Through Head-Mounted Displays (HMDs) used in Augmented Reality. **[9]**

b) Describe the essential components of an Augmented Reality system, including the Scene Generator, Tracking System, Monitoring System, Display and Game Scene. **[9]**

Q7) a) Describe a potential application of Augmented Reality in the field of Education. **[9]**

b) Explain the role of a game engine like Unity in creating AR applications. **[8]**

OR

Q8) a) Describe the role of cloud services in enhancing Augmented Reality applications. Discuss how ARKit and ARCore leverage cloud services and explain the benefits they offer to AR developers. **[9]**

b) Briefly discuss the use of Augmented Reality in smart city initiatives. **[8]**

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Total No. of Questions : 8]

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PE2430

[Total No. of Pages : 2

[6584]-380

B.E. (Artificial Intelligence and Data Science)

BUSINESS INTELLIGENCE

(2019 Pattern) (Semester - VIII) (417533 (B)) (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) ***Make suitable assumptions if necessary.***
4) ***Figures to the right indicate full marks.***

Q1) a) Explain the concept of Change Data Capture and its significance in data provisioning. **[9]**

b) Discuss the importance of Data Duplication and handling late-arriving facts in BI. **[9]**

OR

Q2) a) Analyze the role of Lookups in the transformation process of ETL. **[9]**

b) Develop a plan for Data Quality assessment and profiling in the context of a specific business dataset. **[9]**

Q3) a) Develop a sampling strategy for a large dataset, considering the goals of data reduction. **[8]**

b) Analyze the impact of incomplete data on data analysis results and propose strategies for handling such data. **[9]**

OR

Q4) a) Apply the concept of Standardization to a dataset, demonstrating how it improves data quality. **[8]**

b) Evaluate the effectiveness of different methods of Data Discretization in improving the interpretability of data. **[9]**

P.T.O.

Q5) a) Implement a clustering method on a dataset and interpret the results. **[9]**

b) Apply the concepts of Linear Regression to analyze a dataset and make predictions. **[9]**

OR

Q6) a) Develop a classification model for a specific problem and evaluate its performance. **[9]**

b) Use the Apriori Algorithm to discover association rules using suitable dataset. **[9]**

Q7) a) Develop a Customer Relationship Management strategy that incorporates Business Intelligence tools and analytics. **[8]**

b) Design a Business Intelligence system for Healthcare Monitoring, considering data sources and visualization techniques. **[9]**

OR

Q8) a) Propose a Business Intelligence solution for optimizing Logistics and Supply Chain Management in a given scenario. **[8]**

b) Develop a hypothetical Business intelligence solution for a Higher Education institution, outlining key features and benefits. **[9]**



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PE2431

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B.E. (Artificial Intelligence and Data Science)

INFORMATION SYSTEMS MANAGEMENT

(2019 Pattern) (Semester - VIII) (417533 (C)) (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.***
4) ***Assume suitable data, if necessary.***

Q1) a) List the key components of a Knowledge Network System. **[9]**

b) What is Business Intelligence (BI) and how is it used in an enterprise setting? **[9]**

OR

Q2) a) What are the important dimensions of knowledge? **[9]**

b) What are the requirements for a knowledge work system? **[9]**

Q3) a) Explain the difference between structured methodologies and object-oriented methodologies in system design. **[8]**

b) What are the concluding steps for the system development process? **[8]**

OR

Q4) a) What is portfolio analysis, and how is it used in engineering project management? **[8]**

b) What is meant by the term “linking systems projects to the business plan”? **[8]**

P.T.O.

Q5) a) What is SCM? What are the Objectives of SCM? **[9]**

b) How do CRM systems help organizations segment their customer base? **[9]**

OR

Q6) a) Write a short note on "Business values of Enterprise Systems". **[9]**

b) What is the difference between Operational CRM and Analytical CRM? **[9]**

Q7) a) What is Revenue Model? Explain the types of revenue models for E-Commerce. **[9]**

b) Define the term "Social Network Analysis." **[9]**

OR

Q8) a) What are the main types of B2B E-Commerce? **[9]**

b) What are digital goods? Compare the Digital Market with the Traditional Market. Explain the term "Wisdom of Crowds". **[9]**



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SEAT No. : ____

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B.E. (Artificial Intelligence and Data Science)

REINFORCEMENT LEARNING

(2019 Pattern) (Semester - VIII) (417533 (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 diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain the process of policy improvement in policy iteration algorithms. How does it lead to convergence? **[6]**

b) What is the Bellman equation, and how is it used in dynamic programming for MDPs? **[6]**

c) Describe the convergence criteria for policy evaluation and value iteration algorithms in MDPs. **[6]**

OR

Q2) a) Define a Markov Decision Process (MDP) and explain its key components. **[6]**

b) What is the difference between policy iteration and value iteration algorithms? **[6]**

c) Explain the principle of optimality and its significance in decision-making. **[6]**

Q3) a) What is Monte Carlo tree Search (MCTS), and how does it combine tree search and Monte Carlo evaluation techniques? **[6]**

b) Define importance sampling and explain its role in reinforcement learning algorithms. **[6]**

c) Explain per-decision importance sampling. **[5]**

OR

P.T.O.

Q4) a) How does importance sampling relate to the concept of exploration-exploitation trade-off in reinforcement learning? **[9]**

b) Discuss the potential advantages and limitations of Monte Carlo methods in solving reinforcement learning problems compared to other approaches. **[8]**

Q5) a) Explain the concept of on-policy and off-policy learning in temporal difference learning, providing examples of each. **[9]**

b) Describe the concept of Dueling DQN and how it improves upon traditional DQN architectures. **[9]**

OR

Q6) a) Describe the Q-learning algorithm and its key components in the context of reinforcement learning. **[9]**

b) What is temporal difference learning, and how does it differ from other reinforcement learning approaches? **[9]**

Q7) a) Discuss the challenges and strategies for dealing with inaccurate models in reinforcement learning, emphasizing the consequences of using wrong models. **[6]**

b) Explain the concept of trajectory sampling and its significance in reinforcement learning planning algorithms. **[6]**

c) Compare expected updates and sample updates. **[5]**

OR

Q8) a) Explain role of rollout algorithms in reinforcement learning planning algorithms. **[6]**

b) Explain the Dyna architecture and how it integrates planning, acting, and learning. **[6]**

c) Explain heuristic search algorithms. **[5]**



Total No. of Questions : 8]

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PE2433

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[6584]-383
B.E. (AIDS)
MACHINE LEARNING
(2019 Pattern) (Semester - VII) (417521)

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 electronic pocket calculator is allowed.***

Q1) a) Explain evaluation measures (SSE, MSE) for regression model. For a given data having 100 examples, if squared errors SEI, SE2, and SE3 are 13.33, 3.33 and 4.00 respectively, calculate Mean Squared Error (MSE). State the formula for MSE. **[6]**

b) Explain K nearest neighbor classification algorithm with suitable example. **[6]**

c) What are kernel functions in SVM? Describe the Radial Basis Kernel, Gaussian, Polynomial, and Sigmoid kernel **[6]**

OR

Q2) a) Explain Baysian Linear Regression. **[6]**

b) Differentiate between balanced and imbalanced classification. **[6]**

c) Explain the concept of a soft margin SVM. How does it differ from a hard margin SVM? **[6]**

Q3) a) Explain the DBSCAN algorithm. How does it work? What are its advantages and disadvantages. **[9]**

b) Discuss the applications of clustering techniques in market segmentaion, social network analysis, image segmentation, and anomaly detection. Provide examples for each application. **[8]**

OR

Q4) a) Describe the Gaussian Mixture Model (GMM) for distribution-based clustering. How is it different from other clustering algorithms? **[9]**

b) Explain the K-Means clustering algorithm. What are its advantages and disadvantages. **[8]**

P.T.O.

Q5) a) Explain the concept of ensemble learning. Why is ensemble learning considered beneficial in machine learning? **[6]**

b) Discuss the concept of stacking in ensemble learning. What are the different methods used for variance reduction in stacking? **[6]**

c) Describe the Random Forest ensemble method in detail. **[6]**

OR

Q6) a) Differentiate between homogeneous and heterogeneous ensemble methods. provide examples of each type. **[6]**

b) Describe the concept of a voting ensemble. What are the different types of voting techniques? **[6]**

c) Explain the Adaptive Boosting (AdaBoost) algorithm in detail. **[6]**

Q7) a) Define reinforcement learning. Why is reinforcement learning important in the field of machine learning? **[9]**

b) Explain Markov's Decision Process (MDP). What is the Markov property in the context of MDP? **[8]**

OR

Q8) a) Introduce Q-learning. What are the important terms used in Q-learning? How does Q-learning work? **[9]**

b) Compare and contrast supervised, unsupervised, and reinforcement learning. Provide examples of each type. **[8]**

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Total No. of Questions : 8]

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PE2434

[Total No. of Pages : 2

[6584]-384

B.E. (Artificial Intelligence & Data Science)

DATA MODELING AND VISUALIZATION

(2019 Pattern) (Semester - VII) (417522)

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) What is Computational Statistics, and how does it relate to Data Visualization? **[6]**

b) How do Presentation Graphics differ from Exploratory Graphics? Provide examples. **[6]**

c) Discuss the role of Computing in Graphics and its impact on Data Visualization. **[6]**

OR

Q2) a) Explain the different Types of Data Visualization and their applications. **[6]**

b) Write a short note on Statistical Historiography in data visualization. **[6]**

c) What are some key Scientific Design Choices in Data Visualization, and why are they important? **[6]**

Q3) a) Explain the differences between Combining and Merging Data Sets. When should each technique be used? **[6]**

b) How does matplotlib compare to pandas and seaborn in terms of Data Visualization capabilities? **[6]**

c) Describe the key steps involved in the process of data wrangling. **[5]**

OR

Q4) a) Describe the concept of Multidimensional Scaling and its role in Data Visualization. **[9]**

b) What are Force-directed Techniques in Graph Layout, and how do they help in visualizing complex data structures? **[8]**

P.T.O.

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

i) Data Aggregation

ii) Pivot Tables

b) Explain Cross Tabulation and its uses with suitable example. **[9]**

OR

Q6) a) What is the Group by mechanism in data aggregation, and how does it facilitate data analysis? **[9]**

b) What are Moving Window Functions, and how are they useful in smoothing and analyzing time series data? **[9]**

Q7) a) Discuss Data Reconstruction and its types in data modeling and visualization. **[6]**

b) Discuss a case study where medical image visualization and database modeling played a crucial role in diagnosis or treatment. **[6]**

c) Explain ultrasound images and its applications in data modeling and visualization. **[5]**

OR

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

i) PET Images

ii) Magnetic Resonance Images

b) How can tools like ER/Studio, Erwin Data Modeler, and DbSchema Pro aid in structuring and analyzing medical imaging data? **[9]**



Total No. of Questions : 8]

SEAT No. :

PE2435

[Total No. of Pages : 2

[6584]-385

B.E. (Artificial Intelligence and Data Science)

QUANTUM ARTIFICIAL INTELLIGENCE

(2019 Pattern) (Semester - VII) (417523A) (Elective - 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) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Discuss factoring integers with example. **[6]**

b) Describe Simon's algorithm with example. **[6]**

c) Compare Deutsch algorithm and Deutsch -Jozsa algorithm. **[6]**

OR

Q2) a) Discuss the working of Shor's algorithm with its significance in breaking classical cryptosystems. **[6]**

b) Discuss how Grover's algorithm is used in searching in unsorted databases? **[6]**

c) Write a short note on Phase Kick-Back and its usage. **[6]**

Q3) a) Discuss regression with example. **[6]**

b) Write a note on variational quantum algorithms. **[6]**

c) Discuss quantum neural network in detail with small example. **[6]**

OR

Q4) a) Describe quantum machine learning classification with appropriate example. **[6]**

b) Discuss quantum algorithms for linear algebra. **[6]**

c) Elaborate the steps for nearest neighbour search with example. **[6]**

P.T.O.

Q5) a) Discuss in detail quantum cryptography. **[6]**

b) Write a short note on Fault Tolerance. **[5]**

c) Explain quantum dense coding. **[6]**

OR

Q6) a) Discuss the concept of quantum teleportation and its significance in quantum communication. **[6]**

b) Describe with appropriate steps quantum key distribution process. **[6]**

c) Write a note on classical three bit code. **[5]**

Q7) a) Discuss penny lane a cross platform python library. **[6]**

b) Write a note on Quantum search. **[5]**

c) Elaborate tarrataca's quantum production system. **[6]**

OR

Q8) a) Discuss quantum neural computations with its significance. **[6]**

b) Enlist and discuss challenges and limitations associated with quantum computing utilised in Data Science. **[6]**

c) Write a Note on Quantum walk. **[5]**

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Total No. of Questions : 8]

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PE2436

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[6584]-386

B.E. (Artificial Intelligence and Data Science)

INDUSTRIAL INTERNET OF THINGS

(2019 Pattern) (Semester - VII) (417523B) (Elective - 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) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Describe the functions of the following IIoT components: **[6]**

i) Gateways

ii) Routers

iii) Modem

b) Explain the Business Model Architecture of industrial IoT. **[6]**

c) Explain the difference between edge computing and cloud computing in industrial IoT. **[6]**

OR

Q2) a) What is Cloud broker and why is it used in IIoT? **[6]**

b) Explain the Industrial Internet Architecture Framework (IIAF). **[6]**

c) Explain the Industrial IoT- Layers. **[6]**

Q3) a) Compare and contrast the different features of leading IIoT cloud platforms(e.g. Predix, PTC ThingWorx, Microsoft Azure). **[6]**

b) What is the role of data analytics in Industrial IoT? Explain Any one Example. **[6]**

c) What is need of Digital Twin for industrial IoT? Explain Elements of Digital Twin in Industrial IoT. **[6]**

OR

P.T.O.

