Total No. of Questions : 9]

SEAT No. :

PA-119

[Total No. of Pages : 3

[5927]-1
B.E. (Automobile)
AUTOMOTIVE REFRIGERATION & AIR-CONDITIONING
(2015 Pattern) (Semester - I) (416488)

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 and Q.9 is compulsory.***
2) ***Figures to right indicate full marks.***
3) ***Use of stean table and psychrometric chart is allowed.***
4) ***Assume suitable data if necessary.***

Q1) a) Explain Reverse carnot cycle. **[6]**

b) A refrigeration system operates on reversed carnot cycle between temperature limits of –23°C and 45°C. The refrigerant capacity is 10 TR. Determine COP and power required. **[4]**

OR

Q2) a) Explain vapour compression cycle with T.S diagram. **[6]**

b) Define following Terms : **[4]**

i) T.R.

ii) C.O.P.

Q3) a) Classify refrigerants in detail. **[6]**

b) Give classification of lubricants used in refrigeration system. **[4]**

OR

Q4) a) Explain with neat sketch vapour absorption refrigeration system. **[6]**

b) Define following : **[4]**

i) O.D.P.

ii) G.W.P.

P.T.O.

Q5) a) Explain factors affecting human comfort. **[6]**

b) What is effective temperature. Also explain factors affecting effective temperature. **[10]**

OR

Q6) a) Explain different air distribution modes. **[10]**

b) Explain cool down performance of vehicle. **[6]**

Q7) An air-conditioned system is to be designed for a restaurant with following data : **[16]**

Outside design condition = 40°C DBT, 28°C WBT

Inside Design condition = 25°C DBT, 50% RH.

RSH = 31.5 kW, RLH = 8.47 kW

Bypass factor = 0.2

If 25% fresh air and 75% room air is mixed and passed through cooling coil.

Find the following :

i) ADP of cooling coil

ii) Condition of supply air to room

iii) Amount of total air required

iv) Capacity of plant in TR.

OR

Q8) Following are the conditions of AC system. **[16]**

Room design condition = 26°C DBT, 19°C WBT

Outside condition = 35°C DBT, 27°C WBT

Sensible heat gain = 11.1 kW

Latent heat gain = 3.9 kW

Ration of fresh air to room air is 1 : 3.

Fresh air is mixed with room air and then passed over cooling coil. BPF = 0.2.

Determine following :

i) DBT and WBT of supply air

ii) ADP of cooling coil

iii) Refrigeration load.

iv) Amount of moisture removed.

Q9) Write short notes on following (Any three) : **[18]**

a) Leak detection methods in AC

b) Odour removal in AC

c) Refrigerant Handling

d) Automotive AC system flushing

e) Initial vehicle inspection

f) Refrigerant charging

□□□

Total No. of Questions : 10]

SEAT No. : [ ]

PA-128

[Total No. of Pages : 2

[5927]-10

B.E. (Automobile Engineering)

AUTOMOTIVE SYSTEMS AND TESTING

(2015 Pattern) (Semester - II) (416495)

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

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 and Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain Roll Center with neat figures. **[5]**

b) Define caster and camber and mention their influence on steering system? **[5]**

OR

Q2) a) What is meant by aspect ratio? Designate and write down meaning of each parameter of following, **[5]**

145/70 R 12 69 S

b) Write down functions and requirements of steering system. **[5]**

Q3) a) Explain any two types of tyres tread patterns with suitable sketches. **[5]**

b) What are the different factors affecting tyre performance? Explain briefly. **[5]**

OR

Q4) a) Classify Brakes on the basis of power, method of operation, method of applying braking force and method of application. **[5]**

b) Compara Drum Brakes and Disc Brakes. **[5]**

Q5) a) Explain following performance parameters. **[10]**

i) Fuel Economy
ii) Acceleration
iii) Braking Performance
iv) Handling Characteristics
v) Life Durability

b) What are the different types of EGR? Explain any two types with neat figures. **[8]**

OR

P.T.O.

Q6) a) What are the different sources of interior noise generation of a vehicle? Explain briefly. **[8]**

b) Explain Briefly. **[10]**

i) Model Test

ii) Full Scale Test

iii) Sensor types and selection parameters.

Q7) a) Write a short note on Coast Down Test. **[8]**

b) Explain procedure of two wheeler testing on chassis dynamometer for emissions. **[8]**

OR

Q8) a) Enlist different types of test tracks. Explain any three. **[8]**

b) Write a short note working of chassis dynamometer. **[8]**

Q9) a) Write a note on ergonomic considerations in safety. **[8]**

b) Write a short note on following (Any two) **[8]**

i) Crashworthiness

ii) Energy Absorption in Crash

iii) Crash Test Sensors

iv) Crash Test Dummies

OR

Q10)a) Explain Driver Controls accessibility and driver seat anthropometry in brief. **[8]**

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

i) Adaptive Cruise Control

ii) Navigation Systems

✠ ✠ ✠

Total No. of Questions : 10]

SEAT No. : ____

PA-217

[Total No. of Pages : 2

[5927]-100
B.E. (Electrical)
ELECTIVE-1D : DIGITAL SIGNAL PROCESSING
(2015 Pattern) (403143D) (Semester - I)

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

Instructions to the candidates :

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right side indicate full marks.***
3) ***Use of Calculator is allowed.***
4) ***Assume Suitable data if necessary.***

Q1) a) What are the advantages of digital signal processing? **[4]**

b) State and explain following two properties of DTFT-Transform. **[6]**

i) Linearity

ii) Time delay

OR

Q2) a) What is the relation between z-transform and DTFT? **[4]**

b) State and prove any two properties of z-transform. **[6]**

Q3) a) Find the system function and impulse response of the system described by the difference equation $y(n)=\frac{1}{5}y(n-1)+x(n)$ with ROC |z|>(1/5). **[4]**

b) State and explain sampling theorem. **[6]**

OR

Q4) a) Define z-Transform and its ROC. **[4]**

b) Determine if the following systems are static or dynamic with reason. **[6]**

i) $y(n) = x(n^2)$

ii) $y(n) = x(-n)$

iii) $y(n) = nx(n)$

P.T.O.

Q5) a) Calculate circular and linear convolution of following sequence $x_1 = \{1,2,3,4\}$ and $x_1 = \{0,0,1,0\}$ using matrix approach. **[6]**

b) State and prove following properties of DFT. **[10]**

i) Linearity

ii) Circular convolution

OR

Q6) a) Compute DFT of the sequence $(-1)^n$ for $0 \leq n \leq 3$. **[8]**

b) Explain DIF FFT algorithm for computation of DFT. **[8]**

Q7) a) Explain design of IIR filter using impulse invariance technique. **[8]**

b) Obtain direct form-I and direct form-II realization for the system described by difference equation **[8]**

$$y(n) - \frac{1}{2}y(n-1) + \frac{1}{4}y(n-2) = x(n) + \frac{1}{5}x(n-1)$$

OR

Q8) a) Explain cascade realization of IIR filters. **[8]**

b) Obtain direct form-I and direct form-II realization of the LTI system governed by the equation. **[8]**

$$y(n) = -\frac{3}{8}y(n-1) + \frac{3}{32}y(n-2) + \frac{1}{64}y(n-3) + x(n) + 3x(n-1) + 2x(n-2)$$

Q9) a) Design an ideal low pass filter with frequency response **[10]**

$$H_d(e^{j\omega}) = 1 \quad for \quad -\frac{\pi}{3} \leq |\omega| \leq \frac{\pi}{3}$$

$$H_d(e^{j\omega}) = 0 \quad for\ all\ other\ values\ of\ \omega$$

Find the values of h(n) for N = 7.

b) What are the different methods for realization of FIR filters? Explain any one in detail. **[8]**

OR

Q10) Write short note on application of DSP for **[18]**

a) Overcurrent protection

b) Measurement of voltage and frequency

Total No. of Questions : 8]

SEAT No. :

PA-218

[Total No. of Pages : 2

[5927]-101
B.E. (Electrical)
RESTRUCTURING & DE REGULATION
(2015 Pattern) (Semester - I) (Elective - II) (403144A)

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

Q1) a) Explain the various concepts such as capital cost, debt and equity, depreciation related to power sector economics. **[6]**

b) Explain the objectives of Electricity Act 2003. **[6]**

c) List and explain different tariff setting principles. **[8]**

OR

Q2) a) Explain different methods to assess the financial feasibility of any project. **[8]**

b) Explain in detail the following typical cost components of utilities : **[6]**

i) O and M Expenses

ii) Cost of Working Capital

iii) Interest and finance charges

c) Explain the regulatory process in India. **[6]**

Q3) a) How trading of renewable energy credits is carried out in energy markets. **[8]**

b) Explain the working of Energy Exchange. **[10]**

P.T.O.

OR

Q4) a) With a neat sketch explain following structural models. **[10]**

i) Monopoly

ii) Single buyer

b) Briefly explain any two models of ISO. **[8]**

Q5) a) Write short note on : **[8]**

i) Forward contracts and forward markets

ii) Future contracts and future markets

b) What do you understand by Market Clearing Price (MCP)? What are the factors affecting MCP. **[8]**

OR

Q6) a) Explain the following terms related to Electricity markets. **[8]**

i) Market Power

ii) Market operations - Settlement process

iii) Market Efficiency

iv) Option contract

b) What are the peculiarities of electricity as a commodity? How does it differ than any other commodity? List down the rules that govern the electricity markets. **[8]**

Q7) a) Explain in detail Cost allocation of Transmission system. **[8]**

b) Explain the different methods of congestion management. **[8]**

OR

Q8) a) What is congestion in power transmission network? What are the reasons for congestion? **[8]**

b) What are cost components of transmission system? **[8]**

Total No. of Questions : 8]

SEAT No. :

PA-219

[Total No. of Pages : 3

[5927]-102
B.E. (Electrical)
ELECTROMAGNETIC FIELDS
(2015 Pattern) (Semester - I) (Elective - II) (403144B)

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) ***Figure 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) Derive an expression of electric field intensity due to infinitely spread sheet charge having charge density ρ_s C/m^2. **[8]**

b) Express the following points in cylindrical coordinates **[6]**

i) P(1, –4, –3)

ii) Q(3, 0, 5)

iii) R(–2, 6, 0)

c) Derive expression for gradient of $V\left(\bar{E} = -\nabla V\right)$. **[6]**

OR

Q2) a) Determine the divergence of following vector fields **[8]**

i) $\bar{B} = \rho z \sin\varphi \widehat{a_\theta} + 3\rho z^2 \cos\varphi \widehat{a_\varphi}$

ii) $\bar{C} = \frac{1}{r^2}\cos\varphi \widehat{a_r} + r\sin\theta\cos\varphi \widehat{a_\theta} + \cos\theta \widehat{a_\varphi}$

b) Explain Gauss's law in detail. **[6]**

c) Derive the expression for the potential difference between point A and B in presence of a point charge at the origin. **[6]**

P.T.O.

Q3) a) Derive an expression for magnetic field intensity $\bar{H}$ on the axis of circular current loop of radius r using Biot- Savart's law. Consider the circular loop lying in x-y plane. **[8]**

b) Define magnetic flux density. Given the magnetic vector potential $\bar{A}=-\frac{\rho^2}{4}\hat{a_z}$ Wb/m, Calculate the total magnetic flux crossing the surface $\varphi=\frac{\pi}{2}, 1\leq\rho\leq 2m,\ 0\leq z\leq 5m$ **[8]**

OR

Q4) a) Obtain the $\bar{H}$ (magnetic field intensity) due to infinitely long straight conductor carrying current I at any point P using Ampere's circuital law. **[8]**

b) Derive an expression for force **[8]**

i) Due to a moving charged particle in a magnetic field (**B**)

ii) On a current element in an external magnetic field (**B**)

Q5) a) Derive the boundary conditions for the boundary between two dielectric materials. **[8]**

b) Derive an expression for point form of Ohm's law. Based on Ohm's law derive an expression for resistance of conducting material. **[8]**

OR

Q6) a) Derive the boundary conditions at an interface between two magnetic media having permeability μ_1 and μ_2 in terms of magnetic field intensity and magnetic flux density. **[8]**

b) Two extensive homogenous isotropic dielectrics meet on plane z = 0. For z > 0, $\varepsilon_{r1}=4$ and for z < 0, $\varepsilon_{r2}=3$. A uniform electric field $E_1=5\hat{a}_x-2\hat{a}_y+3\hat{a}_z$ V/m exists for z ≥ 0. Find **[8]**

i) E2 for z ≤ 0

ii) The angles E_1 and E_2 make with the interface

Q7) a) Write Maxwell's equation in point form and integral form for static electromagnetic fields and time varying fields. Explain the significance of displacement current. **[10]**

b) State Faraday's law of electromagnetic induction? Derive an expression for motional emf. **[8]**

OR

Q8) a) Define Poynting theorem. Derive an expression for Poynting vector. State the significance of each term in equation of Poynting vector. **[10]**

b) Derive an expression for time varying potentials. **[8]**

Total No. of Questions : 8]

SEAT No. : ____

PA-220

[Total No. of Pages : 2

[5927]-103

B.E. (Electrical)

EHV AC TRANSMISSION

(2015 Pattern) (Semester - I) (403144C) (Elective - II)

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

Instructions to the candidates:

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

Q1) a) Derive an expression for inductance of current carrying single conductor. **[8]**

b) Explain the importance of surface voltage gradient factors in Extra high voltage lines. **[8]**

c) Explain standard Transmission voltage levels that are recognized in India and give its significance. **[4]**

OR

Q2) a) A power of 12,000 MW is required to be transmitted over a distance of 1,000 km. At voltage levels of 750 kV and 1000 kV, determine the currents transmitted and the total line losses. The magnitudes for sending and receiving end voltages are equal with 30º phase difference. The line resistance and reactance values are given below. **[8]**

	750 kV	**1000 kV**
r (ohm/km)	0.0136	0.0036
x (ohm/km)	0.272	0.231

b) Explain resistance of conductors and effect of temperature on overhead conductors. **[8]**

c) Compare line charge with point charge. **[4]**

P.T.O.

Q3) a) Explain the terms primary shock current, secondary shock current and let-go current. **[10]**

b) Write note on ungrounded ground wire. **[8]**

OR

Q4) a) Discuss effect of high electrostatic field on: **[10]**

i) Humans

ii) Animals

iii) Plants

b) Explain the procedure for finding out electro statically induced voltage in any conductor of unenergized three phase circuit of a double circuit line. **[8]**

Q5) a) With a simple block diagram, explain the Audible noise measuring circuit in Extra high voltage ac lines. **[8]**

b) Explain different corona loss formulae used in EHVA.C lines. **[8]**

OR

Q6) a) What is radio interference? Discuss mechanism for minimization of radio interference in EHV-lines. **[8]**

b) Explain the mechanism of corona formation in detail. **[8]**

Q7) a) Name the materials used for insulation in E.H.V cables; and state the properties of SF_6 gas as an insulating in cables. **[8]**

b) Explain in detail properties of cable insulation materials. **[8]**

OR

Q8) a) Define tan δ loss factor & derive an expression for insulation resistance of a cable. **[8]**

b) State and explain at least four factors to be considered in the design of ehv lines based upon the steady state limits. Also state their limiting value. **[8]**

Total No. of Questions : 8]

SEAT No. : ____

PA-221

[Total No. of Pages : 2

[5927]-104

B.E. (Electrical)

ELECTRIC AND HYBRID VEHICLES

(2015 Pattern) (Semester-I) (Elective-II) (403144D)

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) Explain different charging algorithm and balancing method for battery pack charging. **[12]**

b) Explain Hybridization of drive trains in HEV's. **[8]**

OR

Q2) a) Explain battery-based energy storage and its analysis in detail. **[10]**

b) Explain needs and importance of transportation development. **[10]**

Q3) a) Explain concept and architecture of HEV drive train. **[10]**

b) Explain advantages and challenges in Electric Vehicle design. **[6]**

OR

Q4) a) Explain different components and configuration of Electric Vehicles. **[10]**

b) Explain need of energy consumption in EV and HEV. **[6]**

Q5) a) Explain performance characteristics of BLDC drives. **[10]**

b) Compare BLDC drive and Switched reluctance motor drive for HEV & EV. **[8]**

OR

Q6) a) Explain the concept of vehicle tracking through GPRS. **[8]**

b) Explain in detail instrumentation and control system of Hybrid and Electric Vehicles. **[10]**

P.T.O.

Q7) a) Explain the concept & structure of EV aggregator in vehicle to vehicle energy systems. **[8]**

b) Explain in details PHEV control strategies in vehicle to home energy systems. **[8]**

OR

Q8) a) Explain in details planning of vehicle to Grid infrastructure in the smart grid. **[8]**

b) Explain different control method of EV aggregator for dispatching a feet of EV. **[8]**

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Total No. of Questions : 10]

SEAT No. : ____

PA-222

[Total No. of Pages : 2

[5927]-105

B.E. (Electrical)

SPECIAL PURPOSE MACHINES

(2015 Pattern) (Semester-I) (Elective-II) (403144E)

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

Instructions to the candidates:

1) ***Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Derive expression of magnetic force from co-energy. **[5]**

b) Describe constructional details of permanent magnet synchronous motor with suitable diagram. **[5]**

OR

Q2) a) Describe the types of permanent magnet synchronous motors. **[5]**

b) State the control strategies of PMSM. Describe any one in brief. **[5]**

Q3) a) Elaborate abc - α β transformations. **[5]**

b) Describe various forces in a system with permanent magnet. **[5]**

OR

Q4) a) Draw and explain torque speed characteristics of permanent magnet synchronous motor. **[5]**

b) What is co-energy? Explain its significance in electro mechanical energy conversion. **[5]**

Q5) a) With suitable diagrams explain axial and radial gap reluctance motor. **[8]**

b) With suitable block diagram explain reluctance motor drive. **[8]**

OR

Q6) a) Draw and explain torque-speed characteristics reluctance motor. **[8]**

b) Explain the process of poles and pole arc selection in reluctance motor. **[8]**

P.T.O.

Q7) a) Explain working of variable reluctance stepper motor with diagrams. **[8]**

b) Draw phasor diagram of reluctance motor mark all parameters init. **[8]**

OR

Q8) a) Explain concept of lead angle in case of stepper motor. **[8]**

b) Explain static and dynamic characteristics of stepper motor. **[8]**

Q9) a) Explain various performance characteristics of linear induction motor. **[9]**

b) With suitable diagram explain constructional details of linear induction motor. **[9]**

OR

Q10) a) State various applications of linear induction motor. **[9]**

b) Explain torque production process in linear induction motor. **[9]**

✡ ✡ ✡

Total No. of Questions : 8]

SEAT No. : ____

PA-223

[Total No. of Pages : 2

[5927]-106
B.E. (Electrical)
SWITCHGEAR & PROTECTION
(2015 Pattern) (Semester - II) (403147)

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) ***Figure to right indicate full marks.***
4) ***Use of Non-Programmable Scientific Calculators is allowed.***
5) ***Assume Suitable Data if necessary.***

Q1) a) Derive the torque equation in induction type relay. **[6]**

b) Explain the concept of current chopping of capacitive current. Draw the necessary waveform. **[7]**

c) State and explain the rated characteristics of High Voltage circuit breakers as per IS-2516. **[7]**

OR

Q2) a) What are the essential qualities of protective relaying? Explain. **[6]**

b) Derive the expression for restriking voltage and thereof for maximum RRRV. **[7]**

c) Draw the neat sketch & explain in detail the construction & working principle of SF6 circuit breaker. **[7]**

Q3) a) Draw the neat connection diagram & explain the phase fault and ground fault protection of 3-phase induction motor. **[8]**

b) Draw the neat block diagram & explain numerical relays . Also enlist its advantages & disadvantages. **[10]**

OR

P.T.O.

Q4) a) Draw the connection diagram of DOL Starter used for 3-ph Induction motor & explain (i) Protection against overloading & (ii) the single phasing. **[8]**

b) Draw the neat block diagram & explain the operating principle static relays. Also state its merits and demerits. **[10]**

Q5) a) Explain the phenomenon of magnetizing inrush current in the transformer. Suggest suitable protection against it. **[8]**

b) A 3-phase, 2-pole, 11 kV, 10 MVA alternator has neutral grounding resistance of 5 ohm. The machine is protected by differential protection in which relay trips when its current exceeds 25% of full load current. Determine percentage of winding protected against earth fault. **[8]**

OR

Q6) a) State the types of faults taking place in alternator on stator and rotor side and explain protection against - (i) Loss of field (ii) Loss of excitation.**[8]**

b) A 3 phase, 33/3.3 kV star/delta connected transformer is protected by differential protection. CT's on LT side have a ratio of 400/5. Determine the CT ratio on HT side. Draw the connection diagram. **[8]**

Q7) a) Sketch the neat diagram & explain distance protection scheme for transmission line using reactance relay. Derive its torque equation and draw its characteristics on R-X plane. **[8]**

b) What do you mean by power swings and arc resistance? Explain the effect of power swings and arc resistance on the performance of the distance relay. **[8]**

OR

Q8) a) Compare Impedance relay, Reactance relay and Mho relay with reference to applications and characteristics used for protection of transmission line. **[8]**

b) Draw the block diagram and explain the working of carrier current protection scheme for long transmission lines. **[8]**

Total No. of Questions : 10]

SEAT No. : ____

PA-224

[Total No. of Pages : 2

[5927]-107

B.E. (Electrical)

POWER ELECTRONICS CONTROLLED DRIVES

(2015 Pattern) (Semester - II) (403148)

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

Instructions to the candidates:

1) ***Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicates full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) a) What are different components of load torque? Explain in detail. **[5]**

b) Explain operation of chopper controlled separately excited DC motor drive with suitable waveforms. **[5]**

OR

Q2) a) A drive has the following parameters:

$J = 15$ kg-m^2, $T = 150 - 0.2$ N, N-m and passive load torque $T_l = 0.025$ N, N-m; where N is the speed in rpm.

Initially the drive is operating in steady state. Now it is to be reversed. For this motor characteristics is altered such that, $T = -150 - 0.2$ N, N-m. Calculate the reversal time. **[5]**

b) Explain with block diagram and speed torque characteristics V/f control of Induction motor drive. **[5]**

Q3) a) Explain dynamic braking method for braking operation of DC shunt motor. **[5]**

b) A 230 V, 1000 rpm & 100 A separately excited DC motor has an armature resistance of 0.1 Ω. It is coupled to an overhauling load with a torque of 500 N-m. Determine the speed at which motor can hold the load by regenerative braking. **[5]**

OR

Q4) a) Explain closed loop control of a separately excited DC motor with suitable block diagram. **[5]**

b) Explain Plugging braking of Induction motor. What precautions are to be taken during plugging operation of Induction motor? **[5]**

P.T.O.

Q5) a) Explain the principle of vector control of Induction motor. **[8]**

b) Write in brief about topology, control and applications of AC servo motor drives. **[8]**

OR

Q6) a) Compare and comment on relative merits and demerits of VSI and CSI fed induction motor drive. **[8]**

b) Write a short note on commutator less DC drive. **[8]**

Q7) a) What are the control strategies for Permanent magnet synchronous motor drive? How constant torque angle control is used? **[8]**

b) Explain variable DC link converter topology for PM BLDC half wave drives for motoring and regenerative braking operating mode. **[8]**

OR

Q8) a) Draw neat diagram and explain vector control of PM synchronous motor. **[8]**

b) Comment on use of sensor less control in PM BLDC drives. **[8]**

Q9) a) Write a short note on any two: **[10]**

i) Selection criteria of motors.

ii) Selection of drive and requirement of speed torque characteristics of drive for Electric vechicles.

iii) Requirements of drive for paper mill operations.

b) Why four quadrant operation is needed in rolling mill drives? **[8]**

OR

Q10) a) Write a short note on any two: **[10]**

i) Classification of motors based on Duty cycle.

ii) Requirements of drive for Sugar mill operations.

iii) Torque requirement of traction drive at low speed when it is just being started and during free running condition.

b) How motor duty, heating and cooling affects the temperature of motor? **[8]**

Total No. of Questions : 8]

SEAT No. : ____

PA-225

[Total No. of Pages : 2

[5927]-108
B.E. (Electrical)
HIGH VOLTAGE ENGINEERING
(2015 Pattern) (Semester - II) (403149A) (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) ***Figure to right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain following breakdown theories for dielectrics : **[7]**

i) Suspended Particle theory for liquid dielectric.

ii) Treeing and tracking in solid dielectric.

b) Explain with suitable diagram Impulse Current Generator. Also give the function of different parts of an impulse current generator. **[7]**

c) A solid dielectric material with dielectric constant of 5.2 has void of thickness 2mm. The dielectric material thickness is 9mm and voltage applied across it is 80kV (rms). If void is filled with air and has dielectric strength of 30k V/cm (peak). Find the voltage at which internal discharge can occur. **[6]**

OR

Q2) a) Explain properties of composite dielectrics. Explain short term & long term breakdown theory of composite dielectric. **[7]**

b) State and derive Paschens' law and list its limitations. **[6]**

c) A 12 stage impulse generator has 0.2 μF capacitors. The wave front and the wave tail resistance connected are 600 ohms and 4000 ohms respectively. If load capacitor is l000pF, find the front and tail times of the impulse wave produced. **[7]**

Q3) a) Give the basic circuit for measuring the peak voltage of (i) ac voltage and (ii) impulse voltage. What is the difference in measurement technique in the above two cases? **[8]**

P.T.O.

b) Draw a vertical arrangement of sphere gap used for peak value of the voltage. Clearly show insulator support, sphere shank, operating gear and motor for changing gap distance, HV connection and sparking point. Discuss various factors that affect the sparkover voltage of a sphere gap. **[8]**

OR

Q4) a) What is partial discharge? Explain one method of measurement of partial discharge. **[8]**

b) With suitable figure explain the working of generating voltmeter. Also state its advantages. **[8]**

Q5) a) What is insulation coordination? Explain statistical method of insulation coordination with appropriate graphs. **[9]**

b) Explain main causes of overvoltage due to switching surges. Discuss various methods to overcome problems of switching surges in power system. **[9]**

OR

Q6) a) Explain clearly the process of "Cloud to earth" and "Return" lightning stroke. State the characteristics of such stroke and their effect when they strike EHV AC installations or lines. **[9]**

b) State the different charge formation theories in clouds. Compare Wilsons Theory with Reynolds and Masons' theory of charge formation. **[9]**

Q7) a) Explain the following terms as referred to high voltage testing : **[8]**

i) Withstand voltage

ii) Flashover voltage

iii) 50% flashover voltage

iv) Wet and dry power frequency tests

b) Why is grounding very important in an HV laboratory? Describe a typical grounding system used. **[8]**

OR

Q8) a) What are the different power frequency tests done on insulators? Mention the procedure for testing. **[8]**

b) Classify the different High voltage laboratories and give, salient features of each of them. **[8]**

Total No. of Questions : 11]

SEAT No. :

PA-226

[Total No. of Pages : 2

[5927]-109
B.E. (Electrical)
HVDC AND FACTS (Elective - III)
(2015 Pattern) (Semester - II) (403149B)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) Explain CIA and CC control in HVDC systems. **[7]**

OR

Q2) Enumerate technical and merits and demerits of HVDC systems. **[7]**

Q3) Discuss the harmonic generation by HVDC systems. **[7]**

OR

Q4) Explain protection against over-voltages in HVDC system. **[7]**

Q5) Write a note on HVDC light system. **[6]**

OR

Q6) Discuss the characteristics of VSC based HVDC system. **[6]**

Q7) Solve any two : **[16]**

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?

b) Describe the controller structures and requirements for AC Systems.

c) What is the role of dc link in power controllers? With neat diagram explain dc link converter topologies.

P.T.O.

Q8) a) What are different modes of operations of STATCOM? Also describe the control scheme of STATACOM. **[10]**

b) Compare STATCOM and SVC. **[8]**

OR

Q9) a) Discuss different configurations of SVCs. **[10]**

b) Compare STATCOM and TCSC. **[8]**

Q10) a) With neat sketches describe the construction of UPFC and its applicability in power system. **[8]**

b) Elaborate the internal control structure of UPFC. **[8]**

OR

Q11) a) Explain terminal regulation mode, phase angle control mode and impedance control modes of UPFC. **[8]**

b) Explain the merits of UPFC over other power electronic controllers. Also discuss the applicability of UPFC in power system. **[8]**

Total No. of Questions : 10]

SEAT No. : ____

PA-129

[Total No. of Pages :3

[5927] - 11
B.E. (Automobile Engineering)
AUTOMOTIVE SYSTEM DESIGN
(2015 Pattern) (Semester - II) (416496)

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

Instructions to the candidates :

1) ***Answer five questions from the following.***
2) ***Figures to the right indicate full marks.***
3) ***Use electronic pocket calculator is permitted.***
4) ***Assume suitable data if necessary.***

Q1) a) Explain the classification of gearbox. **[4]**

b) The multi plate clutch is to transmit 6KW at 800rpm. The inside radius is 38mm and outer radius is 70mm. Coefficient of friction 0.1. Maximum pressure is 350 KN/m^2. Determine axial force required total number of disc and average pressure. **[6]**

OR

Q2) a) An automobile gear box gives 3 forward speeds and one reverse with a top gear of unity and bottom and reverse gear ratio of approximately 3.3:1. The center distance between the shafts is to be 110mm approximately. Gear teeth of module 3.25mm. find the number of gear teeth. **[6]**

b) Narrate about the torque tube drive. **[4]**

Q3) a) Sketch the layout of sliding mesh gear box. **[4]**

b) An engine develops a maximum torque of 162 Nm and the low gear ratio of transmission is 2.75, while the back axle ratio is 4.25. The effective wheel radius is 0.325m, the coefficient of friction between the tyre and road surface is 0.6. If the permissible shear stress is 323.70 MPa, determine the maximum shaft diameter. Assuming the load is nearly torsional. What is the maximum load on each wheel? **[6]**

OR

P.T.O.

Q4) a) An engine develops 28 KW at 1500 rpm and its bottom gear ratio is 3.06. if a propeller shaft of 40mm outside diameter is to be used, determine the inside diameter of mild steel tube to be used, assuming a safe shear stress of 55×10^3 KPa for MS. **[4]**

b) Discuss about clutch frictional materials and their properties. **[6]**

Q5) a) Explain in brief about under steer and over steer. **[6]**

b) In a hydraulic single line braking system the force on foot pedal is 100N, pedal leverage ratio is 4.4, cross sectional area of master cylinder is 4 cm^2, cross sectional area of front piston 20 cm^2. Cross sectional area of the rear piston is 5 cm^2. Distance moved by effort is 1cm. Calculate the following.

i) Front to rear brake ratio

ii) Total force ratio

iii) Distance moved by output

iv) Cylinder movement ratio

v) Total movement ratio **[12]**

OR

Q6) a) A light motor vehicle has a wheel base of 2.64m, the height of its CG above the ground is 0.61m and it is 1.12m in front of the rear axle. If the car is travelling at 40km/h on a level track, determine the minimum distance in which the car may be stopped, when,

i) The rear wheels are braked

ii) The front wheel are braked

iii) All wheels are braked **[12]**

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

Q7) a) A vehicle spring of semi elliptic type has leaves of 75mm width and 10mm 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) Discuss the general design considerations of suspension system. **[6]**

OR

Q8) Discuss on: **[16]**

a) What is nipping in leaf springs?

b) Brake fade and Brake torque.

c) Brake balance and Braking efficiency.

d) Components used in hydraulic brake system.

Q9) Design a Tensile Bar for Minimum Cost of the following materials. Assume Factor of Safety of 1.8. **[16]**

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

Length of the bar is 175 mm and a constant tensile load on bar is of 4000N.

OR

Q10)a) What do you understand by,

i) Optimum and adequate design

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

iii) Design for natural tolerances. **[12]**

b) Explain about aspects of Aesthetic Design. **[4]**

◆◆◆

Total No. of Questions : 4]

SEAT No. :

PA-227

[Total No. of Pages : 2

[5927]-110
B.E. (Electrical)
DIGITAL CONTROL SYSTEM (Elective - III)
(2015 Pattern) (Semester - II) (403149C)

Time : 2½ Hours] *[Max. Marks : 70*

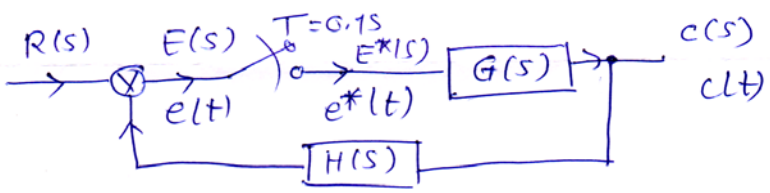
Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Your answers will be valued as a whole.***
3) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
4) ***Assume suitable data, if necessary.***

Q1) Attempt any three : **[21]**

a) State and explain Shanon's sampling theorem with example.

b)



For $G(s)=\frac{10}{s(s+5)}$ H(s) = 1 T = 0.15

Find closed 100p pulse transfer function

c) Explain how Z transfer function can be obtained using state space equations of discrete data system using Z transform method.

d) Explain pole placement design using linear state feedback.

Q2) a) Explain the concept of full order state observer and reduced order state observer in brief. **[7]**

b) Consider a linear discrete data control system described by the following input output relation $c(k+2)+2c(k+1)+c(k)=u(k+1)+u(k)$ obtain state space model by direct decomposition method and determine observability of the system. **[10]**

P.T.O.

Q3) Explain the following methods for digitizing analog controllers (any two) : **[16]**

a) Billinear transformation

b) Fuler's forward method

c) Trapezoidal method

Q4) Explain following digital control system applications (any two) : **[16]**

a) Temperature control

b) Position control

c) Stepper motor control

□□□

Total No. of Questions : 8]

SEAT No. :

PA-1152

[Total No. of Pages : 2

[5927]-111

B.E. (Electrical)

INTELLIGENT SYSTEMS AND APPLICATIONS IN ELECTRICAL ENGINEERING

(2015 Pattern) (Semester-II) (403149 D) (Elective-III)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer any one question from each pair of questions: Q.1 & Q.2, Q.3 & Q.4, Q.5 & Q.6, Q.7 & Q.8.***
2) ***Figures to the right side indicate full marks.***

Q1) a) Describe the types of neuron activation functions. **[6]**

b) Elaborate artificial neuron model with neat sketch. **[6]**

c) Describe discrete and continuous perceptron networks. **[8]**

OR

Q2) a) Write a short note on adaptive resonance theory. **[6]**

b) Explain BAM training algorithms and storage and recall algorithms. **[6]**

c) Explain briefly multilayer feed-forward neural networks and explain each layer of multilayer feed-forward neural networks. **[8]**

Q3) a) Write short notes on various membership functions of fuzzy sets. **[6]**

b) Explain the BAM energy function. **[6]**

c) Define fuzzy relations with suitable examples. **[6]**

OR

Q4) a) Explain self-organizing maps (SOM). **[6]**

b) Describe the properites of fuzzy sets. **[6]**

c) Compare fuzzy sets and crisp sets. **[6]**

Q5) a) Elaborate defuzzification methods. **[6]**

b) Describe briefly predicate logic. **[4]**

c) Write a short note on a fuzzy inference system (FIS) with a block diagram. **[6]**

OR

Q6) a) Explain the main features of Genetic Algorithms. **[6]**

b) Elaborate fuzzy rule-based system with block diagram. **[10]**

P.T.O.

Q7) a) What are fuzzy quantifiers and explain its types. **[6]**

b) What is a mutation and why is it programmed into the algorithm? **[10]**

OR

Q8) a) Differentiate the Single-Point and Two-Point crossover. **[6]**

b) How rank-based selection is carried out in a genetic algorithm? **[6]**

c) Describe the types of Mutation in the genetic algorithm. **[4]**

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Total No. of Questions : 8]

SEAT No. :

PA-228

[Total No. of Pages : 2

[5927]- 112
B.E. (Electrical)
ANALOG ELECTRONICS AND SENSING TECHNOLOGY
(2015 Pattern) (Open Elective - III) (Semester - II) (403149E)

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) ***Use of non programmable calculator is allowed.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain open loop and close loop configuration of TL082. **[8]**

b) Explain with block diagram LM741. **[4]**

c) Design a phase shift oscillator so that f0 = 200Hz. Assume C =0.1 μF calculate Rf,R1 values of resistors. **[8]**

OR

Q2) a) Explain V to f converter using LM3311. **[8]**

b) Explain Op-Amp application as differentiator. **[4]**

c) Design a phase shift oscillator so that f0 = 965Hz. Assume C =0.05 μF.Calculate R,R1 and Rf. **[8]**

Q3) a) Explain temperature sensor LM35 in detail with its calibration range and real time application. **[8]**

b) Explain INA240 current sense amplifier with its diagram calibration and range. **[8]**

OR

Q4) a) Explain HDC 1080 humidity sensor in detail. **[8]**

b) Explain DRV5053 Hall Effect based current sensor. Principle of operation range and calibration. **[8]**

P.T.O.

Q5) *a)* Explain DRV 5032 Hall Effect Sensor in detail. **[8]**

b) What is Inductive position sensor, Capacitive position sensor. Explain their working with circuit diagram. **[8]**

OR

Q6) a) Explain LVDT with its circuit and working. **[8]**

b) Explain AFE5805 Ultrasonic sensor in detail. **[8]**

Q7) a) What is sensing AFEs for capturing a broad range of wavelengths. What are different sensors used. **[9]**

b) Explain concept of infrared. Explain Near Infrared spectroscopy. **[9]**

OR

Q8) a) What is OPT3007 Light Sensor Explain in details. **[9]**

b) What is need of isolation. How it is achieved. Explain optical isolator. **[9]**

Total No. of Questions : 8]

SEAT No. : ____

PA-229

[Total No. of Pages : 2

[5927]-113
B.E. (Electrical Engineering)
SMART GRID
(2015 Pattern) (Semester - II) (Elective - IV) (403150A)

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

Instructions to the candidates:

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

Q1) a) Explain the concept of Resilient and Self Healing Grid. **[6]**

b) List different smart storage techniques and explain anyone in detail. **[6]**

c) Highlight on role of geographic information system is smart grid and also give its function. **[8]**

OR

Q2) a) State and explain challenges of smart grid. **[6]**

b) Explain PMU and importance in smart grid. **[6]**

c) Explain how automatic meter reading can make the system smarter. **[8]**

Q3) a) Explain the architecture of micro grid. **[8]**

b) Explain issues of Micro grid when connected. **[8]**

OR

Q4) a) Explain about protection and control of micro grid. **[8]**

b) Explain the concept of Microgrid, its need and applications. **[8]**

Q5) a) Highlight the issues related to Power Quality in Smart Grid. **[8]**

b) Describe the concept of power quality conditioners related to Smart Grid. **[8]**

OR

P.T.O.

Q6) a) Explain the concept of power quality and EMC in Smart Grid. **[8]**

b) Write a short note on Web based Power Quality Monitoring. **[8]**

Q7) a) Explain cloud computing and its need. **[9]**

b) Explain the role of HAN in smart grid. **[9]**

OR

Q8) a) Write a note on Broadband Over a power line. **[9]**

b) Why cyber security is of prime importance in smart grid? How it can be achieved. **[9]**

Total No. of Questions : 5]

SEAT No. :

PA-230

[Total No. of Pages : 2

[5927]-114
B.E. (Electrical)
ROBOTICS AND AUTOMATION
(2015 Pattern) (Semester - II) (Elective - IVB) (403150B)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q1 or Q2, Q3, Q4, and Q5 are compulsory.***
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 following terms- **[10]**

i) Accuracy

ii) Repeatability

iii) Work Envelope

iv) Compliance

v) Reach

b) Explain the concept of hand matrix with the effect of pre and post multiplication of a hand matrix by basic homogeneous matrix. **[10]**

OR

Q2) a) With the help of a neat diagram, explain in detail SCARA robot. **[10]**

b) Explain rules for establishing coordinate frames at different joints for D-H representation. **[10]**

Q3) a) Explain inverse solution by direct approach. **[8]**

b) Explain Lagrangian analysis for deriving dynamic equations for a single revolute joint. **[8]**

P.T.O.

Q4) a) Explain manipulator Jacobean, Inverse Jacobean and singularities in Jacobean analysis. **[9]**

b) Explain the method of Resolved Motion Position Control (RMPC) for robot motion. **[9]**

Q5) a) With a suitable block diagram, explain industrial part sorting operation using Robots. Explanation should include selection criterion, sensors used, selection of drives and actuators, methods of control etc. **[8]**

b) Write a short note on sensors in servo control system. **[8]**

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Total No. of Questions : 10]

SEAT No. :

PA-231

[Total No. of Pages : 2

[5927]-115
B.E. (Electrical)
ILLUMINATION ENGINEERING (Elective - IV)
(2015 Pattern) (Semester - II) (403150C)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Draw a sectional view of human eye and show different parts in it. **[5]**

b) State the different materials used for lamps. **[5]**

OR

Q2) a) Explain working of any one type of starter for flourocent tube. **[5]**

b) Elaborate the uses of polar curve. **[5]**

Q3) a) Explain zonal cavity method for indoor lighting design. **[5]**

b) State five advantages of LED lamp. **[5]**

OR

Q4) a) State any five parameters in case of eye performance characteristics. **[5]**

b) Explain working of metal halide lamp with a neat diagram. **[5]**

Q5) a) A lamp rated 250 volt takes a current of 0.4 Amp and has total flux of 1500 lumens. Calculate - **[8]**

i) MSCP

ii) Luminous intensity

iii) MSCP per watt

b) State and explain Lambert's cosine law. **[8]**

P.T.O.

OR

Q6) a) Explain following terms : **[8]**

i) Space to height ratio

ii) Maintenance factor

iii) Absorption factor

iv) Reflection factor

b) State and explain objectives of lighting scheme for commercial sector. **[8]**

Q7) a) State and explain any four objectives of outdoor lighting. **[8]**

b) Explain : **[8]**

i) Diffusion principle

ii) Specular reflection in case of street lighting

OR

Q8) a) State and explain road classification as per BIS. **[8]**

b) What is meant by flood lighting? State its applications. **[8]**

Q9) a) Compare LED and flourocent lamp on any nine points. **[9]**

b) With a suitable diagram explain construction of OLED. State any two applications of OLED. **[9]**

OR

Q10) a) Explain any nine applications of LASER. **[9]**

b) With suitable diagrams explain any two methods of natural light conduiting. **[9]**

Total No. of Questions : 8]

SEAT No. :

PA-232

[Total No. of Pages : 2

[5927]-116
B.E. (Electrical)
VLSI DESIGN (Open Elective - IV)
(2015 Pattern) (Semester - II) (403150D)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) i) Compare combinational and sequential circuits. **[4]**

ii) Design two input OR gate and AND gate using 4:1 MUX **[4]**

b) Explain concurrent and sequential statement with example. **[6]**

c) Define package and explain with suitable example and its VHDL code. **[6]**

OR

Q2) a) Explain functions in VHDL. Write VHDL code for T flip flop using function for rising edge clock. **[8]**

b) Explain the following data objects in VHDL **[6]**

i) Constant

ii) Signal

iii) Variable

c) Compare synthesizable and non-synthesizable statements of VHDL. **[6]**

Q3) a) Explain the need of PLDs and compare PLD with CPLD and FPGA. **[8]**

b) Give detailed specifications and application areas of CPLD. **[8]**

P.T.O.

OR

Q4) a) Explain with diagram a generic architecture of FPGA. **[8]**

b) Compare DSP processor and Microcontroller. **[8]**

Q5) a) Compare PMOS, NMOS and CMOS. **[8]**

b) Explain the following : **[8]**

i) body effect

ii) hot electron effect

iii) velocity saturation

OR

Q6) a) Explain the static and dynamic dissipation of CMOS design. **[8]**

b) Compare TTL, ECL and CMOS. **[8]**

Q7) a) Explain the VLSI design implementation using VHDL code to realize a 8×16 memory. **[10]**

b) Write the steps to realize a VLSI design of seven segment display and keyboard. **[8]**

OR

Q8) a) Explain with diagram the design of serial data receiver. Write the VHDL code to realize a 7 - bit data receiver. **[10]**

b) Write algorithm and flowchart for Barrel shifter. **[8]**

Total No. of Questions : 8]

SEAT No. : ____

PA-233

[Total No. of Pages : 2

[5927]-117
B.E. (Electronics)
VLSI DESIGN
(2015 Pattern) (Semester - I) (404201)

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

Q1) a) Explain different architectural modelling types in VHDL. Give brief example of each. **[6]**

b) Write VHDL code for 4 : 1 multiplexer in three modelling types. **[9]**

c) Write a note on test benches. **[5]**

OR

Q2) a) Compare SRAM and DRAM. List various type of memories. **[8]**

b) Draw any 2 schematics of DRAM cells. Explain write and READ operation of any one of them. **[8]**

c) Explain noise margin. Give it expressions. **[4]**

Q3) a) What is Global routing? Explain maze and line routing algorithms in detail. **[8]**

b) Explain power distribution and power optimization in details. **[8]**

OR

Q4) a) What are challenges in routing? Explain switch box routing. **[8]**

b) Explain floor planning, its purposes and the rules. **[8]**

P.T.O.

Q5) a) Compare CPLD and FPGA. **[8]**

b) What is metastability? How it can be removed. **[8]**

OR

Q6) a) Explain the selection criteria for programmable devices. Write four specifications for CPLD and FPGA. **[8]**

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

i) Refresh circuit.

ii) Sense Amplifier.

Q7) a) What is Built in Self Test? Explain with diagram. **[9]**

b) What is the need of boundary scan? Explain boundary scan techniques in detail. **[9]**

OR

Q8) a) Explain fault models in detail. **[10]**

b) Explain the need of DFT with suitable examples. **[8]**

Total No. of Questions : 8]

SEAT No. :

PA-234

[Total No. of Pages : 2

[5927]-118
B.E. (Electronics)
ADVANCED POWER ELECTRONICS
(2015 Pattern) (404202) (Semester - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Draw neat diagram wherever necessary.***
3) ***Assume suitable data, if necessary.***

Q1) a) Compare circulating and non-circulating type of Dual converter. **[6]**

b) Explain Regenerative braking of D.C. machine. Mention its advantages & disadvantages. **[6]**

c) Explain operation of single phase to single phase step up cycloconverter with neat circuit diagram and waveforms. **[8]**

OR

Q2) a) With circuit diagram & waveform explain symmetrical angel control (SAC) method for power factor Improvement of controlled Rectifier. **[6]**

b) Discuss single phase to single step down cycloconverter for $fo = \frac{1}{2}$ fin. **[6]**

c) With the help of neat diagram & waveform explain the operation of three phase full converter fed pc drives for continuous current mode. **[8]**

Q3) a) State speed control methods of Induction motor. Explain any one method in detail with characteristics. **[8]**

b) Explain Indirect vector control for Induction motor with block diagram. **[8]**

OR

P.T.O.

Q4) a) Explain in detail soft acceleration & deceleration for Induction motor. **[8]**

b) Discuss working of VSI drive for 3 phase Induction motor with neat circuit diagram and waveform. **[8]**

Q5) a) Draw the circuit diagram & explain the working of chopper drive for stepper motor. **[8]**

b) Explain working principle of servomotor drive & state its advantages. **[8]**

OR

Q6) a) With diagram explain synchronous Reluctance motor drive. **[8]**

b) Discuss working principle of permanent magnet BLDC motor drive with diagram. **[8]**

Q7) a) With neat block diagram explain stand alone solar energy system. **[8]**

b) Discuss any one type of wind generator control of wind turbine with neat diagram. **[6]**

c) Explain PV characteristics with diagram. **[4]**

OR

Q8) a) Describe selection of solar panel, inverter, battery, and charge controller in solar power system. **[8]**

b) Describe with neat sketch the main components of wind Energy conversion system. **[6]**

c) Discuss Advantages & Disadvantages of wind Energy conversion system. **[4]**

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Total No. of Questions : 10]

SEAT No. : ____

PA-235

[Total No. of Pages : 2

[5927]-119

B.E. (Electronics)

ELECTRONICS SYSTEM DESIGN

(2015 Pattern) (Semester - I) (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, 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.***
5) ***Use of pocket calculator is allowed.***

Q1) a) Why it is important to consider the product specs & market surveys, while designing/developing a product. **[6]**

b) What is reliability & quality of product? **[4]**

OR

Q2) a) What specifications are considered for selection of ADC. **[5]**

b) Explain gain & offset error in DAC. **[5]**

Q3) a) In analog signal conditioning, what are the factors affecting choice of op amp. **[4]**

b) Explain the circuit of Instrumentation Amplifier. State applications of Instrumentation Amplifier. **[6]**

OR

Q4) a) Compare 8, 16 bit micro controller on the basis - **[4]**

i) I/o Pins,

ii) Counter

b) Explain the term, 'Error budget analysis'. How it can be carried out for Instrumentation amplifier. **[6]**

Q5) a) State and explain the factors you will consider in designing the software for Electronic products. **[8]**

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

i) Simulators

ii) Assemblers

OR

P.T.O.

Q6) a) Explain different constructs of regular programming using neat diagram. **[8]**

b) Explain how will you use ICE for troubleshooting electronic products. **[8]**

Q7) a) Illustrate the design rules used in PCB design of mixed signal circuits. **[6]**

b) Explain different design considerations while designing PCB for high speed digital circuits? **[5]**

c) Explain the importance of complying with EMI/EMC standards while designing an electronic product. **[5]**

OR

Q8) a) Explain rules of PCB design for Shielding & Guarding in precision circuits. **[6]**

b) What are Ground loops? How will you minimize them. **[5]**

c) What are the different types of grounding? Explain one of them in detail. **[5]**

Q9) a) Explain how you can make use of DC and AC analysis in troubleshooting Electronic circuits. **[6]**

b) Explain how you will use a logic analyzer helps in fault finding of high speed digital circuits. **[6]**

c) What is environmental testing? Why it is necessary? **[6]**

OR

Q10)a) Explain Monte Carlo analysis? **[4]**

b) Explain the terms used in DSO : **[6]**

i) Bandwidth

ii) Sampling rate

iii) Probe impedance

c) Compare between CRO, DSO and Logic analyser. **[8]**

Total No. of Questions : 10]

SEAT No. :

PA-130

[Total No. of Pages : 2

[5927]-12
B.E. (Automobile)
AUTOMOTIVE NVH
(2015 Pattern) (Semester - II) (416497A) (Elective - III)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 , Q.7 or Q.8 Q.9 or Q.10.***
2) ***Neat Diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume Suitable Data if necessary.***

Q1) a) What is Natural frequency and resonance? **[6]**

b) Explain damping **[4]**

OR

Q2) a) Explain Types of vibration and explain any one of them. **[6]**

b) What is SHM? **[4]**

Q3) a) Explain vibrometer. **[6]**

b) What are vibration absorbers? **[4]**

OR

Q4) a) What are Different types of dampers and explain any one of them. **[4]**

b) What is the instrument used to measure frequency? **[6]**

P.T.O.

Q5) a) Explain specific acoustic impedance and acoustic intensity. **[8]**

b) Explain with figure octave band analysis. **[8]**

OR

Q6) a) Explain anatomy of human ear and mechanism of hearing. **[8]**

b) Explain Weighting networks, equivalent sound level. **[8]**

Q7) a) Explain Modal Parameter estimation technique. **[8]**

b) Explain Pass/Drive by noise. **[8]**

OR

Q8) a) Explain Noise estimation techniques. **[8]**

b) Explain signal and system analysis. **[8]**

Q9) a) Explain noise control at source. **[9]**

b) Explain enclosuresandbarriers used for reducing noise. **[9]**

OR

Q10)a) Write a short on - vibration isolation and vibration damping. **[10]**

b) How the barrier can reduce the noise levels? Explain it. **[8]**

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Total No. of Questions : 5]

SEAT No. :

PA-236

[Total No. of Pages : 2

[5927]-120
B.E (Electronics)
DIGITAL IMAGE AND VIDEO PROCESSING
(2015 Pattern) (Semester - I) (404204A) (Elective - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer all questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume Suitable data if necessary.***

Q1) **Solve any two questions.**

a) With the help of block diagram, explain the fundamental steps in Digital image processing. **[5]**

b) How the image sharpening and image smoothing is done in image enhancement? Explain. **[5]**

c) Explain the following terms with respect to image compression. **[5]**

i) Fidelity

ii) Entropy

iii) Redundancy

iv) Lossy compression

v) Loss less compression

Q2) **Solve any two questions.**

a) Explain the concept of 4 - connectivity, 8 - connectivity and m - adjacency. **[5]**

b) State the equation for power-law transformation and explain w.r. to image enhancement. **[5]**

c) With the help of block diagram, explain the DCT based image compression model. **[5]**

P.T.O.

Q3) a) What is image segmentation. Explain line detection, point detection and edge detection with respect to image enhancement. **[12]**

b) Explain thresholding in an image processing. Write in brief about adaptive thresholding in image segmentation. **[6]**

Q4) a) Explain the 2 - D motion model in brief. **[8]**

b) Write a brief note on Scene Model. **[8]**

Q5) a) State and elaborate a few applications of motion analysis. **[8]**

b) Explain Block Matching Algorithm. **[8]**

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Total No. of Questions : 8]

SEAT No. : ____

PA-237

[Total No. of Pages : 2

[5927]-121

B.E (Electronics)

AUDIO AND SPEECH PROCESSING

(2015 Pattern) (Semester - I) (404204B) (Elective - I)

Time : 2½ Hour] ***[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 jf necessary.***

Q1) a) Explain Classification of Speech Sounds? **[6]**

b) Explain concept of Short Time Autocorrelation of speech Signal? Explain it Applications? **[6]**

c) Explain Spectrographic displays of Pitch period estimation based on FFT? **[8]**

OR

Q2) a) Explain Anatomy and Physiology of Speech Production? **[6]**

b) Concept of Pitch in speech Signal? How to Calculate Pitch of Speech Signal using Autocorrelation Method? **[6]**

c) Explain Time Dependent Fourier representation for Voiced and Unvoiced speech Signal? **[8]**

Q3) a) Explain filter bank analysis of Speech Signal? **[5]**

b) Explain Sub Band Coding of speech Signal. **[5]**

c) Explain Adaptive Transform Coders (ATC)? **[6]**

OR

Q4) a) Explain Linear PCM and Companded PCM? **[5]**

b) Explain Spectral coders of Speech Processing? **[6]**

c) Explain Vector Quantization Coders? **[5]**

P.T.O.

Q5) a) Explain estimation of LPC Coefficients? **[6]**

b) How to decide order and Window Length in LPC calculation. **[6]**

c) Explain levinson Durbin Algorithm? **[6]**

OR

Q6) a) Explain in detail Frequency domain interpretation of LPC? **[10]**

b) Applications of LPC coding in real time applications in Speech processing. **[8]**

Q7) a) What is DTW? What are its applications? **[8]**

b) What is GMM? How it is used? **[8]**

OR

Q8) a) What is HMM? How it is used in Stastistcal Modeling of speech signal. **[8]**

b) Explain the steps involved in Automatic Speech Recognition for Isolated word recognition. **[8]**

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Total No. of Questions : 10]

SEAT No. :

PA-238

[Total No. of Pages : 2

[5927]-122
B.E (Electronics Engineering)
EMBEDDED SYSTEM AND RTOS
(2015 Pattern) (Semester - I) (Elective - I) (404204C)

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 and Q.9 or Q.10.***
2) ***Figures to the right side indicate full marks.***
3) ***Assume Suitable data jf necessary.***

Q1) a) Which are different clock sources of LPC 1768 and how clock source and range is selected? **[6]**

b) Explain following design metrics **[4]**

i) Time to prototype

ii) NRE cost

iii) Unit cost

iv) Flexibility

OR

Q2) a) What is mean by static and dynamic priority of task? Explain the Rate Monotonic Scheduling to assign he priority to different task. **[6]**

b) Explain in detail optimization of time-to-market design metrics. **[4]**

Q3) a) What is meant by Context Switches? Explain steps involved while Context Switching in uCOS-II. **[6]**

b) Explain critical section of code, Shared resource, Multitasking, Context switching w.r.t RTOS. **[4]**

OR

Q4) a) What do you mean by Inter Task Communication? Explain various techniques for Inter Task Communication. **[6]**

b) Explain following functions of task management of μC/OS-II. **[4]**

i) OSTask Del ( )

ii) OS Task Create ( )

P.T.O.