Q4) a) Explain the concept of Cloud of Things (CoT) and its significance in the context of Industrial IoT. **[6]**

b) Explain the importance of data visualization techniques in presenting complex Industrial IoT data. **[6]**

c) Discuss the challenges and benefits of using an IIoT cloud platform to Implement a digital twin. **[6]**

Q5) a) What are the key challenges and security considerations when implementing the industrial IoT in industrial environments? **[6]**

b) Explain the industrial IoT threat analysis in smart manufacturing plant. **[6]**

c) Explain the Network security techniques in industrial IoT. **[5]**

OR

Q6) a) Explain the Conventional web technology and relationship with industrial IoT. **[6]**

b) What is importance of access control in industrial IoT? Explain the methodologies for access control. **[6]**

c) Explain Management aspects of cyber security in industrial IoT. **[5]**

Q7) a) Explain the concept of Smart Irrigation and how they differ from traditional manufacturing facilities. **[6]**

b) Define the terms : **[6]**

i) smart metering

ii) smart robotics

iii) smart logistics

c) Describe the concept of Industry 5.0 (Society 5.0). How does it build upon Industry 4.0? **[5]**

OR

Q8) a) Explain the health care application in industrial IoT. **[6]**

b) Assess the challenges and benefits of implementing cyber Manufacturing systems in different industries. **[6]**

c) What are Key characteristics of industry 4.0? **[5]**

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Total No. of Questions : 8]

SEAT No. : ____

PE2437

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[6584]-387

B.E. (Artificial Intelligence and Data Science)

ENTERPRISE ARCHITECTURE AND COMPONENTS

(2019 Pattern) (Semester - VII) (Elective - III) (417523(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) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicates full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) What is Enterprise Architecture? Explain the planning of Enterprise Architecture Process in detail. **[8]**

b) What are the Architecture design principles . Explain them in detail. **[9]**

OR

Q2) a) Explain the best practices used for implementing Enterprise Architecture. **[8]**

b) What is Architecture Governance in Enterprise Architecture? Explain it in detail. **[9]**

Q3) a) Explain the component model of Enterprise information architecture.**[8]**

b) Explain component interaction diagrams with the help of a suitable deployment scenario. Describe how components communicate and how they are deployed across different nodes or servers. **[9]**

OR

Q4) a) Differentiate between Enterprise Information architecture and Data architecture. **[8]**

b) What is the purpose of using an operational model relationship diagram framework? List out the different tools used to create component diagram. **[9]**

P.T.O.

Q5) a) What are the Strategies used for effective metadata management. **[9]**

b) Which Steps and points are to be considered for implementing a master data management system. **[9]**

OR

Q6) a) Enlist the core functions of master data management and Explain any four in detail. **[9]**

b) What is the purpose of using an operational model relationship diagram framework? List out the different tools used to create component diagram. **[9]**

Q7) a) What is the role of a business Enterprise Architect? What is the difference between business process architect and enterprise architect? **[9]**

b) What is Enterprise Architecture Governance? Explain Guiding principles of EA in detail. **[9]**

OR

Q8) a) Which Tools and Technologies are used for Enterprise Architecture? What are their benefits? **[9]**

b) Explain in details about the tools and resources are used for enterprise designing. **[9]**

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Total No. of Questions : 8]

SEAT No. : [ ]

PE2438

[Total No. of Pages : 2

[6584]-388

B.E. (Artificial Intelligence and Data Science)

BIOINFORMATICS

(2019 Pattern) (Semester - VII) (417523D) (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 indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain the principles behind homology modeling and its significance in predicting protein structures. **[9]**

b) Describe the applications of data science techniques in medical image analysis. Explain how machine learning algorithms can be used to extract meaningful information from medical images. **[9]**

OR

Q2) a) Explain the workflow of computer-aided drug design (CADD) and discuss its importance in modern drug discovery. **[9]**

b) Discuss how molecular docking can be combined with experimental techniques to validate predicted protein-ligand interactions. **[9]**

Q3) a) Explain how machine learning and deep learning techniques, particularly convolutional neural networks (CNNs), are applied in the analysis of gene networks. Provide examples of specific tasks where these techniques have been successfully employed. **[9]**

b) Describe the application of deep learning in bioinformatics, focusing on its role in sequence analysis, protein structure prediction, and drug discovery. **[9]**

OR

P.T.O.

Q4) a) Describe the process of building a classification model using the Support Vector Machine (SVM) algorithm. **[9]**

b) Provide an example of a specific regulatory network and its role in a biological system. **[9]**

Q5) a) Explain the concept of feature selection and dimensionality reduction in machine learning. **[9]**

b) Explain the importance of clustering in pattern recognition and data analysis. **[8]**

OR

Q6) a) Provide an example of a specific gene network analysis task where machine learning, deep learning, or CNNs have provided valuable insights. **[9]**

b) Provide an example of a dataset where feature selection or dimensionality reduction was crucial for model improvement. **[8]**

Q7) a) Evaluate the role of platforms like ResearchGate and GitHub in facilitating collaboration and knowledge sharing in biotechnology research. **[9]**

b) Provide an example of a cutting-edge research project or discovery that has the potential to transform the field of biotechnology. **[8]**

OR

Q8) a) Provide an example of a biotechnological solution that has positively impacted agriculture or environmental conservation. **[9]**

b) Discuss the role of biotechnology in crop improvement, pest control, and soil remediation. **[8]**



Total No. of Questions : 8]

SEAT No. :

PE2439

[Total No. of Pages : 2

[6584]-389
B.E. (AI & DS)
GPU PROGRAMMING AND ARCHITECTURE
(2019 Pattern) (Semester - VII) (417524A) (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.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain CUDA error handling in detail. **[6]**

b) What is mean by synchronization? How to use synchronization in CUDA? **[6]**

c) Write short note on: **[6]**

i) Binary Compatibility

ii) PTX Compatibility

OR

Q2) a) Explain parallel programming issues of CUDA in detail. **[6]**

b) What is significance of algorithm in CUDA? Which are algorithmic issues occurred in CUDA. **[6]**

c) Write short note on: **[6]**

i) Application Compatibility

ii) C++Compatibility

Q3) a) What is significance of OpenCL programming? Explain parallel programming model used in OpenCL in detail. **[9]**

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

i) OpenCL Kernels

ii) OpenCL Host Device Interaction

OR

P.T.O.

Q4) a) Which are the common tasks of OpenCL host programs? Explain four tasks in detail. **[9]**

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

i) OpenCL Execution Environment

ii) OpenCL Memory Model

Q5) a) Explain Prefix Sum and Sparse Matrix in detail. **[6]**

b) What is mean by heterogeneous cluster? Explain with suitable example in detail. **[6]**

c) Write short note on: **[6]**

i) Kernel Overhead

ii) Kernel Implementation

OR

Q6) a) Explain concept of Convolution and matrix Multiplication in detail. **[6]**

b) Explain Nesting and Synchronization Depth in detail. **[6]**

c) Write short note on: **[6]**

i) Kernel Restrictions

ii) Pending Kernel Launches

Q7) a) Explain OpenCL Platform Model in detail. **[9]**

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

i) Application Specific Processors (ASP)

ii) Transport Triggered Architecture (TTA)

OR

Q8) a) Explain OpenCL Memory Model in detail. **[9]**

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

i) OpenCL for Heterogeneous Computing

ii) Application Design:Efficient Neural Network Training.



Total No. of Questions : 8]

SEAT No. :

PE2440

[Total No. of Pages : 2

[6584]-390
B.E.(AI & DS)
INFORMATION RETRIEVAL
(2019 Pattern) (417524B) (Semester -VII) (Elective-IV)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt 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.***

Q1) a) Define and explain Probabilistic Retrieval. **[6]**

b) What is the binary independent retrieval model? **[6]**

c) Explain types of language models. **[6]**

OR

Q2) a) List and explain the challenges in Natural language processing. **[6]**

b) State and explain different types of Bayesian networks? **[6]**

c) Explain with suitable example different levels of NLP. **[6]**

Q3) a) What is the difference between clustering and classification? Can clustering be used for classification purposes. **[6]**

b) What are different types of clustering algorithm? Explain any one of them. **[5]**

c) Explain in detail about naïve Bayes algorithm and its application in text classification. **[6]**

OR

Q4) a) What is K nearest neighbor classifier with an illustration in information retrieval? **[6]**

b) Explain Mixture of Gaussians Model. **[5]**

c) Solve Agglomerative hierarchical clustering for single link with example. **[6]**

P.T.O.

Q5) a) Describe MapReduce with example. **[6]**

b) Discuss the factors that influence a webpage's PageRank score. Discuss the challenges involve in web search engine. **[5]**

c) Define Python library is used for web crawling. **[6]**

OR

Q6) a) Explain Simple Ranking Functions in detail. **[6]**

b) What are the Main challenges posed by Web? **[5]**

c) Explain the components of focused web crawlers. **[6]**

Q7) a) Explain multimedia IR models. **[9]**

b) What are the four phases of recommender system? **[9]**

OR

Q8) a) What are the different evaluation metric for Recommender system. **[9]**

b) What is the difference between information retrieval and recommender system? **[9]**



Total No. of Questions : 8]

SEAT No. :

PE2441

[Total No. of Pages : 2

[6584]-391

B.E.(Artificial Intelligence and Data Science)

UI/UX DESIGN

(2019 Pattern) (417524C) (Semester -VII) (Elective-IV)

Time : 2½Hours] *[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) ***Make suitable assumption whenever necessary.***

Q1) a) Explain the key pillars of design and how they contribute to the creation of user-friendly products. **[9]**

b) Describe the various development methodologies used in design and their impact on usability. **[9]**

OR

Q2) a) What are the human considerations in design, and why are they crucial for creating effective user interfaces? **[9]**

b) Discuss the principles that support usability in design. Provide examples of how these principles can be applied to improve user experience. **[9]**

Q3) a) Explain the concept of direct manipulation in user interfaces and its significance in improving user experience. **[9]**

b) What is a virtual environment in the context of interface design? Discuss its application in various domains such as gaming, simulation and education. **[8]**

OR

Q4) a) Discuss the structure of system menus and how it contributes to ease of use. **[9]**

b) What are the different functions of menus in system design? Explain how well-designed menus enhance user efficiency. **[8]**

P.T.O.

Q5) a) Discuss the importance of user support in interface design. What are the key requirements for providing effective user support? **[9]**

b) What elements are involved in a windowing system? Explain the role of individual and multiple window designs in modern graphical user interfaces (GUIs). **[9]**

OR

Q6) a) What are the strategies for command organization in interface design? How do command menus contribute to improving the usability of a system? **[9]**

b) Explain the concept of natural language interfaces in computing. How can natural language processing (NLP) improve user interactions with systems? **[9]**

Q7) a) Discuss the impact of response time on user productivity. How does variability in response time affect the overall user experience? **[9]**

b) How can designers balance function and fashion in user interface design? Discuss the role of error messages, display design, and color in achieving this balance. **[8]**

OR

Q8) a) Describe the challenges associated with information visualization. How can the task and data type taxonomy assist in designing effective visualization? **[9]**

b) What are the societal and individual impacts of user interface design? How can user interfaces influence behavior and accessibility on both levels? **[8]**

Total No. of Questions : 8]

SEAT No. :

PE2442

[Total No. of Pages : 2

[6584]-392

B.E.(Artificial Intelligence and Data Science)

OPTIMIZATION ALGORITHMS

(2019 Pattern) (Semester -VII) (417524D) (Elective-IV)

Time : 2½Hours] *[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 scientific non programmable calculator is allowed***
5) ***Assume suitable data if necessary.***

Q1) a) Maximize the function $f(x) = xy$ subject to $x+y^2 \leq 2$ and $x, y \geq 0$ with KKT conditions for non linear programming **[8]**

b) Use Revised Simplex Method to find the basic solution of maximizing $25x_1+35x_2$

subject to : $\begin{bmatrix} 3 & 3 \\ 2 & 4 \\ 6 & 2 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \begin{bmatrix} 70 \\ 25 \\ 56 \end{bmatrix}$ and $x_1 \geq 0$ and $x_2 \geq 0$ **[10]**

OR

Q2) a) Consider a rectangular surface with one side with a wall and other three sides to be covered with a glass. Total length of the glass available is 25 meters. determine the precise dimension with geometric optimization which will maximize the area of the laboratory to put computers effectively **[10]**

b) Differentiate between Karmarkar's method and Simplex method **[8]**

Q3) a) Solve the equation $x + 2y + 3z = 6$ with Genetic Algorithms approach, stop your calculation after FOUR iterations and compare how closely you produced an answer **[9]**

b) Write an algorithm for simulated annealing and comment on its performance. **[8]**

OR

P.T.O.

Q4) a) Write an algorithm for particle swarm optimization and comment on its variants **[9]**

b) Find out the optimal values of the variable x,y,z with genetic algorithms and with given optimization function **[8]**

$x + y - 4z = 12$ ..... (1)

$f(x, y, z) = (x + y - 4z) - 12$ ..... (2)

To speed up the calculations values of x, y, z restrict between 0 to 7

Q5) a) Solve the knapsack problem with W = {10,20,7,9,8} and P={25,40,35,55,50} respectively by applying Ant Colony Optimization. **[10]**

b) Write an algorithm for ant colony optimization and explain the function Pheromone update for 3 ants chosen three different paths **[8]**

OR

Q6) a) Apply ant colony optimization problem on traveling salesman problem mentioned in this matrix

$$\begin{bmatrix} \infty & 4 & 5 & 2 \\ 2 & \infty & 4 & 6 \\ 7 & 8 & \infty & 3 \\ 5 & 5 & 5 & \infty \end{bmatrix}$$

[10]

b) Write and algorithm for accelerated particle swarm optimization **[8]**

Q7) a) Write an algorithm for binary Bat and comment on its computational complexity **[9]**

b) Brief the framework of self tuning algorithms **[8]**

OR

Q8) a) Let us assume a scene where Dataset $D^{m \times n}$ contains n features, we will selecting most suitable further for machine learning activity, use Batman algorithm and complete task with small example **[9]**

b) List and explain the application areas where firefly algorithm can be used in detail **[8]**

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Total No. of Questions : 8]

SEAT No. :

PE-5760

[Total No. of Pages : 1

[6584]-399

B.E. (Mechatronics Engineering)

HUMAN MACHINE INTERFACE

(2019 Pattern) (Semester - VIII) (417551B) (Elective-VI)

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 additional data, if necessary.***

Q1) a) Explain the concept of visible languages in HMI. **[8]**

b) What are the graphical design concepts in HMI. Explain in brief. **[9]**

OR

Q2) a) Write a short note on graphical design by grids. **[7]**

b) Explain the beyond screen design in HMI. **[10]**

Q3) a) Explain in detail overcoming the Obstacle of Animism. **[9]**

b) Explain in brief the device-based controls in HMI. **[8]**

OR

Q4) a) Explain how the communication is establish in HMI with example. **[9]**

b) Write a short note on interaction styles in HMI. **[8]**

Q5) a) Explain the principles to support usability in HMI. **[9]**

b) Explain the process oriented standards in detail with example. **[9]**

OR

Q6) a) Explain the project-oriented standards in detail. **[9]**

b) Write a short note on Human Computer interaction (HCI) patterns in HMI. **[9]**

Q7) a) Write a short note on HMI in flight control. **[9]**

b) Explain the design of HMI for Process control application. **[9]**

OR

Q8) a) Explain the smart welding using HMI. **[9]**

b) Explain the role of HMI in smart phones. **[9]**

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Total No. of Questions : 8]

SEAT No. : ____

PE5104

[Total No. of Pages : 2

[6584]-401

B.E. (Mechatronics Engineering)

ROBOT OPERATING SYSTEM

(2019 Pattern) (Semester - VII) (417541)

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 wherver necessary.***
3) ***Use of Non-programmable Calculator is allowed.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain in brief the classification and structure of ROS programming. **[8]**

b) Write a short note on VAL language commands used for motion control in ROS. **[9]**

OR

Q2) a) Explain any one application using conditional statements in detail. **[9]**

b) Write a short pick and place operation. **[8]**

Q3) a) Enlist the different Motion Instructions. Explain any three in detail. **[9]**

b) Explain the manual mode and automatic mode in detail for industrial robots. **[9]**

OR

Q4) a) Write a short note on AML Language. **[9]**

b) Explain with example the subroutine command based programming. **[9]**

P.T.O.

Q5) a) Explain in detail the Robotic Process Automation. **[9]**

b) Explain with neat diagram the computer vision system used in Robotics. **[9]**

OR

Q6) a) Explain the role of augmented reality in Robotics. **[9]**

b) Explain in detail the Robot economics. **[9]**

Q7) a) Explain in brief the Steps in simulation. Draw the flow diagram. **[9]**

b) Explain the Experimental nature of simulation in detail with example. **[8]**

OR

Q8) a) Explain in brief the Analogue and Hybrid simulation. **[9]**

b) Write a short note on Decision making with simulation. **[8]**

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Total No. of Questions : 8]

SEAT No. : ____

PE2443

[Total No. of Pages : 2

[6584]-402

B.E. (Mechatronics Engineering)

DATA COMMUNICATION

(2019 Pattern) (Semester - VII) (417542)

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) ***Assume suitable data, if necessary.***
3) ***Use of electronic pocket calculator is allowed.***
4) ***Neat diagrams must be drawn wherever necessary.***

Q1) a) Explain Balanced Slope Detector and Ratio Detector. **[8]**

b) Explain in details Transistor phase modulator and Noise Triangle. **[9]**

OR

Q2) a) Compare Wide band FM with Narrow band FM. **[8]**

b) Explain in details Pre-emphasis and De-emphasis. **[9]**

Q3) a) Explain the following modulation Techniques **[8]**

i) BFSK

ii) BASK

b) Explain in details Pulse Desperation, Coherent and non-coherent. **[9]**

OR

Q4) a) Explain the following modulation Techniques **[8]**

i) M-ARY PSK

ii) M-ARY FSK

b) Explain in details Differentially Encoded BPSK and DQPSK. **[9]**

P.T.O.

Q5) a) Explain in details **[9]**

i) Ground Wave Propagation

ii) Space Wave Propagation

iii) Surface Wave Propagation

b) Explain in details **[9]**

i) Reciprocity Principle

ii) Effective Length

iii) Effective Area

OR

Q6) a) Explain the relation from small loops and its radiation resistance. **[9]**

b) What is Surface Wave? Explain various types of it. **[9]**

Q7) a) Explain in details Frequency Reuse channels. **[9]**

b) What is Wireless local area network? Explain various types of it. **[9]**

OR

Q8) a) With the help of neat sketch explain Cellular System. **[9]**

b) Explain in details following network system **[9]**

i) 2.5G

ii) 3G

Total No. of Questions : 8]

SEAT No. :

PE-5105

[Total No. of Pages : 2

[6584]-403

B E. (Mechatronics Engineering)

MICRO ELECTRO MECHANICAL SYSTEMS

(2019 Pattern) (Semester - VII) (417543)

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) Explain the basic steps involved in the photolithography process used in MEMS fabrication. **[9]**

b) Explain in brief the bulk and surface micro-machining with neat diagram. **[9]**

OR

Q2) a) Discuss the limitations of traditional photolithography in MEMS manufacturing, especially when dealing with 3D or high-aspect-ratio structures. **[9]**

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

Q3) a) Explain the impact of scaling on electrical parameters such as capacitance, resistance, and signal-to-noise ratio in micro-systems. **[9]**

b) Explain the concept Scaling in fluid mechanics. **[9]**

OR

Q4) a) With neat diagram the Scaling in electro- magnetic forces. **[9]**

b) Discuss how fluid dynamics and viscosity behave differently at micro scales. What are the consequences for micro-fluidic device design? **[9]**

P.T.O.

Q5) a) Explain the concept of interferometry in MEMS with diagram. **[9]**

OR

b) Discuss how mechanical scanning techniques affect delicate MEMS structures. What precautions are necessary during scanning? **[8]**

Q6) a) Describe the role of Scanning Electron Microscopy (SEM) in analyzing MEMS devices. How does it differ from optical microscopy in terms of resolution and sample preparation? **[9]**

b) Explain in detail the different Topography methods with suitable diagram. **[8]**

Q7) a) Explain in detail the Carbon Nano- Thbes with their properties. **[9]**

b) Describe how nanotechnology is used in household products such as sunscreens, textiles, and cleaning agents. What advantages does it offer? **[8]**

OR

Q8) a) Write a short note on fabrication methods in CNT. **[9]**

b) Explain the importance of nano-tribology in the design and performance of MEMS/NEMS devices. What are the key challenges in measuring friction and wear at the nano-scale? **[8]**

Total No. of Questions : 8]

SEAT No. :

PE5106

[Total No. of Pages : 2

[6584]-404

B.E. (Mechatronics Engineering)

IMAGE PROCESSING AND COMPUTER VISION

(2019 Pattern) (Semester-VII) (417544A) (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) ***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) Given matrix Ix and Iy for an image. **[9]**

Ix=

4	7	6
8	8	7
8	6	5

Iy=

4	8	8
8	6	7
6	6	4

Find out, given area of the image is corner or not using Harris Corner Detection Algorithm.

b) Explain Interest or Corner Point Detector with example. **[9]**

OR

Q2) a) Explain Texture Descriptor with Local Binary Pattern (LBP) in detail. **[8]**

b) Explain HOG (Histogram of Oriented Gradient) in detail with example. **[10]**

Q3) a) What is Object Detection in Computer Vision? **[5]**

b) Explain Pattern Recognition System? What are components of pattern recognition System. **[5]**

c) What are different parameter Estimation Techniques? Explain Maximum Likelihood Estimation in detail. **[7]**

OR

P.T.O.

Q4) a) Explain Image Classification with Localization. **[8]**

b) What is Dimension Reduction? **[5]**

c) What is Learning and Adaptation in Machine Learning? **[4]**

Q5) a) Give OpenCV code for following shape drawing functions : **[6]**

i) Circle

ii) Rectangle

b) Give OpenCV code for following operation: **[6]**

i) Accessing and modifying pixel values of an image

ii) Accessing Image properties

c) Explain Image Blurring Technique. Give advantages of Image Blurring. **[5]**

OR

Q6) a) What are Image Contours and Write steps for finding and drawing contours using OpenCV. **[6]**

b) Explain Image Thresholding Technique with syntax and syntax explanation. **[6]**

c) What are different Arithmetic Operations on Image? Explain Addition of Image. **[5]**

Q7) a) What are Autoencoders? **[6]**

b) What is Convolution Neural Networks (CNNs)? **[6]**

c) What is Artificial neural network for pattern Classification? **[6]**

OR

Q8) a) Explain Object Tracking in computer vision in detail. **[9]**

b) Give a brief on application of Computer Vision- Motion Estimation. **[9]**



Total No. of Questions : 8]

SEAT No. :

PE2444

[Total No. of Pages : 2

[6584]-405

B.E. (Mechatronics Engineering)

MEDICAL MECHATRONICS

(2019 Pattern) (Semester - VII) (417544-B) (Elective - 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) ***Neat diagrams must be drawn wherever necessary.***
4) ***Use of calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) State the role of Oximeter? Describe the Working Principle of Oximeter with neat diagram. **[10]**

b) Define Blood Pressure? Compare Indirect (Non-Invasive) and Direct (Invasive) Blood Pressure Measurements. **[7]**

OR

Q2) a) Define Hearing loss. Draw and Discuss the working principle of Audiometer with neat diagram. **[10]**

b) With the help of neat diagram, Explain the working of Nitrogen Gas Analyzer with the help of neat diagram. **[7]**

Q3) a) State the role of Defibrillator in the body. With the help of neat diagram, Explain the working of Cardiac Defibrillator with the help of neat diagram. **[10]**

b) With the help of neat diagram, explain the working of Hemodialysis machine with the help of neat diagram. **[8]**

OR

Q4) a) State the role of Pacemaker in the body. With the help of neat diagram, Explain the working of Pacemaker with the help of neat diagram. **[10]**

b) With the help of neat diagram, Explain the working of Electrosurgical unit with the help of neat diagram. **[8]**

P.T.O.

Q5) a) State the advantages of X-Rays in the body. With the help of neat diagram, Explain the working of Infrared Imaging with the help of neat diagram.**[10]**

b) With the help of neat diagram, Explain the working of Liquid Crystal Tomography with the help of neat diagram. **[7]**

OR

Q6) a) State the advantages of Magnetic Resonance effect in the body. With the help of neat diagram, Explain the working of Magnetic Resonance Imaging with the help of neat diagram. **[10]**

b) With the help of neat diagram, Explain the working of Endoscopy with the help of neat diagram. **[7]**

Q7) a) State the significance of Electrical Safety in the Hospitals, Explain the concept of Macroshock and microshock hazard and its significance.**[10]**

b) With the help of neat diagram, Explain the working of wireless and multi patient Telemetry with the help of neat diagram. **[8]**

OR

Q8) a) State the role of database in HIS. With the help of neat diagram, Explain the working of HIS System with the help of neat diagram. **[10]**

b) Elaborate the working of Wireless and multi patient Telemetry with the help of neat diagram. **[8]**

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Total No. of Questions : 8]

SEAT No. :

PE2445

[Total No. of Pages : 2

[6584]-409

B.E.(Mechatronics Engineering)

INDUSTRY 4.0

(2019 Pattern) (Semester -VII) (417545-C) (Elective-IV)

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) ***Use of non-programmable calculator is allowed.***

Q1) a) Explain the Variable Renewable Electricity Sources. **[6]**

b) What is Electric energy storage? Explain Superconducting Magnetic Energy Storage. **[6]**

c) Discuss the potential of Sodium-Sulphur Battery Energy Storage to Enable Integration of wind. **[6]**

OR

Q2) a) Explain V2G Capacity Estimation algorithm in detail. **[6]**

b) Explain Availability and Usability of EVs. **[6]**

c) Describe the different types of electric energy storage. **[6]**

Q3) a) What is Smart Grid? What are the benefits of Smart Grid. **[6]**

b) Explain Requirements of Self-Healing Grid. **[6]**

c) Differentiate between Conventional Grid and Smart Grid. **[5]**

OR

Q4) a) Explain the Challenges faced by Smart Grid Technology. **[6]**

b) Write a note on Demand optimization in Smart Grid. **[6]**

c) What are design challenges faced in smart grid and Industry 4.0 Integration. **[5]**

P.T.O.

Q5) a) Write a note on Intellectual Property Rights (IPR) **[6]**

b) Distinguish between Automatic car and smart car **[6]**

c) Explain the Pros and Cons of Self Driving Cars. **[6]**

OR

Q6) a) Describe the concept of Smart Monitoring. **[6]**

b) Explain the working of Self-Driving Cars. **[6]**

c) Write a note on Wi-Fi Technology? **[6]**

Q7) a) Explain with neat diagram architecture of Industrial Internet of Things. **[6]**

b) How the concept of IOT evolved? Explain. **[6]**

c) Define IIOT. State the benefits of IIOT. **[5]**

OR

Q8) a) What are General Opportunities and Challenges faced in Industry 4.0. **[6]**

b) What are the different sensors used in IoT? Explain in brief. **[6]**

c) Write a note on Raspberry Pi. **[5]**

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Total No. of Questions : 8]

SEAT No. :

PE3248

[Total No. of Pages : 2

[6584]-410

B.E. (Computer Science & Design)

INFORMATION & CYBER SECURITY

(2019 Pattern) (Semester - VIII) (418250) (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.***
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 Elliptic Curve Cryptography? Explain the difference between ECC vs RSA. **[8]**

b) What is public key cryptography? Explain RSA algorithm used for public key cryptography along with its advantages and disadvantages. **[9]**

OR

Q2) a) What is a digital signatures? Explain the process of Digital Signature in detail. **[8]**

b) Explain the Deffie-Hellman key exchange algorithm with a suitable example. **[9]**

Q3) a) What is IP Security (IPSec)? Explain IP Security: IPv6 and IPv4 in detail. **[9]**

b) What is SSL (Secure Sockets Layer) and how does SSL work, illustrated with a diagram. **[9]**

OR

Q4) a) What is Encapsulating Security Payload (ESP)? Explain the ESP in detail. **[9]**

b) What is IPSec protocols? Difference between IPSec and SSL. **[9]**

Q5) a) What is a firewall? Explain the different types of firewalls and functionalities. **[8]**

b) What is Intrusion Detection? Explain types of IDS. **[9]**

OR

P.T.O.