Q5) a) What is need of Embedded Linux? Explain Open Source & GPL w.r.t. Linux. Explain features of Linux. **[8]**

b) Explain Flash memory used in embedded Linux. State the Advantages of using flash memory for designing embedded system. Compare NAND and NOR Flash memory. **[8]**

OR

Q6) a) What do you mean by Native development and Cross-development? Explain any three cross development tools in Embedded Linux. **[8]**

b) Draw and explain Embedded Linux Setup. **[8]**

Q7) a) Explain Module Utilities in Embedded Linux. Explain Module Utilities Commands. **[8]**

b) Explain the boot loader challenges in Embedded Linux. **[8]**

OR

Q8) a) What is porting? Explain porting of U boot in embedded Linux on new board. **[8]**

b) Draw and explain Linux kernel architecture/structure. Explain key features of Linux kernel. **[8]**

Q9) a) Explain the features of IDE. Explain simple IDE and sophisticated IDE**.** **[6]**

b) What is In-circuit Emulator? With the help of neat diagram explain In-circuit Emulator. **[6]**

c) Explain porting issues of operating system in an embedded platform. **[6]**

OR

Q10)a) Explain Automatic Chocolate Vending Machine with suitable block diagram and state its hardware requirement. **[6]**

b) Draw block diagram and explain development process for embedded system. **[6]**

c) Explain Testing on Host Machine. Explain Testing Steps at Host Machine. **[6]**

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Total No. of Questions : 8]

SEAT No. :

PA-239

[Total No. of Pages : 2

[5927]-123
B.E (Electronics Engineering)
INTERNET OF THINGS
(2015 Pattern) (Semester - I) (Elective - I) (404204D)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***All answers to be written on single answer sheet.***
2) ***Assume suitable data wherever necessary.***
3) ***Figures to the right indicate marks assigned.***

Q1) a) What are the components of RFID protocol? Explain working of RFID protocol. **[6]**

b) Explain how WSN is used in wild life monitoring. **[6]**

c) What is vulnerabilities of Internet of Things? Explain in detail. **[8]**

OR

Q2) a) How sensors and actuators work? Explain each one with giving one appropriate example. **[6]**

b) Compare Private cloud and Public cloud. **[6]**

c) Write note on topology model of IEEE 802.15.4 protocol. **[8]**

Q3) a) Interface temperature sensor with Raspberry Pi. Draw interfacing diagram and explain initialization with the help of algorithm. **[8]**

b) Write program in Python to perform following:
Input 20 numbers randomly. Find the smallest and largest odd number from the inputted numbers. Display the output of your program. **[8]**

OR

Q4) a) What do you understand by open source hardware? Write specifications of any Arduino board that you know. **[6]**

b) Compare Arduino with Raspberry pi. For any application, what should be the different selection criteria for the processor? Elaborate your answer. **[6]**

c) What is difference between dictionary and tuples? Justify the answer by giving example of each. **[4]**

P.T.O.

Q5) a) What are different types of data analytics? Explain each one by giving appropriate example. **[8]**

b) Draw basic architecture of dig data analytics. Explain each element of the architecture. **[8]**

OR

Q6) a) List software tools which are used for data analytics. Describe features and demerits of any one. **[8]**

b) Define big data. What are 5 V's in big data? Explain significance of each V. **[8]**

Q7) a) Explain in detail value creation in Internet of Things. **[9]**

b) Elaborate your views how IOT can change our national agricultural scenario? **[9]**

OR

Q8) Write short notes on following (Any three) : **[18]**

a) Trends in wearable technology

b) IOT for Industrial development

c) Smart governance.

d) Smart transportation

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Total No. of Questions : 8]

SEAT No. :

PA-240

[Total No. of Pages : 2

[5927]-124
B.E (Electronics)
SOFTWARE DEFINED RADIO
(2015 Pattern) (Semester - I) (Open Elective - I) (404204E)

Time : 2½ Hour] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right indicate full marks.***

Q1) a) Explain the various characteristics of software defined radio and compare it with analog radio. **[8]**

b) Discuss the Software Communication Architecture of software defined radio in detail. **[6]**

c) Explain how the computational complexity of multi-rate technique is reduced using digital filter banks. **[6]**

OR

Q2) a) What is GNU radio? Explain with the block diagram. **[8]**

b) Discuss the role of FPGA, CPU and GPU software defined radios. **[6]**

c) Discuss the various channel Estimation algorithms in digital communication. **[6]**

Q3) a) What is cognitive radio? How it affects the spectrum efficiency? **[9]**

b) Discuss the specification of cognitive radio standardized in IEEE 1900.1 **[8]**

OR

Q4) a) Discuss the evolution of elastic spectrum management in advance communication techniques. **[9]**

b) Discuss the specification of cognitive radio standardized in IEEE 1900.6. **[8]**

P.T.O.

Q5) a) Explain the architecture of Cognitive Radio network with suitable diagrams. **[9]**

b) Discuss the basic characteristics of Topology Aware CRN Architectures. **[8]**

OR

Q6) a) Explain the concept of Spectrum Sensing and Spectrum mobility and its effect on spectral efficiency? **[9]**

b) What are various factors taken into consideration for network optimization in CRN? **[8]**

Q7) a Discuss the various standards for Public Safety Communication. **[8]**

b) Explain the Economic Value of the Spectrum in commercial wireless communication networks. **[8]**

OR

Q8) a) Discuss the application of Cognitive Radio in Disaster management. **[8]**

b) Write a short note on the application of cognitive radio for Public Safety (PSCR). **[8]**

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Total No. of Questions : 8]

SEAT No. : ____

PA-241

[Total No. of Pages : 2

[5927]-125

B.E. (Electronics)

MOBILE COMMUNICATIONS

(2015 Pattern) (Semester-I) (Elective-II) (404205A)

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 techniques of improving coverage & capacity of cellular system. **[7]**

b) Explain Parameters of mobile multipath channels in details. **[7]**

c) Explain different types of Propagation mechanisms in detail. **[6]**

OR

Q2) a) Explain linear modulation techniques and constant envelope modulation techniques. **[7]**

b) Write a short note on Trunking & grade of service. **[6]**

c) Explain the RAKE receiver in details. **[6]**

Q3) a) Explain basic radio transmission parameters in GSM system. **[8]**

b) Explain Description of the call setup procedure in GSM. **[8]**

OR

Q4) a) Write a short note on Modifications and derivatives of GSM. **[8]**

b) Explain AMPS in details. **[8]**

Q5) a) Explain EVDO & EVDV. **[8]**

b) Explain RAN Traffic Planning IN CDMA 2000. **[8]**

OR

Q6) a) Give Overview of WiMAX in details. **[8]**

b) Explain 4G Wireless standards-LTE: Network Architecture and Interfaces. **[8]**

P.T.O.

Q7) a) What is Common channel signalling in wireless Networking? **[9]**

b) Write a short note on Wireless data services. **[9]**

OR

Q8) a) Write a short note on UMTS. **[9]**

b) Explain Fixed network transmission hierarchy for Wireless Networks. **[9]**

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Total No. of Questions : 8]

SEAT No. : ____

PA-242

[Total No. of Pages : 2

[5927]-126

B.E. (Electronics)

BIOMEDICAL ELECTRONICS

(2015 Pattern) (Semester - I) (Elective - II) (404205B)

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 and Q.8.***
2) ***Neat diagrams must be drawn whenever necessary.***
3) ***Figures to the right indicates full marks.***
4) ***Use of Calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Explain Bio medical instrumentation system and its component. **[8]**

b) Explain Basic block diagram of EEG. **[6]**

c) Explain various types of EEG electrodes. **[6]**

OR

Q2) a) Explain the effect of various artifacts on recording of Bio Medical Signals. **[8]**

b) Draw and explain the diagram of ECG amplifier. **[6]**

c) Draw and explain the 10 -20 Electrodes Systems for EEG Recording? **[6]**

Q3) a) Explain various types of EEG electrodes. **[8]**

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

OR

Q4) a) Explain normal and abnormal ECG. **[8]**

b) Explain 10-20 electrode placement system for EEG. **[8]**

P.T.O.

Q5) a) What are the objective of patient monitoring system? Explain central monitoring system with block diagram. **[8]**

b) Explain with block diagram Automatic B.P. Machine. **[8]**

OR

Q6) a) Write a short note on indirect & direct blood pressure measurement method. **[8]**

b) Write brief note on finger plethysmography. **[8]**

Q7) a) Explain Biotelemetry system in detail? **[10]**

b) What are the properties of X-ray machine? Explain in detail the technique for visualization of X-ray. **[8]**

OR

Q8) a) Explain various application of LASER in medicine. Write general LASER safety guideline. **[10]**

b) What is Ultrasound? Explain Ultrasonic Doppler Machine. **[8]**

Total No. of Questions : 8]

SEAT No. : ____

PA-243

[Total No. of Pages : 2

[5927]-127

B.E. (Electronics)

OPTIMIZATION TECHNIQUES

(2015 Pattern) (Semester - I) (404205C) (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) ***Figures to the right indicate full marks.***

Q1) a) Use simplex method to solve **[10]**

Maximize $Z = 3x_1 + 2x_2$

Subject to

$x_1 + x_2 \leq 4$, $x_1 - x_2 \leq 2$, $x_1 \geq 4$, $x_2 \geq 4$

b) Enlist Eight Methods of classification of Optimization problem and explain any three in detail. **[10]**

OR

Q2) a) Using Lagrange's method of multipliers solve the NLPP, optimize $Z=4x_1+8x_2-x_1^2-x_2^2$ subjected to $x_1+x_2=4$, $x_1, x_2 \geq 0$. **[10]**

b) Find the dimensions of a box of largest volume that can be inscribed in a sphere of unit radius. Max $f(x) = 8x_1x_2x_3$ Such that $x_1^2 + x_2^2 + x_3^2 = 1$. **[10]**

Q3) a) Define Engineering Optimization? What are Engineering applications of Optimization? **[5]**

b) Enlist all first-order necessary conditions (as per Karush-Kuhn-Tucker) for a solution in nonlinear programming to be optimal. **[5]**

c) Find the minimum of function $f = \frac{\lambda}{\log \lambda}$ using quadratic interpolation method (Take initial Trial step length as 0.1) **[8]**

OR

P.T.O.

Q4) Consider the following problem **[18]**

Minimize $f(x_1, x_2) = (x_1 - 2)^2 + (x_2 - 1)^2$

Subject to $2 \geq x_1 + x_2,\ x_2 \geq x_1^2$

Using Kuhn - Tucker conditions, find which of the following vectors are local minima:

$$X_1 = \begin{Bmatrix} 1.5 \\ 0.5 \end{Bmatrix}, X_2 = \begin{Bmatrix} 1 \\ 1 \end{Bmatrix}, X_3 = \begin{Bmatrix} 2 \\ 0 \end{Bmatrix}$$

Q5) Derive the one-dimensional minimization problem for the following case :

Minimize $f(X) = \left(x_1^2 - x_2\right)^2 + \left(1 - x_1\right)^2$ from the starting point $X_1 = \begin{Bmatrix} -2 \\ -2 \end{Bmatrix}$

along the search direction $S = \begin{Bmatrix} 1.00 \\ 0.25 \end{Bmatrix}$. **[16]**

OR

Q6) Using quadratic Interpolation method,

find the minimum of $f = \lambda^5 - 5\lambda^3 - 20\lambda + 5$. **[16]**

Q7) Consider following multivariate optimization with equality constraint for finding optimal solution.

Minimize $Z = 2x_1^2 + 4x_2^2$ Subject to $3x_1 + 2x_2 = 12$ **[16]**

OR

Q8) Complete one iteration of Generalized Reduced Gradient Method

Minimize $f = x_1^2 + x_2^2$ subject to $x_1 x_2 - 9 = 0$ starting from $X_1 = \begin{Bmatrix} 2.5 \\ 4 \end{Bmatrix}$. **[16]**

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Total No. of Questions : 8]

SEAT No. : ____

PA-244

[Total No. of Pages : 2

[5927]-128

B.E. (Electronics)

COMPUTER MODELING AND SIMULATION

(2015 Pattern) (Semester - I) (Elective-II) (404205D)

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) State advantages and disadvantages of simulation. **[6]**

b) Explain Simulation of Queuing system. **[8]**

c) Explain list processing array method. **[6]**

OR

Q2) a) Enlist 4 areas of simulation application and explain in brief. **[8]**

b) Manual Simulation Using Event Scheduling. **[6]**

c) Use the linear congruential method to generate a sequence of random numbers with: X0 = 27, a = 17, c = 43, and m = 100. **[6]**

Q3) a) Discuss any two methods for selecting families of input distributions when data are available. **[8]**

b) Explain Model building, verification, and validation with flowchart. **[10]**

OR

Q4) What is calibration and validation of models? Explain face validity. **[18]**

a) Validation of Model Assumptions.

b) Validating Input-Output Transformations.

P.T.O.

Q5) a) Write short note on confidence interval with specific precision with derivation. **[8]**

b) Explain stochastic nature of output data. **[8]**

OR

Q6) a) What is point estimation and confidence-interval estimation? Explain in brief. **[8]**

b) Explain output analysis for terminating simulations. **[8]**

Q7) a) What is modulated Poisson process? Explain in brief. **[8]**

b) What is virtual memory referencing? Explain in brief. **[8]**

OR

Q8) a) Write and explain any two protocol of media access control (MAC). **[8]**

b) Explain model construction in simulation of computer networks. **[8]**

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Total No. of Questions : 10]

SEAT No. : [ ]

PA-245

[Total No. of Pages : 2

[5927]-129

B.E. (Electronics Engineering)
DIGITAL SIGNAL PROCESSOR TMS320C67X
(2015 Pattern) (Semester - I) (404205E) (Elective-II)

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

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
3) ***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) Discuss the computer architecture for signal processing. **[5]**

b) Discuss cache configuration (CCFG) register description. **[5]**

OR

Q2) a) Compare Von Neumann and Harvard architectures. **[5]**

b) State the different addressing modes. **[5]**

Q3) a) Compare parallel operations and pipeline operations. **[5]**

b) Discuss the role of Internal Memory and External Memory. **[5]**

OR

Q4) a) Define Interrupt. Enlist the different interrupts. **[5]**

b) Discuss the On-Chip A/D and D/A converters. **[5]**

Q5) a) What is PLL. Explain with block schematic. Discuss the PLL controller in short. **[8]**

b) Write a short note on: Times and Power Management. **[8]**

OR

Q6) a) Discuss the Boot Configuration and JTAG. **[8]**

b) Discuss the inter-Integrated Circuit (I2C) Modules: I2C Own Address Register (ICOAR), I2C Interrupt Mask Register (ICIMR), I2C Interrupt Status Register (ICSTR). **[8]**

P.T.O.

Q7) a) Compare convolution and correlation. Discuss the steps needed for the convolution and correlation in signal processing. Discuss their applications. **[9]**

b) Discuss the System Flow-chart for generating the square wave using TMS320C67X. **[9]**

OR

Q8) a) Discuss the System Flow-chart for IIR filtering using TMS320C67X.**[9]**

b) What is adaptive filtering? Explain any one application of adaptive filtering. **[9]**

Q9) Write a short note on: **[16]**

a) Numeric control using DSP processors.

b) Applications of dsp processors in Robotics.

OR

Q10)a) How can we use dsp processors for the security aspects? Can we use them for cryptography? **[8]**

b) What is power line monitoring? Explain the flow-chart for power line monitoring application using the dsp processors. **[8]**

Total No. of Questions : 10]

SEAT No. :

PA-131

[Total No. of Pages : 2

[5927]-13

B.E. (Automobile Engineering)

HYBRID ELECTRIC AND FUEL CELL VEHICLE

(2015 Pattern) (Semester - II) (416497B) (Elective - III)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 , Q.7 or Q.8 Q.9 or Q.10.***
2) ***Neat Diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Elaborate the role of electric vehicle in automotive sector. **[5]**

b) Differentiate between Synchronous motor and Induction motor. **[5]**

OR

Q2) a) Discuss the advantages, Disadvantages and applications of Series hybrid vehicle. **[5]**

b) Explain the five characteristics of BLDC motor in EVs. **[5]**

Q3) a) Explain the various components of hybrid vehicles with its function. **[5]**

b) List various performance of hybrid vehicle and explain grade ability performance in detail. **[5]**

OR

Q4) a) Explain the regenerative braking system in hybrid vehicle with its features. **[5]**

b) Suggest the good requirements of solar panel in electric vehicle. **[5]**

P.T.O.

Q5) a) What are the various possible power flows in parallel hybrid vehicle? Explain any one with neat layout. **[8]**

b) Define the concept of hybridness and explain its importance in design of hybrid vehicle. **[8]**

OR

Q6) a) Suggest and justify the design consideration you should consider for battery in hybrid vehicle? **[8]**

b) Describe the construction and working principle of lithium ion battery with its features. **[8]**

Q7) a) Define the following terms related to EHV battery. **[8]**

i) Specific power

ii) Energy efficiency

iii) Reserved Capacity (RC)

iv) Cold Cranking Amps (CCA)

b) Explain the construction and working of lead acid battery with its features. **[8]**

OR

Q8) a) Explain the construction and working of hydraulic accumulator in hybrid vehicle. **[8]**

b) Describe the advantages, Disadvantages and applications of fuel cell in vehicle. **[8]**

Q9) a) Explain the construction and working of Proton Exchange Membrane fuel cell with neat sketch. **[6]**

b) Draw a neat sketch of fuel cell efficiency characteristics and explain in detail. **[6]**

c) Explain the construction and working of vane pump. **[6]**

OR

Q10)a) Elaborate the concept of pneumatic hybrid in vehicle. **[6]**

b) List and explain various factors affecting on energy of battery. **[6]**

c) With the help of neat layout. Explain flywheel hybrid technology. **[6]**

◆ ◆ ◆

Total No. of Questions : 8]

SEAT No. :

PA-246

[Total No. of Pages : 2

[5927]-130
B.E. (Electronics Engineering)
COMPUTER NETWORKS AND SECURITY
(2015 Pattern) (Semester - II) (404209)

Time : 2½ Hour] *[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) Draw & Explain TCP/IP reference model in detail with protocol at each layer. **[8]**

b) What is mean by switching? Explain packet switching. **[6]**

c) Explain functions of data link layer. **[6]**

OR

Q2) a) Draw & Explain ISO-OSI model in detail. **[8]**

b) Explain Guided media in brief with suitable example & Applications. **[6]**

c) Explain selective repeat & Go-Back-N ARQ protocol in detail. **[6]**

Q3) a) Explain IPV4 and IPV6 addressing system. **[6]**

b) Explain shortest path algorithm with example. **[6]**

c) Explain ARP & RARP protocol in detail. **[4]**

OR

Q4) a) Explain ICMP & IGMP protocol in detail. **[6]**

b) Explain what do mean by congetion & quality of service in brief. **[6]**

c) Compare TCP & UDP protocols. **[4]**

P.T.O.

Q5) a) What is mean by FTP? Explain in detail wrt client server communication. **[6]**

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

i) Ping

ii) Traceroute

c) Explain HTML programming with related tags. **[6]**

OR

Q6) Write short note on : **[6 each]**

a) DNS

b) WWW

c) Telnet

Q7) a) Explain any one public key Algorithm. **[8]**

b) Write short note on cable Tester. **[4]**

c) Explain applications of cross - over & straight through cable with example. **[4]**

OR

Q8) a) Discuss types of security attacks with solutions. **[8]**

b) With diagram explain cryptography model. **[4]**

c) Explain Network simulation with example. **[4]**

Total No. of Questions : 8]

SEAT No. : ____

PA-247

[Total No. of Pages : 2

[5927]-131

B.E. (Electronics Engineering)

PROCESS INSTRUMENTATION

(2015 Pattern) (Semester - II) (404210)

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 calculator is allowed.***

Q1) a) Explain different types of control system used in process control. **[6]**

b) Explain how to control the temperature by process control using process equation, also explain operation of it. **[7]**

c) Describe Ziegler-Nichols method in detail. **[7]**

OR

Q2) a) Explain following terms: **[6]**

i) Process gain

ii) Process time

iii) Dead time

b) Explain single speed floating and multiple speed floating modes. **[7]**

c) Explain tuning operation of frequency response method. **[7]**

Q3) a) What is cascade control? Explain it's typical characteristics using an example. **[8]**

b) What is Adaptive Control? Explain Programmed or Scheduled Adaptive Control System. **[8]**

OR

P.T.O.

Q4) a) What are the Customary batch Procedures in Batch Reactors. Explain temperature control process. **[8]**

b) Explain Event sequencing with appropriate example. **[8]**

Q5) a) Discuss Discrete State Process control system also explain characteristics of the System. **[9]**

b) List the most common Batch processes in Batch process control, explain any one in detail. **[8]**

OR

Q6) a) What is Set-Point Ramping in process instrumentation? **[9]**

b) Explain in brief Discrete-State control. **[8]**

Q7) a) Explain all points of process operability in short. **[9]**

b) Write a short note on: Integrating the control design methods. **[8]**

OR

Q8) a) Explain with block diagram the process decomposition process. **[9]**

b) What is final element? Explain it. **[8]**

Total No. of Questions : 8]

SEAT No. :

PA-248

[Total No. of Pages : 2

[5927]- 132
B.E. (Electronics)
AUTOMOTIVE ELECTRONICS
(2015 Pattern) (Semester - II) (404211A) (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) ***Assume suitable data if necessary.***

Q1) a) What are competitive standards & microcontroller functions in automotive. **[8]**

b) Discuss the application of Infineon's & Renesas' processors for automotive safety. **[8]**

c) With the help of neat construction, explain working of Lambda Sensor with a neat sketch. **[4]**

OR

Q2) a) Define engine mapping? Explain the necessity of Ignition map with suitable example. **[8]**

b) Discuss key activities & key players in drill down view of automotive value chain? **[8]**

c) What do you mean by catalytic converter and explain the desired functions of catalytic converter? **[4]**

Q3) a) Enlist types of automotive communication protocols & explain any two in detail. **[6]**

b) How GPS car navigation system works? Which is the best car navigation system in India? **[6]**

c) Describe open issues of automotive communication system. **[4]**

OR

P.T.O.

Q4) a) Differentiate between Bluetooth, IEEE802.11x, and LIN. **[6]**

b) Discuss the importance & applications of telematics from automotive perspective **[6]**

c) Compare types of communication interfaces available for ECUs. **[4]**

Q5) *a)* Identify & explain appropriate operating mode for engine management. **[6]**

b) Draw and explain model based design of controller model & generator model in detail. **[6]**

c) Explain various working conditions in which engine performance need to be improved **[4]**

OR

Q6) a) Explore system limitations while tuning the system using different control methods in automotive. **[6]**

b) Which method will you recommend in engine control system? Explain in brief. **[6]**

c) Compare analog and digital control methods. **[4]**

Q7) a) Explain the role of computer vision in collision warning and pedestrian protection. **[6]**

b) With neat sketch, explain electric window control circuit & door lock circuit. **[6]**

c) Write a note on
1) Vechicle emission
2) Emission control strategies. **[6]**

OR

Q8) a) Draw & explain any two passive safety systems in automotive cars. **[6]**

b) Write a note on knowledge needed for accurate fault diagnostics. **[6]**

c) What are the sources of engine noise? State their possible cause and required action. **[6]**

Total No. of Questions : 12]

SEAT No. :

PA-249

[Total No. of Pages : 2

[5927]- 133
B.E. (Electronics)
ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING
(2015 Pattern) (Semester - II) (404211B) (Elective III)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4,Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or .Q12.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume suitable data, if necessary.***

Q1) Define PEAS. Give any three examples of agent types and their PEAS descriptions. **[7]**

OR

Q2) What is agent? Explain goal- based agent with the help of neat diagram. **[7]**

Q3) Explain Genetic algorithim. **[6]**

OR

Q4) Write A* algorithm and explain it. **[6]**

Q5) Explain the two standard quantifiers with example. **[7]**

OR

Q6) Describe the knowledge-engineering process. **[7]**

Q7) a) What are Linear Classifiers. Explain in short any 3 algorithms for Linear Classifiers. **[5]**

b) Explain Entropy and Information Gain with example. **[12]**

OR

Q8) What is a decision tree. Explain it with an example. **[17]**

P.T.O.

Q9) a) What do you mean by Perceptron? What are the different types of Perceptrons? What is the use of the Loss functions? What is the role of the Activation functions in Neural Networks? **[8]**

b) Explain back propagation algorithm. **[8]**

OR

Q10)a) Explain the following related to CNN: **[8]**

i) Pooling
ii) ReLU
iii) Flattening
iv) Full connection

b) Explain Radial basis function network. **[8]**

Q11)a) State any three Machine learning methods and explain any one in detail. **[9]**

b) Explain K means algorithm in detail. **[8]**

OR

Q12)a) Explain Support Vector Machine. **[9]**

b) What are the applications of decision tree? State its advantages and disadvantages. **[8]**

Total No. of Questions : 8]

SEAT No. : ____

PA-250

[Total No. of Pages : 3

[5927]- 134
B.E. (Electronics)
OPTICAL & MICROWAVE COMMUNICATION
(2015 Pattern) (Semester - II) (Elective -III) (404211C)

Time : 2 1/2 Hours] ***[Max. Marks : 70***

Instructions to the candidates:

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

Q1) a) Compare connectors and Splicers. **[6]**

b) List merits and demerits of photodiode. **[6]**

c) A 2x2 biconical tapered fiber coupler has in input optical power level of p_0 = 200 μw. The output powers at the other three ports are P_1 = 90 μw, p_2 = 85 μw and p_3 = 6.3 nw. What are the coupling ratio, excess loss, insertion losses, and return loss for this coupler. **[8]**

OR

Q2) a) Consider a multimode silica fiber that has a core refractive index n_1 = 1.480 and a cladding index, n_2 = 1.460. Find critical angle, numerical aperture and acceptance angle. **[6]**

b) Explain working principle and characteristics of LED. **[6]**

c) What is FBG? Explain FBG. Application. **[8]**

Q3) a) With a neat schematic diagram explain scattering matrix for E- plane Tee. **[8]**

b) Draw a neat schematic diagram and explain Farady rotation isolator in detail. **[8]**

OR

Q4) a) With a neat schematic explain four port micro- wave circulator. Also write 'S' matrix for it. **[8]**

b) Write advantages and applications of microwaves. **[8]**

P.T.O.

Q5) a) Draw and explain helix TWT schematic diagram and simplified circuit. **[8]**

b) Draw and explain schematic diagram of Cylindrical magnetron. Also write hull cut off magnetic equation and cut off voltage eq^{n}. **[8]**

OR

Q6) a) Sketch neat schematic of Two Cavity Klystron and explain it with working principle. **[8]**

b) A two cavity klystron amplifier has the following parameters: **[8]**
V_0 = 1000V, R_o = 40kΩ, I_o = 25A, F = 3GHz.

Gap spacing in either cavity: d = 1 mm

Spacing between the two cavities : L = 4 cm

Effective shunt impedance, excluding beam loading : Rsh = 30 kΩ

i) Find the input gap voltage to give maximum voltage V_2.

ii) Find the voltage gain, neglecting the beam loading in the output cavity.

iii) Find the efficiency of the amplifier, neglecting beam loading.

iv) Calculate the beam loading conductance and show that neglecting it was justified in the preceding calculations.

Q7) a) Explain principle of operation of bipolar Junction Transistor with different modes. **[8]**

b) An n- Ge- p- GaAs- n- GaAs heterojunction transistor at 300 ^{o}k has the following parameters: **[7]**

Donor density in n-Ge region : Nd = 5×10^{18} cm^{-3}

Acceptor density in p- GaAs region : Na = 6×10^{16} cm^{-3}

Hole lifetime : Tp = 6×10^{-6} sec

Bias voltage a emitter juction : V_E = 1 v

Cross section : A = 2×10^{-2} cm^2

Compute:

i) The built - in voltage in the p- GaAs side.

ii) The hole mobility.

iii) The hole diffusion constant.

iv) The minority hole density in the n- Ge region

v) The minority electron density in the p - GaAs region.

vi) The hole diffusion length.

vii) The emitter - junction current.

c) Describe electronics applications of HBT. **[3]**

OR

Q8) Write short notes on (any 3) **[18]**

a) Tunnel diode

b) PIN diode

c) Schottky diode

d) Varactor diode

Total No. of Questions : 8]

SEAT No. :

PA-251

[Total No. of Pages : 2

[5927]- 135
B.E. (Electronic)
AUDIO VIDEO ENGINEERING
(2015 Pattern)(Elective III) (Semester - II) (404211D)

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

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4,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 necessary.***

Q1) a) Explain AM-VSB technique in brief with neat diagram. **[6]**

b) Compare PAL, NTSC and SECAM systems. **[6]**

c) Explain working of IPTV with its block diagram **[8]**

OR

Q2) a) What do you understand by persistance of vision and flicker? How flicker is reduced in television. **[6]**

b) Draw chromaticity diagram & explain it . **[6]**

c) Explain working of smart TV **[8]**

Q3) a) Explain working of DTH system with neat diagram **[8]**

b) What are the technical advantages of using digital technology in television system. **[8]**

OR

Q4) a) What are different video compression techniques? Explain any two. **[8]**

b) Explain with respect to MPEG- 2 **[8]**

i) GOP

ii) IPB

iii) Intra frame coding

P.T.O.

Q5) *a)* Explain the cordless micro phone system & state its advantages, disadvantages & applications. **[8]**

b) Explain with the help of neat figure, how does sound energy grows & decay at a point in a reverberating room. **[8]**

OR

Q6) a) How sound wave can digitally represented? Explain. **[8]**

b) Compare the characteristics of cone type & horn type speakers. List their applications. **[8]**

Q7) a) Discuss the various methods of optical recording of sound. Explain optical recording on CD in detail. **[10]**

b) Explain DVD player with necessary block schematic. **[8]**

OR

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

i) Blue Ray Disc
ii) Dolby 5.1 sound system
iii) Audio standards.

Total No. of Questions : 8]

SEAT No. :

PA-252

[Total No. of Pages : 2

[5927]-136
B.E. (Electronics)
TESTING AND VERIFICATION FOR SOC DESIGN
(2015 Pattern) (Semester - II) (404211E) (Elective - III)

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 diagram must be drawn whereve necessary.*
3) *Figures to the right side indicate full marks.*

Q1) a) Discuss the various trends in VLSI Technology which affects the testing of SoC. **[7]**

b) Discuss the steps required to enhance Testability of circuit. **[7]**

c) Explain how verification helps in regulating faults present in circuit. **[6]**

OR

Q2) a) Discuss Faults, Errors and defects in VLSI Circuit with suitable examples. **[7]**

b) Explain Functional and structural testing in detail. **[7]**

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

i) Fault modeling

ii) Stuck at 0

iii) Fault simulation

Q3) a) Explain testing methodology for Combinational and sequential circuits. **[8]**

b) Elaborate redundancy identification for combinational and sequential circuit. **[9]**

OR

P.T.O.

Q4) a) Discuss the difference between ATPG and Logic BIST. **[8]**

b) Discuss the typical architecture for Automatic Test Pattern Generation (ATPG) in detail. **[9]**

Q5) a) What is scan ATPG? Explain DFT methods for Scan design. **[8]**

b) Compare Scan design and Partial scan design. **[9]**

OR

Q6) a) Discuss simulation-Based Sequential Circuit ATPG. **[8]**

b) Elaborate Scan design with CMOS inverter as an example. **[9]**

Q7) a) Explain system configuration steps with boundary scan. **[8]**

b) Explain the factors responsible for the selection of scanning Memory BIST. **[8]**

OR

Q8) a) Give different description languages for boundary scan. **[8]**

b) Explain the system configuration process for BIST. **[8]**

Total No. of Questions : 10]

SEAT No. :

PA-253

[Total No. of Pages : 2

[5927]-137
B.E. (Electronics)
ROBOTICS
(2015 Pattern) (Semester - II) (404212 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, Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain Anatomy of Robot. **[5]**

b) Discuss the classification of Grippers. Explain with neat sketch Mechanical Gripper. **[5]**

OR

Q2) a) State applications of Robot. Explain any two applications of Robot in detail. **[5]**

b) Explain direct and inverse kinematics for industrial robots for position. **[5]**

Q3) a) Explain in detail working principle of : **[5]**

i) Proximity sensor

ii) Range sensor

b) Define and specify measurement units of following specifications of robot. **[5]**

i) Accuracy

ii) Repeatability.

OR

Q4) a) State different Robot drives. Explain in detail hydraulic Actuator system. **[5]**

b) Explain the Slider - Crank mechanism with neat diagram. Comment on work envolopes traced by it. **[5]**

P.T.O.

Q5) a) Explain with proper set of equations Lagrangian Dynamics. **[8]**

b) Define Trajectory planning. Explain in detail trajectory planning for Flexible Robot. **[8]**

OR

Q6) a) Explain the Newton Euler formulation for RR and RP manipulators. **[8]**

b) Explain method of cubic polynomial linear segments with parabolic blending. **[8]**

Q7) a) How skew line motion is different than straight line motion as far as path planning is concerned. **[8]**

b) How computer is used in controlling of Robot? State different softwares used in control of Robot. **[8]**

OR

Q8) a) Which different aspects must be taken into consideration while planning trajectory of robot so that it can overcome obstacles in its path. Elaborate your answer. **[8]**

b) State different types of motions used in robots. Explain in detail joint integrated motion. **[8]**

Q9) a) Draw and explain with neat diagram Neural controller. Explain importance of each block. **[8]**

b) Draw and explain architecture of Robot Human interaction. **[10]**

OR

Q10)a) What is Fuzzy logic? Draw the block diagram of fuzzy controller and explain in detail. Draw appropriate waveforms. **[8]**

b) Explain in detail following advanced strategies of control : **[10]**

i) Conventional aerial vehicle

ii) Bidirectional X4 - Flyer

Total No. of Questions : 8]

SEAT No. :

PA-254

[Total No. of Pages : 2

[5927]-138

B.E. (Electronics Engineering)

WIRELESS SENSOR NETWORKS (Elective-IV)

(2015 Pattern)(Semester -II) (404212B)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1or 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.***

Q1) a) Explain following performance metrics in WSN **[6]**

i) Network Lifetime

ii) Data accuracy

iii) Latency

iv) Energy Efficiency

v) Signal Strength

vi) Bandwidth, Capacity and Throughput

b) Explain different properties of wireless links in Wireless Sensor Networks **[6]**

c) Draw the structure of Wireless Sensor Network Protocol Stack. Explain the functions of different layer. **[8]**

OR

Q2) a) Draw and explain architecture of Wireless Sensor Network. **[6]**

b) Explain hidden terminal and exposed terminal problem in Wireless Sensor Networks. **[6]**

c) Write short note on **[8]**

i) Zigbee Protocol/Standard

ii) Insteon Standard/Protocol

P.T.O.

Q3) a) Define localization in Wireless Sensor Networks. Explain types of location information in WSN. Explain proximity Schemes for localization in WSN. **[8]**

b) Explain Routing in Wireless Sensor Networks. Explain need of routing in Wireless Sensor Networks. Explain various metrics for routing protocol in WSN. **[8]**

OR

Q4) a) Explain single hop and multi hop wireless Sensor Networks with the help of diagram. Compare single and multi-hop Wireless Sensor Networks. **[8]**

b) With the help of flow diagram explain geographic / location-Based routing algorithm. **[8]**

Q5) a) Explain need of clustering in WSN. Explain design challenges of clustering in WSN. **[6]**

b) What is compression process in WSN? Explain Huffman codes compression. **[6]**

c) Explain threat model in Wireless Sensor Networks. **[6]**

OR

Q6) a) Explain nearest sink clustering and geographic clustering in WSN. **[6]**

b) Explain goal oriented attacks and layer oriented attacks in Wireless Sensor Networks. **[6]**

c) Explain the different the security requirements of Wireless Sensor Networks. **[6]**

Q7) a) What is meant by deployment of WSN? List different problems of deployment in WSN. Explain any two problems in detail. **[8]**

b) Explain the requirements analysis in details in Wireless Sensor Networks. **[8]**

OR

Q8) a) Explain the Top-down design process of deployment of Wireless Sensor Networks. **[8]**

b) With the help of flow diagram explain the general testing and validation of Wireless Sensor Networks. **[8]**

Total No. of Questions : 8]

SEAT No. :

PA-255

[Total No. of Pages : 2

[5927]-139
B.E. (Electronics)
RENEWABLE ENERGY SYSTEMS & DSM,
(2015 Pattern) (Elective-IV) (Semester - II) (404212C)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8***
2) ***Figures to the right side Indicate full marks.***
3) ***Draw neat diagrams wherever necessary.***
4) ***Assume suitable data, If necessary.***

Q1) a) What are the different types of PV cells? Explain any two briefly. **[8]**

b) What are the different types of wind turbines? Explain Wind generators. **[6]**

c) Write a note on Biomass Resources and their Energy Potential. **[6]**

OR

Q2) a) Write a note on Solar Thermal Conversion Devices and Storage. **[8]**

b) Explain installation of wind power plant with neat diagram. **[6]**

c) Define the biomass gasification. What are the different factor affecting Biogas Production. **[6]**

Q3) a) Explain in detail about the different techniques of DSM with necessary examples. **[10]**

b) Define DSM and explain the benefits of DSM. **[6]**

OR

Q4) a) Explain briefly about Energy efficient equipments. **[6]**

b) Explain concept and features of DSM. **[6]**

c) What is load management? Explain its importance. **[4]**

Q5) a) Classification of various Demand Response options in energy systems. **[8]**

b) Explain the energy management system. **[4]**

c) Explain the roll of communication infrastructure in energy system. **[4]**

OR

P.T.O.

Q6) a) Explain the Demand Response strategies for various load categories. **[8]**

b) Explain Demand Response as an apart of smart grid initiative. **[8]**

Q7) a) Discuss understanding variation in demand and supply of electricity. **[8]**

b) Explain in details load forecasting. **[6]**

c) Discuss the need of energy audits. **[4]**

OR

Q8) a) Explain different types of audit and procedures to follow during energy audit. **[8]**

b) Discuss outcome of energy audit and energy saving potential. **[6]**

c) Explain the energy consumption in detail. **[4]**

Total No. of Questions : 8]

SEAT No. :

PA-256

[Total No. of Pages : 2

[5927]-140
B.E. (Electronics)
TM4C123GH6PM MICROCONTROLLER (Elective-IV)
(2015 Pattern) (Semester - II) (404212D)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain the following related to cortex - M4F processor. **[6]**

i) System Level Interface

ii) Integrated configurable debug

b) With neat block diagram explain the programming model of cortex - M4F processor. **[6]**

c) Explain in detail the exception priorities and Interrupt priority grouping in cortex-M4F processor. **[8]**

OR

Q2) a) Draw the block diagram of cortex - M4F processor and explain Register Bank of Cortex - M4F. **[6]**

b) Explain the following related to cortex - M4F processor. **[6]**

i) Bit Banding

ii) Types and Attributes

c) Explain the following related to cortex-M4F processor. **[8]**

i) Power Management

ii) Entering sleep Modes

Q3) a) Explain in detail Internal Memory and Micro Direct Memory Access (Mdma) of cortex-M4F processor. **[8]**

b) Explain in detail Memory Protection unit in cortex - M4F processor and control registers related to it. **[8]**

OR

P.T.O.

Q4) a) With the help of neat diagram explain Watch dog Timers of cortex-M4F processor. **[8]**

b) List the features of Analog to Digital converter in cortex-M4F processor. Explain registers related to ADC. **[8]**

Q5) a) Explain the following related to cortex - M4F processor. **[6]**

i) Universal Serial Bus (USB) controller.

ii) Analog comparator.

b) With the help of neat diagram explain controller Area Network (CAN) module. **[6]**

c) Explain in detail Inter-Integrated Circuit (I2C) Interface. **[6]**

OR

Q6) a) Explain the following related to cortex - M4F processor. **[6]**

i) Quadrature Encoder Interface (QEI)

ii) Pulse Width Modulator (PWM)

b) With the help of neat diagram explain UART in cortex M4F processor. **[6]**

c) Explain in detail synchronous serial Interface in cortex - M4F processor. **[6]**

Q7) a) Explain the following applications using TM4C123GH6PM Microcontroller. **[8]**

i) Remote Monitoring.

ii) Test and Measurement Equipment.

b) With the help of block diagram how TM4C123GH6PM Microcontroller can be useful for transportation. **[8]**

OR

Q8) a) Explain the following applications using TM4C123GHPM Microcontroller. **[8]**

i) Network appliances and Switches.

ii) Gaming Equipment

b) Explain with the help of block diagram application of Factory Automation using TM4C123GH6PM Microcontroller. **[8]**

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

PA-257 **[Total No. of Pages : 2**

[5927] - 141

B.E. (Electronics/E & TC)

ADVANCED AUTOMOTIVE ELECTRONICS

(2015 Pattern) (Semester - II) (Open Elective) (404192DA)

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

Q1) a) With suitable block diagram explain antilock braking system. What are the advantages of it over normal braking system? **[6]**

b) Explain four stroke engines on the basis of following actions **[6]**

i) Intake.

ii) Compression.

iii) Power.

iv) Exhaust.

c) What is principle of EGO sensor? Explain role of EGO sensor in electronic engine control. **[8]**

OR

Q2) a) What is ECU? What are the components of ECU design explain in detail? **[6]**

b) Write short note on V-model development cycle. **[6]**

c) Justify the use of sensors for following applications : **[8]**

i) Anti-collision system.

ii) Fuel injection system.

iii) Vehicle tyres.

P.T.O.

Q3) a) Explain the use of Interrupts Watchdog timers and PWM of a microcontroller in automotive system. **[6]**

b) Explain the necessity of maps and Procedure to generate maps. **[6]**

c) How engine can be controlled using Fuel maps/tables and Ignition maps/ tables? **[6]**

OR

Q4) a) Explain in detail Throttle plate angular positioning is done in automobile system. **[6]**

b) Explain various types of relays used in Automobile applications. **[6]**

c) Explain cruise control system with sensors used in it. **[6]**

Q5) a) Explain CAN & Flex Ray Automotive communication protocols in detail. **[8]**

b) What are infotainment gadgets? How most protocol satisfies the requirement for the same. **[8]**

OR

Q6) a) What is role of telematics in automotive? Exemplify in context to automotive. **[6]**

b) Write a short note on following : **[10]**

i) Global Positioning Systems (GPS).

ii) General Packet Radio Service (GPRS).

Q7) a) What is Model-Based Design? Explain with an example. **[6]**

b) Explain different types of wiring system in automotive. **[5]**

c) Explain self-diagnostic system. **[5]**

OR

Q8) a) Explain control system approach in Automotive Electronics. **[5]**

b) What is on-board diagnostic in automotive? With example explain limitations of on-board diagnostic method. **[6]**

c) Write diagnostic procedures and sequence in automotive context. **[5]**

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

PA-258 **[Total No. of Pages : 2**

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B.E. (Electronics/E & TC)

INDUSTRIAL INTERNET OF THINGS

(2015 Pattern) (Semester - II) (Open Elective) (404192DB)

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

Instructions to the candidates :

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

Q1) a) What is hype cycle? Describe it with reference to IoT and IIoT. **[8]**

b) What is role of cloud in IoT? Explain. **[6]**

c) What is use of IIoT in plant maintenance? **[6]**

OR

Q2) a) How is Industrial Internet of Things (IIoT) different from the Internet of Things (IoT)? **[8]**

b) What are the important Components of Industrial Internet of Things? **[6]**

c) What are special requirements of sensors in IIoT? **[6]**

Q3) a) What is Bluetooth Low Energy (BLE) Protocol for Internet of Things (IoT)? **[8]**

b) Explain the MQTT protocol and its use in IIoT systems. **[8]**

OR

Q4) a) What is MODBUS? Explain how it is useful in IIoT implementations. **[8]**

b) What are the various features of CoAP? Explain any two types of Messages in CoAP. **[8]**

P.T.O.

Q5) a) Should the consumers be concerned about security and privacy issues considering the amount of data Internet of Things (IoT) collects? Explain. **[8]**

b) What is message integrity in IoT systems? Explain with suitable example. **[8]**

OR

Q6) a) A Cloud-based IoT platform is a dynamic and flexible resource sharing platform delivering IoT services. Elaborate on the three service models used in Cloud-based IoT platform. **[8]**

b) Discuss management aspects of cyber security w.r.t. IIoT systems? **[8]**

Q7) a) What is role of data analytics in IIoT? Explain in detail. **[10]**

b) Elaborate on how you will use IoT for smart city applications. **[8]**

OR

Q8) a) What are the industrial applications for wireless sensor networks in Internet of Things (IoT)? **[10]**

b) What impacts will the Internet of Things (IoT) have on Manufacturing Sector? **[8]**

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

PA-259 **[Total No. of Pages : 2**

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B.E. (Electronics/E & TC)

PROGRAMMABLE SYSTEM ON CHIP

(2015 Pattern) (Semester - II) (Open Elective) (404192DC)

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 electronics pocket calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Explain detail programmable routing& interconnect of PSoC technology. **[7]**

b) What is features of PSoC3 family and explain additional features of PSoC 5? **[7]**

c) Explain difference between cypress PSoC and PSoC architecture and explain cypress PSoC? **[6]**

OR

Q2) a) What is features of PSoC3 family and explain additional features of PSoC 5? **[7]**

b) Explain memory organization of PSoC5. **[7]**

c) Explain detail structure of cypress semiconductor PSoC and explain some limitations. **[6]**

Q3) a) Explain detail of PSoC hardware & software. **[8]**

b) Explain hardware and software subsystem of mixed signal architecture. **[8]**

OR

P.T.O.

Q4) a) Explain detail of PSoC interrupt subsystem. **[8]**

b) Design system using PSoC express. **[8]**

Q5) a) Explain programmable gain amplifier. **[8]**

b) Explain universal digital block and arrays and digital system interconnect. **[10]**

OR

Q6) a) Write short note on : **[8]**

i) USB.

ii) SPI.

b) Explain flash temperature sensors and DTMF dialers. **[10]**

Q7) a) Explain ultra wide band RADAR. **[8]**

b) Explain data acquisition and control system with PSoC. **[8]**

OR

Q8) a) Explain hardware of Manchester decoder & DTMF decoder. **[8]**

b) Explain SPI and UART based task communications. **[8]**

Total No. of Questions : 10]

SEAT No. : ____

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[Total No. of Pages : 2

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B.E. (Electronics/E & TC)

DATA SCIENCE AND ANALYTICS

(2015 Pattern) (Semester - II) (Open Elective) (404192DD)

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

Instructions to the candidates :

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Enlist different models of NOSQL. Explain any one in short. **[6]**

b) Differentiate Data science and Business intelligence. **[4]**

OR

Q2) a) Define DDL, DML and TCL. Explain each in detail. **[6]**

b) Explain block diagram of data base management system in short. **[4]**

Q3) a) Explain PL/SQL block structure with suitable block diagram. **[6]**

b) What is big data? Discuss different characteristics of big data. **[4]**

OR

Q4) a) Explain SQL literals and data types in short **[6]**

b) Explain Big data ecosystem diagram. **[4]**

P.T.O.

Q5) a) Explain model planning and building in detail. **[9]**

b) What is data visualization? Explain R-code to visualize data. **[9]**

OR

Q6) a) Explain life cycle of Data Analytics in detail. **[9]**

b) Discuss different steps of data preprocessing. **[9]**

Q7) a) Explain different data types in R-programming. **[8]**

b) Define & explain data exploration in detail. **[8]**

OR

Q8) a) Write a program in R-language to input & out put data to calculate square of any two numbers. **[8]**

b) Explain statistics for model building and evaluation. **[8]**

Q9) a) Explain k-means algorithm in detail. **[8]**

b) What decision trees? Explain any one Decision tree in short. **[8]**

OR

Q10) a) Write a algorithm of Aprior association rule learn. Explain algorithm. **[8]**

b) Define regression. Enlist types of regression in short. **[8]**

Total No. of Questions : 8]

SEAT No. : ____

PA-261

[Total No. of Pages : 2

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B.E. (Electronics and Telecommunication)
VLSI DESIGN AND TECHNOLOGY
(2015 Pattern) (Semester - I) (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) ***Assume suitable data if necessary.***
3) ***Draw neat diagrams wherever necessary.***
4) ***Figures to the right indicate full marks.***

Q1) a) Write a VHDL Code for ALU. **[6]**

b) Explain different attributes in VHDL codes. **[6]**

c) What is power optimization methods at various levels of SOC. **[4]**

d) Compare the performance and features of CPLD with FPGA? **[4]**

OR

Q2) a) What is function? Explain with VHDL code using function in any one circuit. **[6]**

b) Explain different interconnect routing techniques. **[6]**

c) What is clock skew and clock jitter. **[4]**

d) Draw and explain internal structure of CPLD. **[4]**

Q3) a) With the structure, explain theory of n-channel MOS transistor. **[8]**

b) With neat diagrams explain MOS parasitics. **[8]**

OR

Q4) a) Explain Voltage transfer characteristics (VTC) for CMOS inverter. **[8]**

b) Give the details of delays in CMOS. **[8]**

P.T.O.

Q5) a) Explain Design Flow of Application Specific Integrated Circuit. **[8]**

b) With example of circuit explain AC and DC analysis, Transfer Characteristics of ASIC. **[8]**

OR

Q6) a) Explain different Lambda rules in ASIC Design. **[8]**

b) With example of circuit explain Transient responses and Noise analysis of ASIC. **[8]**

Q7) a) Explain different types of fault in detail. **[9]**

b) What is full scan and partial scan? Explain in detail. **[9]**

OR

Q8) a) What is Built in self test (BIST). Explain in detail. **[9]**

b) Explain in detail, Need of design for testability. **[9]**

Total No. of Questions : 10]

SEAT No. :

PA-262

[Total No. of Pages : 2

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B.E. (E & TC)

COMPUTER NETWORKS & SECURITY

(2015 Pattern) (Semester - I) (404182)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Answer questions Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Draw TCP/IP reference model and explain functions of its layers. **[6]**

b) Explain Bluetooth Architecture with functions of its different layers. **[4]**

OR

Q2) a) Explain Non-Persistent, P-Persistent, 1-Persistant CSMA protocols. **[6]**

b) Explain various network topologies. **[4]**

Q3) a) Explain Basic service set and Extended service set in wireless LAN. **[6]**

b) Explain Fast Ethernet and Gigabit Ethernet. **[4]**

OR

Q4) a) What is IGMP? How does it used? **[6]**

b) Write short note on congestion control. **[4]**

P.T.O.

Q5) a) Explain IPv4 Classful addressing and state its disadvantages. **[6]**

b) Explain Internet Group Management protocol. **[6]**

c) Compare IPv4 and IPv6 protocol. **[6]**

OR

Q6) a) Explain IPv6 protocol in detail. **[6]**

b) Explain Internet Control Message Protocol and its messages. **[6]**

c) Explain distance vector routing protocol with an example. **[6]**

Q7) a) Give comparison between TCP and UDP protocol. **[8]**

b) Explain TCP connection management in Client/server model. **[8]**

OR

Q8) a) Explain services provided by transport layer. **[8]**

b) Draw and explain UDP header with all details. **[8]**

Q9) a) State and explain Security attacks and security services. **[6]**

b) Explain World Wide Web and Hyper Text Transfer protocol. **[6]**

c) Write short note on network management protocol. **[4]**

OR

Q10) a) Explain Transposition ciphers. **[6]**

b) Explain symmetric key and asymmetric key cryptography. **[6]**

c) Explain different domains in DNS. **[4]**

Total No. of Questions : 8]

SEAT No. : ____

PA-263

[Total No. of Pages : 2

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B.E. (E & TC)

RADIATION AND MICROWAVE TECHNIQUES

(2015 Pattern) (Semester-I) (404183)

Time : 2 ½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

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

Q1) a) Derive the Friis transmission equation for free space propagation. **[8]**

b) Define an antenna array. Enlist types of arrays. Discuss controlling parameters of an array. **[6]**

c) Explain the terms with respect to waveguide. **[6]**

i) Cut-off frequency

ii) Guide wavelength

iii) Phase Velocity

OR

Q2) a) Define and express mathematical expression of following antenna parameters. **[8]**

i) Directivity

ii) Beam width

iii) Radiation pattern

iv) Bandwidth

b) State the pattern multiplication rule and find the array factor of a two element array. **[6]**

c) An air filled rectangular waveguide have dimension of 2.5 × 1 cm with operating frequency of 8.6 GHz. Find cut-off frequency and guide wavelength at dominant mode. **[6]**

P.T.O.

Q3) a) A Signal of power 40 mW is fed into the collinear ports of lossless H-plane tee, determine the powers in the remaining ports when other ports are terminated with matched impedance. **[8]**

b) Explain the Faradays rotation principle? Explain in detail the working principle of an isolator with its applications. **[8]**

OR

Q4) a) Explain the properties of Hybrid Tee with the help of neat diagram. Also derive its scattering matrix. **[8]**

b) Describe the working principal of directional coupler with a neat diagram. Explain the performance parameters of directional coupler. **[8]**

Q5) a) What are the limitations of conventional tubes at microwave frequencies? To overcome these limitations; justify the remedy for each. **[8]**

b) Explain the working principle, advantages and disadvantages of tunnel diode in detail. **[8]**

OR

Q6) a) With the help of construction and applegate diagram explain working of Two Cavity Klystron Amplifier. **[8]**

b) What are cross field device? How does a magnetron sustain its oscillation using π mode in cavity magnetron. **[8]**

Q7) a) Explain with neat block diagram power measurement of microwave generator using **[10]**

i) Bolometer

ii) Calorimeter Techniques

b) Explain the slotted line technique for measurement of VSWR. Calculate the SWR of a transmission system operating at 8 GHz. The distance between twice minimum power points is 0.9 mm on a slotted line whose velocity factor is unity. **[8]**

OR

Q8) a) Write comparison between Low frequency measurement Vs Microwave frequency measurements. Explain any one method of measuring impedance of terminating load in a microwave system. **[10]**

b) Explain the concept of Microwave Heating. Explain with schematic Microwave Oven. **[8]**

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Total No. of Questions : 8]

SEAT No. :

PA-264

[Total No. of Pages : 3

[5927]-148

B.E. (E & TC) (Semester - I)

DIGITAL IMAGE AND VIDEO PROCESSING

(2015 Pattern) (Elective - I) (404184A)

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 logarithmic tables slide rule, mollier charts, electronic pocket calculator and steam tables is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Explain distance measure in digital image. Given below in 5×5 image. Find out distance between p & q by methods. **[6]**

i) Euclidean distance

ii) City block

	4	2	3	[2] q
	3	3	1	3
	2	3	2	2
p	[2]	1	2	3

b) Explain following concepts in Image Enhancements, with appropriate applications. **[8]**

i) Gray level slicing

ii) Bit plane slicing

iii) Contrast stretching

iv) Power law transformation

c) What is JPEG? Explain Image Compression standard using JPEG, draw and explain block diagram of JPEG coder and decoder. **[6]**

OR

P.T.O.