Q6) a) What is password management, and its types? Explain the challenges in password management. **[8]**

b) Difference between NIDS and HIDS in detail. **[9]**

Q7) a) Explain the following terms in details : **[9]**

i) Botnets

ii) Cyber Forensic

iii) Cyber Stalking

b) What is Cybercrime? Explain in details types of Cyber Crimes with example. **[9]**

OR

Q8) a) What is cyber stalking? Explain types of cyber stalkers. **[9]**

b) Write a short note on Importance of IT Act. **[9]**



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

PE5107 **[Total No. of Pages : 2**

[6584]-411

B.E. (Computer Science and Design Engineering.)

GENERATIVE AI

(2019 Pattern) (Semester - VIII) (418251)

Time : 2½Hours] ***[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.***

Q1) a) Define a Variational Autoencoder (VAE). Briefly describe its objective function. **[6]**

b) Explain the role of the discriminator in a Generative Adversarial Network (GAN). **[6]**

c) Discuss the training process of Generative Adversarial Networks (GANs) **[6]**

OR

Q2) a) Compare GANs and VAEs in terms of sample quality and training stability. **[6]**

b) Describe Autoregressive models PixelCNN and WaveNet. How do they model the joint distribution of data? Explain with examples. **[6]**

c) Discuss the strengths and limitations of deep generative models. **[6]**

Q3) a) What are vector representations in NLP? Explain how word embeddings like capture semantic similarity between words. **[6]**

b) Explain the architecture of a Transformer model. Discuss the role of self- attention and positional encoding. **[6]**

c) Compare GPT-3.5-turbo and GPT-4 in terms of capabilities, architecture, and use cases. **[6]**

OR

P.T.O.

Q4) a) Briefly describe the key features of Google's Gemini and Meta's LLaMA. How do they differ from OpenAI's GPT models in design or philosophy? **[6]**

b) Explain probabilistic text generation in detail **[6]**

c) Illustrate how transformer-based models like GPT generate output using logits, softmax, function. **[6]**

Q5) a) Define Natural Language Processing (NLP). What are its major applications, and what challenges does it face when processing human language? **[9]**

b) What are knowledge-based language models in NLP? Give examples of how external knowledge (like ontologies or WordNet) is used in these models. **[8]**

OR

Q6) a) Describe how neural networks are used in NLP. Discuss the evolution from feedforward networks to RNNs and LSTMs in language modeling. **[9]**

b) Explain the core architecture of Transformer models. How do they overcome the limitations of RNNs in NLP tasks? **[8]**

Q7) a) What is prompt engineering? Explain the principles of crafting effective prompts with suitable examples. **[6]**

b) Compare the use of OpenAI's GPT models via API vs. web interface. **[6]**

c) Explain how tokens are used in GPT models. How do you estimate the cost of a prompt using token-based pricing? **[5]**

OR

Q8) a) Describe and differentiate between Zero-shot, Few-shot, and Chain-of-Thought (CoT) prompting. Provide examples for each. **[6]**

b) What is Retrieval Augmented Generation (RAG)? How does it improve the performance of prompt-based systems using vector databases? **[6]**

c) Explain advanced prompt engineering methods like Auto-CoT and Tree-of- Thought (ToT). **[5]**



Total No. of Questions : 8]

SEAT No. :

PE3249

[Total No. of Pages : 2

[6584]-415
B.E. (Computer Science & Design)
DevOps
(2019 Pattern) (Semester - VIII) (418252 (D)) (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) Define, Time to Market' and explain how CI helps in reducing it. **[6]**

b) Explain any three strategies used for implementing Continuous Delivery in software projects. **[6]**

c) Describe how a Continuous Delivery pipeline differs from a Continuous Integration pipeline with respect to process and output. **[6]**

OR

Q2) a) Explain the concept of Continuous Integration (CI). Why is it important in modern software development? **[6]**

b) What is meant by Continuous Database Integration? Explain its importance in a CI/CD environment. **[6]**

c) Discuss the challenges associated with releasing builds in large-scale software projects. How can these be managed effectively? **[6]**

Q3) a) What is integration testing? Why is it important in a CI/CD environment? **[6]**

b) What is a defect backlog? How is it managed during the integration testing process? **[6]**

c) Discuss how test strategies can be integrated into a deployment pipeline to ensure continuous delivery and deployment readiness. **[6]**

OR

Q4) a) Explain the role of the Commit Stage in a deployment pipeline. What activities typically occur in this stage? **[6]**

b) Describe the key practices to be followed while implementing a deployment pipeline. **[6]**

c) Discuss how preparing to release in a deployment pipeline differs from traditional release cycles. What are the advantages and limitations? **[6]**

P.T.O.

Q5) a) What is a monitoring system? Why is it important in modern IT infrastructure? **[6]**

b) Explain the process of collecting monitoring data and logs from an application. How is this data used? **[6]**

c) List and explain common tools used by SREs. How do these tools help automate monitoring and incident response? **[5]**

OR

Q6) a) Differentiate between white-box monitoring and black-box monitoring with examples. **[6]**

b) What is Site Reliability Engineering (SRE)? How does it relate to DevOps? **[6]**

c) Compare and contrast the goals of SRE and DevOps. How do they complement each other in a CI/CD environment? **[5]**

Q7) a) What is version control? Explain the role of Git in continuous development. **[6]**

b) Explain how Jenkins supports both Continuous Integration and Continuous Delivery in a CI/CD pipeline. **[6]**

c) Describe how Selenium is used for continuous testing. What are its advantages in automated test pipelines? **[5]**

OR

Q8) a) What is Docker? How does it support containerization in modern application deployment? **[6]**

b) What is Kubernetes? How does it enable serverless orchestration in cloud environments? **[6]**

c) How is Jira used for bug tracking and project management in a DevOps setup? **[5]**



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SEAT No. : ____

PE5108

[Total No. of Pages : 2

[6584]-416

B.E. (Computer Science & Design)

DATA VISUALIZATION

(2019 Pattern) (Semester - VIII) (418253(A)) (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) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) What are the key differences between Graph Visualization and Tree Visualization. **[8]**

b) Describe the importance of metaphorical visualizations in conveying abstract concepts with examples. **[9]**

OR

Q2) a) Discuss various method used for Text Data Visualization. How does it aid in NLP. **[8]**

b) Explain effective visualization methods for time series data, describing key time-based charts and visual metaphors used in temporal analysis with suitable examples. **[9]**

Q3) a) Describe the various techniques for visualization hierarchical and relational structures using networks and tree. **[8]**

b) Explain how map color and visual channels like shape, size, orientation, and texture affect user perception and comprehension in data visualization.**[9]**

OR

Q4) a) List three visual channels (like color, size, or shape) and explain how each one can change the way data is shown in a map. **[8]**

b) Define Tree Map and explain its usefulness in hierarchical data representation. **[9]**

P.T.O.

Q5) a) What is a pixel-oriented technique in visualization explain with example. **[9]**

b) Explain the concept of Parallel Coordinates and Scatterplot Matrix in the context of multivariate data visualization. How do these techniques help in identifying relationships among variables. **[9]**

OR

Q6) a) Explain icon-based used for visualizing multivariate data. Discuss any two common types and their advantages. **[9]**

b) Explain how geometric projection helps in visualizing high-dimensional data in 2D or 3D space. Mention one technique used? **[9]**

Q7) a) Describe the use of Marks and Channels in Tableau. How do these visual components help in arranging tables, spatial data, and facets into multiple views? Provide suitable examples. **[9]**

b) What are common mistakes in dashboard design? How can they be avoided? **[9]**

OR

Q8) a) Explain three best practices in dashboard design to make visualizations easier to Understand. **[9]**

b) Explain the key elements of Tableau's interface including Worksheets, Workbooks, and Dashboards. How can workbooks be optimized and protected in professional dashboard design. **[9]**



Total No. of Questions : 8]

SEAT No. : [ ]

PE2446

[Total No. of Pages : 2

[6584]-420
B.E. (Computer Science & Design)
COMPUTER VISION
(2019 Pattern) (Semester - VII) (418241)

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) ***Make suitable assumptions wherever necessary.***

Q1) a) What is Clustering-based segmentation? Explain K-means Clustering-based algorithm with example. **[9]**

b) What is feature? State different feature extraction techniques. Explain any two in detail. **[9]**

OR

Q2) a) Explain different thresholding techniques in image processing. **[9]**

b) What is region identification and how does region identification handle noisy or incomplete data? **[9]**

Q3) a) What is knowledge representation and how it is used in object recognition? **[8]**

b) What is syntactic clustering how does syntactic clustering handled ambiguity and uncertainty? **[9]**

OR

Q4) a) What is statistical object recognition with suitable example? **[8]**

b) What is difference between hierarchical and non-hierarchical approach in object recognition? **[9]**

Q5) a) Write short note on following. **[8]**

i) Bottom-up control

ii) Model-based control

b) How do you represent 3D object with respect to meshes, point clouds and voxels? **[9]**

OR

P.T.O.

Q6) a) How does Parallel and serial processing control strategies applied in image understanding? **[8]**

b) List different Methods for 3D vision and explain any two methods in detail. **[9]**

Q7) a) Explain optical flow analysis based on correspondence of interest points. **[9]**

b) What is motion analysis, List and explain different motion analysis methods? **[9]**

OR

Q8) a) Explain how trajectory detection performs in motion analysis? **[9]**

b) Explain how does motion vectors estimating using sequential search algorithm. **[9]**

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Total No. of Questions : 8]

SEAT No. : [ ]

PE5931

[Total No. of Pages : 2

[6584]-421R

B.E. (Computer Science and Design Engineering)

DEEP LEARNING

(2019 Pattern) (Semester - VII) (418242)

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 whenever necessary.***
4) ***Make suitable assumptions whenever necessary.***

Q1) a) How would you describe the architecture of a typical Convolutional Neural Network (CNN)? Explain the main components and their roles. **[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) What is the purpose of pooling layers in Convolutional Neural Networks? Explain how max pooling and average pooling contribute to down sampling the input data. **[6]**

b) Explain Padding and its types. **[6]**

c) Explain Local response normalization and need of it. **[6]**

Q3) a) Describe the architecture and usage of Bidirectional RNN. What advantages do they offer in sequence modeling tasks? **[6]**

b) Explain the types of Recurrent Neural Network. **[6]**

c) Justify RNN is better suited to treat sequential data than a feed forward neural network. **[5]**

OR

P.T.O.

Q4) a) What are Echo State Networks (ESNs) and how do they address the challenge of long-term dependencies? **[6]**

b) How LSTM and Bidirectional LSTM works. **[6]**

c) Explain Unfolding computational graphs with example. **[5]**

Q5) a) What is a Generative Adversarial Network (GAN) and how does it work? **[6]**

b) Explain different types of GAN. **[6]**

c) Explain Deep Belief Network with diagram. **[6]**

OR

Q6) a) What are the fundamental characteristics of Boltzmann Machines and how do they model probabilistic dependencies among variables? **[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]**

Q7) a) Describe the concept of Deep Q-Networks (DQN) and how they combine Q-learning with deep neural networks. **[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) How can reinforcement learning be applied to learn to play Tic-Tac-Toe? **[6]**

b) Write short note on Q Learning and Deep Q-Networks. **[6]**

c) What are the challenges of reinforcement learning? Explain any four in detail. **[5]**



Total No. of Questions : 8]

SEAT No. :

PE2448

[Total No. of Pages : 2

[6584]-422

B.E. (Computer Science and Design)

GAME DESIGN AND DEVELOPMENT

(2019 Pattern) (Semester - VII) (418243)

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 and Clean Diagram.***
3) ***Assume suitable data if necessary.***

Q1) a) Explain game loop and its types. **[6]**

b) What is Scrolling & explain its types. **[6]**

c) Write a short note on Game objects. **[6]**

OR

Q2) a) Explain Lights and its types. **[6]**

b) Explain 2D Rendering Foundations. **[6]**

c) Write short note on Shading. **[6]**

Q3) a) Explain in details input devices. **[6]**

b) Write Short note on 3D sound. **[6]**

c) Explain Digital Signal Processing (DSP). **[5]**

OR

Q4) a) What is Collision Geometry? **[6]**

b) Explain the types of Camera in details. **[6]**

c) Write short note on Sound Occlusion and Sound Obstruction. **[5]**

Q5) a) What are the different ways to become a great playtester yourself? **[6]**

b) Explain Quality Assurance(QA) Testing and Automated Testing. **[6]**

c) Explain informal individual testing of playtesting. **[6]**

OR

Q6) a) Explain online playtesting in detail. **[6]**

b) Explain other important types of Testing. **[6]**

c) Explain the Circle of Playtesters. **[6]**

P.T.O.

Q7) a) What is Alpha phase list elements required to pass the alpha phase. **[6]**

b) Explain Game Documentation phases in details. **[6]**

c) Write short note on project plan and test plan. **[5]**

OR

Q8) a) Explain Management phases of Game Development in details. **[6]**

b) Explain Beta phase and list elements that must be required to complete beta phase. **[6]**

c) Write short note on game proposal. **[5]**



Total No. of Questions : 8]

SEAT No. : ____

PE2449

[Total No. of Pages : 2

[6584]-424

B.E. (Computer Science and Design Engineering)
SOFTWARE TESTING & QUALITY ASSURANCE
(2019 Pattern) (Semester - VII) (418244B) (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) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Make suitable assumption whenever necessary.***

Q1) a) State & Explain test case Design techniques? **[6]**

b) How would you explain system testing & acceptance testing? **[6]**

c) What is Cookie testing? Explain Cookie testing with an example? **[5]**

OR

Q2) a) Define & explain White Box testing & Black box testing? **[6]**

b) Differentiate between Functional testing and Non-functional testing? **[6]**

c) How would you explain unit Testing and Integration Testing? **[5]**

Q3) a) Explain in detail Pillars of Quality Management System. **[6]**

b) With a neat diagram discuss waterfall model for software development. Also explain its limitations? **[6]**

c) List and explain limitations of Capability Maturity Models [CMM]? **[6]**

OR

Q4) a) Explain why ISO - 9001 standard and its importance in software testing? **[6]**

b) What is automation testing in software testing? Explain in brief. **[6]**

c) With a neat diagram discuss Agile model of software development Also explain its limitations? **[6]**

P.T.O.

Q5) a) Differentiate between Manual Testing and Automation Testing? **[6]**

b) What is Automation testing? Explain it with an example? **[6]**

c) Illustrate Selenium's WebDriver explain in detail? **[5]**

OR

Q6) a) How would you explain R.P.A.? **[6]**

b) What do you understand about selenium grid? Explain it. **[6]**

c) How would you explain the selenium IDE explain in detail? **[5]**

Q7) a) Compare the Ishikawa's Flow chart and Histogram tool? **[6]**

b) Explain in detail Total Quality Management. **[6]**

c) Compare Run charts and Control charts in detail. **[6]**

OR

Q8) a) What do you understand by software maintenance? Explain in detail. **[6]**

b) What are the facts in achieving software quality? Explain in detail. **[6]**

c) Write a note on Software Quality Assurance [SQA] plan? **[6]**

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Total No. of Questions : 8]

SEAT No. : ____

PE2450

[Total No. of Pages : 2

[6584]-425

B.E. (Computer Science and Design Engineering)

BLOCKCHAIN TECHNOLOGY

(2019 Pattern) (Semester - VII) (418244-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) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicates full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Explain proof of Activity with example. **[6]**

b) What is Byzantine General Problem? Explain its significance. **[6]**

c) Explain proof of stake with example. **[6]**

OR

Q2) a) Discuss following consensus algorithms used in blockchain technology. **[6]**

i) Proof of Work

ii) Proof of Burn

iii) Proof of Elapsed Time

b) List the types of blockchain and explain any one of them. **[6]**

c) Explain the types of consensus approaches. **[6]**

Q3) a) What is Cryptocurrency? List types of cryptocurrency. **[6]**

b) Explain in detail Bitcoin. **[5]**

c) Differentiate between Bitcoin and Coinbase. **[6]**

OR

P.T.O.

Q4) a) Explain in detail crypto wallet? **[6]**

b) What is metamask? Explain in detail. **[5]**

c) Differentiate between metamask and coinbase wallet. **[6]**

Q5) a) Explain the concept of a smart contract with an example. **[9]**

b) Identify two types of Ethereum network and briefly explain the purpose of each. **[9]**

OR

Q6) a) How does Swarm contribute to decentralized storage in the Ethereum ecosystem? **[9]**

b) What is Ethereum? Explain the types of Ethereum network? **[9]**

Q7) a) Explain the role of blockchain in healthcare and IOT. **[9]**

b) Describe the role of blockchain in banking and financial sector. **[8]**

OR

Q8) a) Discuss potential challenges and benefits of implementing blockchain in verifying system. **[9]**

b) Describe the role of blockchain in government sector. **[8]**

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Total No. of Questions : 8]

SEAT No. :

PE2451

[Total No. of Pages : 2

[6584]-427

B.E.(Computer Science & Design)

NATURAL LANGUAGE PROCESSING

(2019 Pattern) (Semester -VII) (418245A) (Elective-IV)

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) ***Assume suitable data if necessary.***

Q1) a) Explain Latent Dirichlet Allocation (LDA) in detail **[8]**

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

i) word2vec

ii) doc2vec

iii) Contextualized representations (BERT)

OR

Q2) a) Write a short note on Graph-based Model. **[8]**

b) Explain Latent Semantic Analysis in detail. **[9]**

Q3) a) What is Vector Space Model? Explain in detail. **[9]**

b) Explain the importance of entity extraction in NLP. How does entity extraction differ from named entity recognition, and provide examples of real-world applications where entity extraction is crucial. **[9]**

OR

Q4) a) Explain NER System Building Process. **[9]**

b) Write a note on Cross Lingual Information Retrieval. **[9]**

P.T.O.

Q5) a) Explain Lexical Knowledge Network in detail. **[8]**

b) Compare the Indo Word Net with the traditional WordNet. What are the key differences and advantages of Indo WordNet, especially in the context of Indian languages? **[9]**

OR

Q6) a) Write a short note on **[8]**

i) Indo Wordnet

ii) VerbNets

iii) PropBank

iv) Treebanks

b) What are various Prominet NLP Libraries? Explain **[9]**

Q7) a) Explain working of IBM Watson Natural Language Processing. **[9]**

b) Explain Statistical Machine Translation (SMT). **[9]**

OR

Q8) a) Enlist various applications of NLP? Explain. **[9]**

b) Explain Text Entailment and Discourse Processing. **[9]**



Total No. of Questions : 8]

SEAT No. :

PE-2452

[Total No. of Pages : 2

[6584]-431
B.E. (Civil)
TUNNEL ENGINEERING
(Honors in Metro Construction)
(2019 Pattern) (Semester - VIII) (401303)

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.***

Q1) a) Write about the Cut-and- Cover Method of Tunneling **[6]**

b) Explain about causes for Tunnel collapse **[6]**

c) Explain about the TBM safety hazards **[6]**

OR

Q2) a) Explain about the twin tunnels in relation to the metro **[6]**

b) Explain about advanced drilling techniques **[6]**

c) Explain about methods to deal with types of rock pressure in tunnel construction **[6]**

Q3) a) Write about sources of dust in underground space **[6]**

b) Explain about hazards effects of CO_2, CO, H_2S and CH_4 in tunneling **[6]**

c) Explain in detail about the combination of Blowing and Exhausting Ventilation Systems in Tunnel **[5]**

OR

Q4) a) Write about Exhausting Ventilation Systems in Tunnel **[6]**

b) Explain basic principles of air conditioning in the tunnel **[6]**

c) Explain about the mechanical ventilation system in the tunnel construction **[5]**

P.T.O.

Q5) a) Write about lighting requirements for transition zones of tunnel lighting **[6]**

b) Explain about slime shields method of tunneling **[6]**

c) Explain the open shield and close shield method of tunneling **[6]**

OR

Q6) a) Write about lighting requirements for exit zones of tunnel lighting **[6]**

b) Explain about maintenance in the tunnel **[6]**

c) Explain about emergency lighting in the tunnel **[6]**

Q7) a) Explain about Occupational Safety and Health Administration (OSHA) standards **[6]**

b) Explain about safety inspections **[6]**

c) Explain in detail about Micro-tunnelling **[5]**

OR

Q8) a) Explain about a safety audit **[6]**

b) Explain fire prevention and protection in the tunnel **[6]**

c) Explain about lung problems associated with the worker in the tunnel **[5]**

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Total No. of Questions : 8]

SEAT No. :

PE-2453

[Total No. of Pages : 2

[6584]-432
B. E. (Civil Engineering)
(Honors in Architecuture and Town Planning)
LAND USE AND LAND COVER
(2019 Pattern) (Semester - VIII) (401403)

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 figures must be drawn wherever necessary.***
4) ***Assume suitable data, if required.***
5) ***Use of non programmable scientjflc calculator is allowed.***

Q1) a) Define survey and what is the significance in the field of urban planning. **[6]**

b) How to used GIS and RS for development of any area? **[6]**

c) What will be the impact of smart cities, green cities and sustainable cities on development towards sustainability. **[5]**

OR

Q2) a) Explain the importance of new techniques such as GIS and Remote sensing in design of town area. **[6]**

b) What planning parameters play important role while preparation of smart, green and sustainable cities **[6]**

c) Before starting of any project explain how survey plays important role for planning. **[5]**

Q3) a) Elaborate the demand and supply relationship of land **[6]**

b) What is the benefit of afforestation in environment and public health? **[6]**

c) While planning of land use which norms and environmental aspects taking into consideration **[5]**

OR

P.T.O.

Q4) a) Enlist different types of land use structure and explain any one in detail **[6]**

b) What are the design criteria and requirement of residential zone? **[6]**

c) Explain different Traffic and Transportation system in town planning and its impact on urban area. **[5]**

Q5) a) How town planning principles changed the land development? **[6]**

b) Elaborate how URDPFI Guidelines is benefitted. **[6]**

c) How land development affect on environmental features? **[6]**

OR

Q6) a) How UDCPR guideline make changes in new era development? **[6]**

b) What are the different URDPFI guidelines used for land use and infrastructure development. **[6]**

c) How to solve the current development of area regarding demand and supply of land **[6]**

Q7) a) Write a short note on: Development Plan **[12]**

Neighborhood Plan

Town Planning Scheme

b) Explain in detail "National Land Utilization Policy" **[6]**

OR

Q8) a) How Maharashtra Land Revenue Code 1966 useful for development of land? **[6]**

b) What is mean by Urban Renewal Strategy? **[6]**

c) What are the policy norms used for design of small and medium town **[6]**

♦ ♦ ♦

Total No. of Questions : 8]

SEAT No. :

PE-2454

[Total No. of Pages : 2

[6584]-433
B.E. (Mechanical)
3D PRINTING APPLICATIONS & ENTREPRENEURSHIP
(Honors 3D Printing)
(2019 Pattern) (Semester - VIII) (402016MJ)

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, wherever necessary.***

Q1) a) Explain the Functionally Graded Materials (FGMs) and their application? **[10]**

b) What are the medical applications of Additive manufacturing? **[7]**

OR

Q2) a) What is the bioprinting? Explain the process flow of bioprinting with a flowchart. **[10]**

b) Explain the Nanomaterials for 2D/3D Printing with its classification? **[7]**

Q3) a) Describe the mass customization with its advantages and disadvantages. **[10]**

b) What are the Commercial use of 3D printed consumer products ? Explain briefly. **[8]**

OR

Q4) a) What are the High-Performance Materials in additive manufacturing? Write its applications also. **[10]**

b) What are the challenges to managing AM operations in the consumer goods industry? **[8]**

P.T.O.

Q5) a) Explain the terms: **[10]**

i) Art-to-part disadvantages.

ii) Art-to-part advantages

iii) Benefits of 3D Printers in Art and Modelling

b) What is the ergonomic in Additive Manufacturing? Also define the astetics with its example. **[7]**

OR

Q6) a) Explain briefly Lost wax Casting with its use in 3d printing technology. **[10]**

b) What are applications of 3d printing in Arts? **[7]**

Q7) a) What is the Reverse Engineering? What is the purpose of Reverse Engineering? **[10]**

b) What are the differences between Integrated Design Process (IDP) and conventional design process? **[8]**

OR

Q8) a) What is the Entrepreneurship ? What are the types of entrepreneurship in Additive Manufacturing? **[10]**

b) What are the key indicators of benchmark? Write Disadvantages of Benchmarking. **[8]**

♦ ♦ ♦

Total No. of Questions : 8]

SEAT No. :

PE-2455

[Total No. of Pages : 2

[6584]-434
B.E. (Mechanical)
SUSTAINABLE ENERGY CONVERSION SYSTEMS
(Honors in Energy Management in Utility System)
(2019 Pattern) (Semester - VIII) (402026)

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 side indicate full marks.***
4) ***Use of electronic pocket calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Difference between Up Wind and Down Wind Process. **[6]**

b) Short note on **[6]**

i) Stall Control

ii) Pitch Control

iii) Offshore wind power

c) Explain Wind & Diesel power energy systems. **[5]**

OR

Q2) a) Difference between Vertical Axis turbine and Horizontal Axis turbine. **[6]**

b) Define Wind Energy? Explain its Parameters. **[6]**

c) Explain in details of Wind Energy Basics. **[5]**

Q3) a) Explain the Environment benefits of biochemical and thermo-chemical conversion. **[5]**

b) Write down any Five Utilization and advantages of briquetting. **[6]**

c) Explain the term Industrial waste and Agro residues. **[7]**

OR

Q4) a) What is Anaerobic Digestion explain in details. **[5]**

b) With a neat sketch, explain Community biogas plants. **[6]**

c) What is Gasification? Types of gasifies, Explain any one. **[7]**

P.T.O.

Q5) a) Explain with example of Nonconventional Energy System. **[5]**

b) Briefly explain Techno Commercial Analysis. **[6]**

c) Explain any three variables Conventional Energy System. **[6]**

OR

Q6) a) What are the Various forms of Energy Storage? Explain any one **[5]**

b) Difference Between Conventional and Nonconventional Energy system. **[6]**

c) Short note on Need and importance of Energy storage. **[6]**

Q7) a) Write a short note on controllers? **[5]**

b) Define IOT? Explain the challenges of IOT Development. **[6]**

c) Short note on **[7]**

i) Occupancy sensors

ii) Energy efficient lighting controls

OR

Q8) a) Explain the Electronic ballast. **[5]**

b) Explain the variables of Automatic power factor controllers. **[6]**

c) Write short note on Soft starters with energy saver. **[7]**

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Total No. of Questions : 8]

SEAT No. :

PE-2456

[Total No. of Pages : 2

[6584]-435
B.E. (Mechanical)
E-VEHICLE STANDARDS, CHARGING AND SAFETY
(Honors in Electric Vehicle)
(2019 Pattern) (Semester - VIII) (402036)

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) ***Usc of Calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Describe different types of battery charging methods for electric vehicles. **[9]**

b) Describe EV integration in the power grid. What is the role of aggregator in EV. **[8]**

OR

Q2) a) Explain Control and communication infrastructure in EV charging? **[9]**

b) Explain in short any two pack level EV models with advantages, disadvantages and applications? **[8]**

Q3) a) Explain Specific Requirements for L and M Category Electric Power Train Vehicles, also note any two related terms **[9]**

b) List and explain new internal short circuit testing for EV **[9]**

OR

Q4) a) What are electrical and mechanical test procedures for safety requirements of traction batteries? **[9]**

b) Write a note on future trends in battery testing **[9]**

P.T.O.