Q2) a) What is color model? Compare RGB and HSI color model with their application? **[6]**

b) What is difference between image enhancement & image restoration? Draw and explain image restoration model in detail? **[8]**

c) A 2×2 block of image is given as $\begin{bmatrix} 30 & 20 \\ 10 & 30 \end{bmatrix}$. Determine DCT coefficients of this image? **[6]**

Q3) a) Explain the necessity of Edge linking in image processing? Describe in detail role of Hough transform for Edge linking? **[8]**

b) What is Morphology? Perform dilation and erosion operation of a pseudo binary image X and structuring element B as shown below -

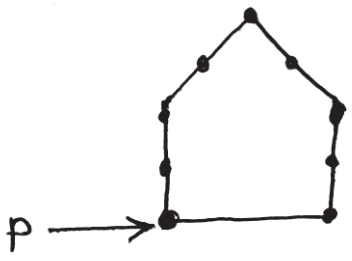
$$X = \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 1 & 1 & 0 & 0 \\ 0 & 1 & 1 & 1 & 0 & 0 \\ 0 & 0 & 1 & 1 & 1 & 0 \\ 0 & 0 & 1 & 1 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}, \quad B = \begin{bmatrix} 0 & 1 & 0 \\ 1 & 1 & 0 \\ 0 & 1 & 0 \end{bmatrix}$$ **[9]**

OR

Q4) a) Explain Hit & Miss transform in detail? **[8]**

b) What is Region Growing? Explain the techniques of Region splitting & Region Merging? **[9]**

Q5) a) Give the eight directional chain code for the arbitrary shape as shown in fig. below. **[8]**



b) State various methods of image representation. Explain Fourier descriptors with its properties and application. **[9]**

OR

Q6) a) Write a short note on - **[8]**

i) Polygonal Approximations

ii) Signatures.

b) Explain the concept of principal components. How they are used for region representation? **[9]**

Q7) a) Describe the basic concept of Fourier descriptor for representation of boundary. List its properties and advantages. **[8]**

b) State the relationship between RGB to YC_bC_r and YC_bC_r to RGB color space? **[8]**

OR

Q8) a) With the help of block diagram explain MPEG video coding standard? **[8]**

b) Justify the necessity of motion estimation in video compression? Explain block based motion estimation and compensation technique? **[8]**

▽▽▽▽

Total No. of Questions : 8]

SEAT No. :

PA-265

[Total No. of Pages : 2

[5927]-149

B.E. (E & TC)

INDUSTRIAL DRIVES & CONTROL

(2015 Pattern) (Semester - I) (404184B) (Elective - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

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

Q1) a) Draw and explain block diagram of electrical drive system. **[7]**

b) Compare converter fed drive & chopper fed drive. **[6]**

c) What are the advantages of electrical braking? Explain the regenerative braking of dc motor drives. **[7]**

OR

Q2) a) Define and classify electrical drives. **[7]**

b) Draw and explain the operation of single phase full converter fed dc drive for separately excited dc motor. Draw output waveforms for firing angle of 60°. **[6]**

c) Explain the operation of the closed loop controlled 3 phase current source inverter drive for 3 phase induction motor. State the advantages of three phase CSI drives over three phase VSI drives. **[7]**

Q3) a) With the help of block schematic explain working of typical Synchronous Reluctance motor drive. **[7]**

b) Explain the operation of permanent magnet stepper motor. Enlist the applications and advantages of it. **[7]**

c) List the important feature and application of brushless DC motor over Conventional DC motor. **[4]**

OR

P.T.O.

Q4) a) Write a short note on Servo motor drive and list its advantages. **[7]**

b) Draw and explain three phase BLDC drive. **[7]**

c) Compare Permanent magnet Brushless DC motor drive and Permanent magnet AC synchronous motor drive. **[4]**

Q5) a) Draw and explain in detail Wind power system with is various components. **[8]**

b) What is the need of charge controller in Photovoltaic Power Systems. Explain the working type of charge controller with suitable circuit diagram. **[8]**

OR

Q6) a) Explain following mechanical controls used in Wind Energy Conversion System (WECS) : **[8]**

i) Pitch Control ii) Yaw Control

b) Draw and explain the PV cell? Draw I-V and P-V curves? **[8]**

Q7) a) What is Neuro fuzzy system? Explain adaptive network based fuzzy interface system. **[8]**

b) Enlist different applications of neural network in drives and control. Explain the operation of Fuzzy logic based Induction motor drive. **[8]**

OR

Q8) a) With the help of block diagram, explain the application of Fuzzy logic in Wind power system for achieving maximum output power. **[8]**

b) Explain the operation of vector controlled induction motor drive with neural network based estimator. **[8]**

▽▽▽▽

Total No. of Questions : 10]

SEAT No. :

PA-132

[Total No. of Pages : 2

[5927]-15

B.E. (Automobile Engineering)

AUTOMOTIVE HYDRAULICS AND PNEUMATICS

(2015 Pattern) (Semester - II) (416497C) (Elective - III)

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

Instructions to the candidates :

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 , Q.7 or Q.8 Q.9 or Q.10.***
2) ***Neat Diagrams must be drawn wherever necessary.***
3) ***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) Explain the desirable properties of hydraulic fluids. **[6]**

b) Compare hydraulic systems over mechanical systems. **[4]**

OR

Q2) a) Classify hydraulic fluids used in hydraulic systems. **[6]**

b) Differentiate between positive seals and non - positive seals. **[4]**

Q3) a) With neat sketch explain gear pump. **[6]**

b) Differentiate between external and internal gear pumps. **[4]**

OR

Q4) a) Explain different types of linear actuators with neat sketches. **[5]**

b) With neat sketch explain swash plate piston pump. **[5]**

P.T.O.

Q5) a) Explain with neat sketch meter - in and meter - out circuits. **[8]**

b) Explain construction and working of unloading valve with a neat sketch. **[8]**

OR

Q6) a) Draw sequencing circuit and explain its working. **[8]**

b) Draw and explain actuator locking circuit using check valves. **[8]**

Q7) a) Explain construction and working of FRL unit used in pneumatic systems. **[8]**

b) Explain with circuit direct control of single acting cylinder. **[8]**

OR

Q8) a) Draw symbols of following pneumatic components with application **[8]**

i) Lubricator

ii) Double acting spring return cylinder

iii) Fixed displacement Bidirectional motor

iv) 4/2 DCV

b) Explain with neat sketch vane type air motor. **[8]**

Q9) a) Explain different types of accumulators with neat sketches. **[9]**

b) Draw and explain circuit for air suspension system used in automobiles. **[9]**

OR

Q10)a) Explain different applications of Accumulator. **[9]**

b) Draw and explain air brake system used in automobiles. **[9]**

◆ ◆ ◆

Total No. of Questions : 10]

SEAT No. :

PA-266

[Total No. of Pages : 2

[5927]-150

B.E. (E & TC) (Semester - I)

EMBEDDED SYSTEM & RTOS

(2015 Pattern) (404184C) (Elective - I)

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

Instructions to the candidates :

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8 and Q.9 or 10.***
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 Typical process for Embedded System development. **[5]**

b) Explain waterfall model. **[5]**

OR

Q2) a) Explain the following design metrics. Time to market, NRE cost, maintainability. **[5]**

b) Explain characteristics of embedded system. **[5]**

Q3) a) What is significance of Interprocess communication? **[5]**

b) Draw and explain μcosII Kernel Structure. **[5]**

OR

Q4) a) What do you mean by clock tick in RTOS. Explain the time management functions in μ COS - II. **[5]**

b) What is need of semaphore? How do you create counting semaphore? **[5]**

Q5) a) How CMS is standards helps in development of cortex based Embedded System? **[8]**

b) Compare BIOS with boot loader in embedded system. **[8]**

OR

P.T.O.

Q6) a) Draw interfacing diagram of motor control using PWM with LPC1768. Write down program or algorithm for the same. **[8]**

b) List and explain various file systems used in embedded linux. **[8]**

Q7) a) Explain the following tool utilities Minicomp, Busy Box, Red Boot. **[9]**

b) Explain the role of boot loader in Embedded linux system? What are the characteristics of the same? **[9]**

OR

Q8) a) Explain any three device driver utilities with an example. **[9]**

b) What is device driver? What is use of device driver in embedded linux system? Explain different types of device driver used in embedded system. **[9]**

Q9) a) What is power Down and Sleep Mode of Power Management in embedded architecture? State it merit and Demerits. **[8]**

b) Explain typical structure of Arduino program. **[8]**

OR

Q10)a) Explain Automatic chocolate vending mechine with suitable block diagram and state its hardware requirements. **[8]**

b) Explain software development tools for embedded system. **[8]**

▽▽▽▽

Total No. of Questions : 8]

SEAT No. :

PA-267

[Total No. of Pages : 2

[5927]-151
B.E. (E & TC) (Semester - I)
INTERNET OF THINGS
(2015 Pattern) (Elective - I) (404184D)

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.***

Q1) a) What is IoT? Explain: Things in IoT. **[6]**

b) What are various components of RFID? Explain any two. **[6]**

c) Write a note on Topology models of IEEE 802.15.4 and PAN Coordinator. **[8]**

OR

Q2) a) Compare IoT and M2M services. **[6]**

b) How sensors and actuators work? Explain with practical example. **[7]**

c) Explain working of Zigbee protocol. **[7]**

Q3) a) What is REST protocol? Explain characteristics of REST based API. **[8]**

b) Explain CoAP messaging format. **[8]**

OR

Q4) a) Explain IPv6 packet format in detail. **[8]**

b) What is RPL? Explain DODAG and DIO wrt RPL. **[8]**

Q5) a) What are various types of Big Data? Explain in detail. **[8]**

b) Explain types of Data Analytics in detail. **[9]**

OR

P.T.O.

Q6) a) What are various characteristics of Hadoop? **[9]**

b) What is precision? Explain different types of errors. **[8]**

Q7) a) Explain Smart home and smart city applications in view of IoT. **[9]**

b) How IoT will be used to protect environmental loss? **[8]**

OR

Q8) a) Explain application of IoT in agriculture field. Explain it with a case study. **[9]**

b) Write a note on Industrial IoT. **[8]**

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

PA-268 **[Total No. of Pages : 2**

[5927]-152
B.E. (E & TC)
WAVELETS
(2015 Pattern) (Semester - I) (Elective - II) (412185A)

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 term Wavelet and describe the different families of wavelets within Wavelet communities. **[10]**

b) Define and explain the following. **[10]**

i) Vector Space

ii) Bases

iii) Orthonormality

iv) Projection

OR

Q2) a) Explain in detail the concept of continuous and discrete wavelet transform. **[10]**

b) State the properties of wavelet transform. **[10]**

Q3) a) Explain the concept of signal decomposition and its relation to filter banks. **[8]**

b) Explain the concept of multirate signal processing. **[8]**

OR

Q4) a) Explain the concept of multiresolution analysis in detail. **[8]**

b) Explain the concept of wavelet lifting. **[8]**

Q5) a) Explain in detail the steps in transform coding. **[8]**

b) Explain how video coding is done using multiresolution technique. **[8]**

OR

Q6) a) Explain how image compression is achieved using Discrete Wavelet Transform. **[8]**

b) Explain the concept of audio masking. **[8]**

Q7) a) Explain the shrinkage functions for hard and soft thresholding. **[9]**

b) Explain the image edge detection scheme using wavelet transform. **[9]**

OR

Q8) a) Explain the applications of sub band and wavelet transform in Communication. **[9]**

b) Explain how image enhancement is done using wavelet transform. **[9]**

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

PA-269 **[Total No. of Pages : 2**

[5927]-153
B.E. (E & TC)
ELECTRONIC PRODUCT DESIGN
(2015 Pattern) (Semester - I) (Elective - II) (412185B)

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) Define Man Machine dialogue. Draw the block diagram of Human Machine System (HMS). **[8]**

b) Explain in detail waterfall Model of software development. **[8]**

c) What is real time software? **[4]**

OR

Q2) a) Compare functional model verses architectural Model. **[6]**

b) Explain in detail comparision among the three basic Black, White & Gray Test Techniques. **[8]**

c) Explain the various phases of bug introduction & common bugs present in software. **[6]**

Q3) a) What is PCB? Elaborate PCB standards. What are the grounding Methodologies? **[10]**

b) Define/explain the following terms associated with PCB design **[8]**

i) Containment

ii) Electromagnetic interference (EMI)

iii) Electromagnetic compatibility (EMC)

OR

Q4) a) Explain Bypassing and Decoupling of PCB design in detail. **[8]**

b) What are different steps to reduce the debugging? How the troubleshooting is different from debugging? **[10]**

P.T.O.

Q5) a) Write a note on Good Programming Practice. **[8]**

b) Differentiate between Active components & passive components. **[8]**

OR

Q6) a) What are electromechanical components? Explain any one of them. **[8]**

b) What is prototyping? Explain in detail. **[8]**

Q7) a) What is concept of Bill of Material (BOM)? Explain with suitable example. **[8]**

b) What do you mean by documentation? What are the different types of documentations? **[8]**

OR

Q8) a) Explain visual technique of documentation in details. **[8]**

b) Write a short note on followings: **[8]**

i) Layout of documentation

ii) Need of documentation

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

PA-270 **[Total No. of Pages : 2**

[5927]-154
B.E. (E & TC)
OPTIMIZATION TECHNIQUES
(2015 Pattern) (Semester - I) (Elective - II) (414185C)

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

Instructions to the candidates:

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

Q1) a) Use simplex method to solve **[10]**

Maximize $Z = -40x_1 - 100x_2$

Subject to

$10x_1 + 5x_2 \leq 2500$

$4x_1 + 10x_2 \leq 2000$

$2x_1 + 3x_2 \leq 900$

$x_1 \geq 0, x_2 \geq 0$

b) Find all basic solutions corresponding to system of equations **[10]**

$2x_1 + 3x_2 - 2x_3 - 7x_4 = 1$

$x_1 + x_2 + x_3 + x_4 = 6$

$x_1 - x_2 + x_3 + 5x_4 = 4$

First reduce the system of equations in to canonical form.

OR

Q2) a) Enlist Eight Methods of classification of Optimization Problem and explain any three in detail. **[10]**

b) Determine extreme points of the function **[10]**

$$f(X) = x_1^3 + x_2^3 - 3x_1x_2$$

P.T.O.

Q3) Maximize $f(x) = 100x - 2x^2$ over the interval $0 \le x \le 50$. **[16]**

OR

Q4) Find the absolute maximum and minimum values of $f(x) = x^3 - 12x - 5$ on the interval [–4, 6]. Clearly explain your reasoning. **[16]**

Q5) Minimize $f(x_1, x_2) = x_1 - x_2 + 2x_1^2 + 2x_1x_2 + x_2^2$ with the starting point (0,0)**[18]**

Use

a) Univariate method (Take E = 0.01, show the computation for two search directions)

b) Using classical optimization technique.

OR

Q6) Draw flow chart for cubic interpolation method for minimizing $f = \lambda^5 - 5\lambda^3 - 20\lambda + 5.$ **[18]**

Q7) Explain following in detail **[16]**

a) Fuzzy Optimization

b) Simulated Annealing

OR

Q8) Explain following in detail **[16]**

a) Genetic Algorithms

b) Ant Colony Optimization

♦ ♦ ♦

Total No. of Questions : 10]

SEAT No. :

PA-271

[Total No. of Pages : 2

[5927]-155
B.E. (E & TC)
ARTIFICIAL INTELLIGENCE
(2015 Pattern) (Semester - I) (Elective - II) (412185D)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***

Q1) a) Explain the structure of agents. What are the four basic types of agent program in any intelligent system? **[5]**

b) Define pruning. Explain alpha beta pruning with its effectiveness. **[5]**

OR

Q2) a) Explain the working of unification algorithm with suitable example. **[5]**

b) What is PEAS? Explain different agent types with their PEAS descriptions. **[5]**

Q3) a) Explain greedy best-first search algorithm with suitable example. **[5]**

b) Explain the steps involved in the knowledge Engineering process. Give an example. **[5]**

OR

Q4) a) Explain first order logic symbol with suitable example. **[5]**

b) Explain the Hidden Markov model. **[5]**

Q5) a) What is reinforcement learning? Explain passive and active reinforcement learning in detail. **[8]**

b) Write short notes on: Inductive learning. **[8]**

OR

P.T.O.

Q6) a) What are the different learning methods? Explain any one in detail. **[8]**

b) Write short notes on: Explanation based learning. **[8]**

Q7) a) Explain the following terms associated with object recognition: **[8]**

i) Feature based approach

ii) Parsing

b) Write a short note: Principal component analysis. **[8]**

OR

Q8) a) Explain in detail steps of pattern recognition system. **[8]**

b) Write a short note: Linear discriminant analysis. **[8]**

Q9) a) What is augmented grammar? Explain with examples. **[9]**

b) What is Probabilistic language processing? Explain Probabilistic language models? **[9]**

OR

Q10)a) Explain syntactic analysis with suitable example. **[9]**

b) Explain semantic interpretation with suitable example. **[9]**

♦ ♦ ♦

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

PA-272 **[Total No. of Pages : 2**

[5927]-156
B.E. (E & TC)
ELECTRONICS IN AGRICULTURE
(2015 Pattern) (Elective - II) (Semester - I)

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

Instructions to the candidates:

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

Q1) a) Write comparison between HART and protibus - PA. **[7]**

b) Define sensor network. State advantage and limitations of sensor-based network. **[7]**

c) Define soil moisture. Explain in brief Soil-moisture measurement and monitoring. **[6]**

OR

Q2) a) Explain supervisory control and data acquisition system (SCADA) with neat diagram. **[7]**

b) Explain architecture of foundation field bus and list its feature. **[7]**

c) State the different techniques for humidity measurement? Explain anyone. **[6]**

Q3) a) How GIS/GPS can be used for yield monitoring in precision farming. **[8]**

b) Define precision farming. Write the objectives of precision farming? And explain in detail issues and conditions for precision farming. **[8]**

OR

Q4) a) Explain how irrigation system works in agriculture field? **[8]**

b) Explain necessity of soil sampling in precision farming? And Explain process of soil sampling in detail. **[8]**

P.T.O.

Q5) a) Explain why site-specific spraying is required? Explain its necessity in brief. Also explain crop handling processing. **[8]**

b) Write the different soil properties and meteorological parameters? Explain any one soil-moisture measurement technique in brief. **[8]**

OR

Q6) a) Classify the types of irrigation. Explain irrigation system? **[8]**

b) Explain need of crop monitoring & give the details of insturment used for it. **[8]**

Q7) a) Describe various Governance services in agriculture sector. **[8]**

b) List the types of greenhouses. Explain any one with suitable diagram in detail. **[10]**

OR

Q8) a) Explain with suitable block diagram electronic control system for grape drying process. **[8]**

b) Enlist the parameters to be measured for monitoring environmental conditions within greenhouse. Explain the effect of excess CO2 levels on plant health. **[10]**

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

PA-272 **[Total No. of Pages : 2**

[5927]-156
B.E. (E & TC)
ELECTRONICS IN AGRICULTURE
(2015 Pattern) (Elective - II) (Semester - I)

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

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagram must be drawn wherever necessary.***
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P.T.O.

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Q7) a) Describe various Governance services in agriculture sector. **[8]**

b) List the types of greenhouses. Explain any one with suitable diagram in detail. **[10]**

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Q8) a) Explain with suitable block diagram electronic control system for grape drying process. **[8]**

b) Enlist the parameters to be measured for monitoring environmental conditions within greenhouse. Explain the effect of excess CO2 levels on plant health. **[10]**

Total No. of Questions : 10]

SEAT No. : ____

PA-273

[Total No. of Pages : 3

[5927] - 157
B.E. (E & TC) (Semester - II)
MOBILE COMMUNICATION
(2015 Pattern) (404189)

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

Instructions to the candidates :

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Use of logarithmic tables slide rule, mollies charts, electronic pocket calculator and stem tables is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Draw and explain input controlled time division space switch? **[6]**

b) During a busy hour, 1400 calls were offered to a group of trunks and 14 calls were lost. The average call duration has 3 minutes. Find **[4]**

i) Traffic offered
ii) Traffic carried
iii) GOS
iv) The total duration of period of congestion

OR

Q2) a) Draw & explain principle of grading. **[6]**

b) If a group of 4 trunks is offered 3 Erlang of traffic. Find **[4]**

i) Grade of service
ii) The probability that only one trunk is busy
iii) The probability that only one trunk is free
iv) The probability that at least one trunk is free

Q3) a) Design two stage switching network for 64 incoming and 36 outgoing trunks using. Switch size 3×4? Calculate number of cross points required? **[5]**

b) Discuss the various types of interferences in GSM. **[5]**

OR

P.T.O.

Q4) a) Define the following : **[5]**

i) Average Holding Time

ii) CCR

iii) Erlang

iv) Busy Hour

v) Traffic Intensity

b) For a given telephone system with MTBF of 98 Hours & MTTR of 1 Hour. Calculate availability and unavailability for a single processor system for 10 years. **[5]**

Q5) a) Explain the following terms related with GSM system **[8]**

i) HLR

ii) VLR

iii) AUC

iv) EIR

b) Explain different radio transmission parameters used in GSM. **[8]**

OR

Q6) a) Explain different interfaces used within NSS. **[4]**

b) Explain different services used in GSM. **[4]**

c) Explain the following terms related with GSM. **[8]**

i) SIM

ii) IMSI

iii) TMSI

iv) Cipher Key

v) IMEI

vi) EIR

vii) Mobile Terminal

Q7) a) Draw & explain SMS architecture for point to point services. **[9]**

b) Draw & explain handover mechanism in GSM. **[8]**

OR

Q8) a) Draw & explain mobile terminated call procedure used in GSM. **[9]**

b) Draw & explain time slot data burst structure used in GSM. **[8]**

Q9) a) State the specifications of 4G LTE with following parameters. **[4]**

i) Switching method

ii) Channel Bandwidth

iii) Modulation

iv) Peak data rate

b) Discuss the requirements of 5G Networks. **[5]**

c) Compare 1G to 5G with following parameters. **[8]**

i) Data rates

ii) Multiple access technique

iii) Services

iv) Carrier frequency

OR

Q10)a) Compare GSM, UMTS & Gprs related with following parameters **[8]**

i) Access Rate

ii) Carrier Bandwidth

iii) Frame Duration

iv) Spectrum

b) Explain TDD frame structure in LTE. **[5]**

c) Draw & explain open wireless 5 G architecture. **[4]**

▽▽▽▽

Total No. of Questions : 8]

SEAT No. :

PA-274

[Total No. of Pages : 2

[5927] - 158

BE. (E &TC)

BROADBAND COMMUNICATION SYSTEM

(2015 Pattern) (Semester - II) (404190)

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

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
3) ***Assume suitable data, if necessary.***
4) ***Solve question Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***

Q1) a) Draw and explain the key elements of an optical communication system. **[6]**

b) Explain the transmission windows along with the attenuation curve for a single mode fibre. **[6]**

c) A student tries to establish a digital optical link by choosing the following specifications of the components:

i) Overall length of fiber having cable attenuation of 2.6 dB/km is 7 km at 20 Mbps using RZ code. The fiber requires splicing after every km with a splice loss of 0.5 dB per splice.

ii) 850 nm LED capable of launching an average of 100 μw of optical power (including the connector loss) into an graded index fiber of 50 μm core diameter.

iii) At the receiver, the fiber is connected using a connector with a loss of 1.5 dB to a p-i-n photo diode.

iv) The receiver requires a mean incident optical power of - 41 dBM in order to give the necessary BER of 10^{-10}, and its is predicted that a safety margin of 6dB will be required.

Analyze the digital optical link using optical power budget for the system and hence decide whether system is viable or not. **[8]**

OR

P.T.O.

Q2) a) A multi mode step index fiber has a relative refractive index difference of 1% & a core refractive index of 1.5. The number of modes propagating at a wavelength 1.3 μm is 1100. Estimate the diameter of the fiber core. **[8]**

b) Compare LED and ILD as light source in optical fiber Communication. **[6]**

c) Draw and Explain the WDM components: Mux and Demux, and FBG. **[6]**

Q3) a) Define the six orbital elements that specify the position of satellite at a particular instant of time. **[8]**

b) State and explain Keplar's three laws of planetary motion applied to satellite systems. **[8]**

OR

Q4) a) Explain briefly the following.

i) Satellite antennas.

ii) System reliability and space qualification. **[8]**

b) Explain various losses in downlink Analysis. **[8]**

Q5) a) Describe the power system in satellite with the help of a neat diagram. **[8]**

b) Explain the different orbit in satellite communication system. What are advantages of GEO orbit. **[9]**

OR

Q6) a) Draw and explain TTC & M system in satellite. **[8]**

b) Explain the role of Altitude and orbit control system in case of satellites. **[9]**

Q7) a) With reference to a satellite system, write the expressions the following terms and explain. Free space path loss and received power in dB. **[8]**

b) A satellite link operating at 14GHz has following details.

i) Receiver feeder loss = 1.5dB.

ii) Free space loss = 207dB.

iii) Atmospheric absorption loss = 0.5dB.

iv) Antenna pointing loss = 0.5dB. Neglect the other losses.

Calculate the total link loss for clear - sky conditions. **[9]**

OR

Q8) a) i) Explain the a term EIRP used in satellite link design.

ii) Calculate the EIRP in dB and watt for a satellite downlink that operates at 12GHz with a transmit power of low and an antenna gain of 48.2dB. **[9]**

b) Write the expression for uplink and downlink budget. **[8]**

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Total No. of Questions : 8]

SEAT No. :

PA-275

[Total No. of Pages : 4

[5927]-159
B.E. (E & TC)
MACHINE LEARNING
(2015 Pattern) (Semester - II)(Elective-III) (404191A)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2 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.***

Q1) a) What is reinforcement learning? Elaborate the concept with the help of suitable example & Flow diagram. **[6]**

b) Classify following application in to supervised and unsupervised leaning **[6]**

i) Spam Filter : given labelled email
ii) News article classification
iii) Movie Recommended system
iv) Weather forecasting
v) Autonomous car
vi) Share market forecasting

c) What is decision tree? How it is used for classification, Explain with suitable example. Do we use decision tree to solve regression problem? Justify. **[8]**

OR

Q2) a) In context with machine learning, elaborate following terms **[6]**

i) Over fitting
ii) Under fitting
iii) Training
iv) Testing
v) Cross validation
vi) Equal Error Rate (EER)

P.T.O.

b) Data presented in the following table gives the details about outlook and tempereture. On particular day and the information whether the cricket game is played or not-palayed under the given conditions. **[6]**

Outlook	Temp.	Playcricket
Rainy	Hot	No
Rainy	Hot	No
Over cast	Hot	Yes
Sunny	Mild	Yes
Sunny	Cool	Yes
Sunny	Cool	No
Over cast	Cool	Yes
Rainy	Mild	No
Rainy	Cool	Yes
Sunny	Mild	Yes
Rainy	Mild	Yes
Over cast	Mild	Yes
Over cast	Hot	Yes
Sunny	Mild	No

Using Bayes classifier, predict the possibility of play of cricket in the situation below.

Out look	Temp.	Play Cricket
Rainy	Hot	?

c) What do you mean by linear regression? With suitable example, describe how linear regression is used to predict the output for test example/input sample. What is non-linear regression. **[8]**

Q3) a) A principal component analysis was run and following eigen value results were obtained : 2.731, 2.218, 0.442, 0.341, 0.183, 0.085. **[6]**
How many factors would you retain using eigen values to determine number of Factors. Justify your answer.

b) In machine learning, what is need of dimensionality redution? Describe LDA along with its application. **[8]**

c) With the help of mathematical expressions, explain computation algorithm for PCA. **[6]**

OR

Q4) a) Implement XOR logic function using MP - Neuron model. **[8]**

b) Compare artificial Neuron with biological Neuron. **[6]**

c) Differentiate between feedback and feedforward neural Network. **[6]**

Q5) a) Describe back propagation algorithm with the help of suitable example. **[8]**

b) Explain architecture of Radial basis function network. **[8]**

OR

Q6) a) Explain linearly seperable and non-seperable data with example. How the issue of non-linearity in addressed in RBFN? **[8]**

b) Describe how neuron is trained using Herbb's learning rule. **[8]**

Q7) a) Explain following function in respect of CNN **[6]**

i) Convolution layer

ii) Pooling

iii) Relu Function

b) What is convolution? Explain 2D convolution process with suitable example? How 2D convolution is used in 3D filtering in CNN. **[8]**

OR

Q8) a) Why pooling layer is used in CNN? With suitable example, explain **[6]**

i) Max

ii) Min

iii) Average Pooling

b) With reference to convolution layer of CNN, explain **[8]**

i) Padding

ii) Stride

And give the relation of stride, padding & filter size with width and height of convolution layer output.

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

PA-133 **[Total No. of Pages : 4**

[5927]-16
B.E. (Automobile)
OPERATION RESEARCH
(2015 Pattern) (Semester - II) (Elective - IV) (416498A)

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 Scientific calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Use simplex method to solve following LPP: **[10]**

Maximize, $Z = 7X_1 + 6X_2$

Subject to $X_1 + X_2 \leq 4$;

$2X_1 + X_2 \leq 6$,

Where $X_1, X_2 \geq 0$.

b) A city corporation has decided to carry out road repairs on the main four arteries of the city. The government has agreed to make a special grant of Rs 50 lakh towards the cost with a condition that the repairs be done at the lowest cost and quickest time. If the conditions warrant, a supplementary token grant will also be considered favorably. The corporation has floated tenders and five contractors have sent in their bids. In order to expedite work, on road will be awarded to only one contractor. **[10]**

Contractor/Road	Cost of Repairs (Rs in lakh)			
	R1	R2	R3	R4
C1	9	14	19	15
C2	7	17	20	19
C3	9	18	21	18
C4	10	12	18	19
C5	10	15	21	16

Find the best way of assigning the repair work to the contractors and the costs. It is necessary to seek supplementary grants, what should be the amount sought?

OR

P.T.O.

Q2) a) Solve the following transportation problem. Use Vogel's Approximation Method to find an initial basic feasible solution and a stepping stone method to test the optimality of the solution. **[10]**

	D1	D2	D3	D4	Supply
Plant I	2	3	11	7	6
Plant II	1	0	6	1	1
Plant III	5	8	15	9	10
Requirement	7	5	3	2	

b) Use big-M simplex method to minimize, $Z = 5X_1 + 6X_2$
Subject to $2X_1 + 5X_2 \geq 1500$; $3X_1 + X_2 \geq 1200$
Where; $X_1, X_2 \geq 0$ **[10]**

Q3) a) A small project consisting of eight activities has the following characteristics: **[10]**

Activity	Time Estimates (in weeks)			
	Preceding activity	Most optimistic time	Most likely time	Most pessimistic time
A	-	2	4	12
B	-	10	12	26
C	A	8	9	10
D	A	10	15	20
E	A	7	7.5	11
F	B,C	9	9	9
G	D	3	3.5	7
H	E,F,G	5	5	5

i) Draw the PERT network for the project.

ii) Prepare the activity schedule for the project.

iii) Determine the critical path.

iv) If a 30-week deadline is imposed, what is the probability that the project will be finished within the time limit?

b) Compare and contrast PERT & CPM. Under what conditions would you recommend scheduling by PERT? State the circumstances where CPM is better technique. **[6]**

OR

Q4) a) The time estimates (in week) for the activities of a PERT network are given below: **[10]**

Activity	t_0	t_m	t_p
1-2	1	1	7
1-3	1	4	7
1-4	2	2	8
2-5	1	1	1
3-5	2	5	14
4-6	2	5	8
5-6	3	6	15

i) Draw to project network and identify all the paths through it.

ii) Determine expected project length.

iii) Calculate the standard deviation and variance of the project length.

iv) What is the probability that project will be completed at least 4 weeks earlier than expected time?

v) If the project due date is 19 weeks, what is the probability of not meeting the due date?

b) Critically comment on the assumptions on which PERT/CPM analysis is done for projects. **[6]**

Q5) a) Use the graphical method to minimize the time needed to process the following jobs on the machine shown, i.e. each machine finds the job which should be done first. Also calculate the total elapsed time to complete both the jobs. **[8]**

Job 1		Machine				
	Sequence	A	B	C	D	E
	Time(hrs)	5	4	2	6	2
Job 2		Machine				
	Sequence	B	C	A	D	E
	Time(hrs)	5	4	3	2	6

b) There are seven jobs, each of which has to go through two machines A and B in the order A-B. The processing times in hours are as follows: **[8]**

	Job						
Machine	A	B	C	D	E	F	G
Machine A	3	12	15	6	10	11	9
Machine B	8	10	10	6	12	1	3

Determine the sequence of these jobs that will minimize the total elapsed time T. Also find T and idle time for machines A and B.

OR

Q6) a) What do you mean by two-person zero sum game? What is pure strategy in game theory? **[6]**

b) Find an optimal sequence for the following sequencing problems of four jobs and five machines when passing out is not allowed of which processing time(in hours) is given below. Also find the total elapsed time. **[10]**

	Job			
Machine	1	2	3	4
Machine A	7	6	5	8
Machine B	5	6	4	3
Machine C	2	4	5	3
Machine D	3	5	6	2
Machine E	9	10	8	6

Q7) a) In a machine shop, a particular cutting tool costs Rs. 6 to replace. If a tool breaks on the job, the production disruption and associate costs amount to Rs. 30. The past life of a tool is given as follows: **[10]**

Job No.	1	2	3	4	5	6	7
The proportion of broken tools on job	0.01	0.03	0.09	0.13	0.25	0.55	0.95

After how many jobs, should the shop replace a tool before it breaks down?

b) Write a note on: **[8]**

i) Replacement of items that fail suddenly

ii) Group replacement.

OR

Q8) a) A pipeline is due for repairs. It will cost Rs. 10,000 and last for 3 years. Alternatively, a new pipeline can be laid at a cost of Rs. 30,000 and lasts for 10 years. Assuming cost of capital to be 10% and ignoring salvage value, which alternative should be chosen? **[8]**

b) The data collected in running a machine, the cost of which is Rs. 60,000, are given below: **[10]**

Year	1	2	3	4	5
Resale value (Rs.)	42,000	30000	20400	14400	9650
Cost of spares (Rs.)	4000	4270	4880	5700	6800
Cost of labor(Rs.)	14000	16000	18000	21000	25000

Determine the optimum period for the replacement of the machine.

♦ ♦ ♦

Total No. of Questions : 10]

SEAT No. :

PA-276

[Total No. of Pages : 2

[5927]-160
B.E. (E & TC)
PLCS AND AUTOMATION
(2015 Pattern) (Semester - II) (Elective - III) (404191B)

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, and Q.9 or Q.10.*
2) *Figures to the right side indicate full marks.*

Q1) a) Define automation and explain types of automation. **[5]**

b) Explain the DPT with its applications. **[5]**

OR

Q2) a) Discuss about effects of modern developments in automation on global competitivenes. **[5]**

b) Explain smart sensors. **[5]**

Q3) a) Explain P/Δ control along with suitable ckt diagram. **[5]**

b) Explain electrical signal transmission systems along with advantages. **[5]**

OR

Q4) a) Explain the working of variable frequency Drive (VFO) in detail. **[5]**

b) Explain cascade control in detail? **[5]**

Q5) a) Explain following terms with respect to PLC. **[8]**

i) Input Scan Time
ii) Output Scan Time
iii) Timers
iv) Counters

b) Draw a ladder diagram for a two-motor system having the following conditions: **[10]**
The START push button starts Motor 1; 10 secs later Motor 2 will start.
The STOP Push button stop Motor 1; 15 seconds later Motor 2 stops.

OR

P.T.O.

Q6) a) Explain the selection criteria of PLC. **[8]**

b) Develop a PLC program for an elevator **[10]**

Given START, UP, DOWN buttons (Push-to-ON, NO), STOP button (push-to-OFF, NO), limit switches LS1 (DOWN, NO), LS2 (UP, NO).

The objectives are:

i) START button should put ON the elevator.

ii) STOP button should stop the elevator.

iii) When started and up button is pushed, the elevator should start moving up, if at button, till up LS1 is sensed.

iv) When started and Down button is pushed, the elevator should start moving down, if at top, till DOWN LS2 is sensed.

Q7) a) Explain MTU and RTU along with their functions. **[8]**

b) Explain architecture of DCS in detail. **[8]**

OR

Q8) a) Explain the elements of SCADA **[8]**

b) Compare PLC and SCADA **[8]**

Q9) a) Explain basic components of CNC. **[8]**

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

i) CAN bus

ii) Ethernet

OR

Q10)a) What is the role of panel EngiSneering in automation? **[8]**

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

i) Foundation feild bus.

ii) TCP/IP Protocol.

Total No. of Questions : 8]

SEAT No. :

PA-277

[Total No. of Pages : 2

[5927]-161
B.E. (E & TC)
AUDIO AND SPEECH PROCESSING
(2015 Pattern) (Semester - II) (404191C) (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) Explain Classification of Speech Sounds? **[6]**

b) Explain concept of Just Noticeable Differences (JNDs)? **[6]**

c) What is short time Average Magnitude Difference Function (AMDF)? What are its applications? **[8]**

OR

Q2) a) Explain Anatomy and Physiology of speech production? **[6]**

b) Concept of pitch in speech signal? How to calculate pitch of speech signal using Autocorrelation Method? **[6]**

c) What is Narrow Band and Wide Band spectrogram? Explain its significance. **[8]**

Q3) a) How to use LPC parameters for Pitch and formant detection in speech signal? **[5]**

b) Explain frequency domain interpretation of LP analysis in speech signal? **[5]**

c) Explain steps involved in MFCC Computation of Speech Signal. **[6]**

OR

P.T.O.

Q4) a) What is formant frequency and Pitch frequency of speech signal? **[5]**

b) Explain Auto Correlation and Covariance method for LP analysis? **[6]**

c) What are speech coding standards? What are their applications? **[5]**

Q5) a) Explain Linear Predictive Coder? What are its applications? **[6]**

b) What is filter bank analysis? **[6]**

c) Explain Sub Band Coder in Speech Signal Processing? **[6]**

OR

Q6) a) Explain the terms with suitable details **[10]**

i) PCM
ii) DPCM
iii) DM
iv) ADM

b) Explain concept of homomorphic-Vocoders on speech processing? What are their applications? **[8]**

Q7) a) What is DTW? What are its applications? **[8]**

b) What is GMM? How it is used? **[8]**

OR

Q8) a) What is HMM? How it is used in stastistical modeling of speech signal. **[8]**

b) Explain the steps involved in Automatic Speech Recognition for Isolated word recognition. **[8]**

Total No. of Questions : 8]

SEAT No. :

PA-278

[Total No. of Pages : 2

[5927]-162
B.E. (Electronics & Telecommunication)
SOFTWARE DEFINED RADIO (Open Elective - III)
(2015 Pattern) (Semester - II) (404191D)

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 whereve necessary.***
3) ***Figures to the right side indicate full marks.***

Q1) a) Discuss the significance of hardware and Software components in SDR. **[8]**

b) Discuss the Open Architecture of software defined radio in detail. **[6]**

c) Explain how the computational complexity of multirate technique is reduced using digital filter banks. **[6]**

OR

Q2) a) Explain the various characteristics of software defined radio and compare it with analog radio. **[8]**

b) Illustrate the applications of CPU and GPU in software defined radios. **[6]**

c) Discuss the various sample timing algorithms. **[6]**

Q3) a) What is smart antenna? Discuss the smart antenna architecture in brief. **[9]**

b) Explain with neat diagram Space-Time Trellis coding for transmit space-time adaptive processing. **[8]**

OR

Q4) a) Explain the benefits of Smart Antenna Phased Antenna Array. **[9]**

b) Draw and explain the block diagram of switched beam antenna array system. **[8]**

P.T.O.

Q5) a) What is cognitive radio? How is it different from SDR? **[9]**

b) Draw neat block diagram of OFDM receiver. Explain the function of FFT block. **[8]**

OR

Q6) a) Draw neat block diagram of OFDM transmitter and explain the function of constellation mapper and IFFT block. **[9]**

b) Explain the concept of Spectrum Sensing and Spectrum mobility and its effect on spectral efficiency? **[8]**

Q7) a) Explain the various challenges and issues in the application of SDR advance communication system. **[8]**

b) Write a short note on the application of cognitive radio for Public Safety (PSCR) **[8]**

OR

Q8) a) Discuss the case study on Embedded PSCR using GNU radio. **[8]**

b) Describe the issue of network interoperability in SDR in detail. **[8]**

Total No. of Questions :10]

SEAT No. :

PA-279

[Total No. of Pages :2

[5927]-163
B.E. (Electronics &Telecommunication)
AUDIO VIDEO ENGINEERING
(2015 Pattern) (Semester-II)(Elective -III)(404191E)

Time : 2 ½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Explain CCIR-B standard in detail. **[5]**

b) Draw the block diagram of NTSC encoder and explain function of each block. **[5]**

OR

Q2) a) Draw the detailed composite video signal with all details. **[5]**

b) State different digital TV transmission types and compare them in short. **[5]**

Q3) a) Explain the construction and working principle of LED display. **[5]**

b) Explain MPEG-4 video Compression format. **[5]**

OR

Q4) a) Explain the working of set-top box using a neat block diagram. **[5]**

b) Draw the block diagram of CATV system, state its applications. **[5]**

Q5) a) With the suitable block diagram explain IPTV system. List its applications. **[8]**

b) Compare IPTV and internet TV. **[8]**

OR

Q6) a) Explain Wi-Fi TV with relevant block diagram in detail. **[8]**

b) What is mobile TV? What are its challenges and the hardware requirments? **[8]**

P.T.O.

Q7) a) Draw the block diagram of disc recording and reproducing system and explain the function of each block. **[10]**

b) Explain DVD player with necessary block schematic. **[8]**

OR

Q8) a) Explain Principles of DVR. How it is differing from VCR. Compare DVR and VCR. **[10]**

b) Compare VCD, DVD and blue ray. **[8]**

Q9) a) Draw the block diagram of PA system and explain. **[8]**

b) What are the factors on which reverberation time depends. **[4]**

c) Define Absorption coefficient & studio acoustics. **[4]**

OR

Q10)a) State the various types of microphones.Explain any one with neat diagram. **[8]**

b) Explain the requirement for a good auditorium for pleasant listening. Discuss salient features of acoustical design for an auditorium. **[8]**

Total No. of Questions : 10]

SEAT No. :

PA-280

[Total No. of Pages : 3

[5927]-164

B.E. (Electronics & Telecommunication)

ROBOTICS

(2015 Pattern) (404192A) (Semester - II) (Elective -IV)

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

Instructions to the candidates :

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figure to the right side indicates full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Draw neat sketch showing basic building blocks of a robotic system. Explain the function of each block. ? **[5]**

b) Explain how robots can be classified based on the types of joints with the help of neat sketches? **[5]**

OR

Q2) a) What is Optical Encoders, explain in brief with neat sketch? **[6]**

b) Give the classification of sensors used in the field of robotics.? **[4]**

Q3) a) Explain need for sensors and vision system in the working and control of a robot? **[4]**

b) List types of end effector. Explain the selection criterion for each type for various applications? **[6]**

OR

P.T.O.

Q4) a) Explain the role of actuator in a robot. Explain any one with neat sketch. **[5]**

b) List different types of sensors used in robotics? Explain any 2 with neat diagram? **[5]**

Q5) a) Explain the concepts of robot arm kinematics with the help of block diagrams. **[8]**

b) Explain the term – Robot arm dynamics. Discuss the E-L formulation used for a robotic manipulator. **[8]**

OR

Q6) a) Explain in details what do you mean by forward kinematics & reserve kinematics? **[8]**

b) What is Inverse kinematic solution? Why the Inverse kinematic solutions are not unique? **[8]**

Q7) a) Write note on : **[8]**

i) Robot Language Classification

ii) Robot language Structure

b) How does line follower robot works, Write any one line following algorithm in detail. **[8]**

OR

Q8) a) What are the recent advances in the field of robotics? What are the challenges in this field? **[8]**

b) What is the difference between lead-through and walk-through programming? **[8]**

Q9) a) What are different types of joints ? Describe the workspace formed by these joints or combination of joints ? **[8]**

b) Explain the term Work envelop & Work Volume. Draw Work envelop for the following types of robot i) Cartesian robot ii) Cylindrical robot? **[6]**

c) Write short notes on Welding automation using robot. **[4]**

OR

Q10) a) Write a case study on human robot interaction. **[6]**

b) Draw & Describe giving appropriate examples how robots can be used for material handling and assembly? **[12]**

Total No. of Questions : 8]

SEAT No. :

PA-281

[Total No. of Pages : 2

[5927]-165

B.E. (Electronics & Telecommunication)

BIOMEDICAL ELECTRONICS

(2015 Pattern) (404192B) (Semester - II) (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) ***Figure to the right side indicate full marks.***
4) ***Use of Calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) Explain the propagation of Action Potential with neat diagram. **[8]**

b) What are Heart murmurs? Explain it with suitable diagrams. **[4]**

c) Explain the construction and working of Ag/AgC1 electrode and calomel electrode. **[8]**

OR

Q2) a) Explain how Bio electrode is a transducer. Draw Equivalent circuit of a Bio Electrode. **[8]**

b) What is Einthoven's triangle? Explain its significance with neat sketch.**[4]**

c) State types of EEG signals and explain how they can be used to diagnose a disease. **[8]**

Q3) a) Explain the significance of Isolation amplifier with neat diagram. **[8]**

b) Explain grounding and shielding techniques. **[8]**

P.T.O.

OR

Q4) a) Explain the significance of Right Leg drive in ECG instrumentation system with respect to common mode rejection ratio. **[8]**

b) Explain Weiner filter for noise removal from biosignal with suitable block diagram and state the equation. **[8]**

Q5) a) State the low frequency and high frequency artifacts which contaminate the signal and discuss how Butterworth filters can remove them from ECG signal. **[8]**

b) Explain the importance of multiscale analysis in biosignals. **[8]**

OR

Q6) a) Explain Pan Tompkins algorithm with suitable equations. **[8]**

b) State an algorithm to classify normal and abnormal ECG beats. **[8]**

Q7) a) State and explain any 5 dental instruments involved in dentistry. **[10]**

b) Write a short note on any two : **[8]**

i) Defibrillators.

ii) Pacemakers.

iii) Bedside monitoring systems.

OR

Q8) a) State the noninvasive and invasive methods of Blood measurement and explain anyone of them. **[10]**

b) Explain with block diagram the data acquisition system in CT scanner. **[8]**

Total No. of Questions : 8]

SEAT No. :

PA-282

[Total No. of Pages : 2

[5927]-166

B.E. (Electronics & Telecommunication)

WIRELESS SENSOR NETWORKS

(2015 Pattern) (404192C) (Elective - IV) (Semester - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

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

Q1) a) Explain performance matrics of WSN in detail. **[8]**

b) What is the main purpose of MAC layer? **[6]**

c) Write a short note on : Zigbee protocol. **[6]**

OR

Q2) a) What are the design constraints and challenges in WSN? Explain any two in detail. **[8]**

b) Explain the low rate WPAN wireless standard architecture with details. **[6]**

c) Explain the need and objectives of cross layer design. Draw cross layer protocol stack architecture. **[6]**

Q3) a) List and explain various ranging techniques of WSN with suitable diagram. **[8]**

b) Why localization is needed in WSN? Explain range based localization technique in detail. **[8]**

P.T.O.

OR

Q4) a) List various categories of routing protocols of WSN. Explain unicast and multicast location based routing. **[8]**

b) Explain the need of multi-hop communication with suitable diagram. **[8]**

Q5) a) What is the need of data aggregation in WSN? Draw data aggregation architecture. Explain compressive sampling in WSN. **[10]**

b) List various security attacks in WSN and explain in brief. **[8]**

OR

Q6) a) Explain In-network data processing and clustering approach in WSN. **[10]**

b) Describe security requirements and threat models in WSN. **[8]**

Q7) a) Explain design and deployment of any one application of WSN. **[8]**

b) Write a short note on Top-down design process in WSN. **[8]**

OR

Q8) a) Explain general testing and validation methods in WSN. **[8]**

b) Write a short note on Bottom-up implementation process in WSN. **[8]**

Total No. of Questions : 8]

SEAT No. :

PA-283

[Total No. of Pages : 3

[5927]-167

B.E. (Electronics & Telecommunication)

RENEWABLE ENERGY SYSTEMS

(2015 Pattern) (404192D) (Elective - IV) (Semester - II)

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) ***Figure to the right side indicate full marks.***
4) ***Use of non-programmable calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) What are the different renewable and conventional sources of energy. Explain their availability, uses and energy scenario in Indian power generation context. **[8]**

b) Define the following terms : **[6]**

i) Solar constant.

ii) Declination.

iii) Hour angle.

c) Explain the current voltage characteristics of solar cell. Define efficiency of solar cell and explain limits to cell efficiency. **[6]**

OR

Q2) a) Explain with neat diagram. **[8]**

i) Nuclear fusion

ii) Nuclear fission

P.T.O.

b) Calculate the angle made by beam radiation with the normal to flat plate collector on Max 1, at 0900h (LAT). The collector is located in New Delhi (28º 35', 77º 12'E). It is tilted at an angle of 36º with the horizontal and is pointing due south. **[6]**

c) Explain off grid solar PV system with suitable diagram. **[6]**

Q3) a) Describe with neat sketch the working of wind energy converter systems (WECS) with main components. **[8]**

b) Define the following terms w.r. to wind turbines. **[6]**

i) Nacelle

ii) Hub

iii) Yaw control

iv) Cut in speed

v) Cut out speed

vi) Rated speed

c) Wind speed is 10 m/s at standard atmospheric pressure. Calculate **[4]**

i) The total power density in wind stream.

ii) The total power produced by a turbine of 100m diameter with an efficiency of 40%.

Air density = 1.226 J/kg. k/m^3

OR

Q4) a) With the help of neat sketch, explain different types of rotors used in wind turbines. **[8]**

b) Explain different modes of wind power generation with neat diagram. **[6]**

c) What are the advantages and disadvantages of wind energy systems. **[4]**

Q5) a) List the different geothermal resources and explain them in detail (any 4). **[8]**

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

i) Tidal energy.

ii) Ocean energy

OR

Q6) a) List different methods of geothermal power generation and explain any one in detail. **[8]**

b) List the different types of Tidal power plants and explain any two in detail. **[8]**

Q7) a) Define fuel cell. Explain the working principle of an acidic fuel cell. **[8]**

b) Compare acidic and alkaline Hydrogen-Oxygen fuel cells. **[8]**

OR

Q8) a) List the different types of fuel cells and explain Molten carbonate fuel cell with neat diagram. **[8]**

b) What are the advantages and disadvantages of fuel cell power plants. **[8]**

Total No. of Questions : 10]

SEAT No. : [ ]

PA-284

[Total No. of Pages : 2

[5927]-168

B.E. (Information Technology)
INFORMATION AND CYBER SECURITY
(2015 Pattern) (Semester - I) (414453)

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

Instructions to the candidates:

1) ***Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume Suitable data if necessary.***

Q1) a) Explain authentication as security goal and different types of authentications. **[6]**

b) Explain Diffie-Hellman Key exchange algorithm? **[4]**

OR

Q2) a) Explain use of X.509 Certificate with diagram. **[6]**

b) List and briefly define categories of active attack. **[4]**

Q3) a) Explain working of following block Cipher. **[6]**

i) Electronic Code Book (ECB)

ii) Cipher Block Chaining (CBC)

b) What is Kerberos? What is Kerberos used for? **[4]**

OR

Q4) a) What is Intrusion detection System? Explain types based on method of detection. **[6]**

b) Describe modes of operation of IPSEC with diagram. **[4]**

P.T.O.

Q5) a) State the ten commandments of computer ethics. **[8]**

b) What are the five criteria for enforcing a policy? **[8]**

OR

Q6) a) What are the objectives, Pros and Cons of Qualitative and Quantitative risk assessment. **[8]**

b) What are the types of law and the difference between law and ethics? **[8]**

Q7) a) What is Cybercrime? Based on the subject explain any three cybercrime. **[8]**

b) What is Cyberstalking. Give example? Is it a crime under the Indian IT Act? **[8]**

OR

Q8) a) What is cybersquatting? Explain types of cyber-squatters and how to prevent it. **[8]**

b) Write short notes on major areas of concern in cloud security. **[8]**

Q9) a) Write short note on Indian IT Act 2000 and amendments in 2008? **[8]**

b) What is Phishing? What are the techniques used by phishers to launch it? **[10]**

OR

Q10) a) Write short note on (Any two) **[10]**

i) Nmap

ii) Snork

iii) Wireshark

b) What is SQL injection attack? How to protect data from SQL Injection? **[8]**

x x x

Total No. of Questions : 10]

SEAT No. :

PA-285

[Total No. of Pages : 3

[5927]-169

B.E. (Information Technology)

MACHINE LEARNING & APPLICATIONS

(2015 Pattern) (414454) (Semester - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Answer Question 1 or 2, 3 or 4, 5 or 6, 7 or 8, 9 or 10.***
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) Write a short note on Vapnik-Chervonenkis dimension. **[5]**

b) Explain with example k-fold cross validation. **[5]**

OR

Q2) a) Explain Supervised, Unsupervised and Semi-Supervised learning. **[5]**

b) Explain with example forward & backward selection methods of subset selection. **[5]**

Q3) a) Write and Explain perceptron training algorithm for linear classification. **[5]**

b) What are the support vector margins and explain soft SVM? **[5]**

OR

Q4) a) Write a short note on Gram matrix and explain with example. **[5]**

b) Explain the term bias-Variance dilemma. **[5]**

P.T.O.

Q5) a) Consider following 8 points P_1 = [0.1, 0.6], P_2 = [0.15, 0.71], P_3 = [0.08, 0.9], P_4 = [0.16, 0.85], P_5 = [0.2, 0.3], P_6 = [0.25, 0.5], P_7 = [0.24, 0.1], P_8 = [0.3, 0.2]. Apply K-mean clustering with initial centroids m1 & m2 where m1 = P_1, m2 = P_8 and Clusters C1 & C2 which points P_6 belongs to which cluster? **[10]**

b) Define and explain **[8]**

i) Gini Index,

ii) Entropy

iii) Minority class

iv) Majority class.

OR

Q6) a) Explain association rule mining. Comment on role of support and confidence in association rule mining. **[8]**

b) Consider following splits having four features: **[10]**

Length = [3,4,5]	[2+,0-][l+, 3-] [2+, 2-]
Gills = [Yes, No]	[0+, 4-] [5+, 1-]
Beak = [Yes, No]	[5+, 3-] [0+2-]
Teeth = [many, few]	[3+, 4-] [2+, 1-]

Find

Total weighted Entropy & Gini-index of all Features.

Q7) a) Explain discriminative learning with maximum likelihood. **[8]**

b) Explain Naïve Baye's classifier in detail. **[8]**

OR

Q8) a) Write short note on GMM. **[8]**

b) Define and explain: **[8]**

i) Univariate normal distribution.

ii) Multivariate normal distribution.

Q9) a) Explain bagging and boosting as ensemble method. **[8]**

b) Describe Feed Forward Neural Network in detail. **[8]**

OR

Q10) a) Describe in detail Reinforcement learning. **[8]**

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

i) Sigmoid.

ii) Tanh.

iii) ReLU

Total No. of Questions :10]

SEAT No. :

PA-134

[Total No. of Pages : 2

[5927]-17
B.E. (Automobile Engg.)
TRANSPORT MANAGEMENT AND MOTOR INDUSTRIES
(2015 Pattern) (Semester-II) (416498B) (Elective-IV)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherver necessary.***
3) ***Figures to the right indicate full marks.***

Q1) a) Write the responsibility of driver for contract carriage vehicle? **[5]**

b) Write a short note on Taxations. **[5]**

OR

Q2) a) Give details registration of new vehicle. **[5]**

b) Explain one Time tax for Maharashtra State. **[5]**

Q3) a) Effect of non-payment of tax & refund of tax. **[5]**

b) What is insurance clamed procedure? **[5]**

OR

Q4) a) Why road tax is levied on vehicle. **[5]**

b) What is certificate of fitness and its validity? **[5]**

Q5) a) Write in brief about passenger amenities. **[8]**

b) Explain standard bus depot layout in brief? **[8]**

OR

Q6) a) Differentiate between state transport (MSRTC) & private bus services **[8]**

b) Explain the Fleet management **[8]**

P.T.O.

Q7) a) Explain the necessary of scheduling operation? **[9]**

b) Explain management information system for goods transport operation. **[9]**

OR

Q8) a) Explain transportation of Petroleum Product. **[9]**

b) What are the emission standards prescribed under the M.V. rules to control pollution? **[9]**

Q9) a) Explain various research organization in motor industry. **[8]**

b) Write short note on global position system. **[8]**

OR

Q10)a) Advance technique in traffic management. **[8]**

b) Explain the role of ARAI in Automobile Industry. **[8]**

Total No. of Questions : 10]

SEAT No. :

PA-286

[Total No. of Pages : 2

[5927]-170

B.E. (Information Technology)

SOFTWARE DESIGN AND MODELING

(2015 Pattern) (Semester-I) (414455)

Time : 2 ½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 Or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain Model Driven Architecture (MDA). **[5]**

b) Explain UML Common Mechanisms. **[5]**

OR

Q2) a) A book is composed of Table of contents, Preface, many chapters and index. Chapters are composed of sections. Convert this using a class diagram. **[5]**

b) Define UML and Explain UML building blocks in brief. **[5]**

Q3) a) Explain the concept of include and extend in use case modeling with suitable example. **[5]**

b) Explain Use case realization with suitable example. **[5]**

OR

Q4) a) A company consists of departments. Departments are located in one or more offices. One office acts as a headquarter. Each department has a manager who is recruited from the set of employees. Draw a class diagram which consists of all the classes in your System their attributes and operations, relationships between the classes, multiplicity specifications, and other model elements that you find appropriate. **[5]**

b) Explain aggregation and composition with example. **[5]**

P.T.O.

Q5) a) Draw deployment diagram of Library management system. **[8]**

b) Explain Macro level design process. **[8]**

OR

Q6) a) What is component diagram. Draw component diagram for online shopping **[8]**

b) Explain the process of designing view layer classes. **[8]**

Q7) a) Explain Low Coupling and High Cohesion GRASP patterns. **[10]**

b) Compare Strategy and State design pattern. **[8]**

OR

Q8) a) i) State the use of GRASP patterns. **[4]**

ii) Explain the Creator and Information Expert GRASP Patterns **[6]**

b) i) State Usage and types of GoF Design pattern. **[4]**

ii) Explain Singleton Design Pattern **[4]**

Q9) a) What are the characteristics of service oriented architecture? Explain with example. **[8]**

b) Which are important goals of software Architecture? Explain Client Server architecture with example. **[8]**

OR

Q10)a) Define product line architecture and explain with suitable example. **[8]**

b) Describe the importance of Component Based Software Architectures.**[8]**

Total No. of Questions : 10]

SEAT No. :

PA-287

[Total No. of Pages : 2

[5927]-171

B.E. (Information Technology)

WIRELESS COMMUNICATIONS

(2015 Pattern) (Semester - I) (414456A) (Elective - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 , Q.7 or Q.8 Q.9 or Q.10.***
2) ***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 frequency reuse for cellular communication systems. **[4]**

b) Compare 1G, 2G and 3G. **[6]**

OR

Q2) a) Explain advantages and disadvantages of wireless communications? **[4]**

b) Explain the common wireless cellular network components with neat block diagram. **[6]**

Q3) a) Differentiate between Wireless Local Area networks (WLAN) and Personal Area Networks (PAN). **[4]**

b) What do mean by handoff? Explain different handoff strategies? **[6]**

OR

Q4) a) What do you mean by WLL? Explain in detail. **[4]**

b) What do you mean by fading? Explain the effects of multipath fading. **[6]**

Q5) a) Write short note on following techniques for wireless communications 1. TDMA 2. CDMA techniques for wireless communications? **[8]**

b) What is Multiple Access? Explain frequency division Multiple Access in wireless communications? **[8]**

OR

P.T.O.

Q6) a) Explain the term : **[8]**

i) Hidden terminal and

ii) Exposed terminal.

b) Explain the concept of spectrum utilization in digital wireless communications. **[8]**

Q7) a) Describe various GSM logical and physical channels. **[8]**

b) Explain the functions of following GSM systems. **[8]**

i) MSC

ii) HLR

iii) VLR

iv) AUC

OR

Q8) a) Describe in details GSM architecture with necessary block diagram and its various blocks. **[8]**

b) What is GPRS? Explain GPRS system architecture in details. **[8]**

Q9) a) List and explain security issues and challenges of Wireless networks. **[8]**

b) What is Zigbee? What are its device types? Explain in details Zigbee Networks. **[10]**

OR

Q10)a) What are WiMax standards? Explain in details WiMax Architecture. **[8]**

b) Write short notes on: **[10]**

i) Wifi

ii) Software Defined Networks.

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Total No. of Questions : 10]

SEAT No. :

PA-288

[Total No. of Pages : 2

[5927]-172
B.E. (Information Technology)
NATURAL LANGUAGE PROCESSING
(2015 Pattern) (Semester - I) (414456B) (Elective - I)

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

Instructions to the candidates :

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 , Q.7 or Q.8 Q.9 or Q.10.***
2) ***Neat Diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume Suitable Data, if necessary.***

Q1) a) State and explain applications of Natural Language Processing. **[5]**

b) What are augmented grammars? Explain with example. **[5]**

OR

Q2) a) Compare top down chart parser and bottom up chart parser? **[5]**

b) Explain Finite State Models. How it is useful in Natural Language Processing. **[5]**

Q3) a) Write a short note on Feature systems and Augmented Grammars. **[5]**

b) Explain deterministic parser? Give example. **[5]**

OR

Q4) a) Explain auxilary verb and verb phrases with example? **[5]**

b) Explain parsing with respect to noun phrases and relative clauses. **[5]**

P.T.O.

Q5) a) Explain in detail Semantics and Logical Form with respect to ambiguity resolution. **[8]**

b) Explain how part of speech tagging is used to reduce ambiguity. **[8]**

OR

Q6) a) What is ambiguity? What are different techniques used to resolve ambiguity? **[8]**

b) Explain parsing. Explain how Best First Parsing works? **[8]**

Q7) a) Explain Semantic Network with example? Explain different properties of Semantic Networks in detail. **[8]**

b) Describe semantic filtering using sectional restrictions in natural language processing. **[8]**

OR

Q8) a) Explain automatic text clustering & word sense disambiguity in natural language processing? Why word sense disambiguation is challenging problem? **[8]**

b) Explain collection and mutual information using example. **[8]**

Q9) a) What is Semantic Web Search? How does it improve the accuracy of the search. **[9]**

b) Describe with example the method for expectation matching to identify references. **[9]**

OR

Q10)a) How establishing coherence is useful in knowledge representation? **[6]**

b) What is knowledge representation? How to handle natural language quantification? **[6]**

c) Explain sentiment analysis with an example. **[6]**

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Total No. of Questions : 10]

SEAT No. :

PA-289

[Total No. of Pages : 2

[5927]-173
B.E. (I.T.)
USABILITY ENGINEERING
(2015 Pattern) (Semester - I) (414456C) (Elective - I)

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

Instructions to the candidates :

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 , Q.7 or Q.8 Q.9 or Q.10.***
2) ***Neat Diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume Suitable Data if necessary.***

Q1) a) Explain Line oriented and Graphical user interfaces. **[6]**

b) Why we require short cut keys in user interface. **[4]**

OR

Q2) a) Explain user interface parallel designs with diagrams. **[6]**

b) Why feedback is important in Usability Heuristics. **[4]**

Q3) a) How will you measure the usability of Android mobile interface with respect to usability attributes. **[8]**

b) Explain Usability attribute memorability. **[2]**

OR

Q4) a) Explain analysis of financial impact of the usability in user interface. **[6]**

b) Explain the importance of prioritizing usability activities. **[4]**

P.T.O.

Q5) a) What is the role of Experimenter in usability testing. **[9]**

b) Explain Test budget in detail with example. **[9]**

OR

Q6) a) Explain different stages of usability testing with example. **[9]**

b) Explain Focus groups and Test goal and test plan. **[9]**

Q7) a) How multilocale interfaces are more useful to the users. **[8]**

b) Explain internationalization related to user interface. **[8]**

OR

Q8) a) How user benefitted from consistency and standards. **[8]**

b) Explain In-House standard with example. **[8]**

Q9) a) Describe Virtual reality with example. **[8]**

b) How intelligent user interfaces are useful for blind persons. **[8]**

OR

Q10)a) Write a short note on Technology transfer. **[8]**

b) Describe simulation with example. **[8]**

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Total No. of Questions : 10]

SEAT No. :

PA-290

[Total No. of Pages : 2

[5927]-174
B.E. (IT)
MULTICORE AND CONCURRENT SYSTEMS
(2015 Pattern) (Semester - II) (414456D) (Elective - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 , Q.7 or Q.8 Q.9 or Q.10.***
2) ***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 IDS? Explain it with its challenges and limitations. **[5]**

b) Describe the decomposition techniques for achieving concurrency. **[5]**

OR

Q2) a) Explain security architecture with its operation models. **[5]**

b) Write short note on

i) Master worker

ii) Map reduce program **[5]**

Q3) a) Explain fork/Join, loop parallism structure patterns. **[5]**

b) What are the classical problems of synchronization and explain any one in detail. **[5]**

OR

Q4) a) Describe classical problem of synchronization for parallel computing. **[5]**

b) Explain PCAM methodology in detail. **[5]**

P.T.O.

Q5) a) Explain Manual partitioning with and without rule condition. **[8]**

b) Explain task directive with example program used in task parallelism in open MP. **[8]**

OR

Q6) a) Describe any four open MP synchronization. directives used for mutual exclusion. **[8]**

b) Write short note on open MP integration. **[8]**

Q7) a) Write a pseudo code for parallel implementation of merge sort in MPT using collective communication. **[8]**

b) With neat diagram describe one sided communication model. **[8]**

OR

Q8) a) With correct syntax, explain RMA communication functions. **[8]**

b) Explain any two communication models used for MPI. **[8]**

Q9) a) Write a short note on

i) Debugging CUDA program

ii) Proiling CUDA program **[10]**

b) With neat diagram, explain GPU memory hierarchy in detail. **[8]**

OR

Q10)a) Write short note on CUDA's optimization techniques. **[6]**

b) Explain CUDA's program execution model with diagram. **[8]**

c) How we can differentiate CUDA and MPI. **[4]**

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Total No. of Questions : 10]

SEAT No. :

PA-291

[Total No. of Pages : 2

[5927]-175
B.E. (Information Technology)
BUSINESS ANALYTICS AND INTELLIGENCE
(2015 Pattern) (Semester - I) (414456E) (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, Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Describe the role of Business Intelligence in making a business sucessful. **[5]**

b) Explain with diagrammatic representation the main components of Business Intelligence system. **[5]**

OR

Q2) a) Explain how Business Intelligence system is beneficial, by considering the case study of Super Market. **[5]**

b) Enlist the various business intelligence user types and explain their roles in business intelligence process. **[5]**

Q3) a) Explain any two visualization techniques with an application example. **[5]**

b) Compare operational versus information data. State the applications of Decision Support System. **[5]**

OR

Q4) a) Mention three main types of analysis which can be performed using any DSS system. Explain any two analysis with applications. **[5]**

b) Explain role of BI in decision support system. **[5]**

P.T.O.

Q5) a) Explain the phases of BPM cycle. **[8]**

b) Differentiate between dashboard and scoreboards. **[8]**

OR

Q6) a) Explain the purpose of performance measurement system and how organizations need to define key performance indicators? **[8]**

b) Write the benefits of using balance score cards vs using six sigma in a performance measurement system. **[8]**

Q7) a) Explain the role of BI in ERP with an example. **[8]**

b) Explain the different ways BI software can help in improving sales and marketing process. **[8]**

OR

Q8) a) Explain in detail the role of BI in finance sector. **[8]**

b) What are the various domains where BI can help in improving sales and marketing process. **[8]**

Q9) a) Explain different levels of BI Maturity. **[9]**

b) Explain security management in terms of BI infrastructures. **[9]**

OR

Q10) a) Explain big data systems in detail. What is open source and social BI systems? **[9]**

b) Explain BI frame work. Explain security management in terms of BI infrastructures. **[9]**

Total No. of Questions : 10]

SEAT No. :

PA-292

[Total No. of Pages : 2

[5927]-176
B.E. (Information Technology)
SOFTWARE DEFINED NETWORKS
(2015 Pattern) (Semester - I) (Elective - II) (414457A)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***

Q1) a) Draw and explain architecture diagram of a modern data center? **[6]**

b) Explain the need of SDN? **[4]**

OR

Q2) a) Draw & explain Open Flow architecture? **[6]**

b) Discuss advantages and limitations of OpenFlow architecture? **[4]**

Q3) a) What is network virtualization? Explain its benefits. **[6]**

b) List and explain fundamental characteristics of SDN? **[4]**

OR

Q4) a) Write a short note on - VMW are. **[6]**

b) Explain the concept of NaaS? **[4]**

Q5) a) What is open Daylight protocol? **[8]**

b) Explain Flood Light project. **[8]**

OR

Q6) a) Explain various SDN controllers. **[8]**

b) How fire-wall can be implemented by using SDN? **[8]**

P.T.O.

Q7) a) Differentiate between data plane and control plane? **[8]**

b) Explain the concept of programmable. **[8]**

OR

Q8) a) What is the difference between software-based and hardware based networks? **[8]**

b) Explain Northbound API. **[8]**

Q9) a) Elaborate on Southbound API. **[10]**

b) Compare NFV vs. NV. **[8]**

OR

Q10)a) List and explain various network topologies. **[10]**

b) Draw and explain architecture diagram of optical networks. **[8]**

Total No. of Questions : 10]

SEAT No. :

PA-293

[Total No. of Pages : 2

[5927]-177
B.E. (Information Technology)
SOFT COMPUTING
(2015 Pattern) (Semester - I) (Elective - II) (414457B)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain in brief constituents of Soft Computing with. **[5]**

b) What is fuzzy logic? Enlist it's application areas. **[5]**

OR

Q2) a) Explain working of Perceptron model. **[5]**

b) What are various applications of Neural Networks. **[5]**

Q3) a) Explain working of Bayesian Neural Networks with suitable diagram. **[5]**

b) Explain learning methodology in Self Organizing Maps. **[5]**

OR

Q4) Write short notes on following (Any Two) **[10]**

a) ART

b) Boltzmann Machines

c) Multi Layer Feed Forward Network

Q5) a) Explain the working of fuzzy inference system with suitable diagram. **[8]**

b) What are merits and demerits of fuzzy logic? **[4]**

c) Give comparison between traditional algorithm and Genetic Algorithm. **[4]**

OR

P.T.O.

Q6) a) What is Defuzzification? Explain any two methods of it with suitable eg. **[8]**

b) Explain how Genetic Algorithms are different from conventional optimization algorithms. **[8]**

Q7) a) Explain the operation of a simple Genetic Algorithms with suitable diagram. **[8]**

b) Enlist and explain in brief types of Genetic Algorithms. **[8]**

OR

Q8) a) Explain the concept of fuzzy logic controlled Genetic Algorithms with suitable diagram. **[8]**

b) State the importance of Genetic Algorithms. Discuss various advantages and disadvantages of it. **[8]**

Q9) a) Explain the working of Genetic Algorithm based back propagation network with suitable diagram. **[10]**

b) Enlist and explain at least four applications where fuzzy logic is applicable with appropriate justification. **[8]**

OR

Q10) Write short notes on following: (Any Three) **[18]**

a) Mamdani Fuzzy Model

b) Triangular Fuzzy Set

c) Genetic Programming

d) Ant Colony Optimization

e) Neuro Fuzzy Hybrid Systems

♦ ♦ ♦

Total No. of Questions : 10]

SEAT No. :

PA-294

[Total No. of Pages : 2

[5927]-178
B.E. (Information Technology)
SOFTWARE TESTING & QUALITY ASSURANCE
(2015 Pattern) (Semester - I) (Elective - II) (414457C)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Draw neat diagram wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain Testing as a process. **[5]**

b) What is Black Box Testing? **[5]**

OR

Q2) a) Explain difference between Random Testing & Testing using error guessing. **[5]**

b) Explain cause and effect diagram with suitable example. **[5]**

Q3) a) What do you mean by functional and Non-Functional Testing? **[4]**

b) Write short note on Test case Design Techniques. **[6]**

OR

Q4) a) Explain Design & Architecture of Automation. **[4]**

b) What is failure mode effects analysis [FMEA]? **[6]**

Q5) a) Explain planning for quality control in your project. Imagine the project at real time cases. Explain in details. **[8]**

b) State and explain the levels of TMM. **[8]**

OR

Q6) a) In what respect does QC vary from QA. **[8]**

b) Explain the modern quality tools with an example. **[8]**

P.T.O.

Q7) a) Compare and contrast CMM and CMMI. **[8]**

b) Explain the model for process management? What are its uses? **[8]**

OR

Q8) a) Write Note on P-CMM. **[8]**

b) Describe process Assessment with suitable diagram. **[8]**

Q9) a) Describe the levels of PSP? **[8]**

b) Write short note on. **[10]**

i) Object oriented methodologies.

ii) CASE tools

OR

Q10)a) Explain code Review Techniques. **[8]**

b) Write a note on internal Auditing and Assessment. **[10]**

Total No. of Questions : 10]

SEAT No. :

PA-295

[Total No. of Pages : 2

[5927]-179
B.E. (Information Technology)
COMPILER CONSTRUCTION
(2015 Pattern) (Semester - I) (Elective - II) (414457D) (Paper - 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, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn and support your answer with and examples wherever necessary .***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) What do you mean by elimination of left recursion? Why it is essential? **[5]**

b) What do you mean by Lookahead Operator? Explain the scenario wih suitable example. **[5]**

OR

Q2) a) What is the need of symbol table? Explain. **[5]**

b) Explain Error recovery. **[5]**

Q3) a) What are Optimum and Optimal tiling? **[5]**

b) What are immutable variables? Explain. **[5]**

OR

Q4) a) Explain the concept of lazy evaluation. **[5]**

b) What is Coalescing? Explain strategies. **[5]**

Q5) a) How can the machine code deal with different types and sizes of data? **[9]**

b) What do you mean by Static overloading? How it differs from dynamic overloading? **[8]**

OR

P.T.O.

Q6) a) Discuss the strategies used to avoid the need for repeated, global calculations of dataflow information. **[9]**

b) Discuss Interprocedural global optimization mechanism. **[8]**

Q7) a) What are dominators? Explain their applications in Compiler? **[8]**

b) Generate CDG of the figure Q7 (B) and explain the steps of CDG construction. **[9]**

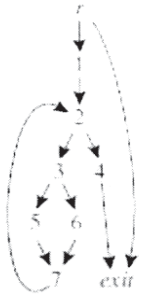


Figure Q7(B)

OR

Q8) a) What is SSA? Why it is useful? Justify its usefulness. **[9]**

b) What is loop unrolling? Discuss the steps of loop unrolling. **[8]**

Q9) a) Explain iterative modulo scheduling algorithm for resource-bounded loop scheduling. **[8]**

b) "Garbage-collector is really a kind of memory manager." Justify this statement. **[8]**

OR

Q10)a) Discuss heuristics in prediction of static branch condition. **[8]**

b) Explain the technique of Blocking with an example. **[8]**

♦ ♦ ♦

Total No. of Questions :10]

SEAT No. : ____

PA-135

[Total No. of Pages : 2

[5927]-18

B.E. (Automobile Engg.)

ENGINEERING ECONOMICS AND FINANCIAL MANAGEMENT

(2015 Pattern) (Semester-II) (416498C) (Elective-IV)

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

Instructions to the candidates:

1) ***Answer Five questions from the following.***
2) ***Neat diagrams must be drawn wherver necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain about wants and their characteristics. **[6]**

b) What are the factors which affects wages? **[4]**

OR

Q2) a) Define the terms: value, price and utility. **[6]**

b) Explain about Insurance and loss assessment. **[4]**

Q3) a) What are the different kinds of taxes? **[2]**

b) Explain the merits and demerits of depreciation. **[8]**

OR

Q4) a) What are the merits of tax? **[2]**

b) What are the causes of depreciation? Explain. **[8]**

Q5) a) What are the objectives of cost accounting? **[6]**

b) A foundry employs 30 persons. It consumes material worth Rs.25,000 pays workers at the rate of Rs. 10 per hour and in curs total overhead Rs. 10,000. In a particular month (25 days) workers had an over time of 150 hours and were paid at double their normal rate. Find the total cost and the man hour rate of overheads Assume 8 hr working day. **[10]**

OR

P.T.O.

Q6) a) Explain the components of cost. **[6]**

b) A factory producing 150 electric bulbs a day, involves direct material cost Rs. 250, direct labour cost Rs. 200 and factory overheads Rs. 225. Assume a profit of 10% of selling price and selling overhead 30% of factory cost, calculate selling price of one electric bulb. **[10]**

Q7) a) Explain the conditions of present worth comparison. **[8]**

b) The cost of the machine is Rs. 6,100 and its scrap value is Rs. 100. The maintenance cost found from experience is as follows. Where the machine should be replaced? **[8]**

Year	1	2	3	4	5	6	7	8
Maintenance cost (Rs)	100	250	400	600	900	1200	1600	2000

OR

Q8) a) Explain the causes and remedies for replacement of a machine. **[8]**

b) A fleet owner finds from his past experience records that cost of machine is Rs. 6000 and the running costs are given below, at what stage the replacement is due? **[8]**

Year	1	2	3	4	5	6	7	8
Maintenance cost (Rs)	1000	1200	1400	1800	2300	2800	3400	4000
Scrap Value	3000	1500	750	375	200	200	200	200

Q9) a) What are the objectives and functions of estimating? **[8]**

b) Explain the cost estimating procedure. **[10]**

OR

Q10) Explain the following. **[18]**

a) Marketable securities

b) Long term liabilities

c) Intangible fixed assets

Total No. of Questions : 10]

SEAT No. :

PA-296

[Total No. of Pages : 2

[5927]-180
B.E. (Information Technology)
GAMIFICATION
(2015 Pattern) (Semester - I) (Elective - II) (414457E)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Define the following terms **[5]**

i) Gaming Context

ii) Replaying History

b) Explain Fun Quotient in Gaming foundation. **[5]**

OR

Q2) a) What are the concepts applied to video games and Gamification? **[5]**

b) What is Gamocracy? Explain in detail. **[5]**

Q3) a) Explain thinking Strategies Used While Engaged in Solving the Tower of Hanoi. **[5]**

b) Explain intrinsic verses Extrinsic Motivation for player motivation. **[5]**

OR

Q4) a) Explain Game Mechanics for opponent moves in Gamification. **[5]**

b) Explain Remodelling design for opponent moves in Gamification. **[5]**

Q5) a) What is the difference between game mechanics and game dynamics? Explain with example. **[9]**

b) Explain any five game mechanics. **[9]**

OR

P.T.O.

Q6) a) Explain 8 queen's problem as a case study for game design in Gamification. **[9]**

b) Explain maze problem as a case study for opponent moves in Gramification. **[9]**

Q7) a) Explain consumer behavior gamification. **[8]**

b) Explain product gamification. **[8]**

OR

Q8) a) Explain coding basic game mechanics for gamification. **[8]**

b) Explain how the development of gamification have been influenced by cloud computing. **[8]**

Q9) a) Explain useful features of mambo. How mambo platform can be used for e-learning activity? **[8]**

b) How App Gamification Boosts Engagement in gamification. **[8]**

OR

Q10)a) Explain application of gamification in business. **[8]**

b) List and explain the features of any gamification server. **[8]**

♦ ♦ ♦

Total No. of Questions : 10]

SEAT No. :

PA-297

[Total No. of Pages : 3

[5927]-181
B.E. (Information Technology)
DISTRIBUTED COMPUTING SYSTEM
(2015 Pattern) (Semester - II) (414462)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***

Q1) a) Describe the Architectural Models of Distributed System with Diagram. **[6]**

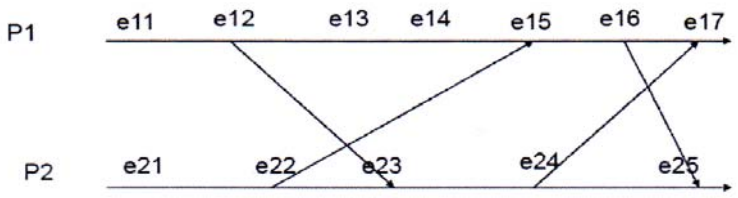
b) Identify the different Advantages and Disadvantages of Distributed System. **[4]**

OR

Q2) a) Discuss RMI implementation and its significance in distributed systems. **[6]**

b) Differentiate between the working primitives MPIbsend and MPIisend in MPI. **[4]**

Q3) a) Compute Lamport's clocks logical event ordering for the following scenario : **[6]**



b) Explain in details centralized mutual exclusion with example. **[4]**

OR

P.T.O.

Q4) a) In a distributed system there are five live processes having process Ids 501, 503, 504, 506 and 510. Sketch the coordinator election process showing messages exchanged by the processes using bully algorithm if process 504 starts election process. **[6]**

b) Identify and explain Resource sharing and challenges in distributed systems. **[4]**

Q5) a) Discuss following terms with respect to naming entities **[8]**

i) Names

ii) Identifiers

iii) Addresses

iv) Name Spaces

b) Classify the following concept with respect to distributed multimedia system. **[8]**

i) Resource management

ii) Stream adaption

OR

Q6) a) List the different distributed file system requirement. Explain the abstract file service architectural model with neat diagram. **[8]**

b) Discuss HDFS? Describe Hadoop architecture. **[8]**

Q7) a) Give the disadvantage of using Hierarchical caches for a Web proxy. How can it be overcome through cooperative caching? **[10]**

b) Discuss the structure of Request and Response messages of HTTP for communication between a client and server. **[8]**

OR

Q8) a) What are the components of web services? Explain the need and use of web services with suitable example. **[10]**

b) Discuss the SSL with respect to following : **[8]**

i) Record protocol layer

ii) Handshake layers

Q9) a) Elaborate on the various security mechanisms in Distributed Systems. **[8]**

b) Describe the Authentication process to log into a distributed system which uses Kerberos to set up a secure channel. **[8]**

OR

Q10) a) Discuss process architecture of KERBEROS with security object namely tickets, authentication and session key. **[8]**

b) Explain what do you mean by public key Cryptography? Explain Digital signatures with public keys. **[8]**

□□□

Total No. of Questions :10]

SEAT No. :

PA-298

[Total No. of Pages :2

[5927]-182
B.E. (Information Technology)
UBIQUITOUS COMPUTING
(2015 Pattern) (Semester-II) (414463)

Time : 2 ½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right side indicate full marks.*
4) *Assume suitable data, if necessary.*

Q1) a) Explain Ubiquitous system Environment Interaction? **[5]**

b) Outline five core properties that characterize UbiCom System? **[5]**

OR

Q2) a) Explain the UbiCom System Model and SMART DEI Model? **[5]**

b) Explain three Main Types of Environment Context? **[5]**

Q3) a) Write a short note on MEMS? **[5]**

b) Explain the properties of Ubiquitous Computing? **[5]**

OR

Q4) a) Write a short note on Virtual Machines? **[5]**

b) Explain RFID tags and Its Types? **[5]**

Q5) a) List out all handling limited key input and explain it in detail? **[8]**

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

i) Organic Interface and

ii) Tangible Interface

OR

Q6) a) Explain **[8]**

i) Virtual and Augmented reality

ii) Wearable Computer Interaction

b) Explain human entered design lifecycle in detail with diagram? **[8]**

P.T.O.

Q7) a) Explain solov's taxonomy of privacy with diagram? **[8]**

b) Describe privacy difficulties of RFID tags? **[8]**

OR

Q8) a) What are the defferent ways of addressing privacy in ubiquitous computing? **[8]**

b) What is Communication Confidentiality and Anti-Collision Protocol? **[8]**

Q9) a) Describe wireless data network with its types? **[6]**

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

i) Personal Area Network

ii) Body Area Network

c) Write a note on Context-based Network? **[4]**

OR

Q10)a) Explain Configuration and Security Management in UbiComp? **[6]**

b) Write short note on : **[12]**

i) WLAN and WiMAX

ii) Bluetooth

iii) ZigBee

Total No. of Questions :10]

SEAT No. :

PA-299

[Total No. of Pages :2

[5927]-183
B.E. (Information Technology)
INTERNET OF THINGS
(2015 Pattern) (Semester-II)(Elective-III) (414464A)

Time : 2 ½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) List various IOT applications and describe in short. **[5]**

b) Which different Sensors are used in a Smart Phone? Explain their use. **[5]**

OR

Q2) a) What is Internet of Things? Explain ITU-T Views in detail. **[5]**

b) List various IOT levels. Explain level 5 used when data size is big in WSN? **[5]**

Q3) a) Justify hierarchy of edge, fog and cloud. **[5]**

b) Which components are involved in Smart Object? Explain smart object in detail. **[5]**

OR

Q4) a) Explain Software Defined Network (SDN) with its diagram. **[5]**

b) Explain the functionalities of Edge Computing Layer of Io TWF Standardized Architecture. **[5]**

Q5) a) Which are the different issues occurred while using IPv4? How these issues will overcome? **[8]**

b) Explain IPv6 Tunneling in details. **[8]**

OR

Q6) a) What is IPsec in IPv6? Explain 2 modes in detail. **[8]**

b) Draw and explain IPv6 Packet and IPv6 Extension Header. **[8]**

P.T.O.

Q7) a) Write a python code for measuring environmental parameters with the help of interfacing diagram. **[8]**

b) What is an IoT Device? Explain using block diagram. **[8]**

OR

Q8) a) Write a python code for traffic signal light controlling with the help of interfacing diagram. **[8]**

b) What are the different IoT Devices other than Rapsberry Pi? List various OS used on Raspberry Pi. **[8]**

Q9) a) What is WAMP - AutoBahn for IoT? Explain sub-protocols of web socket with its components in detail. **[10]**

b) How different amazon web services can be used for IoT? Explain any three. **[8]**

OR

Q10)a) Explain Python Web Application Framework in detail. What is M-T-V Architecture? **[10]**

b) How smart city application can be divided in various small IoT application? Explain them shortly. **[08]**

Total No. of Questions :10]

SEAT No. :

PA-300

[Total No. of Pages :2

[5927]-184
B.E. (Information Technology)
INFORMATION STORAGE AND RETRIEVAL
(2015 Pattern) (Semester-II) (Elective-III) (414464B)

Time : 2 ½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) You are developing a text processing system for use in an automatic retrieval System. **[5]**

Explain the following parts:

Removal of high frequency words.

Suffix stripping.

Detecting equivalent stems

b) Differentiate between data retrieval and information retrieval. **[5]**

OR

Q2) a) Draw and explain IR system block diagram. **[5]**

b) Explain Single Link algorithm with example. **[5]**

Q3) a) Explain Single pass algorithm with example. **[5]**

b) Explain Luhn's idea in details. **[5]**

OR

Q4) a) Define and explain following terms - Precision & Recall. **[5]**

b) Define and explain following terms - **[5]**

i) MRR

ii) NDCG

P.T.O.

Q5) a) Describe the query processing in Distributed IR. **[8]**

b) Explain data models used for Multimedia IR. **[8]**

OR

Q6) a) Explain the Generic multimedia indexing approach. **[8]**

b) What do you mean by Collection Partitioning & Source Selection in Distributed IR? **[8]**

Q7) a) Discuss Challenges involved in web Searching? **[8]**

b) Write a note on Characterizing the Web. **[8]**

OR

Q8) a) Explain page ranking algorithms. **[8]**

b) What is Web crawling? Explain the techniques used by Web crawlers to crawl the web. **[8]**

Q9) a) Define Recommender system? Explain in brief Collaborative Filtering **[9]**

b) Explain semantic web in details. **[9]**

OR

Q10)a) Explain the method of Extracting Data from Text. **[9]**

b) Explain in detail Content Based Recommendation of Documents. **[9]**

Total No. of Questions :10]

SEAT No. :

PA-301

[Total No. of Pages :2

[5927]-185
B.E. (Information Technology)
MULTIMEDIA TECHNIQUES
(2015 Pattern) (Semester-II) (Elective-III) (414464C)

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, Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Explain Multimedia Applications in Entertainment Media. **[5]**

b) What are an objectives and characteristics of multimedia? **[5]**

OR

Q2) a) Explain any two image File formats. **[5]**

b) Explain any two Text Compressions. **[5]**

Q3) a) What is MIDI? Explain MIDI with example. **[5]**

b) Explain Fractal Compression Technique with example. **[5]**

OR

Q4) a) Explain any two Audio file formats. **[5]**

b) Explain any two Video file formats. **[5]**

Q5) a) Explain principles of animation. **[8]**

b) Explain real-time animation techniques. **[8]**

OR

Q6) a) Explain any three Virtual Reality devices. **[8]**

b) Explain any three Programming aspects in creating simple animation. **[8]**

P.T.O.

Q7) a) Explain Basics of illumination and shading models in detail. **[8]**

b) Explain Shadows and textures with example. **[8]**

OR

Q8) a) Explain beam and pencil tracing with example. **[8]**

b) Explain Spatial partitioning and Solid Modeling in detail. **[8]**

Q9) a) Explain Multimedia over IP in detail. **[9]**

b) Explain Android Multimedia Framework Architecture in detail. **[9]**

OR

Q10)a) Explain High-Definition Displays and Augmented Reality with example. **[9]**

b) Explain Mobile Gaming and Cloud Gaming with example. **[9]**

Total No. of Questions :10]

SEAT No. : ____

PA-302

[Total No. of Pages : 2

[5927]-186

B.E. (Information Technology)

INTERNET AND WEB PROGRAMMING

(2015 Pattern) (Semester-II) (414464D) (Elective-III)

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

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) What do you mean by meta tags? Explain the use of meta tag with example. **[6]**

b) What are types of CSS? Explain with example. **[4]**

OR

Q2) a) Differentiate between HTML and XML. **[6]**

b) Explain working of AJAX with diagram. **[4]**

Q3) a) What is Angular JS? What are the features of Angular JS? **[6]**

b) What are different selectors in JQuery? Explain them. **[4]**

OR

Q4) a) Describe following functions used in PHP with example. **[6]**

i) Strlen ()

ii) Strpos (),

iii) Strcmp ()

b) What is the difference between Java Script and JQuery? **[4]**

Q5) a) What is Bootstrap. Explain the significance of Bootstrap in web technology. Give an example. **[8]**

b) What is Joomla. Explain in detail Joomla Control Panel. **[8]**

OR

P.T.O.

Q6) a) What is Java Server Faces (JSF) Technology. Explain steps to create a simple JSF Application. **[8]**

b) Explain with diagram the architecture of Spring framework. **[8]**

Q7) a) What is JQuery Mobile? How to implement jQuery mobile. **[8]**

b) Explain how to write headers and footers in jQuery Mobile. **[8]**

OR

Q8) a) List and Explain different types of Mobile devices. **[8]**

b) What is Mobile Web? What are standards of Mobile web? How do I access mobile? **[8]**

Q9) a) Differentiate user level security with server level security. **[6]**

b) What is CIA traid. What security services are included in CIA triad? **[6]**

c) What are the cyber ethics? Explain issues in cyber ethics. **[6]**

OR

Q10)a) Explain helper applications in browser. Give the steps of configuring helper application for Netscape. **[6]**

b) Write a short note on breach of web security? **[6]**

c) What is SQL Injection. How to mitigate the SQL Injection risks? **[6]**

Total No. of Questions :10]

SEAT No. : ____

PA-303

[Total No. of Pages : 4

[5927]-187
B.E. (Information Technology)
COMPUTATIONAL OPTIMIZATION
(2015 Pattern) (Semester-II) (414464E) (Elective-III)

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

Instructions to the candidates:

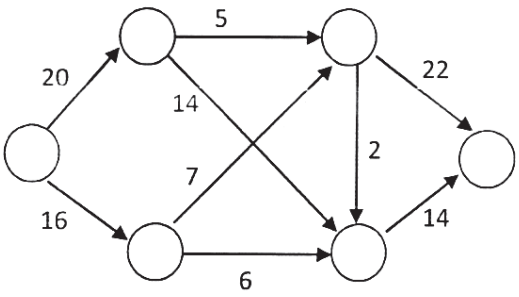
1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 Q.7 or Q.8, Q.9 or Q.10.***
2) ***Assume Suitable Data, if necessary.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right side indicate full marks.***

Q1) a) A firm produces three products. These products are processed on three different machines. The time to manufacture one unit of each of the products and daily capacity of the three machines is given in the table below. **[5]**

Machine	Time per unit (minutes)			Machine capacity
	Product 1	Product 2	Product 3	(Minutes/day)
M1	1	2	3	300
M2	4	–	5	400
M3	2	3	–	450

It is required to determine the daily number of units to be manufactured for each product. The Profit per unit for each product 1,2 and 3 is Rs. 5, Rs. 2 and Rs.4 respectively. It is assumed the all amounts produced are consumed in the market. Formulate the L.P. model for the problem

b) Determine the Max Flow using the Ford Fulkerson's Algorithm. **[5]**



OR

P.T.O.

Q2) a) Define EOQ. Derive EOQ Formula when Demand Rate is Uniform and Replenishment rate is finite. **[5]**

b) The utility data for a network are given below. Determine the total float and identify the critical path. **[5]**

Activity :	1-2	1-4	1-7	2-3	3-6	4-5	4-8	5-6	6-9	7-8	8-9	9-10
Duration :	8	5	4	4	6	3	3	2	2	5	2	6

Q3) a) Solve using Graphical Method **[5]**

Minimize $Z = 3X_1 + 4X_2$ subject to the constraints

$3X_1 + 5X_2 >= 30$,

$2X_1 + 2X_2 >= 20$ and $X_1, X_2 \geq 0$

b) Explain types of Inventories. **[5]**

OR

Q4) a) Obtain initial basic feasible solution for following transportation problem by North-west corner method **[5]**

	D1	D2	D3	D4	Supply
S1	70	20	40	8	17
S2	50	10	19	30	19
S3	40	60	70	30	28
Demand	17	14	15	18	Total=64

b) Tasks A to I constitute a project. The precedence relationships are: **[5]**

A < D ; A < E ; B < F ; D < F ; C < G ; C < H ; F < I ; G < I.

Draw a network to represent the project and find the minimum time to complete the project when time, in days, of each task is as follows:

Task :	A	B	C	D	E	F	G	H	I
Time :	16	8	18	14	9	8	10	17	10

Also identify the critical Path

Q5) a) Explain Theory of Games? Discuss in detail terminologies used in game theory. **[8]**

b) Determine the saddle point and optimum strategies for each player. **[4]**

i)

		Player B		
		B1	B2	B3
Player A	A1	4	6	4
	A2	2	10	0

ii) **[4]**

		Player B	
		B1	B2
Player A	A1	-2	-4
	A2	6	-7
	A3	-4	3

OR

Q6) a) Determine Value of Game. Also indicate that they are fair or strictly determinable. **[8]**

	B1	B2	B3	B4	B5
A1	10	4	2	9	1
A2	7	6	5	7	8
A3	3	5	4	4	9
A4	6	7	3	2	3
A5	5	7	9	3	6

b) Solve the following game by principle of dominance method. **[8]**

	B1	B2	B3	B4
A1	20	15	12	35
A2	25	14	8	10
A3	40	2	19	5
A4	5	4	11	0

Q7) a) A person repairing radios finds that the time spent on the radio sets has exponential distribution with mean 30 minutes. If the radios are repaired in the order in which they come in and their arrival is approximately Poisson with an average rate of 24 for 8 - hour day, what is the repairman's expected idle time each day? How many jobs are ahead of the average set just brought in? **[8]**

b) A saree Emporium has a single cashier. During the rush hours, customers arrive at the rate of 10 per hour. The average number of customers that can be processed by the cashier is 15 per hour. On the basis of this information, find the following: **[10]**

i) Probability that the cashier is idle

ii) Average number of customers in the queuing system

iii) Average time a customer spends in the system

iv) Average number of customers in the queue

v) Average time a customer spends in the queue

OR

Q8) a) Discuss in detail 5 basic elements of waiting line situation. **[8]**

b) In a bank, 40 customers on the average are served by a cashier in an hour. If the service time has exponential distribution, what is the probability that **[10]**

i) It will take more than 4 minutes to serve a customer?

ii) A customer shall be free within 3 minutes?

Q9) a) Draw and explain the flow chart for search algorithm. Explain direct and indirect search algorithm in short. **[8]**

b) Describe Ant colony optimization. Furthermore, describe the effect of colony size in ACO. **[8]**

OR

Q10)a) Write short note on Gradient Descent Procedure of Machine Learning Optimization. **[8]**

b) Explain the concept of evolutionary algorithms for optimization and search. **[8]**

Total No. of Questions : 10]

SEAT No. :

PA-304

[Total No. of Pages : 2

[5927]-188
B.E. (Information Technology)
RURAL TECHNOLOGIES AND COMMUNITY DEVELOPMENT (Elective - IV)
(2015 Pattern) (Semester - II) (414465A)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data, if necessary.***

Q1) a) What is Sustainable Development? Explain with an example. **[6]**

b) What are the different basic elements of Rural development? **[4]**

OR

Q2) a) Explain the rural development model based on Gandhism. **[6]**

b) What are the main sources of human capital? **[4]**

Q3) a) What is a different paradigm used for rural development? **[6]**

b) Briefly explain the modernization theory. **[4]**

OR

Q4) a) How do we measure the quality of water? **[6]**

b) How can groundwater be extracted? **[4]**

Q5) a) What are the various ways in which the knowledge base of Community development can be enhanced? **[8]**

b) What are the community development issues? **[8]**

OR

P.T.O.

Q6) a) Write a note on International community development? **[8]**

b) How will you motivate people to participate in community development. **[8]**

Q7) a) How to Create a Product Development Process? **[9]**

b) What are the major problems faced by Rural Industries? **[9]**

OR

Q8) a) What are the Remedial measures to solve the problems faced by rural entrepreneurs? **[9]**

b) For rural entrepreneurship what financial resources are available? **[9]**

Q9) a) What is the role of ICT in rural development and agriculture? **[8]**

b) What is the role of women's self-help group in development? **[8]**

OR

Q10) a) What major Modern techniques will you introduce to make your village clean and green? **[8]**

b) What is watershed management? Objectives of watershed management. **[8]**

Total No. of Questions : 10]

SEAT No. :

PA-305

[Total No. of Pages : 2

[5927]-189
B.E. (Information Technology)
PARALLEL COMPUTING (Elective - IV)
(2015 Pattern) (Semester - II) (414465B)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain different Parallel Computer Models? **[5]**

b) Explain Message Passing Paradigm with an example? **[5]**

OR

Q2) a) Differentiate between a multi-processor system and multi core system. **[6]**

b) Explain shared and Switched media. **[4]**

Q3) a) What is sequential consistency in distributed systems? **[4]**

b) Discuss various Synchronization Issues in Parallel Programming? **[6]**

OR

Q4) a) Explain various techniques for Parallelizing Programs? **[6]**

b) Write short notes on “Cache Coherence issues”. **[4]**

Q5) a) Discuss two OpenMP directives with their constructs. **[8]**

b) Explain Task parallelism with OpenMP. **[8]**

OR

P.T.O.

Q6) a) Explain OpenMP integration - Manual partitioning without RACE condition. **[8]**

b) Explain OpenMP Execution model with example. **[8]**

Q7) a) Discuss three MPI collective operations. **[9]**

b) Explain the concept of data marshalling in MPI? **[7]**

OR

Q8) a) Explain non-blocking communication in MPI. **[8]**

b) Explain MPI Programming Model with neat diagram? **[8]**

Q9) a) Write short note on "CUDA Threads and Memories". **[10]**

b) Explain any one application of GPU Computing. **[8]**

OR

Q10) a) Write a short note on CUDA Programming Model. **[6]**

b) Explain GPU architecture with neat diagram? **[12]**

Total No. of Questions : 10]

SEAT No. :

PA-136

[Total No. of Pages : 2

[5927]-19
B.E. (Chemical)
PROCESS DYNAMICS & CONTROL
(2015 Pattern) (Semester - I) (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 , Q.7 or Q.8 Q.9 or Q.10.***
2) ***Figures to the right indicated full marks.***
3) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
4) ***Assume suitable data if necessary.***

Q1) A thermometer showing steady state temperature of 20°C is suddenly immersed into a hot bath at 100° C. If the time constant of thermometer is 5 sec, determine the following: **[10]**

i) Thermometer reading after 5 Sec.

ii) Time required reading 80° C on thermometer.

iii) Time required for 80% response.

OR

Q2) a) Develop a transfer function for stirred tank reactor. **[5]**

b) Discuss briefly the objectives of chemical process control. **[5]**

Q3) A first order process with following transfer function is controlled by PI controller. Assuming servo problem and neglecting the dynamics of final control element and measuring instrument i.e $G_f(s) = G_m(s) = 1$; The open loop process is

$$G_p(s) = \frac{1}{s+1}$$ **[10]**

Determine the following

i) Closed loop transfer function

ii) Order of system

iii) Closed loop gain and time constant

OR

P.T.O.

Q4) Sketch the root locus for the following transfer function **[10]**

$$G(s) = \frac{K}{(s+1)(s+2)(s+3)}$$

Q5) a) Sketch the Bode diagram for PD controller. **[8]**

b) Explain Ziegler Nicholes Tuning technique. **[8]**

OR

Q6) a) A unity feedback control system has **[10]**

$$G(s) = \frac{80}{s(s+2)(s+20)}$$

Draw the Bode plot, Determine G.M. & P.M. comment on the stability.

b) Explain Nyquist stability criteria. **[6]**

Q7) a) Explain ratio control system. **[8]**

b) Explain cascade control system for CSTR. **[10]**

OR

Q8) a) Explain split range control system. **[10]**

b) Explain Override control to protect a steam boiler system for steam rate control with a neat process diagram. **[8]**

Q9) a) Draw an instrumentation diagram and discuss all the detail and working of Heat Exchanger control. **[8]**

b) Explain plant wide control for plants with any suitable example. **[8]**

OR

Q10) Explain with Objectives, Functions, Role in process control, Applications

i) PLC and SCADA.

ii) DCS.

iii) Role of digital computers in controller.

iv) Supervisory control. **[16]**

◆ ◆ ◆

Total No. of Questions : 10]

SEAT No. :

PA-306

[Total No. of Pages : 2

[5927]-190
B.E. (Information Technology)
COMPUTER VISION (Elective - IV)
(2015 Pattern) (Semester - II) (414465 C)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Draw neat diagrams and assume suitable data wherever necessary.***
3) ***Figures to the right indicate full marks.***

Q1) a) What is Computer Vision? Give real-world applications. **[6]**

b) Explain some basic approaches to texture analysis. **[4]**

OR

Q2) a) What is the difference between erosion and dilation? **[6]**

b) Explain Corner Orientation in detail. **[4]**

Q3) a) What is Labelling in object detection? **[6]**

b) Write application of Skeletons for Shape Recognition. **[4]**

OR

Q4) a) How do you use a Hough transform to identify a line? **[6]**

b) Write basic RANSAC algorithm for finding the line with greatest support. **[4]**

Q5) a) Explain projection schemes for Three-Dimensional vision. **[10]**

b) Explain in detail the concept of Photometric Stereo. **[8]**

OR

P.T.O.

Q6) a) Write a note on Shape from texture. **[10]**

b) Explain in detail 3D object recognition. **[8]**

Q7) a) Define and explain motion detection? Write applications of Motion Detection and Tracking. **[8]**

b) Explain Mixture of Gaussians (MoG) in detail. **[8]**

OR

Q8) a) Explain Background Subtraction (BGS). Write a note on basic BGS Algorithms. **[8]**

b) Write a note on block matching and object tracking. **[8]**

Q9) a) Explain Single object and multi-object tracking. **[8]**

b) Explain face recognition in detail. **[8]**

OR

Q10) a) Explain in detail Chamfer matching and occlusion. **[8]**

b) Explain in detail how multiple cameras are used to obtain coverage over wide areas? **[8]**

Total No. of Questions : 10]

SEAT No. :

PA-307

[Total No. of Pages : 2

[5927]-191
B.E. (Information Technology)
SOCIAL MEDIA ANALYTICS
(2015 Pattern) (Elective - IV) (Semester - II) (414465D)

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

Instructions to the candidates :

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of calculator is-allowed.***
5) ***Assume Suitable data if necessary.***

Q1) a) What are the Social Media Data Sources? Explain any two in detail. **[5]**

b) How to differentiate Public and Private Social Media Data? **[5]**

OR

Q2) a) Explain Taxonomy of Visualization in Social Networks. **[5]**

b) Explain any two Data Mining methods for Social Media. **[5]**

Q3) a) Explain K-means Clustering with example. **[5]**

b) Explain Interaction and Analytics in Visualizing Social Networks. **[5]**

OR

Q4) a) Explain any-two tools for Text Mining. **[5]**

b) Explain Sampling of Online Social Networks. **[5]**

Q5) a) What is Centrality? Explain Types of Centrality. **[8]**

b) Explain Structural Equivalence and Regular Equivalence with example. **[8]**

OR

P.T.O.

Q6) a) What is Similarity? Explain network and content Similarity. **[8]**

b) Explain Transitivity and Reciprocity with example. **[8]**

Q7) a) What is Individual Behavior? Explain individual online behavior three categories.. **[8]**

b) What is User Migration in Social Media? Explain types of Migration. **[8]**

OR

Q8) a) What is Individual Behavior Modeling? Explain Threshold models and Cascade Models. **[8]**

b) Explain in short (i) user activity on one site, (ii) user network size, and (iii) user rank. **[8]**

Q9) a) Explain an Analyzing the 140 Characters in Twitter. **[9]**

b) Explain Analyzing Facebook Pages. **[9]**

OR

Q10) a) Explain Visualizing Frequency Data with Histograms in Twitter. **[9]**

b) Explain Analyzing mutual friendships with directed graphs in Facebook. **[9]**

Total No. of Questions : 10]

SEAT No. : ____

PA-308

[Total No. of Pages : 2

[5927]-192

B.E. (Instrumentation and Control Engg.)
PROCESS DYNAMICS AND CONTROL
(2015 Pattern) (Semester - I) (406261)

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

Instructions to the candidates:

1) ***Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Figures to the right indicates full marks.***

Q1) a) What are the incentives of Process Control Instrumentation? **[6]**

b) Discuss on Pole-Zero effect on process response. **[4]**

OR

Q2) Derive an approximate first-order-plus-dead time model of the higher order model as below **[10]**

$$G(S) = \frac{6(1-3s)}{(18s+1)(6s+1)(0.9s+1)}$$

Q3) a) Discuss on performance measures of feedback control loop. **[5]**

b) Explicate importance of control loop analysis in process control with suitable example. **[5]**

OR

Q4) Write short note on any two of the following **[10]**

a) Practical issues in feedback control loop.

b) Multi-capacity processes.

c) Dead time processes.

P.T.O.

Q5) a) Discuss on Feed forward-plus-Feedback control with suitable examples. **[8]**

b) Explain ratio control system with suitable examples. **[8]**

OR

Q6) Illustrate any two following control systems with suitable examples **[16]**

a) Auctioneering control system.

b) Split range control system.

c) Selective control system.

Q7) Design decentralized control for Distillation column given by transfer function matrix **[16]**

$$G(s)=\begin{bmatrix} \dfrac{12.8e^{-s}}{16.7s+1} & \dfrac{-18.9e^{-3s}}{21s+1} \\ \dfrac{6.6e^{-7s}}{10.9s+1} & \dfrac{-19.4e^{-3s}}{14.4s+1} \end{bmatrix}$$

OR

Q8) Discuss on design of decentralized control system for two input two output process with **[16]**

a) Relative gain array (RGA)

b) Decoupler design.

c) Controller design using modified transfer functions.

Q9) List different methods for determination of PID Controller settings. Determine PID structure and its settings for FOPDT model using direct synthesis method. **[18]**

OR

Q10) a) Explain Smith predictor technique for compensation of delay time of processes. **[9]**

b) With neat block diagram, discuss on model predictive controller and give its advantages. **[9]**

Total No. of Questions : 10]

SEAT No. :

PA-309

[Total No. of Pages : 2

[5927]-193
B.E. (Instrumentation & Control)
PROJECT ENGINEERING & MANAGEMENT
(2015 Pattern) (Semester - I) (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, Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume Suitable data if necessary.***

Q1) a) Discuss the life cycle of project. **[5]**

b) Define the scope, team building, controlling, directing for project management. **[5]**

OR

Q2) a) What is project? What are the types of projects. **[5]**

b) Discuss SOW, WBS and Milestone scheduling with respect to small automation project. **[5]**

Q3) a) For a research project, which network will you prefer (GERT, PERT, CPM)? Why? **[5]**

b) Discuss Vendor Pre Qualification Evaluation process. **[5]**

OR

Q4) a) What are types of tenders? Discuss in detail. **[5]**

b) What is bidding? Discuss the factors considered for bid evaluation. **[5]**

Q5) a) Discuss importance of PFD. What is material balance sheet? Discuss the contents of material balance sheet. **[8]**

b) Draw a P & I diagram of heat exchanger. **[8]**

1. Consider steam temperature and pressure control
2. Feed flow control

P.T.O.