Q5) a) Elaborate the concept of "Battery Pack and Module Safety" **[9]**

b) Discuss in short the Safety and Abuse Response for Lithium Ion Rechargeable Battery Chemistries? **[8]**

OR

Q6) a) List and explain in short Common causes of battery failure. **[9]**

b) Describe evaluation techniques for batteries and battery materials **[8]**

Q7) a) Write a note on domestic charging infrastructure and Public charging infrastructure **[9]**

b) Explain planning steps of location planning and land allocation for EV charging infrastructure **[9]**

OR

Q8) a) What are main responsibilities of Charge Point Operator(CPO)? **[9]**

b) Explain the effects of Harmonic Impact, and it compensation **[9]**

♦ ♦ ♦

Total No. of Questions : 8]

SEAT No. :

PE-2457

[Total No. of Pages : 2

[6584]-436
B.E. (Mechanical)
SYSTEMS ENGINEERING MANAGEMENT
(Honors in System Engineering)
(2019 Pattern) (Semester - VIII) (402046)

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) Describe the term "risk analysis" **[6]**

b) What is plan risk management? **[6]**

c) Explain with example the concept of information management activities? **[4]**

OR

Q2) a) What is a risk management activity? **[6]**

b) What are the steps of risk profile? **[6]**

c) Explain in brief "information management process" **[4]**

Q3) a) Why is configuration status accounting important? **[6]**

b) What are the activities in the evaluating stage of project management? **[6]**

c) What are the common components of configuration management system? **[6]**

OR

Q4) a) Why do we perform configuration identification? **[6]**

b) Explain the major activities required for configuration management? **[6]**

c) What is the configuration status accounting process? **[6]**

P.T.O.

Q5) a) What are the ways to measure progress of activities in a project? **[6]**

b) Explain in brief about measurement plan in project development process? **[6]**

c) Explain the activities about modeling? **[6]**

OR

Q6) a) What are the measurements for a model application? **[6]**

b) How do you measure project performance? **[6]**

c) Explain the importance of project management measurement? **[6]**

Q7) a) What is the quality assurance system in engineering? **[6]**

b) What are the principles of quality assurance? **[6]**

c) What is incident management? **[6]**

OR

Q8) a) What is treat management? **[6]**

b) Explain the process to maintain records and reports in project management? **[6]**

c) Explain the evaluation of an activity? **[6]**



Total No. of Questions : 8]

SEAT No. :

PE-2458

[Total No. of Pages : 2

[6584]-437
B.E. (E & TC Engineering)
ARTIFICIAL INTELLIGENCE IN ROBOTICS
Honors in Robotics
(2019 Pattern) (Semester - VIII) (404183)

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) What are the Characteristics of uninformed search algorithms in Al? **[6]**

b) Explain Hill Climbing Search algorithm? **[6]**

c) What is Branch and Bound algorithms? Explain with example **[6]**

OR

Q2) a) What is definition of Best First Search algorithm? What are important terminologies used in Best First Search algorithm? **[6]**

b) What are advantages and Limitations of Metaheuristics algorithms? What are its Characteristics of Metaheuristics algorithms? **[6]**

c) How TABU search optimization algorithm works? **[6]**

Q3) a) What is Concept of Machine Vision? How it is useful in Robotics? **[6]**

b) How Image processing is useful in Machine Vision and robotics? **[6]**

c) Explain imaging based automatic sorting and inspection used in Machine Vision? **[5]**

OR

Q4) a) What are Machine Vision algorithms? List out algorithms used inArtificial Intelligence? **[6]**

b) What are types of Machine Vision techniques for robotics applications? **[6]**

c) How AI is used in Imaging? What are its applications? **[5]**

P.T.O.

Q5) a) What are the AI tools/techniques used Intelligent robotics systems? List out **[6]**

b) What is Task Based Hybrid Closure Grasping Optimization for Autonomous Robot Hand? Explain **[6]**

c) Explain accurate Motion Control in Fast Mobile Robots? **[5]**

OR

Q6) a) What are the applications of intelligent systems for mobile Robot Motion Planning? **[6]**

b) Explain intelligent robotic system for obstacle avoidance? **[6]**

c) Explain operation of Path Planning Robot Control in Dynamic Environment? **[5]**

Q7) a) How can you correlate AI with Flexible automation? (Any 3 Points) **[6]**

b) What are advantages of flexible automation? **[6]**

c) What are applications of FMS? **[6]**

OR

Q8) a) What is process planning in Artificial Intelligence in Flexible Automation systems? **[6]**

b) What is flexible automation? What are benefits of flexible automation? **[6]**

c) What is Route optimization for Automated Storage and Retrieval (AS/RS) systems? **[6]**

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Total No. of Questions : 8]

SEAT No. :

PE-2459

[Total No. of Pages : 3

[6584]-438
B.E. (E & TC)
HBCT : BLOCK CHAIN SOLUTIONS
(Honors in Block Chain)
(2019 Pattern) (Semester - VIII) (404183)

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) ***Neat diagram must be drawn whenever necessary.***
4) ***Assume suitable data, if necessary.***

Q1) a) Compare Naive Blockchain Construction and Smart Contract Construction in terms of Motivation, Purpose and Application. **[6]**

b) List out various components and application of Direct Acyclic Graph in Blockchain technology. **[6]**

c) What is Go-ethereum. List Functionalities of Go-ethereum. (Any 4) **[6]**

i) Ethereum node

ii) Transaction Verification

iii) Smart Contract Execution

iv) Command Line Interface

v) Go Programming Language

OR

Q2) a) Explain Step by step operation of Memory Hard algorithm in the construction of Blockchain. **[6]**

b) Explain step by step process to develop one toy application using Blockchain Technology. **[6]**

c) Discuss the working operation of Smart Contract Construction of Blockchain. **[6]**

P.T.O.

Q3) a) Explain the operation of selfish mining attacks in Blockchains Technology. **[6]**

b) What is Advent of Algorand in Blockchain. Explain how Algorand, addresses security in Blockchain Technology. **[6]**

c) What is Zcash for anonymity preservation in Blockchain Security. **[5]**

OR

Q4) a) Write short note on Blockchains. (Any Two) **[6]**

i) Sybil attacks

ii) Selfish mining

iii) 51% attacks

b) What is Pseudo-anonymity and Anonymity in Blockchain Security and Compare them. **[6]**

c) Compare Advent of Algorand and Sharding based consensus algorithms to prevent the attacks in Blockchain Technology. **[5]**

Q5) a) What is the role of blockchain in enhancing the security and trust of Internet of Things (IoT) systems? Explain with examples. **[6]**

b) Explain how blockchain technology can enhance transparency and accountability in government services. **[6]**

c) List out benefits of using blockchain in finance in terms of cost, speed, security and transparency? **[5]**

OR

Q6) a) What are the challenges in traditional medical record management systems and how can blockchain help to address them? **[6]**

b) Describe the architecture of a blockchain-IoT integrated system. What are the various components and how do they interact? **[6]**

c) Explain with real-world example, how blockchain technology has transform the financial services industry. **[5]**

Q7) a) Explain the real facts following myths: **[6]**

i) Every blockchain is public

ii) Blockchain is same as cryptocurrencies

b) Why is it important for organizations to separate myths from reality before implementing Blockchain solutions? Explain. **[6]**

c) Brief following limitations of Blockchain Technology: **[6]**

i) Scalability

ii) Energy Consumption

iii) Security Risk

iv) Immutability

OR

Q8) a) Explain the real facts of following myths: **[6]**

i) Blockchain are invulnerable

ii) Blockchain is a cloudbase database

b) Explain in brief Blockchain Myths: **[6]**

i) Speed

ii) Data Visibility

iii) Industry Use

iv) Crypto-currency use

c) What are Blockchain Myths. Why to address blockchain Myths vs Reality in Blockchain Technology. **[6]**



Total No. of Questions : 8]

SEAT No. : ____

PE-2460

[Total No. of Pages : 2

[6584]-439
B. E. (Printing Engineering)/(Honors)
BRAND AND PACKAGING MANAGEMENT
(2019 Pattern) (Semester - VIII) (408216)

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) ***Black 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) Define what a visual language is and explain its significance in branding and communication. **[8]**

b) Discuss the importance of understanding the brand identity befor creating a visual lanaguge. Provide examples to support your answer. **[9]**

OR

Q2) a) Evaluate the impact of digital platforms and technological advancements on visual language design in contemporary branding. Discuss the opportunities presented by these developments. **[9]**

b) Reflect on the ethical considerations involved in visual language design for brands. How can designers ensure that their visual communication aligns with ethical principles and avoids potential controversies? **[8]**

Q3) a) Evaluate the importance of conducting a competitor analysis in the context of packaging design. **[9]**

b) Describe the typical deliverables expected in a packaging design project. Include tangible items like design mockups, prototypes, and production-ready files, as well as any documentation or reports. **[9]**

OR

P.T.O.

Q4) a) Assess the potential consequences of neglecting to define the scope of a packaging design project thoroughly. Discuss how unclear project scopes can lead to miscommunication, scope creep, and ultimately, project delays and dissatisfaction. **[9]**

b) Explain the significance of setting clear deadlines in a packaging design brief. Discuss how deadlines help manage project timelines, facilitate communication, and ensure timely delivery of deliverables. **[9]**

Q5) a) Explain the significance of empathy in the design thinking process and its impact on the creation of successful products or services. **[9]**

b) Describe the various methods used to gather insights and empathize with consumers needs, highlighting their advantages and limitations. **[8]**

OR

Q6) a) Discuss the Ideation-stage. How can designers facilitate a brainstorming Session to generate innovative ideas. **[9]**

b) Discuss the importance of encouraging creativity during the Ideation stage. How can designers facilitate a brainstorming session to generate innovative ideas. **[8]**

Q7) a) Explain the role of sustainability in the effectiveness of packaging design in today's consumer landscape. **[9]**

b) Discuss how digital technologies, such as augmented reality or QR codes, be integrated into packaging to enhance its impact, relevance, advantage, and persuasive quality. **[9]**

OR

Q8) a) Discuss the key elements that make a product's packaging relevant to its target audience. provide example of successful brand message or points-of-difference communicated through packaging. **[9]**

b) Discuss role of emotional appeal in making a product's packaging more engaging and persuasive. **[9]**

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Total No. of Questions : 8]

SEAT No. :

PE-2461

[Total No. of Pages : 2

[6584]-440
B.E. Honors (Artificial Intelligence and Machine Learning)
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 diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Elaborate Roulette Wheel's Selection algorithm in Genetic Algorithm. **[6]**

b) Distinguish in between Symbolic AI and Genetic Algorithms. **[6]**

c) Write note on Evolving Neural Networks with example. **[6]**

OR

Q2) a) What is Mutation in Genetic Algorithm? Explain with examples. **[6]**

b) Explain Fitness Function in details. **[6]**

c) List the applications of Genetic Algorithms with explanation of one use case. **[6]**

Q3) a) Compare Biological Neural Network (BNN) with Artificial Neural Network (ANN). **[6]**

b) Explain the Model of Artificial Neural Network with suitable diagram. **[6]**

c) Write note on Learning Data sets in ANN. **[5]**

OR

Q4) a) Explain the working principle of recurrent network. **[6]**

b) Describe Universal Approximation Property of ANN. **[6]**

c) Describe the architecture of Artificial Neural network (ANN). **[5]**

P.T.O.

Q5) a) Describe the Long-Short Term Memory (LSTM) algorithm with appropriate diagram. **[6]**

b) Discuss the working principle of Neural Network with suitable example. **[6]**

c) Explain the role of classification in deep learning. **[6]**

OR

Q6) a) Write detailed note on Recurrent Neural Network (RNN). **[6]**

b) Explain the working principle of Convolution Neural Network (CNN) with suitable diagram. **[6]**

c) Discuss the applications of Deep Learning. **[6]**

Q7) a) Explain ReLU (Rectified Linear Unit) Activation Function. **[6]**

b) Write note on Vanishing Gradient in Deep Learning. **[6]**

c) Write note on importance of the Pooling Layer in CNN. **[5]**

OR

Q8) a) List the applications of Deep Learning and explain any one application in details. **[6]**

b) Explain the working principle of Deep Learning. **[6]**

c) Distinguish between Machine Learning and Deep Learning. **[5]**

♦ ♦ ♦

Total No. of Questions : 8]

SEAT No. :

PE-2462

[Total No. of Pages : 2

[6584]-441
B.E.
INFORMATION SYSTEM MANAGEMENT
(Honors Cyber Security)
(2019 Pattern) (Semester - VIII) (410403)

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.***

Q1) a) Enlist open-source software and Linux and explain their business benefits. **[5]**

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

i) Data Management & storage

ii) Grid Computing

c) List and describe the components of IT infrastructure that firms need to manage. **[6]**

OR

Q2) a) Describe the following: **[6]**

i) Web server,

ii) Application/server,

iii) Multitiered client/server architecture.

b) List and Discuss advantages and Disadvantage of Green Computing **[5]**

c) Identify and describe competitive forces model to determine how much to spend on IT infrastructure. **[6]**

Q3) a) Define knowledge and describe the important dimensions of knowledge **[6]**

b) Compare two different management strategies for developing BI and BA capabilities **[6]**

c) List and describe the elements of a business intelligence environment.**[6]**

OR

P.T.O.