OR

Q6) a) What are Instrument specification sheets? Write its significance. Which ISA standard is used to prepare it? **[8]**

b) What are the FEED documents? Discuss in detail Plant and piping layouts n. **[8]**

Q7) a) Discuss the hookup diagram with example. **[8]**

b) What are the various types of cables? Discuss the selection criteria for cable. **[8]**

OR

Q8) a) Write the significance of any 4 ISA standards : ISA S-5.1, 5.2, 5.3, 5.4, 5.5 and S-20. **[8]**

b) What is BOM and MBOM? Write the differences. **[8]**

Q9) a) Write the Panel testing Procedure and its required documentation. **[9]**

b) What are the various activities performed during Installation and commissioning? Mansion the documents required during these activities. **[9]**

OR

Q10)a) What are the SAT, FAT and CAT? Write the sample FAT for control panel. **[9]**

b) Discuss cold and hot commissioning? What are documents required during it. **[9]**

Total No. of Questions : 10]

SEAT No. : ____

PA-310

[Total No. of Pages : 2

[5927]-194

B.E. (Instrumentation & Control)

COMPUTER TECHNIQUES & APPLICATIONS

(2015 Pattern) (Semester-I) (406263)

Time : 2 ½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 Or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of Calculators is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) a) Assume you have the following processes to execute with one processor, arriving in the order listed below. **[5]**

Process	Arrival time	Burst time
P_1	0	7
P_2	2	4
P_3	4	1
P_4	5	4

Draw a Gantt chart illustrating the execution of the processes using FCFS scheduling. What is the average waiting time & average turnaround time?

b) Explain the difference between logical & physical addresses. **[5]**

OR

Q2) a) With neat diagram explain overlays. **[5]**

b) Explain the methods of Deadlock prevention. **[5]**

Q3) a) Explain any two directory structures in file management system. **[5]**

b) Explain the following with respect to networks **[5]**

i) WAN

ii) Tree Topology.

OR

Q4) a) Write a note on. Demand paging. **[5]**

b) List the configuration details of GPIB & its advantages. **[5]**

P.T.O.

Q5) a) Explain different types of real time operating systems in detail. **[6]**

b) State the advantages & disadvantages of data parallelism. **[6]**

c) Differentiate lossless & lossy data compression. **[6]**

OR

Q6) a) Explain the interrupts in real time operating systems. **[6]**

b) Explain the concept of intertask dependency in parallel computers. **[6]**

c) Design a Huffman code for a source that puts out symbols 9_1, 9_2, 9_3 & 9_4 with their respective probabilities of occurance as 0.1, 0.3, 0.2 & 0.4. **[6]**

Q7) a) What is software debugging? Explain any two debugging techniques. **[8]**

b) Write a short on Software Maintenance. **[8]**

OR

Q8) a) Explain white box & black box testing. Discuss advantages & disadvantages of each. **[8]**

b) What is validation testing? Explain in detail. **[8]**

Q9) a) Explain which are processes req. in software development life cycle. **[8]**

b) Explain linear sequential model in detail. **[8]**

OR

Q10)a) Explain the steps in software design. **[8]**

b) Explain the incremental model in software development life cycle. **[8]**

Total No. of Questions : 10]

SEAT No. :

PA-311

[Total No. of Pages : 2

[5927]-195

B.E. (Instrumentation & Control)

INDUSTRIAL INTERNET OF THINGS

(2015 Pattern) (Semester - I) (Elective - I) (406264A)

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

Instructions to the candidates :

1) ***All questions are compulsory.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks***
4) ***Use of electronic Pocket calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) Explain IOT level 1 with example. **[5]**

b) Discuss the challenges in IIOT. **[5]**

OR

Q2) a) What do you mean by GPIO? State advantages of it. **[5]**

b) Explain Class B addressing in IP Protocol, **[5]**

Q3) a) Explain IOT level 3 with example. **[5]**

b) Explain Media Access Control Layer **[5]**

OR

Q4) Explain M2M architecture in detail. **[10]**

Q5) a) Explain FOG computing in brief. **[8]**

b) Explain roll of software agent. **[8]**

OR

Q6) a) Explain user centric identity management. **[8]**

b) Explain federated identity management. **[8]**

P.T.O.

Q7) a) Explain work capability based access control system. **[8]**

b) Why Security Management is necessary in IOT? Explain. **[8]**

OR

Q8) a) Explain FP7 icore access framework. **[8]**

b) Explain Vulnerabilities of IOT. **[8]**

Q9) a) How IOT can be employed to maintain infrastructure of any industry? **[9]**

b) In a residential complex, it is required to implement the IOT system for Fire security. Suggest a IOT architecture, platform required with neat diagram. **[9]**

OR

Q10)a) Explain big data and visualization in IOT. **[9]**

b) Explain IOT in building management system. **[9]**

Total No. of Questions : 12]

SEAT No. : ____

PA-312

[Total No. of Pages : 2

[5927]-196
B.E. (Instru. & Control)
ELECTRICAL DRIVES
(2015 Pattern) (Semester - I) (Elective - I) (406264B)

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

Instructions to the candidates :

1) ***All questions are compulsory.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks***
4) ***Use of electronic Pocket calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) Explain AC drive with block diagram. **[5]**

b) Explain the working of ward leonard method of speed control. **[5]**

OR

Q2) a) Discuss the functions of different parts of drive. **[5]**

b) Write a short note on need of drive in textile mill application. **[5]**

Q3) a) Explain with diagram the Load-quadratal diagram of drive **[5]**

b) Explain the working of half wave controlled rectifier with diagram. **[5]**

OR

Q4) Explain all the five types of choppers with waveforms. **[10]**

Q5) Explain with block diagram the speed setpoint processing in 6RA70 drive. **[9]**

OR

Q6) Explain the steps for quick commissioning of 6RA70 drive. **[9]**

P.T.O.

Q7) Write short note on :

a) Speed control methods for DC motor (Any 2) **[4]**

b) Speed and torque characteristics of DC motor **[4]**

OR

Q8) List the parameters which required for selecting a drive for any particular application. **[8]**

Q9) a) Explain the construction and working of a VFD. Also list 5 manufacturers of VFD. Give at least one example of VFD. **[10]**

b) Write short note on speed and torque characteristics of induction motor. **[7]**

OR

Q10)a) Explain the procedure for interfacing a VFD to a induction motor. **[10]**

b) Explain the concept of servo drive. **[7]**

Q11)a) Explain the working of traction drive. **[8]**

b) Write short note on :

i) Kando system **[4]**

ii) Speed time curve for train movement. **[4]**

OR

Q12)a) Write short note on : **[8]**

i) Solar powered drives

ii) Battery operated drives

b) Differentiate between AC and DC traction systems. **[8]**

Total No. of Questions : 10]

SEAT No. : [ ]

PA-313

[Total No. of Pages : 2

[5927]-197

B.E. (Instrumentation & Control) (Semester - I)

ADVANCED DIGITAL SIGNAL PROCESSING

(2015 Pattern) (Elective - I) (406264C)

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

Instructions to the candidates :

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams should be drawn wherever necessary.***
3) ***Use of Non- programmable Calculator is allowed.***
4) ***Assume suitable data if necessary.***

Q1) a) Explain the multi-rate signal processing in brief. **[5]**

b) Explain the structures of multi-rate signal processing in detail. **[5]**

OR

Q2) a) Explain discrete time random signals. **[5]**

b) Explain the forward and backward linear prediction. **[5]**

Q3) a) Explain spectral factorization in Stochastic Processes. **[5]**

b) Explain in brief the models of stochastic processes. **[5]**

OR

Q4) a) Explain in brief the Periodogramm-based nonparametric methods. **[6]**

b) Explain in brief the Yule - Walker equation and it's solution. **[4]**

Q5) a) Explain the application of adaptive filtering in noise and echo cancellation. **[12]**

b) Write a short note on LMS algorithm. **[6]**

P.T.O.

OR

Q6) a) Explain in detail the applications of homomorphic deconvolution. **[10]**

b) State and explain the properties of complex-spectrum. **[8]**

Q7) a) Explain in detail fixed point DSP processor. **[8]**

b) Explain in detail the sailent features of DSP processor. **[8]**

OR

Q8) a) With neat diagram explain the architecture of DSP processor. **[10]**

b) Explain the bus architecture memory of DSP processor. **[6]**

Q9) a) What is a need of frequency analysis. Explain the Short Time Fourier Transform. **[8]**

b) Explain the filter banks concept in wavelet transform. **[8]**

OR

Q10)a) Distinguish between Fourier Transform and Short Time Fourier Transform. **[8]**

b) Write a short note on Continuous Wavelet Transform. **[8]**

Total No. of Questions : 10]

SEAT No. : ____

PA-314

[Total No. of Pages : 2

[5927]-198

B.E (Instrumentation & Control)

ADVANCED BIOMEDICAL INSTRUMENTATION

(2015 Pattern) (Semester - I) (406264D) (Elective - I)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to right side indicate full marks.***
4) ***Assume Suitable data, if necessary.***

Q1) a) What is an Biotelemetry? Enlist various applications of biotelemetry. **[6]**

b) What is the necessity of pacemaker? List out Various types of pacemaker with respect to its use. **[4]**

OR

Q2) a) What is an Autoanlyser? Draw a neat labelled block diagram of Auto analyser. **[6]**

b) Explain monopolar and Bipolar modes of ESU? **[4]**

Q3) a) Draw block diagram and enlist the front panel controls of x- ray machine. What are the drawbacks of X- Ray imaging? **[6]**

b) What is fibrillation state of heart? What is defibrillator? **[4]**

OR

Q4) a) Discuss Hounsfield no. in CT scan. **[5]**

b) Elaborate on various methods of image reconstruction in CT scanning. **[5]**

Q5) a) What is radionuclide imaging? Explain how it is advantageous than other mode of imaging. **[5]**

b) Explain the photo-annihilation process in PET. **[5]**

c) Explain the operating principle of Ultrasound imaging. **[8]**

OR

P.T.O.

Q6) a) Explain A scan Mode ultrasonography? **[10]**

b) Explain the acoustic impedance with respect to Ultrasound imaging. **[8]**

Q7) a) Explain different applications of LASER in the field of dermatology. **[8]**

b) What is an endoscope? Explain the general construction with the help of a neat diagram. **[8]**

OR

Q8) a) Explain thermal and non thermal interaction of tissue with LASER. **[10]**

b) Explain Conventional heat therapy? Explain high frequency heat therapy concept. **[6]**

Q9) a) Define orthrosis and prosthesis concepts used in rehabilitation engineering. List out two example of Each. Brief out Main types of frame design in connection with wheel chair. **[8]**

b) Explain four critical performance factors in wheel design to optimize interaction of wheel with ground. **[8]**

OR

Q10)a) Draw and explain the structure of nephron thus process of urin formation in nephron. **[8]**

b) Explain in detail parallel plate (KIIL Kidney) dialysers used for hemodialysis. **[8]**

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Total No. of Questions : 10]

SEAT No. :

PA-315

[Total No. of Pages : 3

[5927]-199

B.E (Instrumentation & Control)

DIGITAL CONTROL SYSTEMS

(2015 Pattern) (Semester - I) (Elective - I) (406264E)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Use of Non-programable Calculator is allowed***
4) ***Assume Suitable data jf necessary.***

Q1) a) With neat diagram explain the building blocks of discrete time control system. **[6]**

b) Give the advantages of discrete time control system. **[4]**

OR

Q2) a) Explain the sampling theorem. **[6]**

b) Explain in brief the sample and hold circuit. **[4]**

Q3) a) Derive the model of a zero order hold from the first principles. **[6]**

b) Compare analog system and discrete system. **[4]**

OR

Q4) a) Explain the concept of ringing of poles? **[6]**

b) What are the salient features of the dead beat controller? **[4]**

P.T.O.

Q5) a) A LTI system with the state equation, **[6]**

$$\begin{bmatrix} x_1(k+1) \\ x_2(k+1) \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ 0 & -2 \end{bmatrix} \begin{bmatrix} x_1(k) \\ x_2(k) \end{bmatrix}$$

Compute the solution of the homogeneous equation assuming the initial state vector

$$x(0) = \begin{bmatrix} 1 \\ 0 \end{bmatrix}$$

b) Diagonalise the plant matrix for the system having the state equation as, **[12]**

$$x(k+1) = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 0 & 0.4 & 0.3 \end{bmatrix} x(k) + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} u(k)$$

Find the diagonal matrix also.

OR

Q6) a) Find the state model for the given transfer function using cascade programming and parallel programming. Draw the state diagram also. **[12]**

$$\frac{Y(z)}{R(z)} = \frac{z+6}{z^2+14z+48}$$

b) Explain in brief the Cayley-Hamilton theorem. **[6]**

Q7) a) Define state controllability, state observability and output controllability. **[6]**

b) Find the state controllability, state observability and output controllability for the given system. **[10]**

$$x\,(k+1) = \begin{bmatrix} 0 & 1 \\ -25 & -6 \end{bmatrix} x\,(k) + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u\,(k)$$

$$y\,(k) = [3 \;\; 3]\, x\,(k)$$

OR

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

i) State Observers.

ii) State Variable feedback gain matrix.

b) Find the state feedback gain matrix for the system so that it exhibits a deadbeat response, **[8]**

$$x(k+1)=\begin{bmatrix} 0 & 1 \\ -24 & -1 \end{bmatrix}x(k)+\begin{bmatrix} 1 \\ 1 \end{bmatrix}u(k)$$

Q9) For a system with the state equation as, $x(k+1) = Gx(k) + Hu(k)$, determine the control sequence to minimize the given performance index, Also find J_{min} **[16]**

$$J = \frac{1}{2}\left[x(0)\right]^2+\frac{1}{2}\sum\left[x^2(k)+u^2(k)\right]$$

$G = 0.3679$

$H = 0.6321$

$x(0) = 1$

OR

Q10) For a system with the state equation as, $x(k+1) = Gx(k) + Hu(k)$, find the control sequence, $u(k) = -Kx(k)$, such that to minimize the given performance index. **[16]**

$$J = \sum_{k=0}^{\infty}\left[x^2(k)+u^2(k)\right]$$

$G = 0.3679$

$H = 0.6321$

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Total No. of Questions : 10]

SEAT No. : ____

PA-120

[Total No. of Pages : 2

[5927]-2

B.E. (Automobile Engineering)

ALTERNATIVE FUELS AND EMISSION CONTROL

(2015 Pattern) (Semester-I) (416489)

Time : 2 ½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume Suitable data, if necessary.***

Q1) a) Explain the effects and importance of fuel properties in IC engine. **[5]**

b) Analyze the need of alternative fuels in IC engine. **[5]**

OR

Q2) a) Discuss the LPG as alternative fuel for gasoline engine. **[5]**

b) Compare the properties of ethanol and methanol as an alternative fuel for IC engine. **[5]**

Q3) a) Explain the duel fuel technology with following points. **[5]**

i) Working principle

ii) Advantages and disadvantages

b) Justify the major cause's formation of NOx emission in IC engine. **[5]**

OR

Q4) a) Suggest the various cause's formation of HC emission in SI engine. **[5]**

b) Explain the production method of biodiesel fuel with help of flow chart. **[5]**

Q5) a) Explain with neat sketch constructional and operational features of (NDIR) for measurement of CO concentration. **[8]**

b) Describe the Bharat stage emission standard norms for two wheelers and three wheelers. **[8]**

OR

Q6) a) Explain with neat sketch constructional and operational features Chemiluminescence analyzer (CLA) for measurement of NOx concentration. **[8]**

b) What are the types of diesel smoke? Explain smoke measurement technique in detail. **[8]**

P.T.O.

Q7) a) Explain in detail evaporative emission control system for SI engine. **[8]**

b) Explain the construction and working of exhaust gas recirculation system with neat sketch. **[8]**

OR

Q8) a) Justify the role of compression ratio on SI engine emissions control. **[8]**

b) Draw and explain neat layout of CRDI fuel system in CI engine. **[8]**

Q9) a) Analyze the effect of fuel injection variables on CI engine emission control. **[6]**

b) Explain the various types of sensor used in electronic fuel injection system. **[6]**

c) Describe the function of catalytic convertor with its classification. **[6]**

OR

Q10)a) Explain the characteristics and advantages of metal monoliths catalyst materials. **[6]**

b) Classify and explain the PM reduction techniques in CI engine. **[6]**

c) Explain the construction and functions of wash coat in catalytic converter. **[6]**

Total No. of Questions : 10]

SEAT No. : ____

PA-137

[Total No. of Pages : 2

[5927]-20

B.E. (Chemical)

CHEMICAL REACTION ENGINEERING - II

(2015 Pattern) (Semester-I) (409342)

Time : 2 ½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or 2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Use of logarithmic tables slide rule, mollier charts, electronic pocket calculator and steam tables is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) Derive and expression for time and conversion for Chemical reaction control of spherical particle of unchanging in size. **[10]**

OR

Q2) a) Explain the controlling steps for fluid-particle reaction **[5]**

b) Discuss the film conversion parameter **[5]**

Q3) Describe the mass transfer and kinetic regimes in fluid-fluid reaction. **[10]**

OR

Q4) Explain the pore volume distibution in methods. **[10]**

Q5) a) Explain the surface diffusion in porous catalysts. **[6]**

b) Derive an expression for diffusion of gaseous in single cylindrical pore of catalyst. **[10]**

OR

Q6) The ethylene stream is fed to the reactor in which the catalyst is poisoned by acetylene. The ethylene is prepared by catalytically dehydrogenating ethane. The first order reaction are:

$$C2H6 \xrightarrow{K1} C2H6 \xrightarrow{K3} C2H2$$

for one catalyst k1/k3 = 16. It is suspected that interpallet diffusion strongly retards both dehydrogenation. Estimate the potential improvement in selectivity if diffusion resistance could be eliminated. Make the estimate for concentration ratio (CB/CA)b = 1. Neglect differences in De between ethane and ethylene. **[16]**

P.T.O.

Q7) The catalytic reaction A→4R is studied in a plug flow reactor using various amounts of catalyst and 20 lit/hr of pure A feed at 3.2 atm and 117°C. The concentration of A in the effluent stream is recorded for the various runs as follows:

Run	1	2	3	4	5
Catalyst Used, kg	0.02	0.04	0.08	0.12	0.16
CA, out, mol/lit	0.074	0.06	0.044	0.035	0.029

Find a rate equation for this reaction, using the integral method of analysis. **[16]**

OR

Q8) The 2nd order reaction A→R is studied in an experimental recycle reactor with very large recycle ratio. The data recorded as follows:

Void volume of reactor=1 lit., Amount of catalyst used=3 gm, Feed to the reactor: vo =1 lit/hr, with CAo =2 mol/lit., Concentration of A in exit stream (CAout) = 0.5mol/lit.

a) Find the rate constant for this reaction

b) Calculate the amount of catalyst needed in a packed bed reactor to achieve 80% conversion for feed to the reactor. vo=1000 lit/hr and CAo=1 mol/lit **[16]**

Q9) a) Derive the M-M Kinetic equation. **[9]**

b) Give the design of Fixed bed reactor. **[9]**

OR

Q10) a) Give the design of Slurry reactor. **[9]**

b) Explain the special features of M-M kinetic equation. **[9]**

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Total No. of Questions : 10]

SEAT No. : ____

PA-316

[Total No. of Pages : 2

[5927]-200

B. E. (Instrumentation & Control)

SMART & WIRELESS INSTRUMENTATION

(2015 Pattern) (Semester - I) (Elective-II) (406265A)

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

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicates full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Why Decentralized Management system is used instead of centralize system in WSN? Justify **[5]**

b) Can you explain what happens when you select multi hope instead of single hope network system in wireless sensor network? **[5]**

OR

Q2) a) Summarize the following termrelated to WSN: **[5]**

i) Sensor field

ii) Sensor Node

iii) Processing

b) Develop design entry to design verification by FPGA node architecture. **[5]**

Q3) a) Suggest suitable node architecture in which full duplex and short distance is use. Justify it? **[5]**

b) Analyze Channel encoding used in wireless digital communication. **[5]**

OR

Q4) a) Analyze the necessity of modulation in wireless digital communication? Also Justify AM, FM and PM modulation techniques. **[5]**

b) Elaborate source encoding and efficiency of a source encoder. **[5]**

P.T.O.

Q5) a) Select suitable microcontroller for Structural health monitoring. Justify with neat sketch. **[8]**

b) Can microcontroller is used in WSN? Elaborate with suitable example. **[8]**

OR

Q6) a) Illustrate types of wireless networks used in Zigbee. **[8]**

b) Suggest suitable wireless communication device as per IEEE 802.15.4. for Greenhouse monitoring. Elaborate with neat sketch. **[8]**

Q7) a) Elaborate energy harvesting form vibration. **[8]**

b) Justify with neat sketch how PV cell works in Solar batteries. **[10]**

OR

Q8) a) Illustrate the different energy harvesting techniques? Explain Thermal energy harvesting. **[8]**

b) Elaborate RF energy harvesting for WSN. **[10]**

Q9) a) Dramatically show how magnetic sensor is used in traffic control. **[8]**

b) What are the basic processing components of the artificial retina? Justify it **[8]**

OR

Q10)a) Analyze Global and Local inspection technique used in Structural Health Monitoring. **[8]**

b) Justify Single Damage Detection and Multiple Damage Detection Using Natural Frequencies. **[8]**

Total No. of Questions : 12]

SEAT No. : [ ]

PA-317

[Total No. of Pages : 2

[5927]-201

B. E. (Instrumentation & Control)

INSTRUMENTATION AND CONTROL FOR POWER PLANTS

(2015 Pattern) (Semester - I) (Elective-II) (406265B)

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

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.***
2) ***Neat diagrams must be drawn whenever necessary.***
3) ***Figures to the right indicates full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) Discuss the role of automation in coal handling plant in thermal power plant? What if coal is not uniformly pulverized, how will it affect in combustion chamber? Elaborate. **[3+3=6]**

OR

Q2) Discuss the sensors used for the measurement of feed water flow, air flow, steam flow, coal flow, steam pressure and steam temperature. (1 mark for each sensor) **[6]**

Q3) How will the efficiency of combustion will affect with insufficient air and excess air. Explain with graph. **[8]**

OR

Q4) Which factors are considered in automation of lubrication system? Draw and discuss automation required in lubrication. **[8]**

Q5) Explain the detail Electro-hydraulic governor system **[6]**

OR

Q6) Write the need of fault tolerant control system in thermal power plants. **[6]**

Q7) a) Discuss the power generation by nuclear power plant in detail. Explain the different terminologies in nuclear power plant. **[8]**

b) What are the types of reactors? Explain in detail. **[8]**

OR

P.T.O.

Q8) a) Discuss the terms: Atomic Structure, isotopes, Radioactivity, Basics of fission reaction, Moderation. **[8]**

b) Write short notes on

1) Safety Practices in Indian NPPS,

2) Radiological Protection to workers and public. **[8]**

Q9) a) Draw and discuss P & I diagram for Nuclear power Plant. **[8]**

b) Describe Safety in nuclear power plant, reliability aspects in nuclear plant. **[10]**

OR

Q10)a) Elaborate the instrumentation used in nuclear reactor. **[9]**

b) Write a short note on radiations detection instruments and process sensors for nuclear power plants. **[9]**

Q11)a) What is the role of safety system in hydro power plant. **[8]**

b) How does the regulation & monitoring of voltage & frequency of outpu power is done in hydro-electric power plant? **[8]**

OR

Q12)a) Explain the governing system in hydro power plant in detail. **[8]**

b) How can we use Distributed control and SCADA solution to improve reliability. **[8]**

Total No. of Questions : 12]

SEAT No. :

PA-318

[Total No. of Pages : 2

[5927]-202

B.E. (Instrumentation & Control)

AUTOMOTIVE INSTRUMENTATION

(2015 Pattern) (Semester - I) (406265C) (Elective - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicates full marks.***
4) ***Assume suitable data, if necessary.***

Q1) Elaborate on board diagnostic systems in automobile **[6]**

OR

Q2) Draw and explain battery charging system in automobiles. **[6]**

Q3) Write in details on exhaust emission control. **[8]**

OR

Q4) What is Lambada control? Elaborate in detailed. **[8]**

Q5) Explain throttle position sensor used in automobiles. **[6]**

OR

Q6) What are the different methods to measure vehicle speed? **[6]**

Q7) a) Differentiate between ABS and ASR control methods. **[8]**

b) What is ASR in automobiles? Explain in brief. **[8]**

OR

Q8) a) What do you mean by wiring harness in automobiles? **[8]**

b) Why is cruise control needed in automobile? **[8]**

P.T.O.

Q9) a) What do you mean by RPAS? Explain in detailed. **[8]**

b) Elaborate on air bag technology. **[8]**

OR

Q10)a) Explain electronically controlled doors & windows in automobile. **[8]**

b) Write a short note on Lightning system used in automobiles **[8]**

Q11)a) Explain Automatic Driver Assist Systems in detailed. **[9]**

b) What is the difference between hybrid vehicles and internal combustion vehicles? **[9]**

OR

Q12)a) What is the most important component in Electric vehicle development? **[9]**

b) What is the difference between internal combustion vehicles and electric vehicles? **[9]**

Total No. of Questions : 10]

SEAT No. : [ ]

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[5927]-203

B. E. (Instrumentation & Control)

OPTO - ELECTRONICS INSTRUMENTATION

(2015 Pattern) (Semester - I) (406265D) (Elective-II)

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

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn whenever necessary.***
3) ***Figures to the right indicates full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Enlist the various types of Splices. **[6]**

b) Write a note on Ray theory of transmission. **[4]**

OR

Q2) a) Define following terms **[6]**

i) Numerical Aperture

ii) Acceptance Angle

iii) Critical Angle

b) Explain with diagram Fiber Optic Gyroscope. **[4]**

Q3) a) Explain with neat sketch optical fiber for Level measurement. **[5]**

b) An optical link is to be designed to operate over an 8-km length without repeater. **[5]**

The rise time of the chosen components are:

Source : 8 ns,

Fiber : Intermodal 15ns/km,

Intramodal : 1ns/km,

Detector : 6ns,

From the system rise time considerations estimate the maximum bit rate that may be achieved on the link using NRZ code

OR

P.T.O.

Q4) a) Enlist the losses in Fiber cable. **[5]**

b) Draw and explain with neat sketch steps of Manufacturing of optical fiber. **[5]**

Q5) a) List out the types of LASER. Explain in detail Three level and four level lasers. **[8]**

b) What is Holography? Explain the working principle Holography. **[8]**

OR

Q6) a) Write a note on: Q-Switching. **[8]**

b) Explain with neat sketch of LASER interferometry. List the applications of LASER interferometry. **[8]**

Q7) a) Explain in brief what are the Analog Arithmetic Operations in optics. **[8]**

b) Explain in detail integrated optical devics. **[8]**

OR

Q8) a) List out the advantages of Integrated optics system. List the Integrated optical devices. **[8]**

b) What is Optical Amplifier? Explain the applications of Optical amplifier. **[8]**

Q9) a) Explain with block diagram Optical Power Meter. **[9]**

b) List the applications of Optical Time Domain Refractrometer (OTDR) and list the advantages of OTDR. **[9]**

OR

Q10)a) Explain with block diagram working principal of Fiber Optical Numerical Aperture Measurement. **[9]**

b) Explain the Optical Computing concept w.r.t. following points: **[9]**

i) Concept

ii) Gates

iii) Switch

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Total No. of Questions : 12]

SEAT No. : ____

PA-320

[Total No. of Pages : 2

[5927]-204

B.E. (Instrumentation & Control)

SOFT COMPUTING

(2015 Pattern) (Semester - I) (406265E) (Elective-II)

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

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.***
2) ***Neat diagrams must be drawn whenever necessary.***
3) ***Figures to the right indicates full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) What is difference between perception and convergence rule? **[5]**

b) What are the Artificial Neuron and its model? **[5]**

OR

Q2) a) Explain with example what are recurrent networks? **[5]**

b) Explain Auto-associative and hetro-associative memory. **[5]**

Q3) a) What are advantages and disadvantages of back propagation learning methods? **[5]**

b) Explain perception model with aplication. **[5]**

OR

Q4) a) What are the factors that effect of learning rule co-efficient? **[5]**

b) Elaborate on back propagation algorithm. **[5]**

Q5) a) Explain how fuzzy crisp conversion is done? **[6]**

b) Write a short note on the properties of fuzzy sets. **[6]**

OR

P.T.O.

Q6) a) What is fuzzy set theory? Explain with application. **[6]**

b) Differentiate between Fuzzy and Crisp relations. **[6]**

Q7) a) Explain interference in fuzzy logic. **[7]**

b) Write a short note on Fuzzifications and Defuzzifications. **[6]**

OR

Q8) a) Explain with example the fuzzy if-then rules. **[7]**

b) What are fuzzy controllers? Give example. **[6]**

Q9) a) Differentiate between static and dynamic properties of fuzzy controller. **[6]**

b) Draw and explain basic construction of fuzzy controller. **[6]**

OR

Q10)a) What is the role of Fuzzy sets in commercial products? **[6]**

b) Explain in brief how fuzzy control is used for smart cars. **[6]**

Q11)a) How are rules constructed by self-learning in fuzzy controller? **[6]**

b) Explain Fuzzified RBF network based self-learning controllers. **[5]**

c) What are system structures? **[2]**

OR

Q12)a) Explain hybrid neural network based Fuzzy controller with self-learning teacher. **[7]**

b) Elaborate on unified approximate reasoning approach in neuro fuzzy systems. **[6]**

Total No. of Questions : 10]

SEAT No. :

PA-321

[Total No. of Pages : 2

[5927]-205
B.E (Instrumentation & Control)
PROCESS INSTRUMENTATION
(2015 Pattern) (Semester - II) (406268)

Time : 2½ Hour] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7or Q8, Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume Suitable data if necessary.***
5) ***Use of calculator is allowed.***

Q1) List safety interlocks in boilers. Develop air to fuel ratio control in boiler. **[10]**

OR

Q2) Comment on Shrink and swell effect in boilers. Develop three element drum level control in boiler. **[10]**

Q3) a) Identify process variables, classify input and output variables, determine control objectives and appropriate manipulated variables for distillation column. **[4]**

b) Develop cascade control strategy for steam heater. **[6]**

OR

Q4) a) Comment on optimization of Boiler Operation. **[4]**

b) Develop feedback control strategy for pressure control in distillation column. **[6]**

Q5) a) Identify process variables, disturbance variables and output variables in Evaporators. State objectives of evaporators, identify control variables and select proper manipulated variables to control it. **[8]**

b) Develop feedback control strategy for control of product quality in Evaporators. **[8]**

OR

P.T.O.

Q6) a) Develop cascade control strategy for temperature control in rotary dryer. **[10]**

b) Elaborate issues in control of evaporators from safety point of view. **[6]**

Q7) a) Develop endpoint detection control in batch reactors. **[10]**

b) Explain in brief recipe management in batch reactors. **[8]**

OR

Q8) a) Design ratio control strategy for maintain reactants in exothermic reactors. **[10]**

b) Develop temperature on temperature cascade control strategy for exothermic reactors. **[8]**

Q9) a) Comment on surge phenomenon in compressors. **[8]**

b) Develop anti-surge control system for compressors. **[8]**

OR

Q10) a) Develop on-off control system for compressors. **[6]**

b) Develop on-off level control for dual pump station. **[10]**

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Total No. of Questions : 10]

SEAT No. : ____

PA-322

[Total No. of Pages : 2

[5927] - 206

B.E. (Instrumentation & Control)
INDUSTRIAL AUTOMATION
(2015 Pattern) (Semester - II) (406269)

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

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Draw a neat diagrams wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume Suitable data if necessary.***

Q1) a) What is the role of Automation in industries? **[6]**

b) Compare PLC & SCADA on the basis of performance criteria. **[4]**

OR

Q2) a) Explain OSI/ISO reference model in communication system. **[6]**

b) Explain the general objective of automation. **[4]**

Q3) a) Explain HART protocol with reference to OSI model. **[6]**

b) Write the OPC for process control. **[4]**

OR

Q4) a) Write short note on communication standard RS485. **[6]**

b) List the various command used in HART. **[4]**

Q5) a) Explain the role of PLC in SCADA system. **[8]**

b) Write short note on SCADA. Enlist topologies of SCADA. **[8]**

OR

Q6) a) Explain the procedure for interfacing a PLC with SCADA system using different communication protocols. **[8]**

b) Describe how DCS supports ERP. **[8]**

Q7) a) Explain the hierarchical structure of DCS in detail. **[10]**

b) Explain in brief alarm management system in DCS. **[8]**

OR

P.T.O.

Q8) a) Explain main component of DCS system. **[10]**

b) Explain the need of security & user access management in DCS system. **[8]**

OR

Q9) a) With the help of Block diagram, explain "ESD system". **[8]**

b) Explain the importance of Process Hazard Analysis (PHA) & Hazard and Operability Study (Hazop). **[8]**

OR

Q10)a) Write short note on safety integrity level (SIL). **[8]**

b) What are IEC 61511 standards for functional safety. **[8]**

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Total No. of Questions :10]

SEAT No. :

PA-323

[Total No. of Pages : 2

[5927]-207

B.E. (Instrumentation and Control)

BUILDING AUTOMATION

(2015 Pattern) (Semester-II) (406270-A) (Elective-III)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherver necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) Justify how Field level components, Direct Digital Control (DDC), Supervisory Controller, and Operator Workstation (OWS) works in BAS. **[5]**

b) Differentiate BA Cnet, LON, Profibus and Modbus protocol **[5]**

OR

Q2) a) Draw and discuss architecture of Intelligent (Integrated) building system. **[5]**

b) Summarize the term: Humidity, Specific Humidity, Relative Humidity, Dew point, Saturation point **[5]**

Q3) a) Analyze Dry bulb & Wet bulb temperature with neat sketch. **[5]**

b) Diagrammatically show how ozonisation and UV treatment used in BAS system. Justify. **[5]**

OR

Q4) a) Draw & explain Air handling unit and their components. **[5]**

b) Elaborate concept of Variable Air Volume (VAV) system and their types. **[5]**

Q5) a) Compare air cooled chiller and water cooled chiller **[8]**

b) Elaborate with neat sketch mechanical configuration of different types of components used in refrigeration cycle **[8]**

OR

P.T.O.

Q6) a) Differentiate between water tube and fire tube boilers? **[8]**

b) Explain Battery calculations for FAS system with an example. **[8]**

Q7) a) Classify fire alarm system and explain in detail **[8]**

b) Justify Important Codes- NFPA72, IS 2189, BS 5839 with example **[10]**

OR

Q8) a) Elaborate SLC wiring and its classification in detail **[8]**

b) Explain fire detection system with its components? **[10]**

Q9) a) Elaborate Concepts of Access Control System & explain its components **[8]**

b) Explain video Analytics and Camera connectivity. **[8]**

OR

Q10)a) With neat sketch explain architecture of CCTV System and types of Camera. **[8]**

b) Explain in details different types of Camera & their use in CCTV based Surveillance system. **[8]**

Total No. of Questions :12]

SEAT No. : ____

PA-324

[Total No. of Pages : 2

[5927]-208

B.E. (Instrumentation & Control)

ROBOTICS AND AUTOMATION

(2015 Pattern) (Semester-II) (Elective-III) (406270B)

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

Instructions to the candidates:

1) ***Answer Q.No. 1 or Q2, Q. No.3 or Q4, Q. No. 5 or Q6, Q.No. 7 or Q8, Q.No.9 or Q10, Q. No. 11 or Q12.***
2) ***Neat diagrams must be drawn wherever necesary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) State any three important characteristics of robots. **[3]**

b) With an example, elaborate importance of cycle time (state in 6-to-10 lines) **[3]**

OR

Q2) a) What are different components of robot-electric-drive system? **[3]**

b) Elaborate Return on Investment (ROI) concept in robotics. **[3]**

Q3) a) Draw a typical machine-vision-robot system architecture. Show different components (at least 5 in which only one can be sensor) **[4]**

b) Which different aspects can be computed with robot vision systems? Mention minimum five aspects that are captured by vision system. **[4]**

OR

Q4) a) What is difference between low level and high level machine vision system? **[4]**

b) Which different algorithms are used for image segmentation or edge detection? Elaborate it. **[4]**

Q5) a) Differentiate between forward and inverse kinematics. **[3]**

b) Which are different matrices used in robot manipulator dynamics? Elaborate them. **[3]**

OR

P.T.O.

Q6) a) Elaborate a position control system for robots. **[3]**

b) Elaborate a force control system for robots. **[3]**

Q7) a) How different commands/ steps help to simulate robots programs? Give an example. **[8]**

b) Explain the motion interpolation in robot programming. **[8]**

OR

Q8) a) What do you mean by Jacobian work envelope? Elaborate with example **[8]**

b) What is dynamic stabilization? Explain in brief. **[8]**

Q9) a) How is motion control achieved in mobile robots? **[8]**

b) What is cognition path planning in mobile robots? **[8]**

OR

Q10)a) Draw and explain basic control scheme for mobile robots? **[8]**

b) Explain in detail perception in the control scheme used in mobile robots. **[8]**

Q11)a) Explain the different part presentation methods in robotic assembly automation. **[9]**

b) Explain robotic application in continuous arc welding. **[9]**

OR

Q12)a) What is Remote Centre Compliance (RCC)? Explain its significance. **[9]**

b) How is inspection automation done in robot assembly? **[9]**

Total No. of Questions :8]

SEAT No. :

PA-325

[Total No. of Pages : 2

[5927]-209

B.E. (Instrumentation & Control Engineering)
ENVIRONMENTAL INSTRUMENTATION
(2015 Pattern) (Semester-II) (Elective-III) (406270C)

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

Instructions to the candidates:

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

Q1) a) What are the different Instrumentation methodologies? Explain the Ultraviolet analyzers? **[6]**

b) Differentiate between the Standards of raw water & treated water along with appropriate diagram stating the sources of water & their natural quality, effects. **[7]**

c) What is Ground water monitoring? Explain the Level measurement in ground water monitoring wells. **[7]**

OR

Q2) a) Give the General equation for settling or rising of discrete particles in details. **[6]**

b) List out the Water quality parameters? Explain in details the pH analyzers & their applications? **[7]**

c) Define what are the various portable & stationary analytical instruments? List out them all with proper examples. **[7]**

Q3) a) Explain the optimum waste water sampling locations, and waste water measurement techniques with appropriate diagrams. **[8]**

b) Describe in details what is Flow monitoring system? Explain the Non open channel flow measurement and open channel waste water flow measurement in brief? **[8]**

OR

P.T.O.

Q4) a) Give the definition for Waste Water Systems and Flow Monitoring Systems Also describe the Automatic waste water sampling with diagram. **[8]**

b) Describe the Rain water harvesting system along with the necessity and its methods. **[8]**

Q5) a) Differentiate between air pollution and sound pollution with example of each method. **[9]**

b) Describe the Environmental Laws in brief. **[9]**

OR

Q6) a) Why there should be an importance of air pollution? Explain the Air sampling methods & equipments. **[9]**

b) List out the analytical methods for air pollution studies and sound pollution studies? **[9]**

Q7) a) List out the Instruments in Weather station? Explain the Rain gauge in details. **[8]**

b) Explain the Virtual Instruments in Environmental Engineering Laboratory **[8]**

OR

Q8) a) List out the Instruments in Weather station? Explain anyone in details with diagram **[8]**

b) Explain Rover Environmental Monitoring Station (REMS)? Describe anyone method **[8]**

Total No. of Questions : 10]

SEAT No. : ____

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[Total No. of Pages : 3

[5927]-21
B.E. (Chemical)
CHEMICAL ENGINEERING DESING - II
(2015 Pattern) (Semester - I) (409343)

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

Instructions to the candidates :

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume Suitable data if necessary.***

Q1) a) Explain Cornell's method for prediction of height of transfer units in details. **[5]**

b) What is the effect of the following on plate column design : **[5]**

i) Plate Spacing and Weir height,

ii) Vapour velocity

OR

Q2) Find the column diameter of a tray column for the following specifications : **[10]**

Feed is 10% w/w Acetone in aqueous waste stream at 20°C of the flow rate 1300 kg/hr (Maximum flow rate).

No. of theoretical plates = 16

Slope of bottom operating line = 5

X_D = 0.94 (98% w/w). X_w = 0.01

Reflux ratio = R = 1.35

Overall column efficiency = 60%

Plate pressure drop = 100mm water, Top pressure = 1 atm.

Vapour rate at the top = 55.5 kmol/h., Vapour rate at the bottom = 162.3 kmol/h.

At the bottom

Vapour density = 0.73 kg/m^3, Liquid Density = 954 kg/m^3

Bottom pressure = 1.26 bar, Liquid surface tension = 57 × 10^{-3} N/m

At the top :

Vapour density = 2.05 kg/m^3, Liquid Density = 754 kg/m^3,

Pressure = 1 bar, Surface tension = 23 × 10^{-3} N/m

Assume tray spacing = 0.5m

K_1 bottom = 7.5 × 10^2, K_1 top = 9 × 10^2

Design for 85% flooding at maximum flow rate

P.T.O.

Q3) a) Discuss on fluid dynamic parameters for pipeline design. **[6]**

b) What are the considerations in restriction orifice sizing? **[4]**

OR

Q4) a) Compare the design considerations for a pipeline for compressible and non-compressible fluids. **[6]**

b) What are the design considerations for piping used at very high temperature? **[4]**

Q5) a) State the parameters to be considered in design of pipeline for transportation of crude oil. **[6]**

b) Calculate the optimum pipe diameter of a pipeline to be used for the transportation of water at the rate of 2 kg/s. Take density of water 995 kg/m^3 and MOC of pipeline as carbon steel. **[8]**

c) Define Schedule number and BWG for pipe and tubes. **[4]**

OR

Q6) a) Liquid is flowing through a pipeline with 25mm I.D. for a distance of 2.5km. The pressure drop 12m of water. The density of liquid = 1100 kg/m^3, viscosity of liquid = 1.1 mNs/m^2. Estimate the flow rate of liquid through the pipeline. **[8]**

b) State the problems raised due to hydrates formation in natural gas pipeline. **[6]**

c) What do you mean by Economic Pipe Diameter? **[4]**

Q7) a) Define the Enthalpy and Entropy of steam. **[4]**

b) List out the Process utilities used and their importance in Chemical Industries. **[6]**

c) What is the use of compressed air in industries? What are the process air and instrument air? **[6]**

OR

Q8) a) Describe the boiler accessories and their functions. **[8]**

b) Write a short note on Thermic Fluids. **[6]**

c) Define the Dryness fraction of steam. **[2]**

Q9) a) What is meant by predictive maintenance? Explain in detail with examples. **[8]**

b) What preventive measures are mandatory when handling explosive chemicals in industries? **[8]**

OR

Q10)a) Write a note on necessity of process safety with proper examples. **[8]**

b) Differentiate between the predictive maintenance and scheduled maintenance. **[8]**

Total No. of Questions : 10]

SEAT No. :

PA-326

[Total No. of Pages : 2

[5927]-210

B.E. (Instrumentation & Control)

DIGITAL IMAGE PROCESSING

(2015 Pattern) (Semester - II) (Elective - III) (406270D)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams should must be drawn wherever necessary.***
4) ***Use of non-programmable calculator allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Explain and list components of DIP system. **[5]**

b) Explain CMY color model. **[5]**

OR

Q2) a) Explain types and characteristics of Digitizer. **[5]**

b) Explain image model. **[5]**

Q3) a) Explain Gabor transform and discuss its properties and applications. **[5]**

b) Explain image decomposition using wavelet transform. **[5]**

OR

Q4) a) Explain DCT transform and discuss its properties and applications. **[5]**

b) Write short note on Histogram. **[5]**

Q5) a) Explain in brief the edge linking in case of image segmentation. **[8]**

b) Enlist the different types of classifiers. Explain any one in detail. **[8]**

OR

Q6) a) What is edge discontinuities. Explain in detail. **[8]**

b) Explain the different methods for edge detection. **[8]**

P.T.O.

Q7) a) Write a short note on Huffman coding. **[9]**

b) What the need of image compression. Explain different methods in short. **[9]**

OR

Q8) a) Compare lossy and lossless compression. **[9]**

b) Explain LZW compression in detail. **[9]**

Q9) a) Explain the fingerprint verification using image processing. **[8]**

b) How image processing is used in military application. Explain with neat diagram. **[8]**

OR

Q10)a) Explain the application in image processing in agriculture field. **[8]**

b) Write a short note on application of image processing in space. **[8]**

Total No. of Questions : 10]

SEAT No. : ____

PA-327

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[5927]-211

B.E. (Instrumentation)

PROCESS MODELLING AND OPTIMISATION

(2015 Pattern) (Semester - II) (Elective - III) (406270E)

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

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of logarithmic tables, slide rule, mollier charts, electronic.***
5) ***Pocket calculator and steam tables is allowed.***
6) ***Assume suitable data, if necessary.***

Q1) Derive process model of three tanks in parallel. **[10]**

OR

Q2) Obtain mathematical representation of two isothermal tanks having constant holdups series converting reactant A and B into two product C with reaction rate K and reaction is endothermic. **[10]**

Q3) What is curve fitting? Why it is needed? Find the coefficients for linear relation Y = MX + C for following data : **[10]**

Number of study hours	2	4	6	8	10
Number of sleeping hours	10	9	8	7	6

OR

Q4) Explain eyeball fitting method for identification: **[10]**

Q5) a) Determine the stability of a 2×2 process with a diagonal feedback controller given as : $G_m = \begin{bmatrix} 1 & 5 \\ 6 & 4 \end{bmatrix}$ and $B\_s = \begin{bmatrix} 4 & 1 \\ -1 & 5 \end{bmatrix}$. **[9]**

b) Explain relative gain array . **[9]**

OR

P.T.O.

Q6) a) Explain multivariable Nyquist plot **[9]**

b) For the system given Find NI for this comment on stability also find proper paring of control and manipulated variables.

$$\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 25\dfrac{e^{-4s}}{(s+1)} & 15\dfrac{e^{-s}}{(s+1)} \\ 6\dfrac{e^{-s}}{(s+1)} & \dfrac{e^{-4s}}{(s+1)} \end{bmatrix} \begin{bmatrix} \mathrm{P} \\ \mathrm{Q} \end{bmatrix}$$ **[9]**

Q7) a) Explain payback period, Return of investment, Net present value, Internal Rate of Return. **[8]**

b) Explain optimization component of optimization statement with suitable example. **[8]**

OR

Q8) a) Explain convex and concave functions with proper example and it's roll in optimization. **[8]**

b) For the functions given below, analyze the concavity and convexity in each case. **[8]**

i) $f(x_1, x_2) = (x_1 - x_2)^3 + x_2$

ii) $f(x) = x_1^2 + 6x_1 x_2 + 2x_1 + x_2 + 4$

iii) $f(x) = 6x + 4x^2 + x^3$

iv) $f(x_1, x_2) = 2x_1^2 - 4x_1 x_2 + 6x_2^2$

Q9) a) Determine the optimum values of x_1 & x_2 for the function. $y = \dfrac{x_1^2}{3} + \dfrac{6}{x_1 x_2} + 2x_2$ and state whether point is minimum or maximum. **[8]**

b) Explain Quasi Newton method for optimization. **[8]**

OR

Q10)a) Explain region elimination method. **[8]**

b) Explain simplex method of optimization. **[8]**

Total No. of Questions : 12]

SEAT No. :

PA-328

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[5927]-212
B.E (Instrumentation & Control)
RELIABILITY ENGINEERING
(2015 Pattern) (Semester - II) (406271A) (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, Q9 or Q10, Q11 or Q12.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume Suitable data jf necessary.***

Q1) a) Explain the probability theory. **[5]**

b) Differentiate on Multi Component & Approximate System Reliability Evaluation. **[5]**

OR

Q2) a) What is Network Modeling? Give example. **[5]**

b) Explain briefly Reliability Evaluation. **[5]**

Q3) a) What is Interval Estimation? Give example. **[5]**

b) Elaborate on Reliability Life Testing Methods. **[5]**

OR

Q4) a) Write short on Probability Distribution Functions. **[5]**

b) Explain Non - Parametric methods with example. **[5]**

Q5) a) What are the uses of Control Charts? **[6]**

b) What is Quality Control? Explain with application. **[6]**

OR

Q6) a) What is Acceptance Sampling? Give example. **[6]**

b) Explain with application Total Quality Management. **[6]**

P.T.O.

Q7) a) What is Software Metrics for Reliability Assessment? **[7]**

b) Explain Software Reliability Concepts? **[6]**

OR

Q8) a) Explain Operational Profile with example. **[7]**

b) What are the differences between Software Testing and Reliability? **[6]**

Q9) a) What is Failure Mode and Effect Analysis (FMEA)? Give example. **[6]**

b) Elaborate on Product Development Process with example. **[6]**

OR

Q10)a) Explain with example what is Fault Tree Analysis (FTA)? **[6]**

b) Write a short note on Product Liability and Planning. **[6]**

Q11)a) What are the types of maintenance? **[6]**

b) What are the factors affecting maintainability? **[5]**

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

OR

Q12)a) What is system down time? Give example. **[7]**

b) What is inherent, achieved and operational availability? **[6]**

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Total No. of Questions : 10]

SEAT No. : ____

PA-329

[Total No. of Pages : 2

[5927]-213

B.E (Instrumentation & Control)

RENEWABLE ENERGY SYSTEMS

(2015 Pattern) (Semester - II) (406271B) (Elective - IV)

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

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume Suitable data jf necessary.***

Q1) a) Elaborate on the working of solar renewable system with diagram. **[6]**

b) Compare renewable and nonrenewable energy system. **[4]**

OR

Q2) a) Explain the working of Solar photo voltaic cell with diagram. **[6]**

b) Define the following terms related to the battery: Battery Voltage, Charge Storage Capacity. List the various parameters of battery. **[4]**

Q3) a) Draw and explain the working of Rechargeable battery. **[6]**

b) Define the following terms related to Photo voltaic cell: Short circuit current, Open circuit Voltage. Draw I - V curve of Solar cell. **[4]**

OR

Q4) a) Explain the working of Fuel cell with neat diagram. **[6]**

b) Elaborate on the charging technique for batteries. **[4]**

Q5) a) What is solar panel? How solar panel is manufactured from solar cell? Elaborate on the Solar Panel selection and array design. **[10]**

b) Draw and explain the working of Series and Parallel operation of Solar Panels. State the advantage of Series and Parallel connection of Solar Panel. **[8]**

OR

P.T.O.

Q6) a) What is Solar Tracker? State the need of Solar Tracker? Explain the working of solar tracker with neat diagram. **[10]**

b) With an block diagram, explain the working of Solar Panel mounting and Tracking. **[8]**

Q7) a) Explain the working of Solar water heater with neat diagram. **[8]**

b) Draw and explain the working of Grid tied Inverter with neat diagram. **[8]**

OR

Q8) a) Explain the working of Solar cooker with neat diagram. **[8]**

b) Elaborate on the working of solar power UPS system with neat diagram. **[8]**

Q9) a) Describe the wind energy conversion technology with neat diagram brief. **[8]**

b) Draw and explain the working of Wind plus diesel hybrid wind energy system. **[8]**

OR

Q10)a) Describe the concept of wind farm. **[8]**

b) Elaborate on the Wind Resource Assessment. **[8]**

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Total No. of Questions : 10]

SEAT No. :

PA-330

[Total No. of Pages : 2

[5927]-214
B.E. (Instrumentation and Control)
INSTRUMENTATION IN AGRICULTURE AND FOOD INDUSTRIES
(2015 Pattern) (Semester - II) (406271-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, Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Explain any four benefits of Instrumentation and Control in Agricultural field. **[5]**

b) Draw a process flow diagram of Sugar Industry? Enlist various parameters to be measured? **[5]**

OR

Q2) a) Enlist any two sensors for soil moisture measurement and two sensors for soil temperature measurement? Draw suitable labelled diagrams of it? **[5]**

b) Draw a process flow diagram of dairy industry? Explain with suitable diagram any two instruments used in it? **[5]**

Q3) a) Explain with proper diagram center pivot method of irrigation? Give its merit? **[5]**

b) Explain the working soil moisture measurement method using gypsum block? **[5]**

OR

Q4) a) Explain with proper diagram micro irrigation system? Give its merit? **[5]**

b) What is Green Houses? Apply instrumentation to Green Houses? Show it with block diagram? **[5]**

P.T.O.

Q5) a) Explain the concept of automation in earth moving equipments? Discuss the merits and demerits of it over conventional method? **[8]**

b) Explain the soil water measurement technique using Time-Domain refractometry (TDR)? **[8]**

OR

Q6) a) Classify various pumps? Explain the principle of working of centrifugal pump? Draw neat diagrams. **[8]**

b) Enlist Agrono-metrological instruments? Explain with proper diagram working of rain gauge? **[8]**

Q7) a) Define the term "Food Processing" Explain how food quality measurement is carried out? **[9]**

b) Explain the importance and use of "Agmark"? **[9]**

OR

Q8) a) Explain the concept of Indian Standards and Codex standards? **[9]**

b) Design a cold storage of small size? Give designing steps? **[9]**

Q9) a) Explain with proper diagrams how SCADA is used in food processing industry? **[8]**

b) With the help of block diagram explain how controlled environment is created in food industry? **[8]**

OR

Q10)a) Explain with proper diagrams how PLC is used in food processing industry? Give one example with design steps? **[8]**

b) Enlist various trends followed in food processing industry **[8]**

Total No. of Questions : 10]

SEAT No. : ____

PA-331

[Total No. of Pages : 4

[5927]-215

B.E. (Mechanical)

REFRIGERATION AND AIR CONDITIONING

(2015 Pattern) (Semester - I) (302049)

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

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume Suitable data if necessary and mention it clearly.***
5) ***Use of steam table is allowed.***

Q1) a) Explain with neat sketch Bell-Coleman Cycle. Also represent the cycle on P-V and T-s diagram. **[6]**

b) Explain the working of three fluid vapour absorption system with neat sketch. **[4]**

OR

Q2) a) State desirable properties of a good refrigerant. **[4]**

b) A vapour compression system having capacity of 4 TR and uses R12 as a refrigerant works on simple saturated cycle with dry compression between evaporator temperature of – 15°C & condenser temperature of 30°C. Take specific heat of vapour referigerant as 0.62 kJ/kgK. Represent the cycle on p-h and T-s diagram and Calculate : **[6]**

i) Mass flow rate of refrigerant circulated through the system.

ii) Power required to drive the compressor.

iii) COP of the system.

iv) Heat rejected in condenser.

Properties of R12 are :

T(°C)	h_f (kJ/kg)	h_g (kJ/kg)	S_f (kJ/kgK)	S_g (kJ/kgK)
–15	22.33	180.98	0.0906	0.7052
30	64.59	199.62	0.24	0.6853

P.T.O.

Q3) a) Explain water cooler with neat sketch. **[4]**

b) Explain with neat sketch the working of two stage compression with water intercooler and liquid subcooler employed for vapour compression system. Represent the cycle on p-h diagram. **[6]**

OR

Q4) A 40 TR two stage compression ammonia refrigeration system uses water intercooler between two stages and liquid subcooler for undercooling of refrigerant leaving the condenser. The system is working between the evaporator temperature of –20ºC and condenser temperature of 40ºC. The intercooler pressure is 6 bar. The ammonia is cooled to 30°C in water intercooler and subcooled as liquid to 30°C. **[10]**

Find :

a) The mass flow rate of ammonia circulation

b) Power required to drive the system and

c) COP of the system. Also represent the cycle on p-h diagram. [Use Ammonia (R717) refrigerant chart]

Q5) a) Define specific humidity, relative humidity, dew point temperature and degree of saturation. **[8]**

b) Without using psychrometric chart, calculate specific humidity, relative humidity, humid specific heat and enthalpy of moist air when DBT is 30°C, DPT is 15°C and total barometric pressure is 101.325 kPa. **[8]**

OR

Q6) a) Moist air at 27ºC and 80% RH is adiabatically dehumidified by passing through a drier so that is final relative humidity is 30%. The air is then cooled by passing through cooler until its temperature reaches to 25ºC without change in specific humidity. Show the process on psychrometric chart and Determine : **[10]**

[Use of Psychrometric Chart is allowed]

i) Temperature of air leaving the drier.

ii) DPT of the air leaving the drier.

iii) Heat rejected during the cooling process.

iv) Relative humidity at the end of cooling process.

v) The moisture removed during dehumidification process.

b) Explain Adiabatic Mixing of Two Air Streams. **[6]**

Q7) a) Give the classification of refrigerant compressors. **[2]**

b) Explain Flooded Evaporator with neat sketch. **[8]**

c) Explain Winter air conditioning system with neat sketch. **[8]**

OR

Q8) a) Enlist the different expansion devices used in refrigeration and air conditioning systems. **[2]**

b) Classify the condensers and explain evaporative condenser with neat sketch. **[8]**

c) Explain Thermostatic Expansion Valve with neat sketch. **[8]**

Q9) a) What are the different methods of duct design? Explain any one method in detail. **[8]**

b) A rectangular duct 0.8m × 0.5m size carries $4m^3/s$ of air having density of 1.2 kg/m^3. Determine the equivalent diameter of the circular duct if **[8]**

i) the quantify of air carried is same

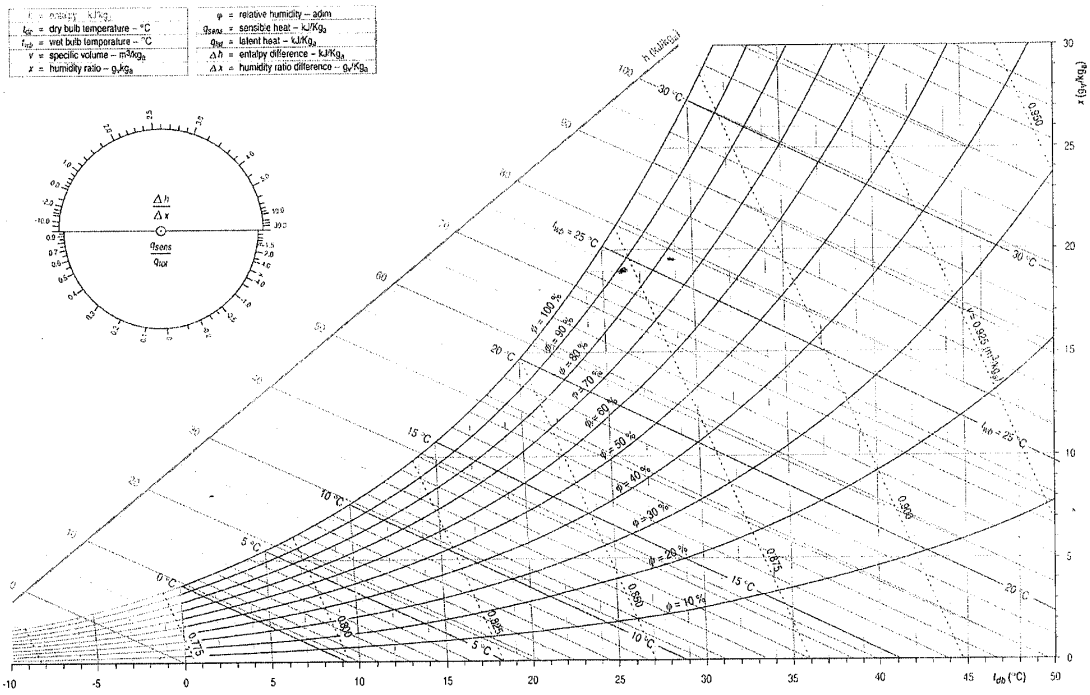
ii) velocity of air is same

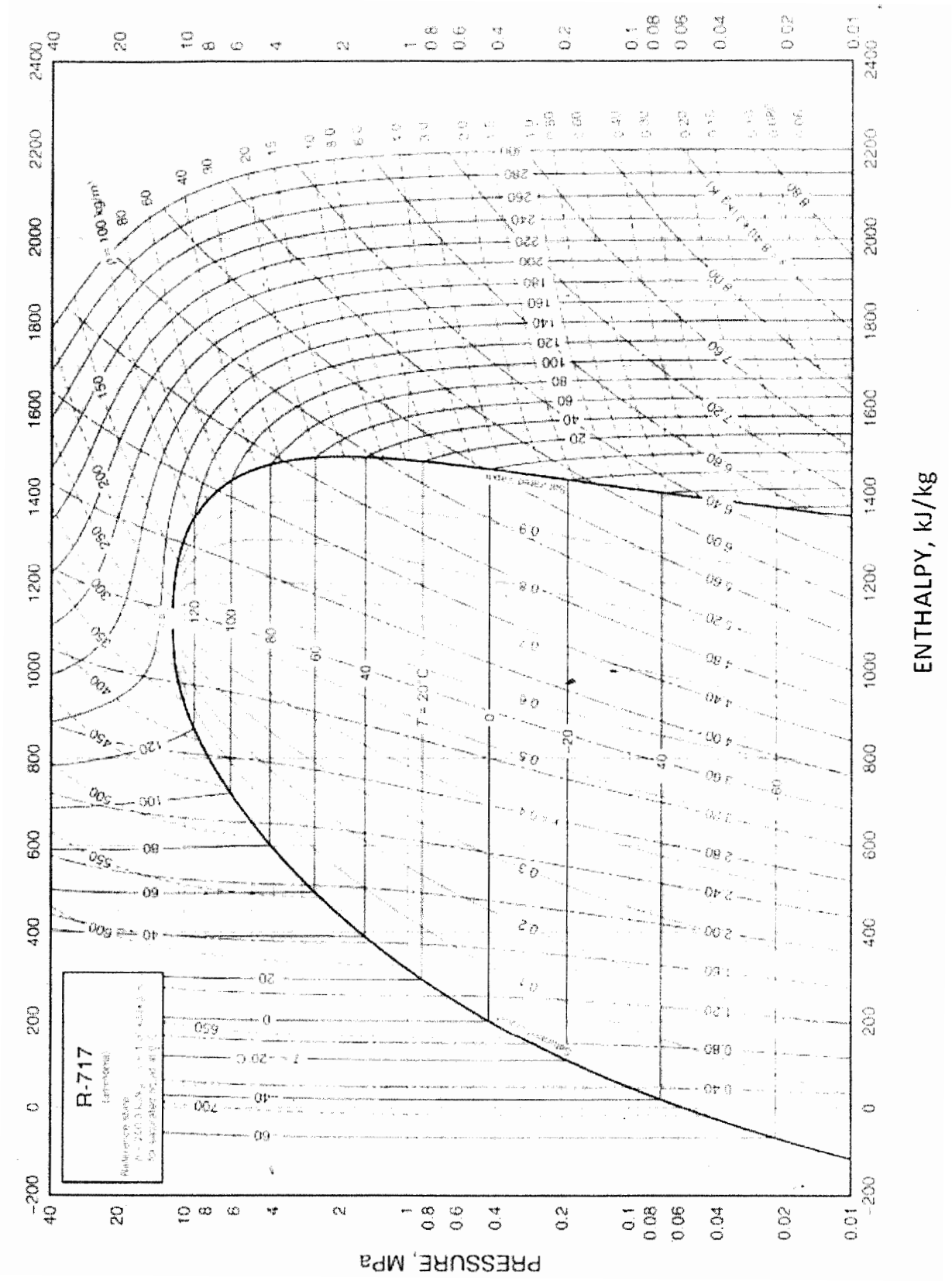
If friction factor f = 0.001, Find the pressure loss per 100 m length of duct.

OR

Q10) a) Derive the expression for equivalent diameter of circular duct corresponding to a rectangular duct of sides 'a' and 'b' for the same pressure loss per unit length, when the discharge is same and when the velocity of air flowing through both ducts is same. **[10]**

b) A rectangular duct 400mm × 200mm is 20m long and carries $30m^3/min$, of air having density $1.2kg/m^3$. Find the total pressure required at the inlet to the duct and air power required. Take friction factor f = 0.005. **[6]**




R-717
ENTHALPY, kJ/kg
PRESSURE, MPa

× × ×

Total No. of Questions : 8]

SEAT No. : ____

PA-332

[Total No. of Pages : 3

[5927]- 216
B.E. (Mechanical Engineering)
HYDRAULICS AND PNEUMATICS
(2015 Pattern) (Semester - I) (402041)

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

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4,Q.5 or Q.6, Q.7 or Q.8.***
2) ***Use of non-programmable scientific calculator is allowed.***
3) ***Figures to the right indicate full marks.***
4) ***Draw neat and suitable figure wherever necessary.***
5) ***Assume data wherever necessary and mention it.***
6) ***Use of steam table is permitted.***

Q1) a) What are the factors considered while selecting hydraulic fluids? **[4]**

b) Sketch double acting hydraulic cylinder and name different parts. What are the parameters considered during cylinder design? **[8]**

c) List various methods of varying the swash plate angle in case of axial pumps. Explain any one method with net sketch. **[8]**

OR

Q2) a) Compare hose connections with pipe connections in brief. **[4]**

b) Classify directional control valves. Explain a float centered directional control valve with neat sketch along with application. **[6]**

c) What factors will you consider in selecting a hydraulic motor? Mention two allocations of usages of hydraulic motor with their types. **[10]**

Q3) a) With the help of neat sketch, explain the pump unloading circuit. **[8]**

b) What are the source of contamination in hydraulic systems? Explain how contamination control is done in these systems. **[8]**

OR

Q4) a) What are the conditions for two cylinders to be synchronized? Explain with the help of circuits. **[10]**

b) What are the locations where filters are typically installed in hydraulic circuits? What are their advantages? **[6]**

P.T.O.

Q5) a) Draw typical circuit of different speed regulating methods used in pneumatics circuits. **[9]**

b) What is purpose of quick exhaust valve in a pneumatic system? Explain with neat sketch of it, with a typical application. **[8]**

OR

Q6) a) Draw and explain a typical compressed air generation and distribution system. **[8]**

b) What are the different selection criteria for air compressor? **[4]**

c) What are the advantages of pneumatic systems over hydraulic system? **[5]**

Q7) a) A high - low circuit with an unloading valve is employed for press application. This operation requires flow rate of 200 lit/min for high speed opening and closing of the dies at maximum pressure of 30 bar. The work stroke needs a maximum pressure of 400 bar. Assuming equal power requirement in both process, determine the suitable delivery of both pumps. **[10]**

b) Analyze the ciruit shown inFig 7 (b). **[7]**

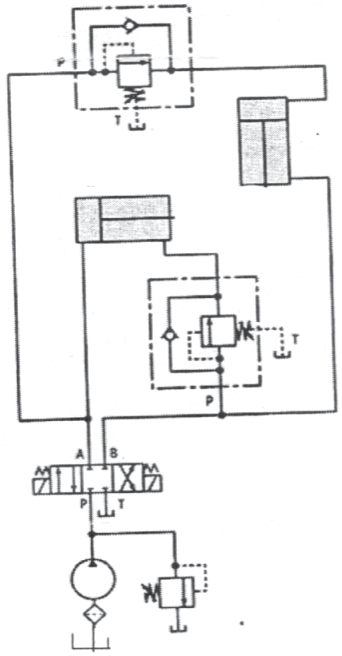


Fig. 7 (b)

OR

8) a) In a meter - in circuit, a cylinder with 100 mm bore diameter and 70 mm rod diameter is used to exert a forward thrust of 100 kN, with velocity of 0.5m/min. Neglecting the pressure drop through the piping valves. If the pump flow is 20 lit/min, find the following: **[10]**

i) Pressure required at the pump during extension.
ii) Flow through the flow control valve
iii) Relief valve setting.
iv) Flow out of the pressure relief valve.
v) System efficiency during extension.

b) Analyze the circuit shown in Fig 8 (b). **[7]**

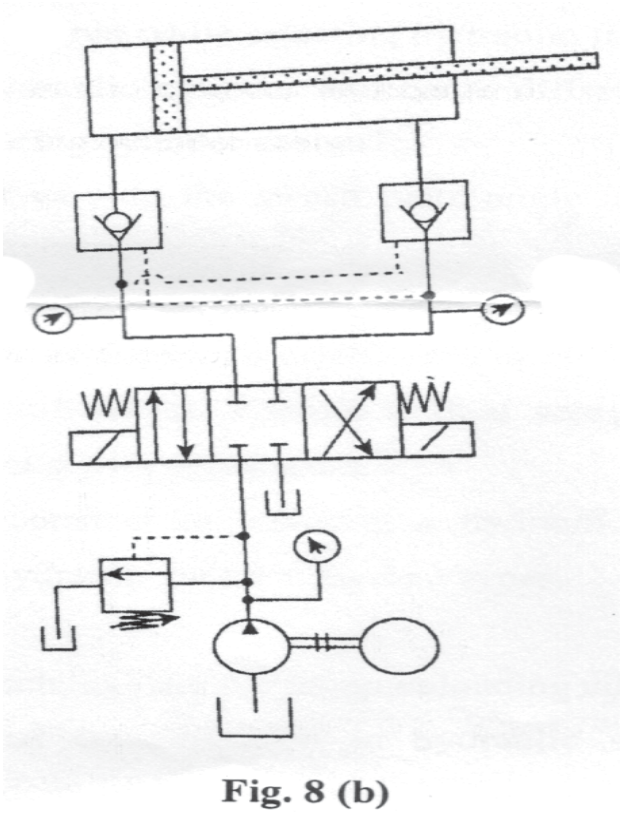


Fig. 8 (b)

Total No. of Questions : 10]

SEAT No. :

PA-333

[Total No. of Pages : 3

[5927]-217
B.E. (Mechanical)
CAD/CAM & AUTOMATION
(2015 Pattern) (Semester - I) (402042)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Figures to the right 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) A triangle ABC has its vertices at A(10,10), B(10, 20), C(20, 10) is rotated about Origin 'O' in 90° in CCW direction. Calculate concatenated transformation matrix and determine final position of triangle. **[6]**

b) Write parametric equations of (i) Circle, (ii) Ellipse. **[4]**

OR

Q2) a) Differentiate between Orthogonal and Perspective Projections. **[6]**

b) Explain Cubic spline curve with neat sketch. **[4]**

Q3) a) Explain Coon's patch surface with neat sketch. **[5]**

b) Distinguish between 'h' & 'p' formulations. **[5]**

OR

Q4) An axial stepped bar as shown in Figure 1, is axially loaded by force $F_1 = 10kN$ and $F_2 = 10kN$. Assuming $E_1 = E_2 = 200\text{N/mm}^2$, $A_1 = 200\text{mm}^2$, $A_2 = 100mm^2$ and $L_1 = L_2 = 200mm$, determine deflection, stresses in elements and reactions at nodes. **[10]**

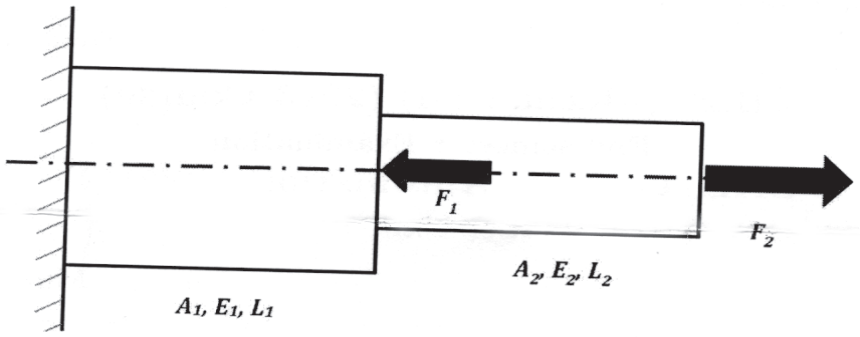
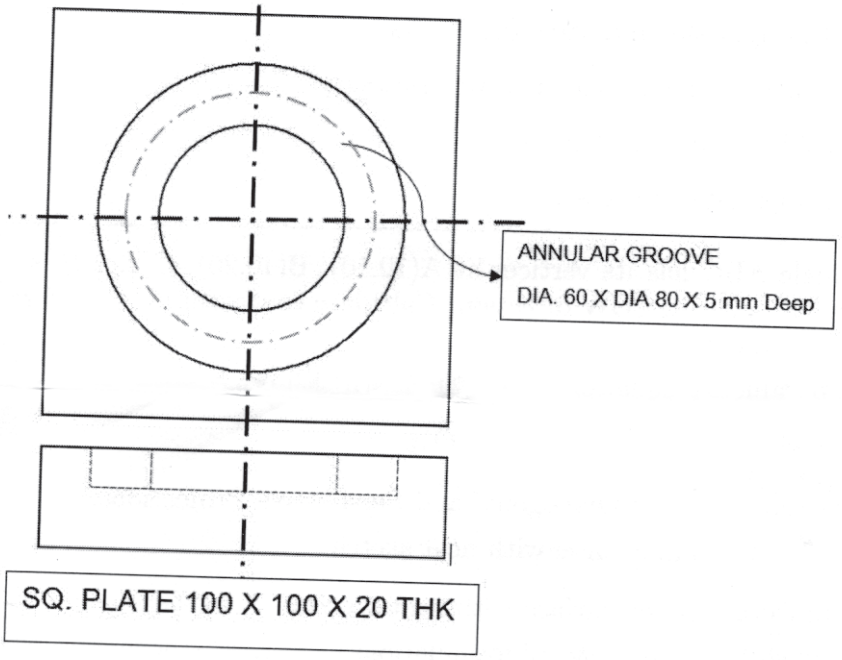


Figure 1: Qu 4

P.T.O.

Q5) a) Write steps in FEA with neat sketch. **[6]**

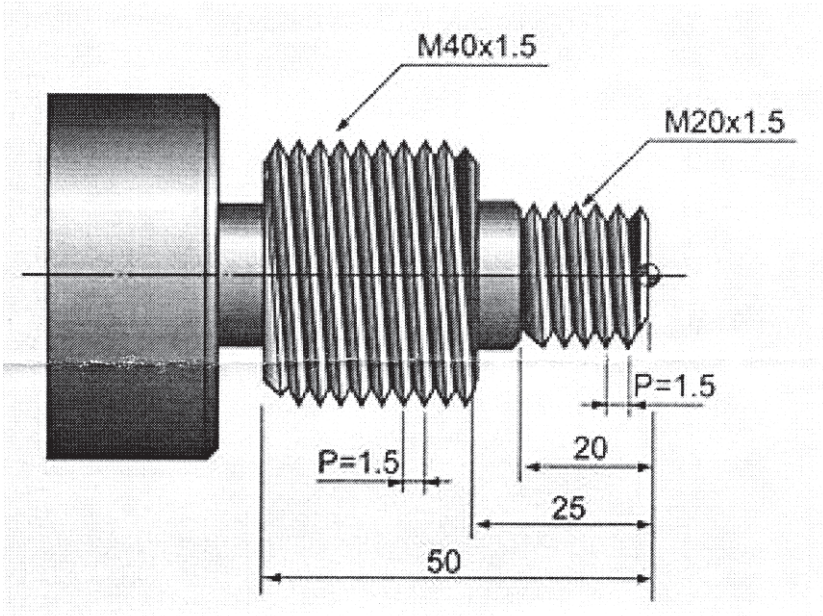
b) Write CNC part programming for Milling for component as shown in figure 2 using concept of sub-programming with 1 mm step. Assume suitable cutting data. **[12]**



OR

Q6) a) Explain difference between canned cycle for roughing and finishing operations in CNC turning with neat sketch. **[6]**

b) Write CNC part program for turned component as shown in figure 3 using canned cycles. Assume suitable cutting data. **[12]**



Q7) a) Write short note on Components of Product Life Cycle (PLM). **[8]**

b) Explain FDM with neat sketch. **[8]**

OR

Q8) a) Discuss: Classification of RP processes. **[8]**

b) What is Collaborative Engineering and briefly discuss role of Collaborative Engineering in current industry. **[8]**

Q9) a) Differentiate between HARD & SOFT Automation. **[8]**

b) State 'Laws of Robotics'. **[8]**

OR

Q10)a) Write short note on Flexible Manufacturing Systems (FMS). **[8]**

b) Discuss briefly: Group Technology. **[8]**

Total No. of Questions : 10]

SEAT No. : [ ]

PA-334

[Total No. of Pages : 3

[5927]-218
B.E. (Mechanical)
DYNAMICS OF MACHINERY
(2015 Pattern) (Semester - I) (402043)

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

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Draw neat diagrams wherever necessary.***
3) ***Use of scientific calculator is allowed.***
4) ***Assume suitable data where ever necessary.***
5) ***Figures to the right indicate full marks.***

Q1) a) Explain the following terms with respect to the free damped vibrations **[4]**

i) Critical damping coefficient

ii) Damping factor

b) Explain frequency response curves for different damping conditions with significance. **[6]**

OR

Q2) a) Explain following terms : **[4]**

i) Zero frequency deflection

ii) Node point

b) An under damped shock absorber is to be designed for a motorcycle of mass 200 kg, such that during a road bump, the damped period of vibration is limited to 2 seconds and the amplitude of vibration should reduce to one-sixteenth in one cycle. Find the spring stiffness and damping coefficient of the shock absorber. **[6]**

Q3) a) Explain the concept of torsionally equivalent shaft. **[4]**

b) Explain mathematical model of a bicycle with a rider. **[6]**

OR

P.T.O.

Q4) A periodic torque having a maximum value of 0.65 Nm at a frequency corresponding to 5 rad/sec is impressed upon a flywheel suspended from a wire. The wheel has a moment of inertia of 0.15 kg.m^2 and a wire is having a diameter of 6 mm and a length of 1.2 m. The modulus of rigidity of the material is equal to 0.8×10^{11} N/m^2. A viscous dashpot applies damping couple of 0.693 Nm at an angular velocity of 1.5 rad/sec. Calculate: **[10]**

a) The maximum angular displacement from the rest position.

b) The maximum couple applied to dashpot.

c) The angle by which the angular displacement legs the torque.

Q5) a) Differentiate between static and dynamic balancing. Why there is a need of accurate dynamic balancing of high speed machines? **[6]**

b) Explain the method of direct and reverse cranks to determine the unbalance forces in radial engines with the help of neat diagrams. **[10]**

OR

Q6) a) Explain with neat diagram why single cylinder engine cannot be completely balanced. **[6]**

b) In a three cylinder radial engine, axes of cylinder are coplanar and angles between neighboring axes are 60°. All cylinders drive same crank of length 220 mm. Each connecting rod is 850 mm long. Reciprocating mass per cylinder is 1.5 kg and the engine runs at 1200 rpm. Find primary and secondary direct and reverse unbalance forces. **[10]**

Q7) a) Explain condition monitoring of machines. Explain different techniques for it. **[6]**

b) Explain the working of FFT Analyzer. **[6]**

c) It is required to measure the maximum acceleration of a machine, which vibrates violently with the frequency of 700 cycles per min. Accelerometer with negligible damping is attached to it and the indicator travels by 8.2 mm. If the accelerometer weighs 0.5 kg and has a spring rate of 17500 N/m, what is the maximum amplitude and maximum acceleration of the part? **[6]**

OR

Q8) a) What are the different methods of vibration control? Explain any one. **[6]**

b) Explain working of Magneto-Rheological dampers with neat sketch and application. **[6]**

c) A vibrometer has a natural frequency of 5 rad/sec and a damping factor of 0.2. An instrument is used to measure a vibrations of a body having a harmonic frequency of 45 rad/sec. The difference between the maximum and minimum reading is 7 mm. Find the amplitude of motion of vibrating body. **[6]**

Q9) a) Explain in brief various sources of noise and how to control the same. **[6]**

b) Explain acoustic material & its characteristics. **[6]**

c) Show that if the sound power is doubled, then the sound power level increases by approximately 3 bB. **[4]**

OR

Q10)a) Explain following terms with respect to sound : **[6]**

i) Anechoic chamber

ii) Reverberation chamber

b) State and explain various types of sound fields? **[6]**

c) Calculate the total noise, if there are 4 sources of noise having magnitudes 45 dB, 54 dB, 53 dB and 52 dB. What would be effect on total noise, if 45 dB noise is switched off? **[4]**

x x x

Total No. of Questions : 10]

SEAT No. :

PA-2617

[Total No. of Pages : 3

[5927]-219A

B.E. (Mechanical / Automobile)

FINITE ELEMENT ANALYSIS

(2015 Pattern) (Elective - I) (402044A) (Semester - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Figures to the right indicate full marks.***

Q1) a) Explain Finite Element Analysis with basic steps. **[6]**

b) Write difference between finite element method and finite difference method. **[4]**

OR

Q2) Find the displacement and reaction for each section in figure 1. **[10]**

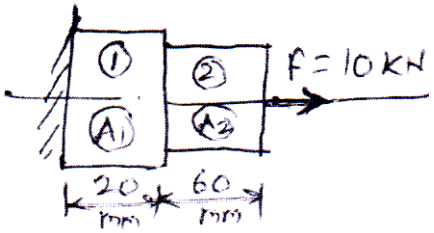


Fig. 1

Given

$A_1 = 200\ mm^2$ $E_1 = 200\ GPa$

$A_2 = 180\ mm^2$ $E_2 = 120\ GPa$

Axial Pull F = 10 kN

Q3) a) Explain the importance of boundary conditions in FEA analysis with types and neat sketches. **[6]**

b) Explain different types? Elements used in FEA with sketches. **[4]**

OR

Q4) Find the displacement and reaction for each section in figure 2. **[10]**

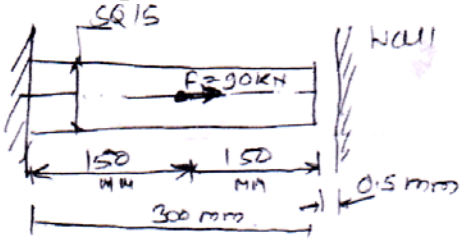


Fig. 2

Given Data :

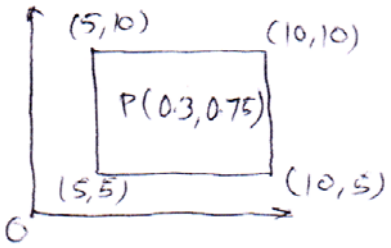
Uniform material

with $E = 80 \times 10^3\ N/Nm^2$

P.T.O.

Q5) a) Explain Isoparametric, super parametric and subparametric element. **[6]**

b) Point P is located in rectangular element having natural coordinates (0.3, 0.75) Determine coordinates of point 'P'. **[10]**



OR

Q6) a) Explain step by step procedure of gauss 2 and 3 point numerical integration method and how it is applied in iso-parametric formulations. **[8]**

b) Evaluate the following integrals using two point Gaussian quadrature method. **[8]**

$$I=\int_{-1}^{+1}\int_{-1}^{+1}\left[r^2+2rs+s^2\right]dr.ds$$

Q7) a) Write down governing equation of steady state heat transfer. Also write element stiffness matrix and compare it with bar element. **[8]**

b) Write down various steps involved in the processing step, to solve for IP heat transfer problem using finite element analysis. **[8]**

OR

Q8) a) Derive FEA stiffness matrix for pin fin heat transfer problem. **[8]**

b) A composite wall consisting of three elements as shown in fig 3. The outer temperature is T_0 = 20°C; convection heat transfer takes place on the inner surface of the wall T_∞ = 800°C and h = 25 W/m²°C. Determine the temperature distribution in wall. **[8]**

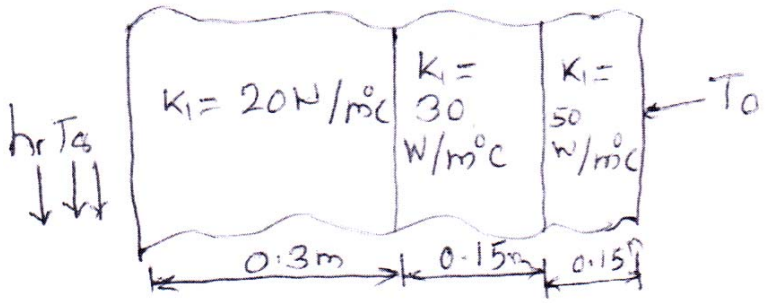


Fig.3

Q9) a) Explain the difference between lumped mass matrix and consistent mass matrix techniques for modal analysis of structures. **[8]**

b) Estimate the natural frequencies of axial vibrations of bar as shown in figure 4. Using both consistent as well as lumped mass matrices and compare the results. The bar is having uniform cross section with area $A = 50 \times 10^{-6}$ m^2 length L = 1.5 m, modulus of Elasticity $E = 2 \times 10^{11}$ N/m^2 and density $\rho = 7800$ kg/m^3. Model the bar using three elements. **[10]**

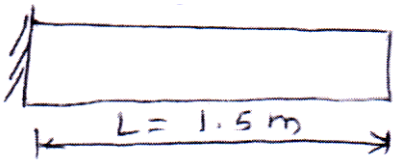


Fig.4

OR

Q10)a) Write down lumped mass matrix and consistent mass matrix for following elements. **[9]**

a) Bar element

b) Plane truss element

c) Triangular element

b) Find the natural frequencies of longitudinal vibrations of the unconstrained stepped bar of cross sectional areas A and 2A; having equal step lengths as shown in fig .5. **[9]**

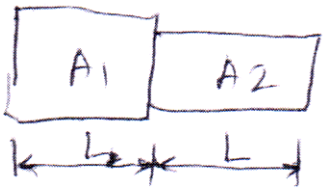


Fig. 5

Total No. of Questions : 10]

SEAT No. : ____

PA-139

[Total No. of Pages : 2

[5927]-22

B.E. (Chemical)

ENVIRONMENTAL ENGINEERING

(2015 Pattern) (Semester - I) (Elective - I) (New) (409344A)

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

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) Write an Explanatory note on scale of pollutant concentration. **[10]**

OR

Q2) Write an explanatory note on impact of urban areas on environmental pollution. **[10]**

Q3) Explain with a neat sketch fabric filter used in air pollutant removal. **[10]**

OR

Q4) Explain with a neat sketch: **[10]**

a) Venturi Scrubber

b) Spray Tower

Q5) a) Write an explanatory note on: **[12]**

i) Dissolved Oxygen (DO)

ii) Biochemical Oxygen Demand (BOD)

b) Explain with a neat sketch Oxygen Sag Curve. **[5]**

OR

P.T.O.

Q6) 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.

Q7) Explain with a neat sketch Trickling filter used for effluent treatment. **[16]**

OR

Q8) Explain the process design and basic operating principles of activated sludge (suspended growth) process. **[16]**

Q9) Write and explanatory note on: **[17]**

a) Sanitary land filling

b) Incineration

OR

Q10)a) What do you understand by composting? How do you treat solid waste by means of composting? **[9]**

b) What are tertiary treatments? Explain disinfection by UV. **[8]**

Total No. of Questions : 10]

SEAT No. :

PA-336

[Total No. of Pages : 2

[5927]-220
B.E. (Mechanical)
COMPUTATIONAL FLUID DYNAMICS
(2015 Pattern) (Semester - I) (Elective-I) (402044 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. Q9 or Q10.***
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) Explain the concept of substantial derivative, divergence and curl of velocity. **[6]**

b) Explain the mathematical nature of Hyperbolic equation and their physical boundary conditions. **[4]**

OR

Q2) Explain the momentum equation for an infinitesimally small fluid element fixed in space. **[10]**

Q3) a) Write a short note on FEM and FVM. **[4]**

b) Short note on first order upwind (FOU) and QUICK convection schemes **[6]**

OR

Q4) Explain the solution of two dimensional steady heat conduction equation using finite volume method. **[10]**

Q5) a) Derive an expression for numerical solution of two-dimensional convection diffusion equation for slug flow using finite volume method. **[10]**

b) Derive mathematical equation for 1-D transient convection diffusion system. **[8]**

OR

P.T.O.

Q6) a) A property ϕ is transported by means of convection and diffusion through the one dimensional domain sketched in Figure 1. The governing equation is, $\frac{d(\rho u\varphi)}{d}\frac{d}{d}\left(\frac{d\varphi}{d}\right)$ the boundary conditions are φ_0 = 1 at x = 0 and $\varphi_L = 0$ at $x = L$. Using five equally spaced cells and the central differencing scheme for convection and diffusion, calculate the distribution of φ as a function of x for u = 0.1 m/s. **[14]**

Figure-1

b) Define Pec let number and state its importance? **[4]**

OR

Q7) a) Write a short note on importance of pressure correction method in SIMPLE algorithm. **[6]**

b) List out the difficulties for solving the Navier Stokes equation. Explain SIMPLE algorithm for solution of 2-D Navier Stokes equation. **[10]**

OR

Q8) a) Explain external flow simulation with an example. **[6]**

b) Derive a solution of Navier-Stokes equation for incompressible flow using SIMPLE algorithms for lid driven cavity flow problem. **[10]**

Q9) a) Explain the necessity of turbulence modeling in CFD. List out different types of turbulence models and explain any one turbulence model in detail. **[8]**

b) Explain 1) k-ε turbulence model and 2)1) k-ω turbulence model. **[8]**

OR

Q10)a) Explain Reynolds average Navier stokes (RANS) in details. **[10]**

b) Write a short note on one equation and two equation model. **[6]**

Total No. of Questions : 10]

SEAT No. :

PA-337

[Total No. of Pages : 2

[5927]-221

B.E. (Mechanical Engineering)

HEATING, VENTILATION & AIR CONDITIONING AND REFRIGERATION ENGINEERING

(2015 Pattern) (Semester - I) (Elective-I) (402044C)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8, Q.9 or Q.10.***
2) ***Assume suitable data, If wherever necessary.***
3) ***Use of non-programmable pocket calculator is allowed.***
4) ***Draw neat diagrams wherever necessary.***
5) ***Figures to the right Indicate full marks.***

Q1) a) Write advantages and Disadvantages of transcritical cycle. **[3]**

b) A 10 ton ammonia vapour compression refrigeration system consists of one evaporator and two stage compression. The suction temperature is -30°C and condensing temperature of 35°C. Flash inter-cooling is done between two stages of compression. Find theoretic kW of each compressor and COP of the plant. **[7]**

OR

Q2) a) Explain with neat sketch construction and working of Ejector refrigeration. **[3]**

b) Calculate the power needed to compress 20 kg / m in of ammonia from saturated vapour at 1.4 bar to a condensing pressure of 10 bar by two stage compression with intercooling by liquid refrigerant at 4 bar. Assume saturated liquid to leave the condenser and dry saturated vapors to leave the evaporator. Use the p-h chart. Determine, also, the power needed when intercooling is not employed. **[7]**

Q3) a) What are the standard Codes used for Evaporator? **[3]**

b) Explain with neat sketch, what is hunting of thermostatic valve and how it can be prevented? **[7]**

OR

P.T.O.

Q4) a) Explain various parameters to be considered while piping design for reciprocation refrigeration systems. **[5]**

b) How capacity control of reciprocation compressor is done? Explain with neat sketch. **[5]**

Q5) a) What are the basic parameters which affect the thermal comforts? Draw thermal comfort chart. **[8]**

b) Write advantage of Mechanical ventilation over Natural Ventilation system with neat sketch. **[8]**

OR

Q6) a) What are the elements of air distribution system? Explain any one air distribution system with neat sketch. **[8]**

b) Explain the use of outdoor air weather data in design. Weather characteristic and it influence. **[8]**

Q7) a) Explain how heat gain through fenestrations affect heat load estimation in building structures. **[8]**

b) What is CLTD? Explain CLTD method in detail. **[8]**

OR

Q8) a) Discuss various techniques of Energy efficient and cost effective measures for building envelope. **[10]**

b) Write short notes on **[6]**

i) Sol air temperature

ii) ECBC

Q9) a) What are sorbents and desiccants? How sorbents and desiccants are useful? **[8]**

b) What is solid packed tower? Explain with neat sketch. **[10]**

OR

Q10)a) Explain with neat sketch rotary desiccant dehumidifier. **[8]**

b) Explain heat pump cycle with neat sketch. **[10]**

Total No. of Questions : 10]

SEAT No. : ____

PA-338

[Total No. of Pages : 2

[5927]-222

B.E. (Mechanical)

AUTOMOBILE ENGINEERING

(2015 Pattern) (Semester - I) (Elective-II) (402045A)

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

Instructions to the candidates:

1) ***All questions carry equal marks.***
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 vehicle specification & classify the vehicles? **[5]**

b) Draw neat sketch of fluid flywheel & explain its working? **[5]**

OR

Q2) a) What are the different types of frames used in automobile? **[5]**

b) Explain working of torque conuverter with neat sketch. **[5]**

Q3) a) What are the different types of loads acting on axels? **[5]**

b) What is wheel balancing? Explain alloy wheels? **[5]**

OR

Q4) a) What is wheel alignment? Explain the parameters checked during wheel alignment? **[4]**

b) Explain air braking system with neat sketch. **[6]**

Q5) a) A passenger car travelling at 80 km/hr is accelerated up a gradient of 1 in 20. The gross vehicle weight is 11026.GN it has a frontal area of 1.858 m^2 and the air resistence. Coefficient may be assumed as 0.0167. The rolling resistance is 221.7N. at the above speed, the engine develops 58.88 kw at engine speed of 4000 Rpm, rear axel ratio is 5:1 and transmission efficiency is 95% calculate. **[8]**

i) The total tractive resistance.

ii) The tractive effort available at the wheel.

iii) The acceleration while ascending the above gradient.

b) Explain road performance curve? Types of vehicle resistances? **[8]**

OR

P.T.O.

Q6) a) Write note on NVH in automobile? **[8]**

b) Explain different types of safety in automobile? **[8]**

Q7) a) Explain hom & wiper system with neat sketch? **[8]**

b) Explain maintance schedule of propeller shaft, differential & steering system. **[8]**

OR

Q8) a) Explain electrical fuel pump & temperature gauges. **[8]**

b) Write note on rating capacity & efficiency of batteries. **[8]**

Q9) a) Write note on environmental importance of EV's & HEV's. **[9]**

b) Explain layout, construction 8 working of EV's? **[9]**

OR

Q10)a) Explain challenges & future scope for HEVs? **[9]**

b) Write note on fuel efficiency analysis of HEV's. **[9]**

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Total No. of Questions : 10]

SEAT No. :

PA-339

[Total No. of Pages : 6

[5927]-223

B.E. (Mechanical)

OPERATION RESEARCH

(2015 Pattern) (Semester - I) (Elective - II) (402045B)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Answers in one answer book.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Briefly trace the history of Operation Research (OR). How did operation research develop after World War II? **[4]**

b) The data refers to the machining whose purchase price is Rs. 2,00,000. The other costs are as follows : **[6]**

Year	1	2	3	4	5	6	7
Running cost (Rs.)	30,000	38,000	46,000	58,000	72,000	90,000	1,10,000
Resale value (Rs.)	1,00,000	50,000	25,000	12,000	8,000	8,000	8,000

Determine at which time it is profitable to replace the machine.

OR

Q2) A department of 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. How should the jobs be allocated, one per employee so as to minimize the total man-hours? **[10]**

		Employees				
		I	**II**	**III**	**IV**	**V**
Jobs	**A**	2	9	2	7	1
	B	6	8	7	6	1
	C	4	6	5	3	1
	D	4	2	7	3	1
	E	5	3	9	5	1

P.T.O.

Q3) a) Explain the following terms : **[4]**

i) Two-person zero-sum game.

ii) Pure strategy in game theory.

b) Two competitors are competing for the market share of the similar product. The payoff matrix in terms of their advertising plan is shown below : Suggest optimal strategies for the two firms and the net outcome thereof. **[6]**

Competitor A	**Competitor B**		
	No advertising	Medium Advertising	Heavy Advertising
No advertising	10	5	–2
Medium Advertising	13	12	13
Heavy Advertising	16	14	10

OR

Q4) A dairy firm has three plants located in a state. The daily milk production at each plant is as follows : **[10]**

Plant 1 : 6 million litres,

Plant 2 : 1 million litres, and

Plant 3 : 10 million litres.

Each day, the firm must fulfil the needs of its four distribution centres. The minimum requirement of each centre is as follows :

Distribution centre 1 : 7 million litres,

Distribution centre 2 : 5 million litres,

Distribution centre 3 : 3 million litres, and

Distribution centre 4 : 2 million litres

Cost (in hundreds of rupees) of shipping one million litre from each plant to each distribution centre is given in the following table :

		Distribution Centre			
		D1	**D2**	**D3**	**D4**
	P1	2	3	11	7
Plants	**P2**	1	0	6	1
	P3	5	8	15	9

Find initial feasible solution for a given problem by using

a) North-west corner rule.

b) Least cost method.

c) Vogel's approximation method.

Q5) a) Explain Critical path, Total, Free and Independent float in the CPM analysis. **[4]**

b) A company has decided to modernized its office. The major elements of the project are as follows : **[12]**

Activity	**Description**	**Predecessor Activity**	**Duration (Days)**
A	Organize sale office	----	6
B	Hire salesman	A	4
C	Train salesman	B	7
D	Select advertising agency	A	2
E	Plan advertising campaign	D	4
F	Conduct advertising campaign	E	10
G	Design package	----	2
H	Set up packaging facilities	G	10
I	Package initial stocks	J, H	6
J	Order stock from manufacturer	-----	13
K	Select distributors	A	9
L	Sell to distributors	C, K	3
M	Ship stocks to distributors	I, L	5

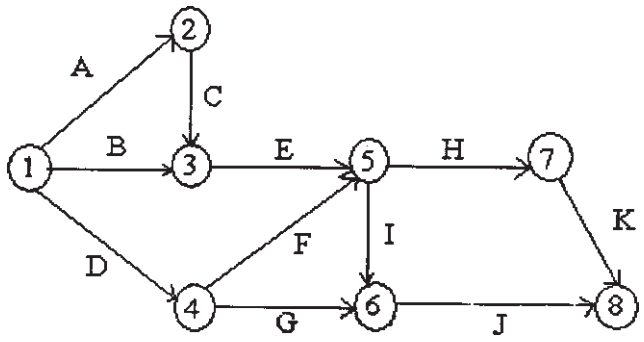
i) Draw an arrow diagram for this project.

ii) Find out the critical path.

iii) For each non-critical activity find out the total and free floats.

OR

Q6) a) For the project



Task :	A	B	C	D	E	F	G	H	I	J	K
Least time :	4	5	8	2	4	6	8	5	3	5	6
Greatest time :	8	10	12	7	10	15	16	9	7	11	13
Most likely time :	5	7	11	3	7	9	12	6	5	8	9

Find the earliest and latest expected time to each event and also critical path in the network. **[10]**

b) Compare and Contrast CPM and PERT. Under what conditions would you recommend the scheduling by PERT? Justify your answer with reasons. **[6]**

Q7) a) Seven jobs are to be process on three machines. The processing time is as follows, Find the optimal schedule so that the total elapsed time is minimized. **[10]**

Job	**1**	**2**	**3**	**4**	**5**	**6**
Machine A (Hrs)	8	3	7	2	5	1
Machine B (Hrs)	3	4	5	2	1	6
Machine C (Hrs)	8	7	6	9	10	9

b) Explain the following arrivals behaviours : **[6]**

i) Balking.

ii) Reneging.

iii) Jockeying.

OR

Q8) a) In a railway marshalling yard, goods trains arrive at a rate of 30 trains per day. Assuming the inter-arrival time follows an exponential distribution and the service time distribution is also exponential with an average of 36 minutes. Calculate **[8]**

i) Expected queue size (Line length).

ii) Probability that the queue size exceeds if the input of trains increases to an average of 33 per day. What will be the change in 1 and 2.

b) Find out the sequence that minimizes the total elapsed time required to complete the tasks on two machines. **[8]**

Operation	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**
Machine 1	2	5	4	9	6	8	7	5	4
Machine 2	6	8	7	4	3	9	3	8	11

Q9) a) Solve the following integer LP problem using the cutting plane method **[12]**

Maximize $Z = 3X_1 + 12X_2$

Subject to constrain

i) $2X_1 + 4X_2 \leq 7$

ii) $5X_1 + 3X_2 \leq 15$

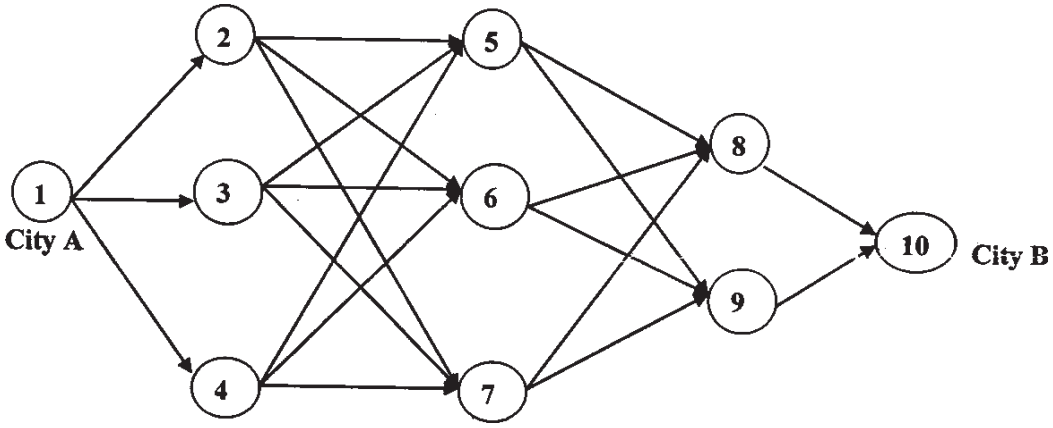
iii) $X_1, X_2 \geq 0$ and are integers.

b) Explain in brief Branch and Bound method. **[6]**

OR

Q10) a) A salesman located in a city A decided to travel to city B. He knew the distances of alternative routes from city A to city B. He then drew a highway network map as shown in following figure. The city of origin A, is city 1. The destination city B is city 10. Other cities through which the salesman will have to pass through are numbered 2 to 9. The arrow representing routes between cities and distances in kilometers are located on each route. The salesman problem is to find the shortest route that covers all the selected cities from A to B. **[12]**

The time for each activity is given in the table. (Solve by using Dynamic programming)



Activity	Duration	Activity	Duration
1-2	4	4-5	6
1-3	6	4-6	10
1-4	3	4-7	5
2-5	7	5-8	4
2-6	10	5-9	8
2-7	5	6-8	3
3-5	3	6-9	7
3-6	8	7-8	8
3-7	4	7-9	4
		8-10	7
		9-10	9

b) Explain methodology used in cutting plane method. **[6]**

Total No. of Questions : 10]

SEAT No. : [ ]

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B. E. (Mechanical)

ENERGY AUDIT & MANAGEMENT

(2015 Pattern) (Semester - I) (Elective-II) (402045C)

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

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 and Q.10.***
2) ***Answers should be written in same answer book.***
3) ***Neat diagrams must be drawn whenever necessary.***
4) ***Figures to the right indicates full marks.***
5) ***Use of log tables, slide rules, mollier charts electronic calculator and steam table is allowed.***
6) ***Assume suitable data, if necessary.***

Q1) a) Write a note on Indian Energy Scenario. **[6]**

b) What are the different types of Energy Audits? **[4]**

OR

Q2) a) Write a note on Energy security and reliability. **[6]**

b) Explain working of Ultrasonic flow meter in Energy Audit. **[4]**

Q3) a) With suitable example explain ROI. **[4]**

b) An industry intends to invest Rs. 5,00,000 in a new energy saving project. **[6]**

The cash flows expected are:

Year 1 : Rs. 2,00,000

Year 2 : Rs. 3, 00, 000

Year 3 : Rs. 2, 00, 000

The expected return is 10%. Evaluate the Net Present Value and comment on the feasibility of the project?

OR

P.T.O.

Q4) In an industry, an electrical oven consuming 1,100 kWh/batch, is proposed for replacement, by a FO fuel fired oven. Calculate the simple payback period, given the following data: **[10]**

Number of batches/ Years = 4,000

Efficiency of electric oven = 82%

Efficiency of FO fired oven = 55%

Cost of FO = Rs. 35,000/Tonne

GCV of FO = 10,200 kcal/kg

Electricity cost = Rs.6.0/kWh

Investment for FO fired oven = Rs. 125 Lakhs

Q5) a) What is the significance of volatile matter, in case of solide fuels? **[8]**

b) In a process plant, 30 TPH of steam, after pressure reduction to

20 kg/cm^2 (g), through a pressure reducing valve, gets superheated. The temperature of superheated steam is 350ºC. The management desires to install a de-super heater to convert the superheated steam into useful saturated steam 20 kg/cm^2 (g) for process use. The saturated steam temperature is 210ºC. Calculate the quantity of water required to be injected at 30ºC, in the de-super heater, in order to obtain the desired saturated steam, using the following data: **[10]**

- Specific heat of superheated steam = 0.45 kcal/kg ºC
- Latent heat of steam at 20 kg/cm^2 (g) = 450 kcal/kg

OR

Q6) a) List the functions of a steam trap. **[8]**

b) Compute the heat loss in percentage, due to unburnt in fly ash and bottom ash, for an AFBC Boiler, using Indian coal, with: **[10]**

- GCV = 4,200 kcal/kg.
- % Ash in coal = 38.8
- Ratio of bottom ash to fly ash = 15 : 85
- GCV of fly ash = 452.5 kcal/kg
- GCV of bottom ash = 800 kcal/kg

Q7) a) What is standard labelling program? List the equipment and appliances covered under Standards and Labelling Program. **[8]**

b) What is power factor in power distribution system? List the benefits of power factor improvement in an industrial power distribution system. **[8]**

OR

Q8) a) Write note on distribution and transformer losses. **[8]**

b) Write a note on Electricity Act 2003. **[8]**

Q9) a) Explain the following: **[8]**

i) Regenerator

ii) Gas Turbine cogeneration system

b) With respect to Cogeneration write its need, applications and advantages. **[8]**

OR

Q10)a) Write a note on CDM projects and Carbon credit calculations. **[8]**

b) Write a note on PRV and Microturbine. **[8]**

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Total No. of Questions : 10]

SEAT No. :

PA-341

[Total No. of Pages : 3

[5927]-225

B.E. (Mechanical-Sandwich)/(Mechanical Engineering)

ENERGY ENGINEERING

(2015 Pattern) (Semester - II) (402047)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right of each question indicate full marks.***
4) ***Assume suitable data wherever necessary and mention the same clearly.***
5) ***Use of steam tables, mollier chart and calculator is allowed.***

Q1) a) Elaborate following terms in brief : **[5]**

i) Load Shedding.

ii) Carbon Credits.

b) Define following terms : **[5]**

i) Vacuum Efficiency.

ii) Condenser Efficiency.

iii) Corrected Vacuum.

OR

Q2) a) Which are factors considered for selection of coal for Thermal Power Plant? **[5]**

b) What do you mean by FGR? Explain with simple diagram. **[5]**

Q3) a) Elaborate working principal of FBC. What are different types of FBC? **[5]**

b) What is a function of Surge tank in Hydropower Plant? Enlist different types of the same and explain anyone from it. **[5]**

OR

P.T.O.

Q4) a) Explain typical construction, working and advantages of PWR with simple diagram. **[5]**

b) What do you mean by ESP? Explain with simple diagram. **[5]**

Q5) a) Explain General Layout of Diesel Power Plant indicating different systems. **[8]**

b) The pressure ratio used in an open cycle gas turbine power plant is 6.5. The pressure and temperature of air entering in the compressor are 1 bar, 300K. Inter cooling arrangement is used to reduce the work of compression. The maximum temperature of the cycle is limited to 850K. If the power plant capacity is 10MW, find the thermal efficiency of the plant and air consumption per hour if calorific value is 45000kJ/kg. Assume compression in both the stages and expansions in turbine are isentropic. Take γ = 1.4 (air and gas), Cp = 1 kJ/kgK (air and gas). Assume perfect inter cooling. **[8]**

OR

Q6) a) Explain the advantages, disadvantages and applications of diesel power plant in brief. **[8]**

b) An open cycle gas turbine plant works on Brayton cycle. The maximum pressure and temperature of the cycle is limited to 5 bar, 900K. The pressure and temperature at the inlet to the compressor are 1 bar and 300K. Reheating is used at the pressure of 2.5 bar where the temperature of the gases is increased to its original turbine inlet temperature. Mass flow rate of the air in the plant is 10 kg/s. Determine the thermal efficiency and capacity of the plant in MW. The exhaust pressure of the gases leaving the plant is 1 bar. Assume compression and expansions are isentropic. Take γ = 1.4 (air and gas), Cp= 1 kJ/kgK (air and gas), CV of the fuel 40000 kJ/kg. Neglect pressure losses in the system. Do not neglect the mass of the mass of the fuel. **[8]**

Q7) a) Explain Low temperature flat plate collector solar power plant with a suitable sketch. **[6]**

b) Explain Superheated Geothermal Power Plant a suitable diagram. **[6]**

c) What is working principal of Solar Photovoltaic System? What are advantages and applications of the same. **[6]**

OR

Q8) a) Explain Open cycle OTEC with typical diagram and merits. **[6]**

b) Explain Solar Chimney with typical diagram and merits. **[6]**

c) Elaborate advantages and disadvantages of MHD based plant. **[6]**

Q9) a) What is the function of switch gear? Explain any one type of switchgear with neat diagram. Discuss their relative merits and demerits. **[8]**

b) A power station has to supply load as follows : **[8]**

Time (hours)	0-6	6-12	12-14	14-18	18-24
Load (MW)	30	90	60	100	50

Draw i) Load Curve.

ii) Load duration curve and Calculate.

1) Load factor

2) Capacity of the plant and

3) Plant capacity factor.

OR

Q10) a) Explain terms with significance : **[8]**

i) Load factor,

ii) Peak and base load,

iii) Demand factor,

iv) Plant capacity factor.

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

i) Layout of electrical equipment.

ii) Methods of generator cooling.

Total No. of Questions : 10]

SEAT No. : ____

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[Total No. of Pages : 3

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B.E. (Mechanical/Mechanical Sandwich)
MECHANICAL SYSTEM DESIGN
(2015 Pattern) (Semester - II) (402048)

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

Instructions to the candidates:

1) ***Solve question Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Draw structural diagram for following structural formulae. **[6]**

i) 3 (1) 3 (3)

ii) 2 (1) 3 (2) 2 (6)

b) Find the reliability of operating period of 1000 Hrs for a device having failure rate of 1×10^{-6} failure/hrs .If there are 1000 items in the test, how many failures are expected in 1000 hrs. **[4]**

OR

Q2) a) A 2×2 drive is required for transmitting speed starting from 600 rpm with. Geometric progression ratio 1.4. draw suitable structural diagrams. **[6]**

b) Explain the difference between Design and Natural Tolerance. How the designer would select the tolerances for minimum rejection of the Components. **[4]**

Q3) A belt conveyor is to be designed to carry the bulk material at the rate of 300×10^3 kg/hr with following details

Density of bulk material = 800 kg/ m^3

Angle of repose of bulk material = 15 degree

Belt speed= 10 Km/hr

Material factor for plies, K1 = 2.0

Belt tension and arc of contact factor, k2 = 63

No of plies for belt = 4

Determine:

a) The suitable width of belt

b) The diameter and length of drive pulley

OR

P.T.O.

Q4) a) State the advantages, disadvantages and applications of conveyor as material handling equipment. **[4]**

b) Horizontal belt conveyor is to be used transporting material with mass density of 3 tons/m^3. the belt is 1m wide and has speed of 2 m/s determine the capacity of conveyor if surcharge angle is 20 degrees. **[6]**

Q5) a) Derive the expression to determine the principal stresses at the inner surface of thick cylinder. **[8]**

b) A tube of inner and outer diameter 50 mm and 75 mm respectively is reinforced by shrink fitting another tube of 100 mm diameter. This assembly is to withstand an internal pressure of 35 MPa. If the shrinkage is such that the maximum tangential stress in both the tubes is same,**[10]**

Calculate:

i) The shrinkage pressure

ii) The original dimensions of the tube.