Q4) a) Explain different collaboration & Social tools **[9]**

b) Explain requirement of knowledge work system with example **[9]**

Q5) a) Identify and describe methods for documenting project plans. **[6]**

b) List and describe the variables addressed by project management. **[6]**

c) Distinguish between tangible and intangible benefits of Information System. **[5]**

OR

Q6) a) Explain Business Process Redesign (BPR). **[6]**

b) Explain scoring mode with its different components **[6]**

c) How to write an effective project management objective explain with example. **[5]**

Q7) a) Explain different strategies for password securities **[6]**

b) Difference between BlockChain & Bitcoin **[6]**

c) What is backup and how it works? **[6]**

OR

Q8) a) Define Mobile Security and Explore any three types of Mobile attacks **[8]**

b) List Information Security Triad and discuss in detail with example. **[10]**

♦ ♦ ♦

Total No. of Questions : 8]

SEAT No. :

PE-2463

[Total No. of Pages : 2

[6584]-442
B.E. (Computer Engineering)
ARTIFICIAL INTELLIGENCE FOR BIG DATA ANALYTICS
(Honors in Data Science)
(2019 Pattern) (Semester - VIII) (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) What is feed forward neural network explain with suitable example. **[6]**

b) Explain fundamental of neural networks in big data. **[6]**

c) Explain recurrent neural networks with example. **[8]**

OR

Q2) a) Explain Gradient descent algorithm that is used to train the neural networks **[6]**

b) Difference between linear and nonlinear neural networks? **[6]**

c) How the backpropagation algorithm works? Explain with suitable example. **[8]**

Q3) a) Define Hadoop Streaming? How Streaming is works in Hadoop **[4]**

b) Explain HDFS (Hadoop Distributed File System) with the help of neat sketch. **[6]**

c) Explain map reduce in big data with suitable example. **[8]**

OR

Q4) a) What is Spark? Explain the key features of Spark. **[4]**

b) Explain Hadoop Ecosystem in detail. **[6]**

c) What is HDFS? Explain Hadoop Distributed File System architecture. **[8]**

P.T.O.

Q5)	a)	What are the different key. characteristics of a Data Mining?	**[6]**
	b)	Write a short note on: Data Warehouse?	**[6]**
	c)	What is Hive Big Data and it's Benefits?	**[4]**

OR

Q6)	a)	Explain the following	**[6]**
		i) Data Integration	
		ii) Data Transformation methods	
	b)	Explain Scalable Machine Learning on Big Data using Spark.	**[6]**
	c)	Write a short note on: Data mining.	**[4]**

Q7)	a)	List and explain the applications of computer vision.	**[6]**
	b)	Explain object detection application in Computer Vision.	**[6]**
	c)	Explain Feature Extraction Techniques in NLP.	**[4]**

OR

Q8)	a)	What is sentiment analysis Explain with application in detail.	**[6]**
	b)	List and explain the applications of NLP	**[6]**
	c)	What is the objective of Natural Language Processing?	**[4]**



Total No. of Questions : 8]

SEAT No. :

PE-2464

[Total No. of Pages : 2

[6584]-443
B.E. (Computer Engineering) (Honors)
INTERNET OF THINGS SECURITY
(2019 Pattern) (Semester - VIII) (410603)

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 Public-key based authentication with example. **[6]**

b) Which are Existing Security Schemes for IoT? Explain with example. **[6]**

c) Explain security goals in IoT **[6]**

OR

Q2) a) Explain- Trust Model for IoT node authentication **[6]**

b) What is Identity-Based Authentication? Explain with example. **[6]**

c) Explain Security Goals in IoT **[6]**

Q3) a) Explain IoT Security for machine learning applications. **[6]**

b) What is Threat? Explain Threats Caused in Maintenance of IoT. **[6]**

c) Which are the security requirements in Application Interface Layer? **[5]**

OR

Q4) a) Explain Data Lifecycle in IoT. **[6]**

b) Which are the security requirements in Network Layer? **[6]**

c) Which are the security requirements in Service Layer? **[5]**

P.T.O.

Q5) a) Explain Security Protocols and Privacy Issues into 6LoWPAN Stack **[6]**

b) Explain Security in Integration of Wireless Sensor Network and RFID. **[6]**

c) Explain with example - Security concerns in Social IoT **[6]**

OR

Q6) a) Explain Security in Tracking Technologies. **[6]**

b) Explain Security in Communications, with example. **[6]**

c) How to provide Confidentiality and Security for IoT Based Healthcare? **[6]**

Q7) a) What is Smart City? How the security can be provided in Smart Cities? **[6]**

b) What is Connected Car? How to provide security to Connected Car? **[6]**

c) Explain How Blockchain Technology can be used for providing security and privacy in IoT? **[5]**

OR

Q8) a) What are the Challenges Associated with secure IoT Deployment and Blockchain in IoT? **[6]**

b) Explain The IoT and Secure Orchestration Opportunities in Cities. **[6]**

c) Explain The IoT and Secure Automation Opportunities for Connected Cars. **[5]**

♦ ♦ ♦

Total No. of Questions : 8]

SEAT No. :

PE-2465

[Total No. of Pages : 2

[6584]-444
B.E. (Computer Engineering)
APPLICATION DEVELOPMENT USING AUGMENTED REALITY AND VIRTUAL REALITY
(Honors in Virtual Reality and Augmented 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 AR core? 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 : 10]

SEAT No. :

PE-2466

[Total No. of Pages : 2

[6584]-445

B.E. (Civil)

HONORS IN METRO CONSTRUCTION

Work Method Statement Making

(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 and Q.7 or Q.8 and 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 and clearly state.***
5) ***Use of cell phone is prohibited in the examination hall.***

Q1) Explain in details Erection of hard barricades and utility trenching, diversion of underground utilities. **[14]**

OR

Q2) Explain General Safety measures while excavation **[14]**

Q3) Explain in brief Roles & Responsibility, Project In charge, Site Engineer for Pile Foundation. **[14]**

OR

Q4) Write Method statement for Open Foundation in case of metro projects, **[14]**

Q5) Explain Quality assurance Plate Load Test in detail. **[14]**

OR

Q6) Explain in brief Work Method Statement for Pier construction. **[14]**

P.T.O.

Q7) Explain Sequence of Work for construction of Concourse Pier arm Platform Pier arm with 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]**



Total No. of Questions : 8]

SEAT No. :

PE-2467

[Total No. of Pages : 2

[6584]-446

B.E. (Civil)

HONORS IN"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.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.***
5) ***Use of non programmable scientific calculator is allowed.***

Q1) a) Describe in detail the Overtaking Sight Distance. **[6]**

b) Explain norms and standards for on street and off street parking. **[6]**

c) Write a note on public transport and its importance in today's context. **[5]**

OR

Q2) a) Write a note on hierarchy of roads. Explain in detail what are the design criteria for the same. **[6]**

b) What are the pedestrian design considerations at-grade and grade separated facilities. **[6]**

c) Explain in detail concept of Para-transit and how it plays important role in today's context. **[5]**

Q3) a) What are the different types of road intersection? Elaborate any one with proper sketch **[6]**

b) What facilities are provided at Passenger terminals? **[6]**

c) Which issues consider unde road safety management and Also explain the various activities conducted by Government of India for road safety. **[5]**

P.T.O.

OR

Q4) a) Enlist the components of at grade intersection and explain importance of at grade intersection. **[6]**

b) What is logistics management and how it is affect on urban transportation. **[6]**

c) Draw the neat sketch of rotary intersection and show all the design elements in it. Also explain any two design elements of it. **[5]**

Q5) a) Write a note on: Salient features of Nagpur 20 year road plan. **[6]**

b) What is the purpose of Land Use Model? Explain Lowry Model. **[6]**

c) Enlist urban system components and mention issues normally observed in India. **[6]**

OR

Q6) a) Write a note on: Salient features of Bombay 20 year road plan. **[6]**

b) Write a note on urban spatial structure and its influence on transport linkages. **[6]**

c) Explain Lowry - Garin Model. **[6]**

Q7) a) Elaborate urban transport problems in India. **[6]**

b) Write a note on BRTS. **[6]**

c) Elaborate : Transportation System Management (TSM) process **[6]**

OR

Q8) a) Explain the need and components of sustainable urban transportation. **[6]**

b) Write a note on Metro rail by mentioning names of case studies. **[6]**

c) Elaborate different special aspects in case of sea shore cities in transportation planning. **[6]**



Total No. of Questions : 8]

SEAT No. :

PE-2468

[Total No. of Pages : 2

[6584]-447
B.E. (Mechanical)
ADDITIVE MANUFACTURING SYSTEM DESIGN
(3D Printing Honors Course)
(2019 Pattern) (Semester - VII) (402014)

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 jf required.***

Q1) a) Define Atomization and explain any one type with neat sketch. **[8]**

b) What is Plasma Atomization explain in details with it's Benefits. **[10]**

OR

Q2) a) Write a short note on Electrolysis. **[8]**

b) Explain Plasma Rotating Electrode Process. **[10]**

Q3) a) Explain: **[10]**

i) Inert gas cooling system

ii) Gas recirculating system

b) Explain types of Powder delivery nozzles. **[7]**

OR

Q4) a) Explain the design and structure of nozzle with Nozzle movement system. **[10]**

b) What is the relation of warpage of print and bed heating? **[7]**

Q5) a) Write comparison between Single printing and Multi-printing mode. **[8]**

b) Write a short note on steps of Calibrating 3D printer with a laser pointer. **[10]**

OR

Q6) a) Explain determination the correct temperature of filament? **[8]**

b) Explain steps of calibration: **[10]**

i) Calibrate the extruder

ii) Calibrate your 3D Printer axes.

P.T.O.

Q7) a) What are the different types of Sensors used in 3D Printer? **[7]**

b) Explain Quality inspection system in Additive manufacturing system. **[10]**

OR

Q8) a) Explain different ASM/ASTM Standards for Additive Manufacturing system. **[7]**

b) Explain faults and trouble shooting in 3D Printing system? **[10]**



Total No. of Questions : 8]

SEAT No. :

PE-2469

[Total No. of Pages : 2

[6584]-448
B.E. (Mechanical) (Honors)
ELECTRICAL ENERGY SYSTEMS
(2019 Pattern) (Semester - VII) (402024 MJ)

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.***

Q1) a) Explain the procedure for quantification of compressed air leakages. **[10]**

b) Explain Positive Displacement Compressor and Dynamic Compressor with examples and schematic diagrams. **[8]**

OR

Q2) a) Explain compressed air system with its components and their functions. **[10]**

b) Discuss parameters for efficient operation of compressed air system. **[8]**

Q3) a) Discuss following air-conditioning process with hand drawn psychometric chart **[10]**

i) Cooling with dehudification

ii) Heating with humidification

b) Explain the working of Li-Br vapour absorption system with a neat sketch? **[7]**

OR

Q4) a) Discuss following psychometric terms. **[10]**

i) Specific humidity

ii) Relative humidity

iii) WBT

iv) Degree of saturation

v) Enthalpy of air.

b) Discuss the function of cooling tower. Explain different performance parameters of cooling tower. **[7]**

P.T.O.

Q5) a) What are types of fans? Explain working of axial fan with schematic diagram. **[10]**

b) Explain Municipal water pumping system. **[8]**

OR

Q6) a) Discuss energy saving opportunities in a fans and blowers. **[10]**

b) Discuss the parameters affecting pump system curves. **[8]**

Q7) a) What is a lamp? Explain the principle of operation and features of Fluorescent tube lamp (FTL). **[10]**

b) Discuss energy conservation measures possible in lighting system. **[7]**

OR

Q8) a) Explain the principal of operation and features of LED Lamps. **[10]**

b) Discuss the factors that need to be considered for DG set selection. **[7]**

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Total No. of Questions : 8]

SEAT No. :

PE-2470

[Total No. of Pages : 2

[6584]-449

B.E. (Mechanical / Automobile)/(Honors)

Modelling and Simulation of EHV

(2019 Pattern) (Semester - VII) (402034MJ)

Time : 2½ Hour] ***[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 Torque and speed coupling in electric vehicle? **[4]**

b) Explain the importance of Sensor Management and Integration for electric vehicle with functional and application point of view? **[8]**

c) What is Battery/Cell Control System in EV? Explain with its functions and working principal? **[8]**

OR

Q2) a) Explain A Motor Control Unit in electric vehicle with its functional features? **[4]**

b) Explain EV and EHV configuration based on power electronics? **[8]**

c) Explain Electronic Control Unit of electric vehicle with its types and working principal? **[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

P.T.O.

OR

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 Chassis frame layout with suitable sketch? Also list out various types of Loads on the Chassis frame? **[8]**

b) What do you mean by the term "DFMEA"? Explain the objective feature that can achieve the in the process of system or equipment design? **[8]**

OR

Q6) a) Explain Frame building Problems? Also list out Types of Frame Damage & How to Spot it? **[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) What do you mean by Topology and Topography Optimization, explain with suitable example? **[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) Explain Durability along with Factors Affecting Electric Car Dutability? **[8]**

Total No. of Questions : 8]

SEAT No. : ____

PE-2471

[Total No. of Pages : 2

[6584]-450
B.E. (Mechanical Engineering)
System Modelling and Simulation
(Honors in Systems Engineering)
(2019 Pattern) (Semester - VII) (402044 MJ)

Time : 2½ Hour] ***[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, if necessary.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicates full marks.***

Q1) a) With an example, describe the 1-Port resistor component. **[9]**

b) Demonstrate the causation for the fundamental 1 -Port element. **[9]**

OR

Q2) a) Describe the 2-Port component with an example. **[9]**

b) Briefly describe the causation for the fundamental 2-Port element. **[9]**

Q3) a) Describe in brief the circuit construction procedure. **[9]**

b) Illustrate the steps involved in creating a circuit. **[8]**

OR

Q4) a) Give a brief description of the mechanical translation construction procedure. **[8]**

b) Explain the term fluid resistance in detail. **[9]**

P.T.O.