Assume E = 207 kN/mm^2.

OR

Q6) a) What is the need of autofrettage? Explain any method of autofrettage in detail along with sketch. **[6]**

b) A cylindrical pressure vessel with 1500 mm inside diameter and 150 mm thickness is subjected to internal pressure of 1.5 N/mm^2. A nozzle of 300 mm inside diameter and 12 mm thickness is to be provided in the shell. Welds joints efficiency for shell as well as nozzle is 85 % , while corrosion allowance is 2 mm. The nozzle projects 20 mm outside and 30 mm inside the shell. If the allowable tensile stress for the shell and nozzle material is 120 N/mm^2, determine whether the reinforcing is adequate, if not find the dimensions of reinforcing pad, if the plate thickness is 150 mm. **[12]**

Q7) a) What is the cross section of connecting rod for low speed and high speed engines? Explain with sketch. **[6]**

b) Following data is given for piston of four stroke diesel engine: **[10]**

i) Cylinder bore = 250 mm;

ii) Maximum gas pressure = 4 N/mm^2

iii) Bearing pressure = 15 N/mm^2

iv) Length of piston pin in bush of small end = 0.45 D;

v) Ratio of inner to outer diameter of piston pin = 0.6;

vi) Mean diameter of piston boss = 1.4 × Outer diameter of piston pin;

vii) Allowable bending stress of piston pin = 84 N/mm^2

Calculate:

1) The outer diameter of piston pin;

2) The inner diameter of piston pin;

3) The mean diameter of piston boss

4) Check design for bending stress

OR

Q8) Design a cylinder and cylinder head for a four stroke C.I. engine with the following data: **[16]**

a) Brake Power = 5 kW;
b) Engine speed = 1200 rpm; Indicated mean effective pressure = 0.3 N/mm^2;
c) Maximum gas pressure = 3.5 N/mm^2;
d) Mechanical efficiency = 80%;
e) Compression ratio = 12;
f) Rboring factor, C_1 = 4 mm;
g) Cylinder head thickness constant K_1 = 0.35 and Allowable tensile stresses are.

Name of Part	Cylinder Liner	Cylinder Head	Studs
Material	Alloy Cast Iron	Alloy Cast Iron	Alloy steel 40Ni3
Allowable tensile stress N/mm^2	40	40	70

Q9) a) Explain methodologies of optimum design in detail with suitable example. **[6]**

b) A tensile bar of length 400 mm is subjected to constant tensile force of 4000 N. If the factor of safety is 2 design the bar with the objective of minimizing the material coat out of the following materials. **[10]**

Material	Mass density, ρ (Kg/m^3)	Material Cost, C (Rs/N)	Yield Strength Syt (MPa)
Plain carbon steel	7800	28	400
Alloy steel	7850	150	900
Al alloy	2800	140	150
Titanium alloy	4500	2200	800

OR

Q10) In a light weight equipment a shaft is required to transmit 40 KW power at 425 rpm. The required stiffness of the shaft is 90 N-M/ Degree. The factor of safety based on yield strength in shear is 1.5. Using the maximum shear stresss theory design the shaft with the objective of minimizing the weight out of the following materials. **[16]**

Material	Mass density, ρ (Kg/m^3)	Material Cost, C (Rs/N)	Tensile Yield Strength syt (MPa)	Modulus of rigidity, G N/mm^2
Alloy steel	7800	7.5	450	82×10^3
Al alloy	2800	9	150	27×10^3
Titanium alloy	4500	150	800	41×10^3
Magnesium alloy	1800	10	100	17×10^3

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Total No. of Questions : 10]

SEAT No. : ____

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B.E. (Mechanical)

TRIBOLOGY

(2015 Pattern) (Semester - II) (Elective - III) (402049A)

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

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Use of electronic pocket calculators allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Explain the importance of Tribology in Industry. **[6]**

b) Explain the physical and chemical properties of lubricants. **[4]**

OR

Q2) a) Write note on Stick-slip phenomenon in friction. **[4]**

b) Explain the following terms in short : **[6]**

i) Extreme pressure additives

ii) Recycling of used oil

Q3) a) Write short note on : **[6]**

i) Gaskets

ii) Oil seals

b) Explain the effect of temperature and pressure on viscosity. **[4]**

OR

Q4) The following data is given for 360º hydrodynamic bearing **[10]**

Journal speed = 1500 rpm

Journal diameter = 100 mm

Bearing length = 50 mm

Minimum oil film thickness 0.015 mm

Viscosity of lubricant = 30cP

The fit between journal and bearing is H7e7 for which

Hole diameter = $100^{+0.00}_{+0.035}$ mm

Shaft diameter = $100^{-0.072}_{-0.107}$ mm

P.T.O.

Specify the load carrying capacity of given hydrodynamic bearing.

$\frac{L}{d}$	$\frac{h_o}{c}$	S	$\left(\frac{r}{c}\right)$f	$\frac{Q}{r c n_s L}$	$\frac{Q_s}{Q}$
$\frac{1}{2}$	0.1	0.0313	1.6	5.69	0.939
	0.2	0.0923	3.26	5.41	0.874
	0.4	0.319	8.10	4.85	0.730
	0.6	0.779	17.00	4.29	0.552
	0.8	2.03	40.9	3.27	0.310

Q5) a) What is squeeze film lubrication? State applications of squeeze film lubrication. **[10]**

b) Differentiate hydrostatic bearing and hydrodynamic bearing on the basis of **[8]**

i) Friction between shaft and bearing at starting and running condition

ii) Power losses

iii) Load carrying capacity

iv) Operating speed

OR

Q6) a) Derive an expression for flow rate of fluid through rectangular slot. State the assumptions while deriving the expression. **[8]**

b) The following data is given for hydrostatic thrust bearing **[10]**

Supply pressure = 2.5MPa,

Shaft speed = 720 rpm

Shaft diameter = 400 mm,

Recess diameter = 250 mm

Film thickness = 0.15 mm

Viscosity of lubricant = 30cP

Calculate :

i) Load carrying capacity of bearing

ii) Total flow rate of lubricant

iii) Frictional power loss

iv) Pumping power loss

Q7) a) How Elasto-hydrodynamic lubrication differs from hydrodynamic lubrication? Also explain the Ertel-Grubin equation with its limitation in brief. **[8]**

b) State the merits and demerits and four application of gas lubricated bearing. **[8]**

OR

Q8) a) Explain Hertz theory of contact stress with example. Explain in brief contact stresses between two cylinders. **[8]**

b) Compare the gas lubricated bearings with oil lubricated bearings based on following parameters. **[8]**

i) Load carrying capacity

ii) Overall coefficient of friction

iii) Viscosity of lubricant

iv) Operating speed

Q9) a) Explain with neat sketches any two methods used for corrosion resistance. **[8]**

b) Write a note on Lubrication system in I.C. engine. **[8]**

OR

Q10)a) Classify surface engineering processes. **[8]**

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

i) Hot dip coating

ii) Flame spraying

Total No. of Questions : 12]

SEAT No. : [ ]

PA-344

[Total No. of Pages : 3

[5927]-228

B.E. (Mechanical Engineering)

INDUSTRIAL ENGINEERING

(2015 Pattern) (Semester - II) (Elective - III) (402049B)

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

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10. Q.11 or Q.12.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Use of programmable calculator is not permitted.***
5) ***Assume suitable data, if necessary.***

Q1) What is productivity? Discuss in details factors that affect productivity. **[8]**

OR

Q2) Define Industrial Engineering. Explain in brief various function of Industrial Engineering. **[8]**

Q3) Write a short note on (any two) : **[8]**

a) Multi activity chart

b) SIMO chart

c) Stringdiagram

OR

Q4) What is method study? Explain symbols used in recording the activity. **[8]**

Q5) What is work measurement? Explain different allowances used in standard time calculations? **[8]**

OR

P.T.O.

Q6) A work study was conducted in a machine shop following data has been recorded. **[8]**

a) No of observation = 2000

b) No of activity idle = 500

c) Ratio between manual and machine = 3:1

d) Performance rating = 85%

e) No of pieces produced = 120

f) Duration of study = 60 hrs.

Calculate standard time per piece assuming 10% relaxation and 3% contingency allowance.

Q7) a) Explain the functions of PPC. **[8]**

b) Write note on MRP, MRP-II. **[8]**

OR

Q8) a) Write a note on forecasting methods. **[8]**

b) Explain concept of ERP with block diagram. **[8]**

Q9) a) Explain in detail factors affecting on selection of location for the industrial plant. **[7]**

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

i) ABC analysis

ii) Assembly Line Balancing

OR

Q10)a) Estimate the sales forecast for the year 2000, using three month moving average and exponential smoothing forecast. Take $\alpha = 0.5$. **[8]**

Year	1995	1996	1997	1998	1999
Sale Rs. ($x10^5$)	180	168	159	170	188

b) What are different principles of material handling? Describe any four material handling equipment commonly used in industries. **[7]**

Q11)a) Write short note on : **[8]**

i) Break even analysis

ii) Push and pull systems

b) A company has given following information : **[7]**

Data	Rs.
Selling price	20/- unit
Variable cost	5/- unit
Fixed cost	50,000/-

Determine :

i) BEP

ii) Sales when it is desirable to earn profit of Rs. 20,000/-

OR

Q12)a) Write a short note on (any two) : **[8]**

i) KRA

ii) Cost accounting

iii) Net present value (NPV)

b) Explain in brief different functions of human resource department. Comment on Key Result Area and Performance appraisal of employee. **[7]**

Total No. of Questions : 10]

SEAT No. : ____

PA-345

[Total No. of Pages : 2

[5927]-229

B.E. (Mechanical)

ROBOTICS

(2015 Pattern) (Semester - II) (402049C) (Elective - III)

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

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Figures to the right side indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Use of scientific calculator allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) A Vacuum gripper is used to lift a weight of 10 kN with the help of two suction cups, each having diameter of 200 mm. Determine the negative pressure required to lift the weight. **[5]**

b) Explain the term 'Compliance' in Robotics with a suitable example. **[5]**

OR

Q2) a) Distinguish between forward and inverse kinematics. **[5]**

b) Suggest suitable gripper for following applications: **[5]**

i) Car wind shields

ii) Glass jar

iii) Cylindrical metal pins

iv) Spherical metal jobs

v) Razor blade

Q3) a) Explain the working principle of the Tactile sensor with a neat sketch. **[5]**

b) Give different robot configurations based on coordinate system. **[5]**

OR

Q4) a) Write short note on robot anatomy with neat sketch. **[5]**

b) Explain kinematics of redundant robots. **[5]**

P.T.O.

Q5) a) Write a short note on the following : **[10]**

i) Forward Dynamics of a Robot,

ii) Inverse Dynamics of a Robot.

b) Explain with a suitable example the force control of a robot manipulator. **[8]**

OR

Q6) a) It is desired to have a joint of a six-axis robot move from an initial angle of 20° to a final angle of 100º in 8 seconds. Using a third-degree polynomial, calculate the joint angles at an interval of 2 seconds. Assume velocity at the initial and final position is zero. **[10]**

b) Explain in details, Euler-Lagrange formulation for dynamics. **[8]**

Q7) a) Describe the different steps in trajectory planning. **[8]**

b) Discuss the following commands for programming a robot: **[8]**

i) WAIT

ii) SIGNAL

iii) DELAY

OR

Q8) a) Write short note on control. **[8]**

i) Law of positioning.

ii) Considerations in trajectory planning.

b) Explain with a neat block diagram the Machine Vision System for a Robot. **[8]**

Q9) a) Discuss the application of Artificial Intelligence to Robotics systems. **[8]**

b) Elaborate on the role of Robotic systems in Industry 4.0. **[8]**

OR

Q10)a) Elaborate on the different types of Robot Simulations. **[8]**

b) Write short note on machine vision. Write two applications of machine vision in Robotics. **[8]**

Total No. of Questions : 10]

SEAT No. : [ ]

PA-140

[Total No. of Pages : 2

[5927]-23

B.E. (Chemical Engg.)

MEMBRANE TECHNOLOGY

(2015 Pattern) (Semester - I) (Elective - I) (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, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume Suitable data, if necessary.***

Q1) a) Give classification of membranes? Explain in short factors affecting the properties of membrane materials. **[6]**

b) Define : **[4]**

i) Percentage rejection

ii) Molecular weight cut off

OR

Q2) a) Explain in details about characterisation of membrane. **[6]**

b) What is pervaporization? Give any one application. **[4]**

Q3) a) Explain with neat sketches hollow fiber membrane module. **[6]**

b) Define dead end filtration and cross flow filtration. **[4]**

OR

Q4) a) Derive an equation for transport through dense membrane. **[6]**

b) Give advantages and disadvantages of ceramic membrane. **[4]**

P.T.O.

Q5) a) Explain in details methods of reducing concentration polarization. **[9]**

b) Explain in details with suitable equation boundary layer film model. **[8]**

OR

Q6) a) Explain in details about fouling of membrane and methods of reducing the fouling. **[10]**

b) What is desalination? Explain in details sea water desalination. **[7]**

Q7) a) What is metallic membrane? Explain in details its application for hydrogen separation. **[10]**

b) What is membrane bioreactor? Explain any one application. **[8]**

OR

Q8) a) Explain in details application of membrane for separation of heavy metals from dilute solution. **[10]**

b) Explain in short electrically driven membrane processes. **[8]**

Q9) a) Explain in details membrane application for carbon dioxide separation. **[10]**

b) Define : **[5]**

i) Selectivity

ii) Diffusivity

OR

Q10) a) Explain in details with suitable sketches liquid membrane. **[10]**

b) Define membrane distillation. **[5]**

Total No. of Questions : 10] **SEAT No. :**

PA-346 **[Total No. of Pages : 2**

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B.E. (Mechanical Engineering)

ADVANCED MANUFACTURING PROCESSES

(2015 Pattern) (Semester - II) (Elective - IV) (402050 A)

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

Instructions to the candidates :

1) ***All questions are compulsory i.e. Solve Que. 1 or Que. 2, Que. 3 or Que. 4, Que.5 or Que.6, Que.7 or Que.8 and Que.9 or Que.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***

Q1) a) Examine with sketch electro hydraulic forming. **[6]**

b) How friction stir welding is useful in modern era? **[4]**

OR

Q2) a) Examine with neat sketch Stretch forming and list their applications. **[6]**

b) List applications of adhesive bonding. **[4]**

Q3) a) Examine with neat sketch Electro Jet Machining process with its process parameter. **[6]**

b) Examine the process of underwater welding. **[4]**

OR

Q4) a) Examine working principle of wire electric discharge machining with the process parameter. **[6]**

b) Examine basic principle of friction stir welding process. **[4]**

Q5) a) Examine the process of Focused Ion Beam Machining. **[6]**

b) Examine how- the ultrasonic micro machining carried out. **[6]**

c) Write short note on Diamond micro machining. **[4]**

OR

P.T.O.

Q6) a) Write in detail the need of micro machining. **[6]**

b) Examine the process of photochemical machining. **[6]**

c) Write short note on Lithography. **[4]**

Q7) a) Give classification of additive manufacturing processes. **[6]**

b) Write note on post processing of parts manufactured by additive manufacturing processes. **[6]**

c) Write applications of additive manufacturing processes in medical technology. **[4]**

OR

Q8) a) Examine the basic steps in additive manufacturing. **[6]**

b) What care should be taken while designing the object while manufacturing by additive manufacturing. **[6]**

c) Write application of additive manufacturing processes in aerospace industry. **[4]**

Q9) a) Examine operating principal of Atomic force micro scope with neat sketch. **[6]**

b) Examine operating principal of Electron Microscopes with neat sketch. **[6]**

c) Describe in details, the applications of microscopes. **[6]**

OR

Q10) a) Examine operating principal of Energy-dispersive X-ray spectroscopy. **[6]**

b) Describe in details, the applications of spectroscope. **[6]**

c) Write short note on material characterization. **[6]**

Total No. of Questions : 6] **SEAT No. :**

PA-347 **[Total No. of Pages : 2**

[5927] - 231

B.E. (Mechanical Engineering)

SOLAR AND WIND ENERGY

(2015 Pattern) (Semester - II) (Elective - IV) (402050B)

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

Instructions to the candidates :

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

Q1) a) Explain the solar energy potential available. Draw the azimut, Zenith, Altitude and incident angle. **[8]**

b) Classify the different Solar Dryers used and draw natural convention solar flat plate collector used for drying. **[7]**

OR

Q2) a) Solar and Wind Energy Scenario across the India and government support for renewable Energy Source. **[8]**

b) Explain the Solar Relation measuring instruments i.e. Solar Pyranometer, Sunshine recorder. Give the significance of the measurement. **[7]**

Q3) a) Explain the working of Solar parabolic dish type of collector used for Cooling Purpose. **[8]**

b) Explain the working of the Solar ETC system for air healing. **[7]**

OR

Q4) a) i) Explain Solar Pond. **[4]**

ii) Write short note on Solar Still. **[4]**

b) Derive the Expression for Solar PV system its Imax, Vmax Ishort Vshort. Draw PN junction diagram. **[7]**

P.T.O.

Q5) Design a stand alone system for a load of 2kw total (continuous load for 5 hrs per day) with back up of 2 days for non sunshine days. Consider avg. daily solar radiation as 720 wp/m^2. **[20]**

Q6) A propeller type of wind turbine has the following data. **[20]**

speed of free wind at a height of 10m = 15 m/s.

α = 1.4

air density 1.226 kg/m^3.

height of tower 100 m.

wind velocity at turbine reducess by 20%

generator efficiency - 90%

Find the total power available in wind power extracted by wind turbine electrical power generated, axial thrust an turbine.

Total No. of Questions : 10]

SEAT No. :

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[Total No. of Pages : 2

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B.E. (Mechanical)

PRODUCT DESIGN AND DEVELOPMENT

(2015 Pattern) (Semester - II) (Elective - IV) (402050 C)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of calculators is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) Explain phases of product design. **[5]**

b) Differentiate between product development and product design. **[5]**

OR

Q2) a) Explain customer need with suitable example. **[5]**

b) Explain the concept of Technology forecasting. **[5]**

Q3) a) Explain morphological analysis with suitable example. **[5]**

b) How standardization, simplification and specialization are related to product design'? **[5]**

OR

Q4) a) Discuss product testing in detail. **[5]**

b) Explain the process of concept embodiment. **[5]**

P.T.O.

Q5) a) What is product tear down? Explain the tear down process in detail. **[8]**

b) Explain force flow diagram with suitable example. **[8]**

OR

Q6) a) Explain any two types of product architecture. **[8]**

b) Explain following tools in benchmarking **[8]**

i) Intended Assembly Cost Analysis.

ii) Trend Analysis.

Q7) a) Explain guideline for design for manufacturing. **[8]**

b) Discuss guideline for design for environment. **[8]**

OR

Q8) a) Discuss guidelines design for Reliability. **[8]**

b) What are guidelines for design for safety? Discuss and elaborate. **[8]**

Q9) a) What is Life cycle management'? Discuss the applications of PLM. **[10]**

b) Explain the components of PDM in detail. **[8]**

OR

Q10) a) Discuss the concept of product data and product workflow in PLM. **[10]**

b) Explain Five phases of PLC in detail with example. **[8]**

Total No. of Questions : 10]

SEAT No. : ____

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[Total No. of Pages : 4

[5927] - 233

B.E. (Mechanical-Sandwich) (Semester - II)

MECHANICAL VIBRATIONS

(2015 Pattern) (402066)

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

Instructions to the candidates :

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Draw Neat diagrams wherever necessary.***
3) ***Use of scientific calculator is allowed.***
4) ***Assume suitable data whereever necessary.***
5) ***Figures to the right indicate full marks.***

Q1) a) Classify mechanical vibrations. Give at least one engineering example of each type. **[4]**

b) A single-d of mass-spring system of mass 'm' and stiffness 'k' is subjected to the initial displacement of x_0 and initial velocity of v_0 and then allowed it to oscillate freely. Obtain an expression for displacement of the mass and hence find the amplitude in terms of x_0 and v_0. **[6]**

OR

Q2) a) Draw the time-displacement graph of free vibration of 1-dof viscously damped system for different damping conditions - **[4]**

i) zero damping,

ii) under damping,

iii) critical damping and

iv) over damping

b) A block of mass 10 kg is placed on a horizontal surface and attached to a horizontal spring of stiffness 1200 N/m. The coefficient of sliding friction between the block and surface is 0.2. When the mass is given an initial displacement of 80 mm, calculate **[6]**

i) the frequency of free oscillations.

ii) the number of cycles corresponding to 50% reduction in the initial amplitude.

P.T.O.

Q3) a) Explain with neat sketch the transient state and steady state of vibration related to forced vibration. **[4]**

b) A single DOF mass-spring-damper oscillator is excited by a harmonic force f (t) = 3 sin(15 t) N. The oscillator has a mass of 10 kg, stiffness 1000 N/m and damping coefficient 50 N-s/m. Determine **[6]**

i) Steady state amplitude of vibration of mass and

ii) Maximum force transmitted to the support.

OR

Q4) a) Define the following terms in relation to forced vibration - **[4]**

i) Magnification factor

ii) Quality factor

iii) Force transmissibility

iv) Motion transmissibility

b) A rotor of 10 kg mass is mounted midway on a horizontal shaft of diameter 3 cm which is simply supported with a span of 1.2 m in bearings at both the ends. The center of gravity of the rotor is 0.2 mm offset from its axis of rotation. The modulus of elasticity of shaft material is 200 GPa. Determine - **[6]**

i) Static deflection of rotor

ii) Critical speed of shaft

iii) Amplitude of steady state vibrations of rotor at a speed of 3000 rpm.

Q5) a) Explain two degree of freedom system with any two practical examples.**[6]**

b) For the system of spring and masses shown in the figure, derive differential equations of motion in terms of displacement x_1 and x_2 of masses. Determine natural frequencies and corresponding mode shapes. Describe the mode shapes graphically. **[10]**

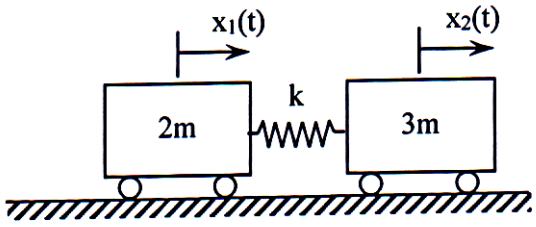

Figure: Q 5 b)

OR

Q6) a) Explain the concept of 'Torsionally Equivalent Shaft'. **[6]**

b) Two equal masses of magnitude 'm' are attached to a light string of length 3L which is stretched with static tension 'T' between two supports as shown in figure. Assuming that the static tension 'T' is so high that the dynamic change in it is negligible due to small vertical displacements of masses. Derive differential equations of motion for small vertical displacements x_1 and x_2 of masses and determine natural frequencies and mode shapes. Describe the mode shapes graphically. **[10]**

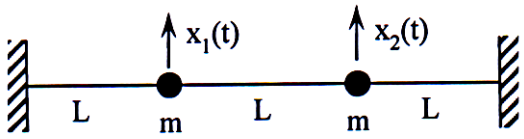

Figure: Q No 6 b)

Q7) a) Differentiate between static and dynamic balancing. Why there is a need of accurate dynamic balancing of high speed machines? **[4]**

b) Four masses A, B (10 kg), C (5.5 kg) and D (3.6 kg) are attached to a shaft at radii 0.1, 0.225, 0.15 and 0.15 m respectively. The planes in which the masses revolve are spaced 0.6 m apart. Determine the magnitude of mass A and relative angular position of all masses with respect to mass B to achieve the complete dynamic balance. **[12]**

OR

Q8) a) Explain the concept of partial balancing in single cylinder IC engine. **[4]**

b) A four stroke four cylinder inline engine has firing order of 1-4-2-3. The length of crank and connecting rod are 80 mm and 320 mm respectively. The angular position of cranks is at equal angles and engine cylinders are at 180 mm apart. The mass of reciprocating parts of each cylinder is 3 kg. Determine unbalanced primary and secondary forces and couples at a speed of 2000 rpm. **[12]**

Q9) a) Explain in brief various methods and techniques for vibration control. **[6]**

b) Explain with neat sketches the working principle of seismic sensor for vibration measurement. **[6]**

c) The static deflection of the vibrometer mass is 20 mm. The instrument when attached to machine vibrating with a frequency of 125 Hz, records the relative amplitude of 0.3 mm. Find the amplitude of displacement, velocity and acceleration of the machine vibration. **[6]**

OR

Q10)a) Explain with neat labeled sketches a typical arrangement of vibration measurement system. **[6]**

b) What is Dynamic vibration absorber? Explain working principle of undamped dynamic vibration absorber. **[6]**

c) Explain the method of vibration based condition monitoring of machines. **[6]**

▽▽▽▽

Total No. of Questions : 10]

SEAT No. : ____

PA-350

[Total No. of Pages : 2

[5927]-234

B.E. (Mechanical - Sandwich)

COMPUTATIONAL FLUID DYNAMICS

(2015 Pattern) (Semester-II) (Elective-I) (402068A)

Time : 2 ½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of electronic pocket calculator is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) a) Explain divergence and curl of velocity. Explain the physical significance of it with suitable example. **[6]**

b) Explain the physical substances of substantial derivative? **[4]**

OR

Q2) a) Write down the conservations equations in differential form and its signification. **[6]**

b) Difference between conservation and non-conservation forms of fluid flow. **[4]**

Q3) a) Derive the discretized form of 2D unsteady state heat conduction problem. **[5]**

b) Finite volume discretization equation for scalar variable φ is obtained as :

$$-5\varphi_P = -3\varphi_E - 2\varphi_W + 5$$

Is the above discretization expected to yield a physically unrealistic solution? Justify with reasoning. **[5]**

OR

Q4) a) Explain in details of boundary conditions of heat conduction problem by FVM **[6]**

b) What are the stability criteria in first order upwind (FOU) and Central difference (CD) **[4]**

P.T.O.

Q5) a) Write an expression for numerical solution of two dimensional heat convection-diffusion equation using finite volume method. **[10]**

b) Define Peclet number and state its importance? **[4]**

c) Difference between FEA and FVM **[4]**

OR

Q6) a) Derive finite volume discretized expression for two-dimensional unsteady heat convection-diffusion equation using suitable approach. **[10]**

b) Explain the significance of 1-D transient convection-diffusion system.**[8]**

Q7) a) Explain the significance of Navier-Stokes equation for incompressibe flow using SIMPLE algorithms for lid driven cavity flow problem. **[10]**

b) Explain the concept of external flow simulation in CFD. **[6]**

OR

Q8) a) What is a simple Lid driven cavity problem? Explain the boundary conditions with a neat sketch. Write an algorithm for the same. **[10]**

b) Write down the steps taken for solving a problem of an external incompressible flow over an airfoil. **[6]**

Q9) a) What is turbulence modeling? Explain any one "two-equation" turbulence model. **[8]**

b) Explain Eddy viscosity and its relevance with turbulence modeling. **[8]**

OR

Q10)a) Explain Reynolds average Navier stokes (RANS) in details. **[10]**

b) Explain the details requirement of the turbulence modeling. **[6]**

❖ ❖ ❖

Total No. of Questions : 10]

SEAT No. : ____

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[Total No. of Pages : 3

[5927]-235

B.E. (Mechanical-Sandwich)

CAD/CAM AND AUTOMATION

(2015 Pattern) (Semester-II) (Elective-I) (402068B)

Time : 2 ½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of Calculators is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) a) Discuss the shear transformation using a suitable example. **[5]**

b) Discuss Bezier surface with suitable example. **[5]**

OR

Q2) A triangle ABC has its vertices at A (5, 6) B (15, 6) C (15, 20). It is uniformly scaled by factor 2 at point 'A'. Calculate concatenated transformation matrix and determine final position of triangle.

Represent the original and transformed triangles graphically **[10]**

Q3) a) Discuss the properties of stiffness matrix **[5]**

b) A circle is drawn with center point at (6,7) and radius as 5 units. Determine coordinates of four point in first quadrant. **[5]**

OR

Q4) For the axially loaded Spring system as shown in fig. 1, determine **[10]**

i) Nodal Displacements

ii) Deformation of each spring

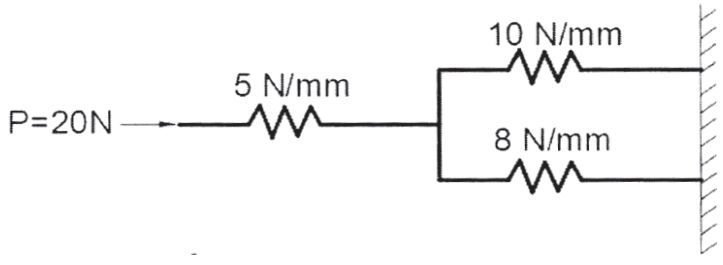

Fig. 1

P.T.O.

Q5) a) Discuss coordinate systems of CNC Turning center and Milling center. **[8]**

b) Write CNC program using G and M codes to turn the component shown in fig. 2 having Stock size is ∅ 45mm × 60mm. Use canned cycles wherever applicable. Assume suitable data for speed and feed. **[10]**

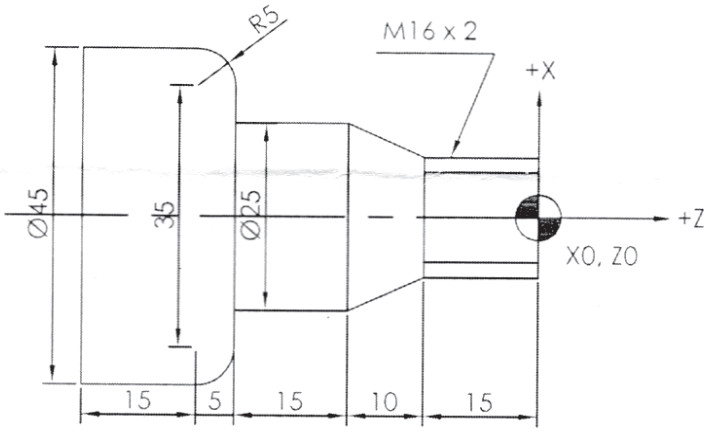

Fig. 2

OR

Q6) a) Write CNC program using G and M codes to contour and face the component shown in fig. 3 Use canned cycles wherever applicable. Thickness of the component is 5mm and thickness of blank is 7 mm Assume suitable data for speed and feed. **[10]**

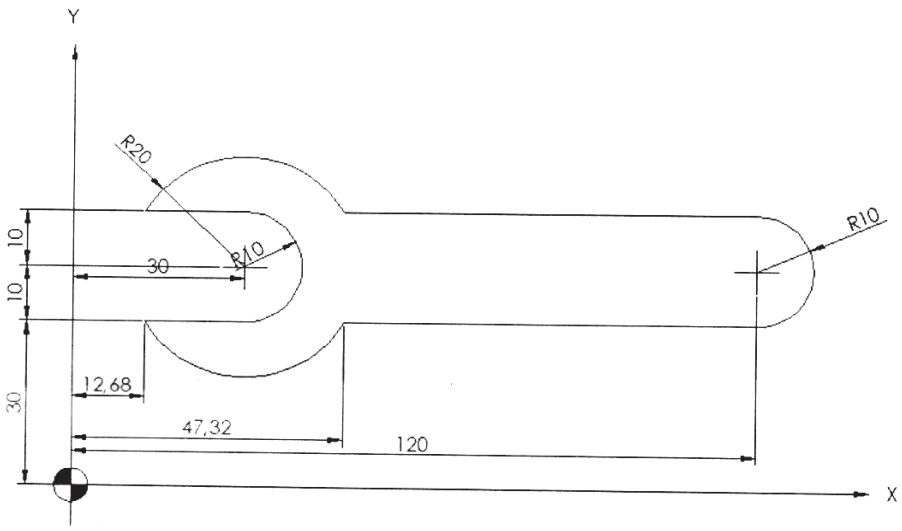

Fig. 3

b) Discuss the use of subroutine in CNC programming with suitable example. **[8]**

Q7) a) Discuss Collaborative Engineering with suitable example. **[8]**

b) Discuss the components of Product Life Cycle Management. **[8]**

OR

Q8) a) Explain working principle of Fused Deposition Method for rapid prototyping. **[8]**

b) Discuss advantages and disadvantages of rapid prototyping. **[8]**

Q9) a) Compare hard and soft Automation. **[8]**

b) List the mechanical grippers as end effector in robots and discuss any two in detail. **[8]**

OR

Q10)a) Discuss the concept of Computer Integrated Manufacturing. **[8]**

b) Discuss the advantages of Automated Guided System. **[8]**

❖ ❖ ❖

Total No. of Questions : 10]

SEAT No. : ____

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[5927]-236

B.E. (Mechanical Engineering-Sandwich)

FINITE ELEMENT ANALYSIS

(2015 Pattern) (Semester-II) (Elective-I) (402068C)

Time : 2 ½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4 Q.5 'or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Figures to the right indicate full marks.***

Q1) a) Write general steps of finite element analysis. **[6]**

b) Derive stiffness matrix for two noded bar element. **[4]**

OR

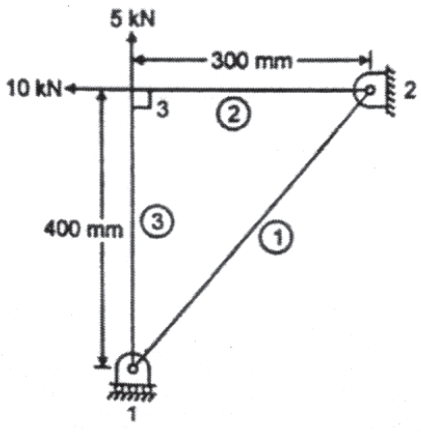
Q2) A truss shown in figure with cross-section area of all elements equal to 250 mm^2 and young's modulus $E=2\times10^5$ MPa. Determine **[10]**

a) Element stiffness matrix for each element

b) Global stiffness matrix for entire truss

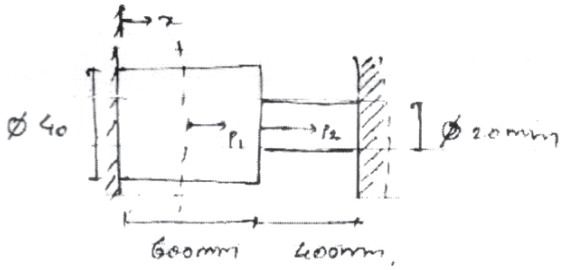
c) Nodal displacement using elimination approach

d) Stresses in each element



P.T.O.

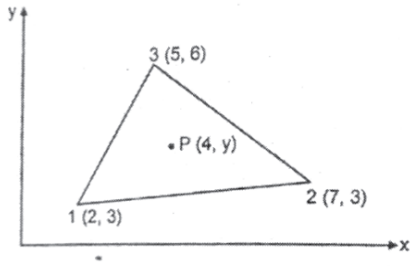
Q3) a) Figure shows one dimensional step bar fixed at each end subjected to load P_1 and P_2. Determine nodal displacement at each element. E=200 GPa, P_1=50kN, P_2=20kN. **[6]**



b) Explain in brief types of elements used in FEM along with their characteristics. **[4]**

OR

Q4) a) The nodal co-ordinates of the triangular element are shown in figure. At the interior point 'P' the X-coordinate is 4 and N_1=0.3. Determine N_2, N_3 and Y-coordinate of point 'P'. **[6]**



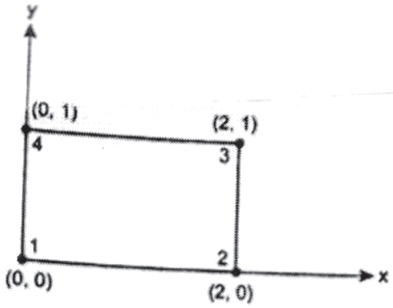
b) Derive shape function for 2D triangular CST element. **[4]**

Q5) a) Derive Jacobian matrix for three noded triangular (CST) element. **[8]**

b) A four noded rectangular element is shown in fig. Take $\zeta = 0$ and $\eta = 0$. Determine **[8]**

i) Jacobian matrix

ii) Strain displacement matrix



OR

Q6) a) Explain the terms isoparametric, subparametric and superparametric elements. **[8]**

b) Evaluate $I = \left(\int_{y=-2}^{y=2} \int_{x=-1}^{x=1} (x^2 + 2xy + y^2)\, dxdy \right)$ using Gauss quadrature method. **[8]**

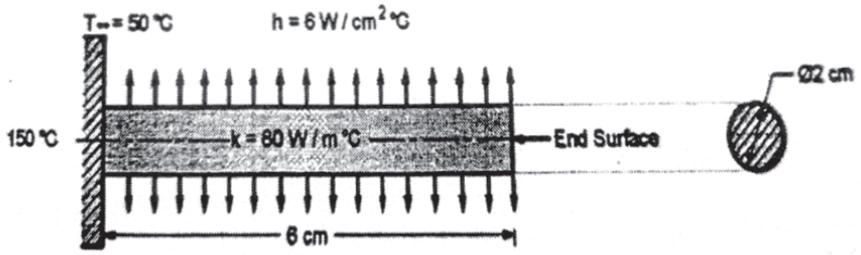
Q7) a) Write down governing of steady-state heat transfer. Also write elemental stiffness matrix and compare it with bar element. **[8]**

b) The brick wall has a thickness of 0.3 m and K=0.7 W/m°K. The inner surface is at 28°C and the outer surface is exposed to cold air at-15°C. The heat transfer coefficient associated with the outside surface is 40 W/m°K. Determine the steady-state temperature distribution within the wall and also the heat flux through the wall using two elements. **[10]**

OR

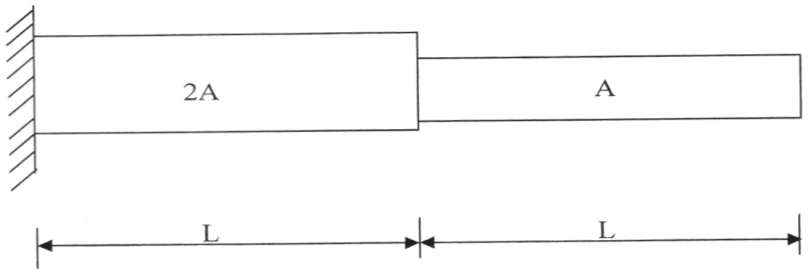
Q8) a) Write short note on heat transfer through fin-pin. Explain with appropriate governing equation. **[8]**

b) Find the temperature distribution in the one-dimensional rod as shown in figure. **[10]**



Q9) a) Explain each term of dynamic equation $m\ddot{x} + c\dot{x} + kx = F$. Explain importance of eigenvalues and eigenvectors. **[6]**

b) Find the natural frequencies of longitudinal vibration of stepped shaft using consistent mass matrix having cross sectional areas A_1=2000 mm^2 and A_2=1000 mm^2. The shaft is constrained at one end as shown in figure. **[10]**

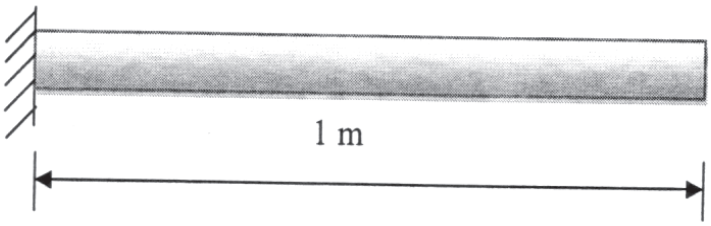


OR

Q10)a) Write down consistent and lumped mass matrices for following elements. **[6]**

i) Bar element
ii) Plane truss element
iii) Beam element

b) Estimate the natural frequencies of axial vibrations of bar shown in figure using lumped mass matrix. The bar is having uniform cross-section with cross-sectional area A=50×10^{-6} m^2. Length L=1m. modulus of elasticity E=2×10^{11} N/m^2 and density ρ=7800kg/m^3. Model the bar by using two elements. **[10]**



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Total No. of Questions : 8]

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B.E. (Mechanical Sandwich)

HYDRAULICS AND PNEUMATICS

(2015 Pattern) (Semester-II) (Elective-I) (402068D)

Time : 2 ½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4 Q.5 or Q.6, Q.7 or Q.8.***
2) ***Figures to the right indicate full marks.***
3) ***Use non-programmable scientific calculator is allowed.***
4) ***Assume data wherever necessary and mention it.***
5) ***Draw neat and suitable figure wherever necessary.***
6) ***Use of steam table is permitted.***

Q1) a) Compare Characteristics of hydraulic and pneumatic systems with mechanical system. **[4]**

b) With the help of a neat diagram, explain the construction and working of a vane pump. **[8]**

c) Explain with neat sketch working of pressure reducing valve. Draw an ISO symbol of it. **[8]**

OR

Q2) a) State applications of accumulator and discuss any one application in details. **[4]**

b) What are the functions of reservoirs? Draw a neat sketch of standard reservoir showing its Internal and External features. **[6]**

c) Explain various types of methods of actuation of DCV with ISO symbols. **[10]**

Q3) a) With the help of a suitable hydraulic circuit, explain the working of meter-in circuit. **[8]**

b) What is Contamination? State the effect of contamination on hydraulic circuit. What are the sources of contamination? **[8]**

OR

Q4) a) With the help of a suitable hydraulic circuit, explain the working of Sequencing circuit. **[8]**

b) Sketch and discuss the hydraulic circuit for Synchronization of two cylinders. **[8]**

P.T.O.

Q5) a) Discuss the various applications of pneumatics for low cost automation. **[5]**

b) Identify different components of the following circuit diagram and analyze the same. **[12]**

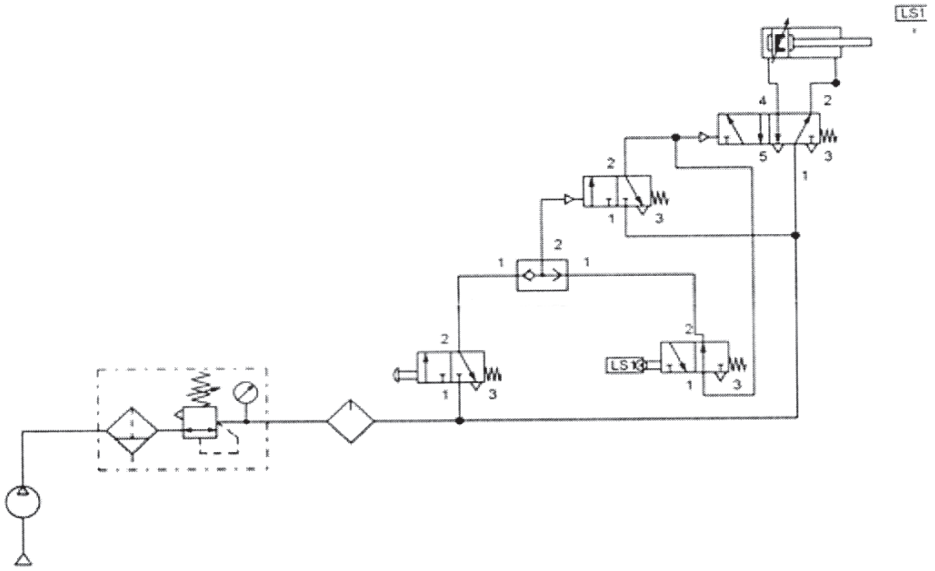

Fig.5 (b)

OR

Q6) a) Explain construction and working of F-R-L unit in pneumatic system.**[6]**

b) Give the classification of compressors and discuss any one in detail.**[5]**

c) Discuss various logical valves in pneumatics and state application of each. **[6]**

Q7) a) A machine Tool slide is to be moved by means of Hydraulic cylinder as follows: **[12]**

i) Initially it moves through a distance of 250 mm against a load of 10 kN in 5 seconds.

ii) It then follows a working stroke of 120 mm aganist an effective load of 40 kN. The feed rate required is between 0.5 to 1m/min.

iii) The return stroke is as fast as possible.

A meter out circuit is used for speed control. Draw the circuit & select different components used circuit. (Refer List of Table)

b) Identify different components of the following circuit diagram and analyze the same. **[5]**

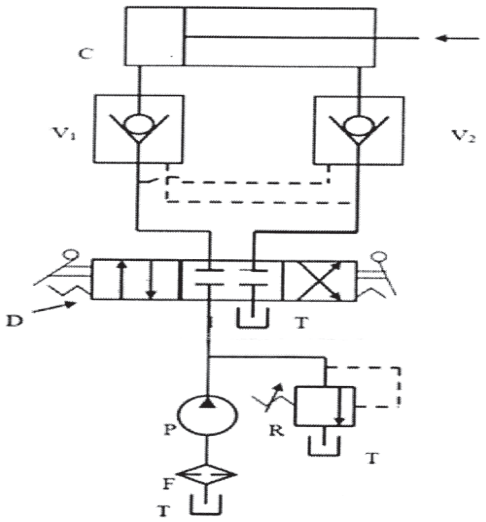

Fig. 7 (b)

OR

Q8) a) Describe the procedure for selection of following hydraulic components:

i) Hydraulic Pump

ii) Cylinder

iii) Direction Control Valve

iv) Pressure Relief Valve

v) Reservoir **[10]**

b) Identify different components of the following circuit diagram and analyze the same. **[7]**

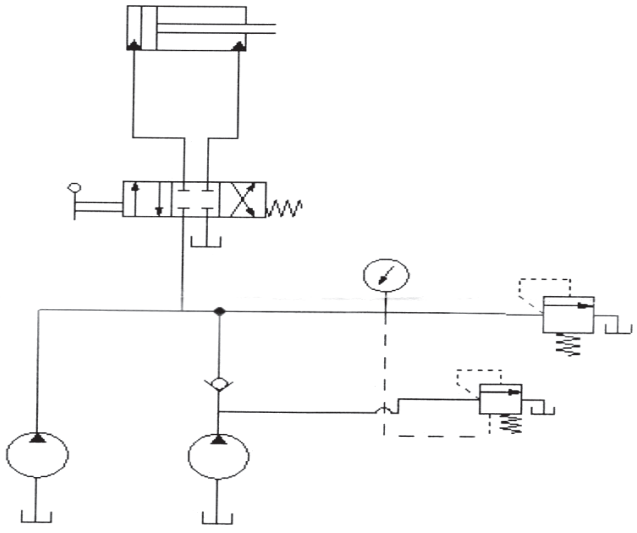

Fig. 8 (b)

DATA

1. Suction Strainer :

Model	Flow Capacity (/pm)
S_1	38
S_2	76
S_3	152

2. Pressure Gauge :

Model	Range (bar)
PG_1	0 - 25
PG_2	0 - 40
PG_3	0 -100
PG_4	0 - 160

3. Vane Pump :

Model	Delivery in / pm		
	at 0 bar	at 35 bar	at 70 bar
P_1	8.5	7.1	5.3
P_2	12.9	11.4	9.5
P_3	17.6	16.1	14.3
P_4	25.1	23.8	22.4
P_5	39.0	37.5	35.6

4. Relief Valve :

Model	Flow capacity (/ pm)	Max Working Pressure & bar
R_1	11.4	70
R_2	19	210
R_3	30.4	70
R_4	57	105

5. Flow control Valve :

Model	Working Pressure (bar)	Flow Range (/pm)
F_1	70	0-4.1
F_2	105	0-4.9
F_3	105	0-16.3
F_4	70	0-24.6

6. Directional Control Valve :

Model	Max working Pressure (bar)	Flow Capacity (/pm)
D_1	350	19
D_2	210	38
D_3	210	76

7. Check Valve :

Model	Max working Pressure (bar)	Flow Capacity (/pm)
C_1	210	15.2
C_2	210	30.4
C_3	210	76

8. Pilot Operated Check Valve :

Model	Max working Pressure (bar)	Flow Capacity (/pm)
PO_1	210	19
PO_2	210	38
PO_3	210	76

9. Cylinder-(Max Working Pressure-210 bar)

Model	Bore dia. (mm.)	Rod dia (mm)
A_1	25	12.5
A_2	40	16
A_3	50	35
A_4	75	45
A_5	100	50

10. Oil Reservoirs :

Model	Capacity (litres)
T_1	40
T_2	100
T_3	250
T_4	400
T_5	600

Total No. of Questions : 10]

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B.E. (Mechanical Sandwich)

OPERATIONS RESEARCH

(2015 Pattern) (Elective - II) (Semester - II) (402069B)

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 and Q.9 or Q.10.***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data, if necessary.***

Q1) a) With the help of neat sketch methodology use in operation research. **[4]**

b) A pharmaceutical company has four branches one each at city A, B, C & D. A branch manager is to be appointed at each city, out of four candidates P, Q, R & S. The monthly business depends upon the city & the effectiveness of the branch manager in that city. **[6]**

Branch Manager	Monthly Business (Rs. lakhs) City			
	A	B	C	D
P	11	11	9	9
Q	13	16	11	10
R	12	17	13	8
S	16	14	16	12

OR

Q2) a) The initial cost of a machine is Rs. 7100 & scrap value is Rs. 1000. The maintainance cost found from experience are as follows.

Year	1	2	3	4	5	6	7	8
Maintainance	2000	3500	5000	7000	10000	13000	17000	21000

When should the machine be replaced? **[6]**

b) Discuss different types of decision making environments. **[4]**

P.T.O.

Q3) a) Consider the following transportation problem, involving three sources and four destinations. The cell entries represent the cost of transportation per unit.

		Destination				
		1	2	3	4	Supply
Source	1	6	2	14	8	3000
	2	4	12	10	18	4000
	3	16	6	6	4	5000
		2500	3500	4000	2000	

Obtain initial basic feasible solution using Vogeis Appron Method (VAM). **[6]**

b) Discuss the generalised model of linear programming (IP) in OR. **[4]**

OR

Q4) A & B play a game in which each has three coins, a 5 paise, 10 paise & 20 paise coins. Each player selects a coin without the knowledge of other's choice. If the sum of the coins is an odd amount, A wins B's coins. If the sum is even, B wins A's coins. Find the optimal strategies for the players and the value of the game. **[10]**

			Player B		
			5	10	20
			I	II	III
Player A	5	I	-10	15	25
	10	II	15	-20	-30
	20	III	25	-30	-40

Q5) a) A small project is composed of 7 activities whose time estimates are listed in the table below. Activities are defined by their begining (i) & ending (j) note numbers. **[12]**

Activity (i - j)	Estimated Durations (Weeks)		
	Optimistic	Most likely	Pessimistic
1 - 2	1	1	7
1 - 3	1	4	7
1 - 4	2	2	8
2 - 5	1	1	1
3 - 5	2	5	14
4 - 6	2	5	8
5 - 6	3	6	15

i) Draw the network diagrams of activities in the project.

ii) Find expected duration & varience of each activity. What is the expected project length?

iii) Calculate the variance & standard deviation of project length. What is the probability that project will complete

1) At least 3 weeks earlier than expected time

2) No more than 4 weeks later than expected time.

b) What is looping & dangling errors in the network? **[4]**

OR

Q6) a) Explain the significance of CPM & PERT? **[4]**

b) A bakery keeps stock of popular brands of cake. Previous experiences show the daily demand pattern for the item associated probabilities as given.

Daily Demand (number)	0	10	20	30	40	50
Probability	0.01	0.20	0.15	0.50	0.12	0.02

Use the following sequence of random numbers to simulate the demand for next 10 days.

Random Numbers : 25, 39, 65, 76, 12, 05, 73, 89, 19, 49

Also estimate the daily average demand for the cakes on the basis of simulated data. **[12]**

Q7) a) Strong Book Binder has one printing machine, one binding machine, and the manuscripts of a number of different books. Processing times are given in the following table

Book	Time in Hours	
	Printing	Binding
A	5	2
B	1	6
C	9	7
D	3	8
E	10	4

We wish to determine the order in which books should be processed on the machines in order to minimize the total time required. **[10]**

b) Draw the sketch of queuing system structure & explain various components of it. **[6]**

OR

Q8) a) A firm has to process five items on three machines A, B & C processing times are given in the following table :

Item	Ai	Bi	Ci
1	4	4	6
2	9	5	9
3	8	3	11
4	6	2	8
5	3	6	7

Find the sequence that minimizes the total elapsed time. **[10]**

b) Explain the Following terms related to queue discipline **[6]**

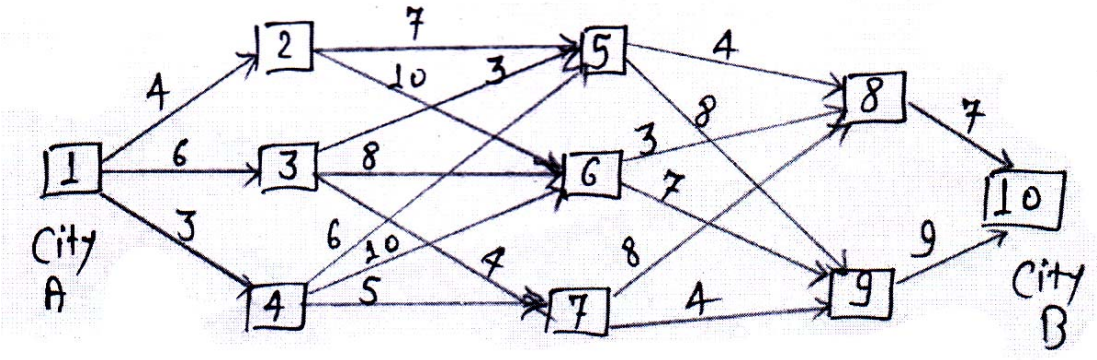
i) First-Come, First-Served (FCFS)

ii) Last-Come, First-Served (LCFS)

iii) Service In Random Order (SIRO)

Q9) a) Explain in brief Branch & Bound method. **[6]**

b) A salesman is located at a city named as 'A'. He decided to travel to the city named as 'B'. He is aware of the distances of alternative routes from city A to B. He has the diagram of the routes from 'A' to 'B' with in between cities. The city of origin 'A' is city 1. The destination city B is 10. Find the shortest path by using dynamic programming. **[12]**



OR

Q10)a) Explain in brief Dynamic programming (DP) model. **[6]**

b) Solve the following integer LP problem using cutting plane method. **[12]**

Maximize :

$$Z = 5x_1 + 6x_2$$

Subject to,

$$x_1 + x_2 \leq 5$$

$$4x_1 + 7x_2 \leq 28$$

$x_1, x_2 \geq 0$ & are integers

▽▽▽▽

Total No. of Questions : 10]

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B.E. (Chemical Engineering)

CORROSION ENGINEERING

(2015 Pattern) (Semester - I) (409344C) (Elective - I)

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

Instructions to the candidates:

1) ***Write Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Figures to right indicate full marks.***
3) ***Draw suitable diagrams wherever necessary.***
4) ***Use of scientific calculators is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) What is Nernst equation for electrode potential? Under what conditions Nernst equation can be applied to corrosion reactions and calculation of corrosion rates? **[10]**

OR

Q2) Define the following terms with units of each - **[10]**

a) Faradays Laws

b) Specific conduction

c) Specific resistance

d) Electrochemical Principles

e) Transportation Number

Q3) Illustrate the need and significance of Pourbaix-diagram for Fe-H_2O system.**[10]**

OR

Q4) Discuss the advantages and disadvantages of Anodic control, Cathodic control and mixed control. **[10]**

P.T.O.