Q5) a) Give an example of the fundamental causality attribution process. **[9]**

b) Explain in brief nonlinear simulation. **[9]**

OR

Q6) a) Illustrate the system equations' standard form. **[9]**

b) Explain in brief automated simulation. **[9]**

Q7) a) Describe the methods used to solve ordinary differential equations. **[8]**

b) Explain the second-order system with an example. **[9]**

OR

Q8) a) Explain the first-order system with an example. **[8]**

b) Describe the steps taken to locate the free response. **[9]**

Total No. of Questions : 8]

SEAT No. : ____

PE2472

[Total No. of Pages : 2

[6584]-451
B.E. (Robotics) (Honors)
INDUSTRIAL ROBOTICS & AUTOMATION
(2019 Pattern) (Semester - VII) (404181)

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) ***Assume suitable data, if necessary.***
4) ***Neat diagrams must be drawn whenever necessary.***

Q1) a) Explain components and constructional features of Pneumatic control. **[7]**

b) Explain pressure and flow of Pneumatic control. **[7]**

c) What are the types of cylinders in Pneumatic control. **[4]**

OR

Q2) a) Draw and explain pneumatic control system design. **[7]**

b) Explain in detail control modes, program control and sequence control in Pneumatic control system design. **[7]**

c) Short note on Karnaugh – Veitch mapping. **[4]**

Q3) a) What are the special design features of CNC systems and features for lathes and machining centers? **[7]**

b) What are condition monitoring of manufacturing systems? **[6]**

c) Short note on CIM. **[4]**

OR

Q4) a) Design parts for high speed feeling and orienting. **[7]**

b) Analysis of an assembly for programmable automation. **[6]**

c) General rules for product design for programmable automation. **[4]**

Q5) a) What are the stages in design of mechatronics systems? **[7]**

b) Draw and explain in detail pick and place robot. **[7]**

c) Applications of mechatronics systems. **[4]**

OR

P.T.O.

Q6) a) What are possible design solutions for mechatronics systems? **[7]**

b) Draw and explain in detail engine management system. **[7]**

c) Compare traditional and mechatronics design. **[4]**

Q7) a) What are types of pumps and motors of hydraulic systems? **[7]**

b) Selection criteria for cylinders, valves and pipes. **[6]**

c) How heat generation in hydraulic system. **[4]**

OR

Q8) a) Explain Electro pneumatic in detail. **[7]**

b) Short note on PLC. **[6]**

c) Draw ladder diagram with suitable example. **[4]**



Total No. of Questions : 8]

SEAT No. : [ ]

PE5963

[Total No. of Pages : 2

[6584]-452

B.E. (E & TC)

HONORS IN BLOCK CHAIN TECHNOLOGY

Smart Contracts & Cryptocurrency

(2019 Pattern) (Semester - VII) (404181) (Theory)

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 history and evolution of Distributed Ledger Technology. **[8]**

b) Explain Namecoin and its working with use cases. **[9]**

OR

Q2) a) Explain Bitcoin protocol and proof-of-work mechanism. **[8]**

b) Explain Ethereum construction and working of smart contracts. **[9]**

Q3) a) Explain stakeholders involved in cryptocurrency regulation. **[9]**

b) Explain black market usage of cryptocurrency and its impact on global economy. **[9]**

OR

Q4) a) Explain legal challenges in cryptocurrency exchanges. **[9]**

b) Explain blockchain applications in Medical Record Management Systems. **[9]**

P.T.O.

Q5) a) Explain Bitcoin addresses and their generation process. **[8]**

b) Explain Bitcoin transactions and payment mechanism. **[9]**

OR

Q6) a) Explain Bitcoin working, advantages and limitations. **[8]**

b) Explain public keys, private keys and digital keys used in Bitcoin. **[9]**

Q7) a) Explain IBM Blockchain use cases in investment management platforms. **[9]**

b) Explain components and benefits of AI marketplaces. **[9]**

OR

Q8) a) Explain blockchain-based healthcare innovation systems. **[9]**

b) Explain future scope of blockchain and AI integration. **[9]**

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Total No. of Questions : 8]

SEAT No. :

PE3250

[Total No. of Pages : 2

[6584]-453
B.E. (Honors) (Printing Technology)
ADVANCED PACKAGING TECHNOLOGY
Sustainable Packaging
(2019 Pattern) (Semester - VII) (408214)

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

Instructions to the candidates:

1) ***Attempt 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.***

Q1) a) What is design for safety explain in brief. **[10]**

b) What is sustainable food packaging. **[7]**

OR

Q2) a) What is edible packaging. **[10]**

b) State the importance of corporate images and brand management. **[7]**

Q3) a) What is Life Cycle Analyses? **[9]**

b) Define the core concepts of sustainability and circular economy. Explain how these concepts differ from those in the traditional linear economy model. **[9]**

OR

Q4) a) Explain the stages in the lifecycle of product/service or activity. **[9]**

b) Describe the structure of a linear economy. What are the limitations and environmental consequences associated with this model of production and consumption? **[9]**

Q5) a) What are the phases and process of LCA. **[8]**

b) Why is life cycle assessment essential in modern industry and environmental management? Discuss its role in achieving sustainability goals. **[9]**

OR

P.T.O.

Q6) a) Define green packaging and explain how LCA contributes to the design and evaluation of environmentally friendly packaging solution. **[10]**

b) Describe the main functions of LCA in decision-making and policy development. How does it help identify environmental hotspots in a product's lifecycle? **[7]**

Q7) a) Explain how marketing strategies can support sustainability goals. Discuss the key components of an effective sustainable marketing plan, with examples from real-world brands. **[9]**

b) Why is stakeholder engagement critical in driving sustainability initiatives? Describe methods for identifying and collaborating with key stakeholders in a sustainability context. **[9]**

OR

Q8) a) Discuss the challenges and best practices for communicating sustainability messages. How can companies ensure transparency and credibility in their communication? **[9]**

b) Explain the purpose and structure of ISO 14040. How does it support the development and application of Life Cycle Assessment in sustainability practices? **[9]**



Total No. of Questions : 8]

SEAT No. :

PE2473

[Total No. of Pages : 2

[6584]-454

B.E. (Computer Engineering)

MACHINE LEARNING

Honours in Artificial Intelligence and Machine Learning

(2019 Pattern) (Semester - VII) (410301)

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) ***Make suitable assumption whenever necessary.***

Q1) a) What is curse of dimensionality? Explain SVM in detail. **[8]**

b) Write note on regression and kernels. **[9]**

OR

Q2) a) Explain Random Forest and overfitting in detail. **[8]**

b) Write note on Adaptive Nearest Neighbour? **[9]**

Q3) a) Explain Learning Boolean Function in detail. **[9]**

b) Explain two class & multiclass discrimination. **[9]**

OR

Q4) a) What is Learning Time & Recurrent Network? Explain in detail. **[9]**

b) Explain Bayesian Neural Network in detail with the help of example. **[9]**

Q5) a) What is association rule mining? Explain the Apriori algorithm with the help of example. **[8]**

b) Explain the Proximity Matrices in detail. **[9]**

OR

P.T.O.

Q6) a) Explain the following : **[8]**

i) K-Medoids

ii) Hierarchical Clustering

b) Explain the self – organizing maps in detail. **[9]**

Q7) a) Explain in detail the discrete Markov Process in detail. **[9]**

b) Explain in detail the Hidden Markov Model in detail. **[9]**

OR

Q8) a) What are different graphical models? Explain any two in detail. **[9]**

b) What is belief propagation? Explain Chains, Trees, olytrees, Junction Trees. **[9]**



Total No. of Questions : 8]

SEAT No. :

PE-5805

[Total No. of Pages : 2

[6584]-455

B.E. (Computer Engineering) (Honors)

INTERNET OF THINGS AND EMBEDDED SECURITY

(2019 Pattern) (Semester - VII) (410401)

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) Explain an IoT Security CONOPS document, network and security integration? **[8]**

b) Explain in details system security verification and validation (V&V) model. **[9]**

OR

Q2) a) Explain Operations and Maintenance in IoT security with focus on identity and security monitoring. **[8]**

b) Explain the secure IoT system implementation life cycle **[9]**

Q3) a) Explain the role of cryptography in ensuring security goals (CIAAN) in IoT systems **[9]**

b) Explain the cryptographic controls in IoT communication protocols such as ZigBee, Bluetooth, and NFC **[9]**

OR

Q4) a) Explain the cryptographic mechanisms used in IoT messaging protocols like MQTT, CoAP, DDS, and REST. **[9]**

b) Explain symmetric and asymmetric encryption with suitable IoT use cases. **[9]**

P.T.O.

Q5) a) Explain secure bootstrap, credential provisioning, and account monitoring in IoT IAM. **[8]**

b) Explain the identity lifecycle in IoT with an example of device onboarding and sunset. **[9]**

OR

Q6) a) Write short notes on authentication credentials used in IoT **[8]**

i) passwords

ii) symmetric keys

iii) certificates

iv) biometrics.

b) Describe the IAM infrastructure for IoT, focusing on 802.1X and PKI integration. **[9]**

Q7) a) Compare federated identity and global web identity with examples. **[9]**

b) Describe identity portrayal and its importance in identity management. **[9]**

OR

Q8) a) Compare local identity vs. network identity models. **[9]**

b) Design a secure IoT identity model for smart home or smart healthcare systems. **[9]**



Total No. of Questions : 8]

SEAT No. :

PE2474

[Total No. of Pages : 2

[6584]-456

B.E. (Computer Engineering)

HONORS IN DATA SCIENCE : MACHINE LEARNING AND DATA SCIENCE

(2019 Pattern) (Semester - VII) (410501)

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) What is the role of dendrograms in choosing number clusters in Hierarchical clustering? **[8]**

b) Explain in detail KNN technique with example. **[9]**

OR

Q2) a) What is clustering? Explain Agglomerative Hierarchical Clustering technique. **[8]**

b) What is K-Means algorithm? Explain in detail. **[9]**

Q3) a) What is Activation Function? Explain its types in detail. **[9]**

b) What is Perceptron? Explain the process of training a perceptron? **[8]**

OR

Q4) a) What is a Neural network? Explain Back propagation Algorithm in detail. **[9]**

b) Explain the following concept in detail. **[8]**

i) Generalized Delta Learning Rule.

ii) Multilayer Perceptron's

P.T.O.

Q5) a) Explain the concept of Long - short Term memory with example. **[9]**

b) Describe Gradient descent optimization in depth. **[9]**

OR

Q6) a) Explain CNN algorithm and its architecture with a diagram. **[9]**

b) What is Recursive Neural Network? Explain Recurrent Neural Network with example. **[9]**

Q7) a) Describe the concept Text Preprocessing with suitable example. **[9]**

b) Explain Topic modeling algorithms in detail. **[9]**

OR

Q8) a) Explain in detail. **[9]**

i) Tokenization

ii) Feature selection and Extraction.

b) What is document representation in text preprocessing. Explain Text Similarity measure in detail. **[9]**



Total No. of Questions : 8]

SEAT No. :

PE2475

[Total No. of Pages : 2

[6584]-457

B.E. (Computer Engineering)

HONORS IN 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) ***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.***

Q1) a) Explain CNN with any one application. **[6]**

b) Explain Random forest algorithm with working. **[6]**

c) What are the steps to apply PCA in computer vision? **[6]**

OR

Q2) a) Explain GANs with any one application. **[6]**

b) Compare CNN with RNN. **[6]**

c) Explain SVM with an example. **[6]**

Q3) a) Explain Distributed Machine Learning with an example. **[6]**

b) What is smart building? What are the analytics advantages? **[6]**

c) Explain the concept of Algorithm optimization in Machine Learning. **[5]**

OR

Q4) a) What is Edge Computing? Why are edge devices essential for IoT? **[6]**

b) Explain Machine Learning Accelerator with an example. **[6]**

c) Explain the concept of Hardware Implementation in Machine Learning. **[5]**

P.T.O.

Q5) a) Explain any one application for Embedded deep learning. **[9]**

b) Explain in detail Real Time IoT imaging with Deep Neural Network. **[9]**

OR

Q6) a) Explain any one application for deep learning for sensor data. **[9]**

b) For Pre-training the network which deep learning architecture can be used? Why? **[9]**

Q7) a) Explain IoT for Agriculture application using smart irrigation system. **[9]**

b) What do you mean by IoT security using ML? **[8]**

OR

Q8) a) What is Remote Patient Monitoring? Explain with example. **[9]**

b) Explain in detail Smart Transportation System. **[8]**



Total No. of Questions : 8]

SEAT No. : ____

PE2476

[Total No. of Pages : 2

[6584]-458
B.E. (Computer Engineering) (AR & VR) (Honors)
VIRTUAL REALITY IN GAME DEVELOPMENT
(2019 Pattern) (Semester - VII) (410701)

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 the following terms: **[6]**

i) Design with virtual environments

ii) Design for virtual environments

iii) Design of virtual environments

b) State different tools for building VR applications. **[6]**

c) Explain block diagram for a multimodal VR system developed at HRL Laboratories. **[6]**

OR

Q2) a) Explain Formative usability evaluation cycle. **[6]**

b) Explain in detail Task analysis of Make stage. **[6]**

c) Explain different guidelines of Iterative Design. **[6]**

Q3) a) Explain working with Unity's UI System. **[6]**

i) UI Canvas

ii) UI Text and Images

iii) UI Buttons

b) Explain Interactive NPCs and Non-interactive NPCs. **[6]**

c) Explain working with Sprites in Unity. Also describe how to actually use Sprites in Unity. **[6]**

OR

Q4) a) Explain step to develop town view using unity. **[6]**

b) Differentiate between Animations in Unreal engine Vs Unity Engine. **[6]**

c) Explain the term NPCs and Interactions. **[6]**

P.T.O.

Q5) a) How to add background music and sound effect for gaming application using unity? **[6]**

b) How to building in-game menu structures? Explain. **[6]**

c) How to Implement the turn-based battle system? Explain. **[5]**

OR

Q6) a) Illustrate the overall design process of the Battle System in Unity. **[6]**

b) Consider The Following Code Snippet Below: **[6]**

```
Class Mover: Monobehaviour
{
Vector3 Target;
Float Speed;
Void Update()
{
}
}
```

Finish This Code So The Gameobject Containing This Script Moves With Constant Speed Towards Target, And Stop Moving Once It Reaches 1.0, or Less, Units of Distance?

c) Illustrate the process to build the shop scene in unity. **[5]**

Q7) a) What are different Questionnaire of Kennedy Simulator Sickness? **[5]**

b) State any six system factor that contribute to adverse effects. **[6]**

c) What is unified model of motion sickness? Explain with neat diagram. **[6]**

OR

Q8) a) What are different Questionnaire of Kennedy Simulator Sickness? **[5]**

b) State different examples of reducing adverse effects. **[6]**

c) Explain any three terms w.r.t. physical issues involved with the use of VR equipment. **[6]**

i) Physical fatigue

ii) Headset fit

iii) Injury and Hygiene

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