Q5) a) Explain intergranular and stress corrosion cracking. Discuss the remedial measures for it. **[8]**

b) Write a brief note on - **[8]**

i) Pitting Corrosion

ii) Cavitations

OR

Q6) a) Explain the Pilling Bedworth ratio and describe its significance in the mechanisms of oxidation. **[8]**

b) Illustrate the effect of velocity on iron and steel for corrosion in air and aqueous media in detail. **[8]**

Q7) a) What are the different prevention techniques to minimize the corrosion? Write them in brief. **[8]**

b) "The modification of the material by alloying and the appropriate heat treatment minimizes the corrosion to a great extent" - Justify with suitable examples and neat diagram. **[8]**

OR

Q8) a) Write a note on Nernst equation for electrode potential and that to corrosion reactions also. **[8]**

b) How metallic and non-metallic linings affects on corrosion? What do you mean by cathodic protection? **[8]**

Q9) a) Explain the use of Tafel equation and Evans diagram with suitable illustrations. **[9]**

b) Explain the Chemical and Mechanical methods of surface treatment coatings with suitable examples. **[9]**

OR

Q10) a) With a suitable examples illustrate the fretting corrosion. **[9]**

b) Explain polarization and corrosion potentials. Also explain how the reference electrodes are useful for corrosion measurements with specific example. **[9]**

Total No. of Questions : 10]

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B.E. (Mechanical Sandwich)

AUTOMOBILE ENGINEERING

(2015 Pattern) (Semester - I) (402064) (Self Study - III)

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

Instructions to the candidates :

1) ***All questions are compulsory.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Assume suitable data if necessary.***

Q1) a) Explain overdrive with neat sketch. **[5]**

b) Write a short note on current scenario in Indian Auto Industry. **[5]**

OR

Q2) a) Explain necessity and requirements of gear box. **[5]**

b) Explain the purpose & requirements of front axle beam. **[5]**

Q3) a) Explain with neat sketch vacuum assisted brakes. **[5]**

b) What forces are supported by leaf spring? List down types of spring. **[5]**

OR

Q4) a) Explain Constriction of wheel? What are the benefits to use alloy wheels. **[5]**

b) Explain with neat sketch rack & pinion type of steering gear box. **[5]**

Q5) a) List the active safety components & describe with neat sketch role of each in vehicle safety. **[8]**

b) What are the crash test carried out for the automobile? Explain with neat sketch side impact test with specifications. **[8]**

OR

P.T.O.

Q6) a) Explain in detail importance of ergonomics in automobile safety. **[8]**

b) Explain function of each in automobile vehicle. **[8]**

i) Horn

ii) Windscreen wiper

iii) Speedometer

iv) Lamp & indicators

Q7) a) Explain various vehicle performance parameters in details. **[8]**

b) Explain **[8]**

i) Vehicle road test

ii) Free acceleration test

OR

Q8) a) Explain **[8]**

i) Coast down test

ii) Wheel test

b) What is traction and tractive efforts. Explain in detail. **[8]**

Q9) a) Explain in detail constriction of transport vehicles. With neat sketch. **[6]**

b) Explain application of off road machine. **[6]**

c) Explain specification and faction of light wheeled tractors. **[6]**

OR

Q10)a) Explain different types and application of bulldozers. **[9]**

b) Explain application and purpose of **[9]**

i) tankers

ii) dampers

iii) hydraulic dozers

▽▽▽▽

Total No. of Questions : 10]

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B. E. (Mechanical Sandwich)

PLANT ENGINEERING AND MAINTENANCE (Self-Study - III)

(2015 Pattern) (Semester - I) (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, Q.9 and Q.10***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume Suitable data if necessary.***

Q1) a) What factors will be consider for the site selection for the following industries: **[5]**

i) Consumable durable industries like TV manufacturing unit

ii) Automobile car manufacturing unit.

b) Discuss the classification of maintenance system. **[5]**

OR

Q2) a) Explain the different types of Plant Layout. **[5]**

b) What is the use of REL chart? How it is prepared? **[5]**

Q3) a) Explain the terms maintainability and availability. **[5]**

b) Discuss in brief main steps in systematic layout planning (SLP). **[5]**

OR

Q4) a) Write a note on Group Technology. **[5]**

b) Compara the advantages and disadvantages of a product to a process lay-out. **[5]**

Q5) a) What is reliablity? Discuss MTBF and Hazard function. **[8]**

b) Explain the concept of product life cycle. **[8]**

OR

P.T.O.

Q6) a) Explain any one model of life cycle costing. **[8]**

b) Explain predictive preventive maintenance? **[8]**

Q7) a) Discuss various industrial Engineering tools for failure analysis. **[8]**

b) Explain the general procedure for failure analysis. **[8]**

OR

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

i) FTA

ii) Pareto chart

b) Explain in short various fire prevention practices? **[8]**

Q9) a) Differentiate between spectroscopic oil analysis procedure and the Magnetic plug inspection system. **[9]**

b) Explain Total Productive Maintenance (TPM) in detail. **[9]**

OR

Q10)a) Write short notes on **[18]**

i) Ferrography

ii) Reliability and Costs

iii) Design for Maintainability

Total No. of Questions : 10]

SEAT No. : ____

PA-358

[Total No. of Pages : 3

[5927]-242

B.E. (Honors/ Minors)

MACHINE LEARNING

(2015 Pattern) (Semester - I) (410301)

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

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Define Machine learning and state two examples or applications of machine learning in our day to day lives. **[5]**

b) What is principal component analysis (PCA), when it is used? **[5]**

OR

Q2) a) Explain out of bag samples in random forest with example. **[5]**

b) What is factor analysis? Discuss it with suitable example. **[5]**

Q3) a) Enlist and explain different models of machine learning. **[6]**

b) Explain with example the variant of SVM, the Support vector regression. **[4]**

OR

Q4) a) Explain the Lasso, and Ridge types of regression. **[5]**

b) Write short note on Vapnik-Chervonenkis dimension. **[5]**

P.T.O.

Q5) a) What is perceptron? Discuss it with suitable diagram. **[8]**

b) Explain regularization in Neural Networks in detail. **[5]**

c) Differentiate single layer perceptron with multilayer perceptron? **[4]**

OR

Q6) a) Draw and explain multi-layer perception in detail. **[8]**

b) Write short note on **[9]**

i) Recurrent Networks

ii) Bayesian Neural Networks

Q7) a) Describe algorithm of association rule mining with suitable example. **[8]**

b) Using K-means clustering cluster following data into two clusters. **[9]**

{2, 4, 10, 12, 3, 20, 30, 11, 25}

Show each of the steps.

OR

Q8) a) What is clustering? Explain Hierarchical clustering algorithm in detail. **[8]**

b) Consider the following transactions **[9]**

Transaction	Items
T1	Bread, Jelly, Peanut Butter
T2	Bread, Peanut Butter
T3	Bread, Milk, Peanut Butter
T4	Beer, Bread
T5	Beer, Milk

Calculate the support and confidence for the following association rules

i) Bread->PeanutButter

ii) Jelly->Milk

iii) Beer->Bread

Q9) a) What is HMM? Explain HMM with suitable diagram. **[8]**

b) For the given dataset apply Naive Bayes algorithm and predict the outcome for the car ={Red, Domestic, SUV}. **[8]**

Color	Type	Origin	Stolen
Red	Sports	Domestic	Yes
Red	Sports	Domestic	No
Red	Sports	Domestic	Yes
Yellow	Sports	Domestic	No
Yellow	Sports	Imported	Yes
Yellow	SUV	Imported	No
Yellow	SUV	Imported	Yes
Yellow	SUV	Domestic	No
Red	SUV	Imported	No
Red	Sports	Imported	Yes

OR

Q10)a) Explain Linear regression with example. **[8]**

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

i) Discrete Markov Processes

ii) Markov Random Fields

Total No. of Questions : 12]

SEAT No. :

PA-359

[Total No. of Pages : 2

[5927]-243

B.E. (Honors/ Minors)

INTERNET OF THINGS AND EMBEDDED SECURITY

(2015 Pattern) (Semester - I) (410401)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.***
2) ***Figures to the right side indicate full marks.***
3) ***Neat diagram must be drawn wherever necessary.***
4) ***Assume suitable data, if necessary.***

Q1) a) What are the risk associated with IoT? **[5]**

b) Describe different vulnerabilities occurred in IoT System. **[5]**

OR

Q2) a) Explain different ways to prevent IoT attacks? **[5]**

b) Explain CPS for IoT? **[5]**

Q3) a) Why does IoT requires a security? **[5]**

b) What are the fundamental components of security in IoT. **[5]**

OR

Q4) a) What are security issues in IoT? **[5]**

b) Explain different ways to overcome the security issues in IoT? **[5]**

Q5) a) Describe IoT security CONOPS document, Network and security integration? **[8]**

b) Explain in details system security verification and validation (V&V) model. **[5]**

OR

P.T.O.

Q6) a) Explain the secure IoT system implementation life cycle. **[8]**

b) Describe attribute based access control mechanism for IoT? **[5]**

Q7) a) Describe cryptographic module principals for IoT? **[6]**

b) Describe cryptographic controls built into IoT messaging protocols? **[6]**

OR

Q8) a) Describe the following. **[6]**

i) Key derivation

ii) Key lifetime

b) Describe cryptographic control in Zigbee protocol **[6]**

Q9) a) Explain IEEE 1609.2? **[6]**

b) Explain identity life cycle with suitable diagram. **[6]**

OR

Q10)a) Explain IoT IAM infrastructure 802-1X? **[6]**

b) Discuss authorization & access control for IoT? **[6]**

Q11)a) Explain global web identity management for IoT? **[8]**

b) Describe local identity management model for IoT? **[5]**

OR

Q12)a) Explain network identity model for IoT? **[8]**

b) Describe Identity Portrayal? **[5]**

Total No. of Questions :8]

SEAT No. :

PA-360

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[5927]-244

B.E. (Computer Engineering) (Honors / Minors)
MACHINE LEARNING AND DATA SCIENCE
(2015 Pattern) (Semester-I) (410501)

Time : 2 ½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Describe how logistic regression can be used as a classifier. **[7]**

b) What are support vectors in Support Vector Machine? What are different types of kernel functions in SVM? **[7]**

c) Write k-means clustering algorithm? What is k in k-means? **[6]**

OR

Q2) a) What is regression line? What are characteristics of simple and multiple linear regression? **[7]**

b) What is ensemble learning? Differentiate between bagging and boosting. **[7]**

c) What are different hierarchical clustering algorithms? Differentiate between them? **[6]**

Q3) a) Define neural network model. How it can be used for classification? **[8]**

b) What is perceptron learning? Explain generalize delta rule? **[8]**

OR

Q4) a) What are activation functions? State and explain any three activation functions. **[8]**

b) State and explain backpropagation algorithm with example. **[8]**

P.T.O.

Q5) a) Write a note on convolution neural network. **[8]**

b) Explain in brief Long Short Term Memory (LSTM). **[8]**

OR

Q6) a) What are different optimization algorithms used in ANN? State and explain any one algorithm. **[8]**

b) Write a note on recursive neural network. **[8]**

Q7) a) Explain following text preprocessing steps with example. **[9]**

i) Tokenization

ii) Stop word removal

iii) Stemming

b) How does LDA work and how will it derive the particular distributions? **[9]**

OR

Q8) a) State and explain different text similarity measures. **[9]**

b) What is TF and IDF? How document is represented with TF-IDF explain with one example. **[9]**

Total No. of Questions :8]

SEAT No. :

PA-361

[Total No. of Pages :2

[5927]-245
B.E. (Honors/Minors)
MACHINE LEARNING FOR INTERNET OF THINGS
(2015 Pattern) (Semester-I) (410601)

Time : 2 ½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) What are elements of machine learning? Explain in detail. **[6]**

b) Explain machine learning for Internet of things data analysis. **[6]**

c) Write a note on Ensemble learning. **[8]**

OR

Q2) a) Differentiate between supervised, unsupervised & reinforcement learning. **[6]**

b) What are different advanced data exploration techniques? Explain any two in detail. **[8]**

c) What is convolution neural network? Explain in brief. **[6]**

Q3) a) Explain various techniques of machine learning model optimization. **[8]**

b) What is importance of least square solver for shallow neural network? Explain alternative for the same. **[9]**

OR

Q4) a) Explain steps involved in hardware implementation of least square solver for shallow neural network. **[9]**

b) Write a note IOT based smart building. **[8]**

P.T.O.

Q5) a) Write a short note on realtime IOT imaging with deep neural network. **[8]**

b) Explain embedded deep learning with example. **[9]**

OR

Q6) a) Why does a convolution neural network (CNN) work better with image data? **[8]**

b) State and explain challenges & opportunities for deep learning in IOT applications. **[9]**

Q7) a) How machine learning can be used in automation in farming with IOT devices? **[8]**

b) Explain How different sensors can be used in real-time patient monitoring system. **[8]**

OR

Q8) a) State and explain any two smart city applications where machine learning can be used. **[8]**

b) How machine learning can be used for accident prediction in IOT enabled transportation system. **[8]**

Total No. of Questions :10]

SEAT No. :

PA-362

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[5927]-246

B.E. (Computer Engg./ Honours / Minors)

VIRTUAL REALITY IN GAME DEVELOPMENT

(2015 Pattern) (Semester-I) (410701)

Time : 2 ½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Figures to the right side indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***

Q1) a) Differentiate between Virtual reality and Augmented Reality? **[5]**

b) What are Different Interaction patterns used in VR for content creation? **[5]**

OR

Q2) a) Explain the applications versus games? **[5]**

b) What is human centered interaction? **[5]**

Q3) a) Explain Define stage in Iterative design. **[5]**

b) Explain different content creation guidelines. **[5]**

OR

Q4) a) Explain Different guidelines of Iterative Design. **[5]**

b) What are different technical skills required for VR? **[5]**

Q5) a) Explain steps involved in creating project in Unity? **[6]**

b) Explain steps to add sound and music in Unity. **[12]**

OR

Q6) a) Differentiate between Animations in Unreal engine Vs Unity Engine. **[6]**

b) How to create and script enemy in Unity? **[12]**

P.T.O.

Q7) a) Explain Motion sickness. **[5]**

b) What is eye strain? **[3]**

c) Explain working of Unity's UI system in detail? **[8]**

OR

Q8) a) What is seizures? **[6]**

b) Explain all hardware challenges involved in Virtual Reality game development? **[10]**

Q9) a) How to measure sickness in virtual reality? **[4]**

b) Give the summary of all factors that contribute to adverse effects? **[12]**

OR

Q10)a) Explain the latency factor in virtual reality game development. **[4]**

b) Explain With example how to reduce adverse effects. **[12]**

Total No. of Questions : 10]

SEAT No. : ____

PA-363

[Total No. of Pages : 2

[5927]-247

B.E. (Artificial Intelligence & Machine Learning) (Honors/Minors)

SOFT COMPUTING AND DEEP LEARNING

(2015 Pattern) (Semester - II) (410303)

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

Instructions to the candidates :

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Assume suitable data, if necessary.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicates full marks.***

Q1) a) Define the following for membership functions : **[3]**

i) Core. ii) Support.

iii) Boundary.

b) What is soft computing? Indicate biological analogies of basic techniques of soft computing. Describe why soft computing is particularly useful in representing and reasoning with human- oriented knowledge. **[6]**

OR

Q2) a) Differentiate Supervised Learning and unsupervised learning. **[3]**

b) Define Crisp and Fuzzy relation. Describe fuzzy max-min composition, fuzzy min-max composition and max-product composition. **[6]**

Q3) a) Explain in detail convergence working principle in genetic algorithm. **[3]**

b) Explain fuzzification and defuzzification techniques. **[6]**

OR

Q4) a) Explain in detail Mamdani Fuzzy Inference System FIS. **[3]**

b) What is genetic programming? Write and explain the executional steps of Genetic Programming. **[6]**

Q5) a) Explain working of Bayesian Neural Networks with suitable diagram. **[6]**

b) What do you mean by Tensor in TensorFlow? What are the Programming element of TensorFlow. **[6]**

c) Explain in detail Feed Forward Neural Network. **[4]**

P.T.O.

OR

Q6) a) Explain in detail various Open Source Deep Learning Libraries and Platforms. **[6]**

b) What is Neural Network? Explain with suitable diagram the different classes of network architecture. **[6]**

c) Explain the following terms : **[4]**

i) Theano in Deep Learning.

ii) Caffe in Deep Learning.

Q7) a) What is the role of the Activation functions in Neural Networks? Explain in detail some of the popular Activation Functions used in Neural Networks. **[8]**

b) What is a Deep Belief Network? How did Deep Belief Neural Networks Evolve? **[6]**

c) What do you mean by Perceptron? Explain in detail different types of Perceptrons? **[4]**

OR

Q8) a) Explain with example Self Organizing Maps. **[8]**

b) What is pooling? What are the different types of Pooling? Explain their characteristics. **[6]**

c) What is image captioning in Deep Learning? **[4]**

Q9) a) Explain following with example **[8]**

i) Sequential processing LSTM

ii) Recurrent Neural Network(RNN)

b) Write short notes on : **[6]**

i) Artificial Neural Network (ANN)

ii) Application of RNN

c) Explain on detail Architecture of Back Propagation (BP) Networks. **[4]**

OR

Q10)a) What is associate memory in neural network? Explain various types and applications of associative memory. **[8]**

b) Explain in detail architecture Convolution Neural Network (CNN). Write down various properties of CNN representations. **[6]**

c) Explain Adaptive Resonance Theory? What is the major difference between ART1 and ART2? **[4]**

▽▽▽▽

Total No. of Questions : 12]

SEAT No. :

PA-364

[Total No. of Pages : 3

[5927]-248

B.E. (Honors/Minors)

INFORMATION SYSTEMS MANAGEMENT

(2015 Pattern) (Semester - II) (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, Q.9 or Q.10, Q.11 or Q.12.***
2) ***Figure to the right side indicates full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable data, if necessary.***

Q1) a) What is an Organization? Enlist and explain the features of Organizations? **[5]**

b) Discuss, how Information Systems Impact Organizations and Business Firms? **[5]**

OR

Q2) a) Explain Porter's Competitive Forces Model? **[5]**

b) Explain Information System Strategies for Dealing with Competitive Forces? **[5]**

Q3) a) What ethical social and political issues are raised by information systems? **[5]**

b) What specific principles for conduct can be used to guide ethical decisions? **[5]**

OR

P.T.O.

Q4) a) How have information systems affected everyday life? **[5]**

b) Explain key technology trends that raises ethical issues? **[5]**

Q5) a) What is IT infrastructure and what are its components? **[8]**

b) What are the stages and technology drivers of IT infrastructure evolution. **[5]**

OR

Q6) a) What are the current trends in software platform? **[8]**

b) What are the challenges of managing IT infrastructure? **[5]**

Q7) a) Explain the role of knowledge management programs in business? **[6]**

b) How knowledge work system provides value for firms? **[6]**

OR

Q8) a) Explain decision making process relevant to information management systems? **[6]**

b) What are the business benefits of using intelligent techniques for knowledge management? **[6]**

Q9) a) How does a building new system produce organizational change? **[6]**

b) Explain system development process for building information system? **[6]**

OR

Q10) a) Explain the objective & Importance project management? **[6]**

b) What strategies are useful for managing system risk and system implementation? **[6]**

Q11) a) Explain the component of block chain architecture and how does it work? **[8]**

b) What is CIA TRIAD of information security? **[5]**

OR

Q12) a) Explain **[8]**

i) Public block chain.

ii) Private block chain.

iii) Consortium block chain.

iv) Hybrid block chain.

b) What are the different mobile security threats. **[5]**

Total No. of Questions : 8]

SEAT No. :

PA-365

[Total No. of Pages : 2

[5927]-249

B.E. (Computer Engineering)

(Honors/Minors)

ARTIFICIAL INTELLIGENCE FOR BIG DATA ANALYTICS

(2015 Pattern) (Semester - II) (410503)

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 Scalable Machine Learning Using Spark. **[6]**

b) Explain Hadoop Ecosystem in detail. **[6]**

c) List and explain the applications of Computer Vision. **[8]**

OR

Q2) a) Explain in brief general steps of image preprocessing. **[6]**

b) Explain difference between OLTP and OLAP. **[6]**

c) Explain different Hadoop configuration files. What are the three modes in which Hadoop can run? **[8]**

Q3) a) What are some of the machine learning algorithms that can be used for computer vision? **[4]**

b) Explain Spark basics and Pyspark. **[6]**

c) List and explain the applications of NLP. **[8]**

P.T.O.

OR

Q4) a) What is Big Data Analytics? **[4]**

b) Write a note on NLP techniques. **[6]**

c) Explain feature extraction in NLP. **[8]**

Q5) a) Explain how programmability can be improved by using Pig and Hire in Hadoop. **[6]**

b) Explain NLP application : Sentiment Analysis. **[6]**

c) Explain content based recommendation system. **[4]**

OR

Q6) a) Explain Data Analysis using Hire with a example. **[6]**

b) Explain Hemmatization in NLP. **[6]**

c) Explain the need of Artificial Intelligence. **[4]**

Q7) a) Write note on application of AI. **[6]**

b) Explain logic programming with an example. **[6]**

c) List down the names of some popular Activation functions used in Neural Networks. **[4]**

OR

Q8) a) Demonstrate the Regression analysis using suitable example. **[6]**

b) Explain Clustering and Clustering methods. **[6]**

c) Write a note on greedy search technique. **[4]**

Total No. of Questions : 10]

SEAT No. : ____

PA-142

[Total No. of Pages : 2

[5927]-25

B.E. (Chemical)

PETROLEUM REFINING

(2015 Pattern) (Semester - I) (Elective - I) (409344D)

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

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable data, if necessary.***

Q1) a) Define & explain the following terms: **[6]**

i) Flash point

ii) Cetane Number

iii) Cloud point

b) What are the key issues and challenges for refineries in India? **[4]**

OR

Q2) a) Discuss the electric desalting process with a typical diagram? **[6]**

b) Discuss the composition & exploration of petroleum? **[4]**

Q3) Describe heating through exchangers and pipe still heaters. **[10]**

OR

Q4) a) Explain opération, working of the thermal cracking process with typical diagram? **[5]**

b) Write recent development of FCC along with a neat schematic diagram? **[5]**

Q5) a) Describe deasphalting operation with schematic diagram. **[8]**

b) Explain solvent extraction with a neat schematic diagram? **[8]**

OR

P.T.O.

Q6) a) Describe the bitumen manufacturing process with a typical diagram? **[8]**

b) Explain in detail about various additives used for lube oil? **[8]**

Q7) a) Why desulphurization is necessary for the refinery? Discuss the Hydro-desulphurization process with a typical schematic diagram along with reaction and operating parameters. **[12]**

b) What is the blending operation and explain the line blending operation? **[5]**

OR

Q8) a) Write in detail about the Environmental aspects used in the refineries. **[9]**

b) Describe the process of Hydrotreating with a typical schematic diagram. **[8]**

Q9) a) Write in detail about various storage strategies used in refineries. **[9]**

b) Discuss various safety aspects in the refinery. **[8]**

OR

Q10) a) Discuss the various strategies for marketing petroleum and petrochemical products. **[9]**

b) Write in detail about housekeeping strategies used for petroleum and petroleum products. **[8]**

Total No. of Questions : 8]

SEAT No. :

PA-366

[Total No. of Pages : 2

[5927]-250

B.E. (Honors/Minors) (Computer Engineering)

INTERNET OF THINGS SECURITY

(2015 Pattern) (Semester - II) (410603)

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

Instructions to the candidates :

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

Q1) a) Justify the need of lightweight cryptography for securing IoT applications. **[4]**

b) Elaborate the use of digital signatures to provide the integrity and authenticity. **[6]**

c) What is public key cryptography? How can it help to secure IoT applications? **[6]**

OR

Q2) a) Discuss the use of symmetric key cryptography to meet the security goals in IoT. **[6]**

b) What are the two identity-based authentication schemes? Describe in detail. **[6]**

c) Briefly discuss X.509 certificate scheme. **[4]**

Q3) a) Analyze the security threats and vulnerabilities in sensing layer of IoT. **[6]**

b) Draw and describe the five stages of IoT data lifecycle. **[6]**

c) List and explain the application-interface layer security threats in IoT. **[6]**

OR

P.T.O.

Q4) a) State the security challenges in IoT and describe the current schemes for IoT security. **[6]**

b) Justify the importance of machine learning algorithms in IoT security. **[6]**

c) Analyze the security threats and vulnerabilities in network layer of IoT. **[6]**

Q5) a) Discuss the security features and issues of 6LoWPAN. **[6]**

b) Identify the security concerns in social IoT and IoT based healthcare applications. **[6]**

c) Which security schemes can be applied to protect information in Wireless Sensor Networks (WSNs)? Discuss. **[6]**

OR

Q6) a) Identify the security issues in integration of RFID and WSNs. Describe in detail. **[6]**

b) What are the security issues in identification and tracking? **[6]**

c) Define key management. What are the components of key management in IoT? **[6]**

Q7) a) How IoT is used in smart cities? Discuss IoT based "smart home" use case. **[6]**

b) What is the role of IoT in connected cars? Write a short note on "Connected cars security and automation". **[6]**

c) List and explain various challenges associated with secure IoT deployment and Blockchain in IoT. **[6]**

OR

Q8) a) Which technologies are commonly used in a food traceability system? Describe blockchain enabled food supply chain traceability system in detail. **[7]**

b) Comment on "Intelligent traffic system". **[5]**

c) Identify and elaborate the types of risks involved in smart cities. **[6]**

Total No. of Questions : 8]

SEAT No. :

PA-367

[Total No. of Pages : 2

[5927]-251

B.E. (Computering Engineering)

(Honors/Minors)

APPLICATION DEVELOPMENT USING AUGMENTED REALITY AND VIRTUAL REALITY

(2015 Pattern) (Semester - II) (410703)

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) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable data if necessary.***

Q1) a) Define Virtual Reality. Enlist any four applications of Virtual Reality. **[6]**

b) Write short note on Mobile VR controller tracking **[7]**

c) Explain working of Simultaneous Localization and Mapping algorithm. **[7]**

OR

Q2) a) What is difference between AR,VR and MR. **[6]**

b) Explain VR SDK's framework. **[7]**

c) Write down features of "ARToolkit" and "Vuforia" **[7]**

Q3) a) Write short note on functions and macros. **[8]**

b) Explain various OOP concepts in AR and VR. **[9]**

OR

Q4) a) What is 3 D models compatibility with C#. **[8]**

b) What is dynamic memory allocation and explain with example. **[9]**

P.T.O.

Q5) a) Write short note on AR components. **[8]**

b) Explain structure and working of HTC Vive. **[9]**

OR

Q6) a) Write down Advantages and Disadvantages of AR and VR technologies. **[8]**

b) What are various AR devices and explain any two among them. **[9]**

Q7) a) Write role of AR and VR in Gaming and Entertainment field. **[8]**

b) Write down various AR and VR application and explain use case of any one. **[8]**

OR

Q8) a) Write short note on Human factor consideration in AR and VR. **[8]**

b) Explain Legal and Social consideration in AR and VR. **[8]**

Total No. of Questions : 10]

SEAT No. :

PA-1157

[Total No. of Pages : 2

[5927]-252A

B.E. (Instrumentation & Control)

SMART MATERIAL & SYSTEMS

(2015 Pattern) (Semester - II) (406271D) (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, Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Differentiate between Piezo electricity & Ferro electricity. **[6]**

b) Explain electrostrictive elastomers in detail. **[4]**

OR

Q2) a) Explain Ionic Polymer metal composite actuators. **[6]**

b) Write applications of shape memory alloys. **[4]**

Q3) a) Explain fiber optic sensor. **[5]**

b) Explain the principal of operation of Silicon Capacitive accelerometer. **[5]**

OR

Q4) a) Enlist applications of areas of smart sensors. **[5]**

b) Explain Piezo resistive pressure sensor. **[5]**

P.T.O.

Q5) a) Enlist advantages & applications of MEMS. **[8]**

b) Explain principal of operation of magnetic micro relay. **[8]**

OR

Q6) a) Explain Portable blood analyzer. **[8]**

b) Explain micro PCR systems. **[8]**

Q7) a) Explain silicon micro machining process. **[8]**

b) Explain etching - dry etching. **[8]**

OR

Q8) a) Explain surface micro machining process. **[8]**

b) Explain lithography in detail. **[8]**

Q9) a) Explain lab on chip technology. **[10]**

b) Explain the automotive applications of smart sensors. **[8]**

OR

Q10) a) Justify how Lab on chip technology is advantages than traditional technology giving suitable examples. **[8]**

b) What is Lab on Chip Technology? Enlist application of lab on chip in research. **[10]**

Total No. of Questions : 10]

SEAT No. :

PA-143

[Total No. of Pages : 2

[5927]-26
B.E. (Chemical)
CHEMICAL PROCESS SYNTHESIS
(2015 Pattern) (Semester - I) (Elective - II) (409345A)

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

Instructions to the candidates :

1) ***Answer five questions.***
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 the concept of hierarchy of process design. **[5]**

b) Write in brief different approaches in overall process design. **[5]**

OR

Q2) Explain various types of reaction paths considered in choice of reactors. **[10]**

Q3) Explain the effect of following parameters on choice of reactor : **[10]**

a) Concentration

b) Catalyst

OR

Q4) Explain the idealized reactor models for process. **[10]**

Q5) a) Discuss various types of dryers. **[8]**

b) Explain magnetic separation process for separation of heterogeneous mixtures with suitable example. **[8]**

OR

P.T.O.

Q6) Write notes on following for separation of mixtures : **[16]**

a) Filtration

b) Fractional distillation

Q7) Explain with sketches the concept of heat integration by thermal coupling. **[16]**

OR

Q8) a) Discuss integration of integration of heat pump. **[8]**

b) Explain the composite curves. Write down a simple heat recovery problem with one hot stream and one cold stream. **[8]**

Q9) a) Explain the concept of Threshold problems in heat exchanger network. **[9]**

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

OR

Q10)a) Explain overall safety and health considerations in Chemical industries. **[8]**

b) Write in brief on : **[10]**

i) Toxic release from Chemical Industries.

ii) Attenuation of hazardous materials.

Total No. of Questions : 10]

SEAT No. :

PA-144

[Total No. of Pages : 2

[5927]-27

B.E. (Chemical Engineering)

INDUSTRIAL MANAGEMENT AND ENTREPRENEURSHIP

(2015 Pattern) (Semester - I) (Elective - II) (409345B)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Write Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Figures to the right indicate full marks.***
3) ***Draw suitable diagrams wherever necessary.***
4) ***Use of scientific calculators is allowed***
5) ***Assume suitable data if necessary.***

Q1) Write distinguishing points between : **[10]**

a) Entrepreneur and Intrapreneur

b) Entrepreneur and Manager

OR

Q2) Write short notes on : **[10]**

a) Attributes and characteristics of successful entrepreneur

b) Role of entrepreneur in Indian economy

Q3) Explain the role of National Institute of Entrepreneurship and Small Business Development (NIESBUD) and Small Industries Service Institute (SISI) in entrepreneurship development. **[10]**

OR

Q4) What is feasibility? Explain personnel and management feasibility in detail.**[10]**

Q5) a) Explain the hierarchy of needs given by Abraham Maslow. **[8]**

b) Explain business communication and communication process. **[8]**

P.T.O.

OR

Q6) Explain the five stages of team development described by Tuckman. **[16]**

Q7) Illustrate the six sigma concept by enlisting its requirements and advantages.**[16]**

OR

Q8) Illustrate the Computer based project management. **[16]**

Q9) Explain the following : **[18]**

a) Product and Brand Management

b) Data collection methods and analysis

c) Channels of distribution

OR

Q10) Explain in detail marketing and marketing management. By taking an example of new product, illustrate the various marketing research for its marketing.**[18]**

Total No. of Questions : 10]

SEAT No. :

PA-145

[Total No. of Pages : 3

[5927]-28

B.E. (Chemical)

PIPING DESIGN AND ENGINEERING

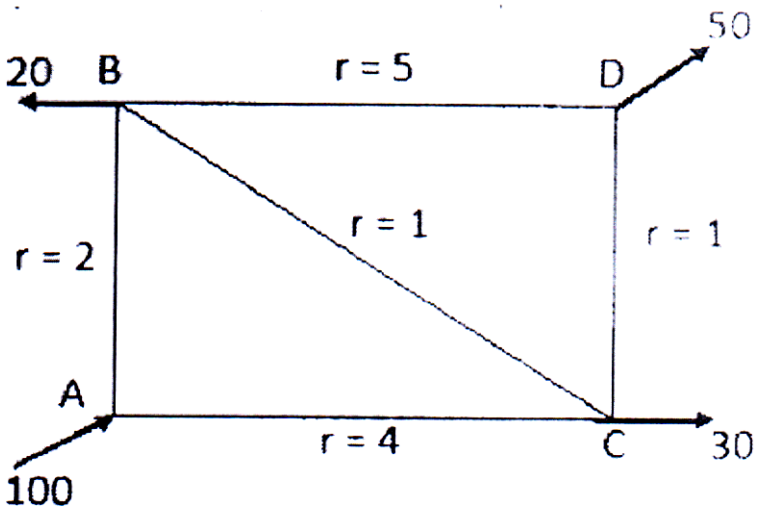
(2015 Pattern) (Semester - I) (409345c) (Elective - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) For a pipe network shown in figure. Determine the flow in each pipe. The value of n may be assumed as 2.0. **[10]**

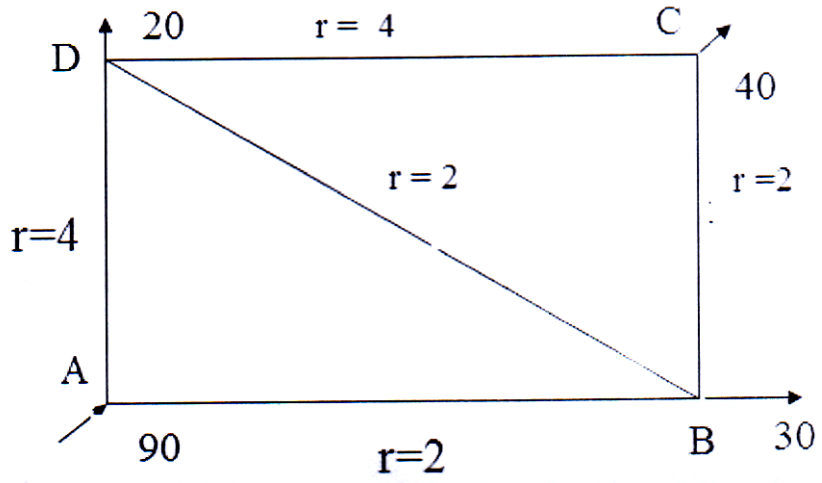


OR

Q2) Explain the desirable properties of the piping material. **[10]**

P.T.O.

Q3) Calculate the discharge in each pipe of the network as shown in figure. The Pipe network consists of 5 pipes. The head loss h_f in each pipe is given by $h_f = rQ^2$. The values of r for various pipes and also the inflow and outflow at nodes are shown in the figure. **[10]**



OR

Q4) Explain the types of valves with application. **[10]**

Q5) a) Water at 15°c flows through a 15 cm diameter riveted steel pipe of length 450 m and roughness ε = 2 mm . The head loss is known to be 8.30 m. Find the volumetric flow rate of water in the pipe. **[8]**

b) Find the head loss due to the flow of 3,500 gpm of oil ($\nu = 1.15 \times 10^{-4}$ ft^2/s) through 1,600 feet of 6" diameter cast iron pipe. If the density of the oil $\rho = 1.8$kg/ft^3. **[8]**

OR

Q6) a) Explain line sizing of pneumatic conveying of solids. **[8]**

b) Find the head loss due to the flow of 4,500 gpm of oil ($\nu = 1.15 \times 10^{-4}$ ft^2/s) through 1,600 feet of 8" diameter cast iron pipe. If the density of the oil $\rho = 1.75$ kg/ft^3. **[8]**

Q7) a) A steam pipe with 90 mm ID and 100 mm OD is covered with an insulating material having thermal conductivity of 2.0 (W/m.K). The steam temperature is 473 K and ambient temperature is 293 K. Taking the convective heat transfer coefficient between the insulation surface and air as 9.0 (W/m^2.K), find the critical radius of insulation. For this value (r_c), calculate the heat loss per meter of pipe and outer surface temperature. Neglect the resistance of pipe wall. **[8]**

b) Explain optimum thickness of insulation. **[8]**

OR

Q8) a) Calculate the critical radius of insulation for asbestos (k = 0.17 W/m.K) surrounding a pipe and exposed to a room air at 293 K with h=3.0 W/(m^2.K). Calculate the heat loss from 473 K, 50 mm diameter pipe when covered with the critical radius of insulation and without insulation. **[8]**

b) Explain hot and cold materials. **[8]**

Q9) a) Explain piping system layout considerations for Heat Exchangers. **[9]**

b) Explain piping system layout considerations for Reactors. **[9]**

OR

Q10)Write short note on : **[18]**

a) Piping isometrics

b) P & ID

c) Pipe Rack

Total No. of Questions : 10]

SEAT No. : ____

PA-146

[Total No. of Pages : 2

[5927]-29

B.E. (Chemical)

ADVANCED SEPARATION PROCESSES

(2015 Pattern) (Semester - I) (Elective - II) (409345)

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

Instructions to the candidates :

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume Suitable data if necessary***

Q1) Explain residue map curve in detail. **[10]**

OR

Q2) Explain the working principle of Azeotropic distillation and extractive distillation. **[10]**

Q3) Explain reactive distillation processes. **[10]**

OR

Q4) Explain reactive crystallization process. **[10]**

Q5) a) Explain basic types of modules used in reverse osmosis. **[8]**

b) Explain fouling of membrane and concentration polarization. Discuss the methods of controlling the fouling. **[8]**

OR

Q6) a) Explain the principle and working of ultrafiltration. Discuss its applications. **[8]**

b) What is cross flow filtration? What are its advantages over dead end filtration? **[8]**

P.T.O.

Q7) a) Explain the detail working of Chromatography. **[8]**

b) Explain the concept and general principles of adsorption. **[8]**

OR

Q8) a) Write short note on : **[8]**

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. **[8]**

Q9) a) Explain zone electrophoresis in detail. **[9]**

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

OR

Q10)a) Give the industrial applications of molecular sieves. **[9]**

b) What is principle and working of ultra centrifugation and discuss its application. **[9]**

Total No. of Questions : 9]

SEAT No. :

PA-121

[Total No. of Pages : 3

[5927]-3
B.E. (Automobile)
MACHINE AND VEHICLE DYNAMICS
(2015 Pattern) (Semester - I) (416490)

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

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right side indicate full marks.***
3) ***Use of Logarithmic tables, sliderule, electronic pocket calculator is allowed.***
4) ***Assume suitable data if necessary.***

Q1) Four masses m1, m2, m3 and m4 are 200kg, 300kg, 240kg and 260kg respectively. The corresponding radii of rotation are 0.2m, 0.15m 0.25m and 0.3m respectively and the angels between successive masses are 45°, 75° and 135°. By using analytical method, find the position and magnitude of the balance mass required if its radius of rotation is 0.2m. **[10]**

OR

Q2) a) Explain with displacement time plot for over damped, under damped and critically damped system. **[6]**

b) Write a short note on partial balancing of reciprocating engines? **[4]**

Q3) a) A spring mass damper system has a mass of 3.43kg, stiffness 343N/m and damping coefficient as 34.3Ns/m. Find :- **[5]**

i) Natural frequency of damped vibration.

ii) Natural frequency of system under dry friction damping instead of viscous damping.

iii) If there is Coulomb damping and the frictional force is 6.86N. Find the amplitude loss per cycle.

b) Find the natural frequency of simple pendulum by energy method. **[5]**

P.T.O.

OR

Q4) a) Derive an expression for determining the transmissibility using vector method of representation? **[5]**

b) A vehicle has a mass of 1200 kg. The suspension system has a spring constant of 400kN/m and damping ratio of 0.5. If the vehicle speed of 100 km/hr, determine the displacement amplitude of vehicle. The road surface varies sinusoidally with an amplitude of 0.05 m and a wavelength of 6 m. **[5]**

Q5) a) How stability of vehicle affects its performance on slope? Explain with neat sketch of forces. **[8]**

b) Write a short note on "gyroscopic effort". **[8]**

OR

Q6) a) Write a short note on gradibility & draw bar pull. **[8]**

b) Explain concept of equivalent mass & equivalent moment of inertia? **[8]**

Q7) a) Explain vehicle acceleration with the help of engine performance curve in detail. **[8]**

b) Explain Braking of vehicle when **[10]**

i) Brakes applied to Rear Wheels

ii) Brakes applied to Rear Wheels

OR

Q8) a) Explain following terms in brief : **[10]**

i) Automatic Transmission

ii) Transverse weight shift

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

i) Braking efficiency

ii) Brake Fade

Q9) Write a short note on (Any Four) : **[16]**

a) Modal Analysis.

b) Constant speed test for vehicle handling.

c) Mathematical model for ride.

d) Explain yaw velocity response and gain.

e) Shock absorber.

□□□

Total No. of Questions : 10]

SEAT No. : ____

PA-147

[Total No. of Pages : 2

[5927]-30

B.E. (Chemical Engineering)

PROCESS MODELING AND SIMULATION

(2015 Pattern) (Semester - II) (409349)

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

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8 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.***

Q1) a) Explain in short, the four different phases of model building. **[5]**

b) Explain the concept of dynamic behavior of system with respect to law of conservation of Mass and energy with equations. **[5]**

OR

Q2) a) Explain the terms-distributed parameter system. Give example. **[5]**

b) Develop the model equation shell and tube heat exchanger. **[5]**

Q3) a) Develop the mathematical model for triple effect evaporator. **[5]**

b) Draw figure and write assumptions for the model equation for flow of film on the outside of circular tube. **[5]**

OR

Q4) a) Develop modeling equation of continuity. **[5]**

b) Draw the figure, write all notations and assumption needs to be made for cooling tower. **[5]**

Q5) a) Consider an ideal binary distillation column and write all the model equations to describe the system. **[8]**

b) Draw a model to show a dryer and write all notations, assumptions and important parameters to be considered during modeling of tray dryer. **[8]**

OR

P.T.O.

Q6) a) Develop the modeling equation for the batch distillation column. **[8]**

b) Develop the mathematical model for absorber. **[8]**

Q7) a) Derive the model equations for C.S.T.R. reactor by considering reversible reaction. **[8]**

b) Develop the state model equation for the batch mixing of two solutions. Initially tank is empty. Consider volume of tank is V m^3 and flow rate is volumetric and concentrations are moles per volume. **[10]**

OR

Q8) a) Derive modeling equations for plug flow reactor. **[8]**

b) Develop model equations for trickle bed reactor. **[10]**

Q9) a) Write short notes on use of numerical methods to solve the differential equations. **[8]**

b) Develop the modeling equation for the following Bio-chemical reactor by considering that the biochemical reactor is perfectly mixed. **[8]**

OR

Q10)a) Derive the model equation for effluents treatment reactor. **[8]**

b) Explain utilization of CHEM-CAD in modeling and simulation in detail. **[8]**

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Total No. of Questions : 10]

SEAT No. :

PA-4309

[Total No. of Pages : 2

[5927]-3001

B.E. (Computer Engineering)

SMART SYSTEM DESIGN AND APPLICATIONS

(2012 Pattern) (Semester - I)

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 Q6, 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.***

Q1) a) Explain the environment types & PEAS properties of agent. **[8]**

b) Explain Problem solving with AI in detail with suitable example. **[6]**

c) Explain the unification algorithm and state its application. **[4]**

OR

Q2) a) What is alpha beta pruning? Explain alpha beta search algorithm with suitable example. **[8]**

b) Explain the various AI problems and AI techniques. **[6]**

c) Explain the architecture of Goal Based agents. **[4]**

Q3) a) Explain A Star search algorithm using an example. **[4]**

b) What is Expert System shell? Why explanation is necessary in expert system? **[6]**

c) Write short note on structure of intelligent agents. **[4]**

OR

Q4) a) What is reasoning? What is its role in artificial intelligence. **[4]**

b) Explain the concept of uncertainty. Write down an example illustrating the behavior of an agent in an uncertain world. **[6]**

c) Explain types of decision trees in data mining. **[4]**

P.T.O.

Q5) a) What are the basic axioms of probability? Explain how to derive the useful facts from the basics axioms with suitable example. **[6]**

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

i) Inductive learning

ii) Learning Decision Tree

OR

Q6) a) What is problem? What are the basic elements needed for solving single state problem and formalize the 8-Puzzle problem? **[6]**

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

i) Information Retrieval

ii) Information Extraction

Q7) a) Write a note on Bayesian Network. **[6]**

b) Explain the steps to assess the performance of the learning algorithm with an example. **[6]**

OR

Q8) a) Write is Artificial Neural Network? Explain its types. **[6]**

b) Write a short note on Wumpus world environment. **[6]**

Q9) a) Write a short note on planning with operator. **[6]**

b) How to represent and evaluate decision problem with a decision network. **[6]**

OR

Q10) a) Write a short note on : **[6]**

i) Dynamic Bayesian Network.

ii) Kalman Filters.

b) Enumerate and explain the different. Edge profiles using in edge detection. **[6]**

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Total No. of Questions : 10]

SEAT No. :

PA-4310

[Total No. of Pages : 2

[5927] - 3002

B.E. (Computer Engineering)

PROBLEM SOLVING WITH GAMIFICATION

(2012 Pattern) (410451) (Semester - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***

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

3) ***Figures to the right indicate full marks.***

Q1) a) How Gamification could be employed to improve the efficiency of an individual? **[5]**

b) What are the different types of players? **[5]**

OR

Q2) a) Explain the significance of the phrase "House always wins" in the context of Gamification. **[5]**

b) Explain Point Systems. **[5]**

Q3) a) Why gamification design has to be agile? **[5]**

b) What is Gamified loyalty? Explain with suitable example. **[5]**

OR

Q4) a) Explain Intrinsic and Extrinsic motivation in detail. **[5]**

b) What is Game Dynamics? What are building blocks of gamification. **[5]**

P.T.O.

Q5) a) List and explain the installation and use of Gamification tools. **[9]**

b) Which game mechanics would you suggest in any activity for the prosperity of the nation? **[9]**

OR

Q6) a) Explain how game mechanics like Surprise, unexpected delight and gifting can be useful for gamified system? **[9]**

b) Explain significance and relevance of participants profile and applications in context of Gamification. **[9]**

Q7) a) How the behavior of the user could be quantified and studied to know the engagement in Social network? **[8]**

b) How would you realize the game mechanics to develop Gamification based system for encouraging aspirants for innovation? **[8]**

OR

Q8) a) Explain 8 Queen problems of Gamification. **[8]**

b) What are the considerations one must do while designing the Game Mechanics? **[8]**

Q9) a) What are the facilities available on mambo pattern to improve e-learning and training activity? **[8]**

b) What are the various advantages of Gamification tools? **[8]**

OR

Q10) a) How the customer's loyalty can be increased using the features provided Bigdoor? **[8]**

b) How the Gamification tool can be used to develop the solution to improve teaching learning process. **[8]**

Total No. of Questions : 10]

SEAT No. : ____

PA-4311

[Total No. of Pages : 3

[5927] - 3003

B.E. (Mech.)

REFRIGERATION AND AIR-CONDITIONING

(2012 Pattern) (402041)

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

Instructions to the candidates :

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Draw neat diagrams wherever necessary.***
3) ***Use of scientific calculator, psychrometric chart is allowed.***
4) ***Assume suitable data wherever necessary.***
5) ***Figures to the right indicate full marks.***

Q1) a) Draw a schematic and T-s diagrams of Bell Coleman refrigeration cycle. **[4]**

b) A household refrigerator maintains a space at a temperature of 0°C. Every time the door is opened, warm material is placed inside, introducing an average 400 kJ of heat, but making only a small change in temperature of the refrigerator. The door is opened 25 times a day and the refrigerator operates at 25% of ideal COP. The cost of work is Rs.5.0 per kWh. What is the monthly bill of this refrigerator? The atmospheric temperature is at 30°C. **[6]**

OR

Q2) a) State any four applications of refrigeration and air conditioning. **[4]**

b) Draw skeleton of p-h diagram and mark the property line on it. Sketch ideal vapour compression cycle on T-s and p-h diagrams and mark the name of processes. **[6]**

Q3) a) Discuss the effect of condenser pressure rise on performance of VCC with the help of p-h diagram. **[4]**

b) Explain with suitable diagram the working of Ammonia water vapour absorption system. **[6]**

OR

P.T.O.

Q4) a) Compare vapour absorption system with vapour compression system on minimum four criterion. **[4]**

b) State desirable properties of refrigerant. Why are use of CFC based refrigeration banned worldwide? Explain in brief **[6]**

Q5) a) Define relative humidity, BPF of coil and SHF. **[6]**

b) Air is cooled from 39°C DBT and 29% RH to 24°C at the rate of 5 m^3/s. Calculate the capacity of the cooling coil if the surface of the cooling coil is 20 °C. Also, calculate the by-pass factor. Show the process on psychrometric chart. **[10]**

OR

Q6) a) What do you understand by evaporative cooling? list three important characteristics of evaporative cooling systems. Show the process on psychrometric chart. **[6]**

b) 142 m^3/min moist air at 5°C with specific humidity of 0.002 kg/kg of dry air is mixed adiabatically with 497.07 kg/min of moist air stream at 24°C and 50% relative humidity. If the pressure is constant throughout at 1 bar. **[10]**

Determine :

i) the humidity ratio, and

ii) the temperature of the mixed stream.

Q7) a) Draw a schematic of Winter air conditioner and explain its working in brief. **[6]**

b) Compare unitary and central air conditioning systems. **[6]**

c) Draw a schematic of evaporative condenser and explain its working. **[6]**

OR

Q8) a) Draw *schematic of screw* compressor and explain its working. **[6]**

b) Compare dry and flooded evaporators on minimum 3 criterion. **[6]**

c) Explain the working of TXV with suitable diagram. **[6]**

Q9) a) What are causes of pressure losses in ducting system? **[4]**

b) What should be the design aims of an air distribution system? **[4]**

c) A 12m long duct passes air at a rate of 1.2 m^3/s. If the friction factor is 0.0048, calculate the pressure drop in the following ducts **[8]**

i) Circular duct of 280 mm diameter, and

ii) Square duct of 280 mm side.

OR

Q10) a) Prove that the equivalent diameter of rectangular duct for same air flow rate is given by

$$D_{eq} = 1.265\left[\frac{(ab)^3}{(a+b)}\right]^{1/5}$$

where a/b is aspect ratio. **[8]**

b) Enlist minimum four steps (each) for equal friction method and velocity reduction method of duct design. **[8]**

Total No. of Questions : 10] **SEAT No. :**

PA-4312 **[Total No. of Pages : 4**

[5927]-3004
B.E. (Mechanical)
DESIGN OF PUMPS, BLOWERS AND COMPRESSORS
(2012 Pattern) (Semester-II) (402050C) (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, Q9 or Q10.***
2) ***Answers for questions should be written in one single answer sheet only.***
3) ***Figures to the right indicate full marks.***
4) ***Neat diagrams must be drawn wherever necessary.***
5) ***Use of electronic pocket calculator is allowed.***
6) ***Assume suitable data, if necessary.***

Q1) a) Explain performance characteristics of Pump, Fan, Blower and Compressor (Any 1 with neat sketch/graph) **[5]**

b) A rotary air compressor working between 1 bar and 2.5 bar has internal and external diameter of impeller as 300mm and 600mm respectively. The vane angle at inlet and outlet are 30° and 45° respectively. If air enters at 15m/s, Find - **[5]**

i) Speed of rotation in rpm

ii) Work done by compressor per kg of air

OR

Q2) a) Explain the different applications of compressors, fans, blowers. **[5]**

b) A centrifugal pump impeller whose external diameter and width at the outlet are 0.8 and 0.1m respectively is running at 550rpm.The angle of impeller vanes at outlet is 40°. The pump delivers 0.98m^3 of water per second under an effective head of 35m.If the pump is driven by 500kW motor, determine : **[5]**

i) Manometric Efficiency

ii) Overall Efficiency

iii) Mechanical Efficiency

P.T.O.

Q3) a) Explain Indicator diagram in Reciprocating Pumps? **[5]**

b) A double acting reciprocating pump has piston of diameter 250mm and piston rod of diameter 50mm which is on one side only. Length of piston stroke is 350mm and speed of crank moving the piston is 60rpm.The suction and delivery heads are 4.5m and 18m respectively. Determine the discharge capacity of the pump and the power required to operate the pump. **[5]**

OR

Q4) a) What is Slip? Explain the concept of Negative Slip? **[5]**

b) For a pump with no air vessel, stroke length=300mm, piston diameter=125mm,suction pipe diameter=75mm, length of suction pipe=6m and suction head=3m. Atmospheric pressure=10.3m of water and separation may be assumed to occur when the absolute pressure head in the cylinder falls below 2.5m of water. Calculate the maximum speed at which the pump may be run if separation is to be avoided. **[5]**

Q5) a) Write a short note on Pump Selection. **[8]**

b) How does the dust erosion of centrifugal fan/blower occurs? What is it's effect on the performance? **[8]**

OR

Q6) a) Explain the different Mechanical losses in fans and blowers. **[8]**

b) A centrifugal blower takes in $180 m^3/min$ of air pressure P_1 = 1.013 bar and temperature t_1 = 43°c and delivers it at 750mm W.G. Taking the efficiencies of the blower and drive as 80% & 82% respectively. Electric motor driving the blower runs at 3000 rpm. Determine the power required to drive the blower and specific speed. **[8]**

Q7) a) What are main cause for noise generation? What are methods for reducing the fan noise? **[8]**

b) An axial fan stage consisting of only a rotor has the following data. **[8]**

Rotor blade air angle at exit	10°
Tip diameter	60 cm
Hub diameter	30 cm
Rotational speed	960 rpm
Power required	1 kW
Flow coefficient	0.245

(Inlet flow conditions P1 = 1.02 bar and T1 = 316 K)

Determine the rotor blade angle at the entry, the flow rate, stage pressure rise, overall efficiency, degree of reaction and specific speed.

OR

Q8) a) Explain performance of axial fans with neat graph. **[8]**

b) A Centrifugal fan has the following data : **[8]**

Inner diameter of the impeller	18 cm
Outer diameter of the impeller	20 cm
Speed	1450 rpm

The relative and absolute velocities respectively are

At entry	20 m/s, 21 m/s
At exit	17 m/s, 25 m/s
Flow rate	0.5 kg/s
Motor efficiency	78 %

Determine

i) Stage Pressure rise

ii) Degree of reaction

iii) The power to drive the fan Take density of air as 1.25 kg/m^3 **[8]**

Q9) a) Explain Enthalpy-Entropy diagram for Centrifugal Compressor in details. **[8]**

b) A Centrifugal air compressor compresses air from 1 bar to 3 bar. Internal and outer diameter of the impeller are 0.2 m and 0.4 m respectively. The impeller blade angle at inlet is 30° and at exit is 40°. Air enters the impeller blade radially at a speed of 12 m/s. Find

i) Speed of impeller in RPM

ii) Workdone per Kg of air.

iii) Thickness of the impeller blades for mass flow rate of air as 0.5Kg/s, if impeller has 30 blades and width of each impeller blade is 5.5cm. Assume the specific volume of air as 0.82m^3/kg and velocity of flow constant throughout. Assume isentropic process and Cp =1.005KJ/KgK. **[10]**

OR

Q10)a) Write a note on 'Prewhirl' of Compressor. **[8]**

b) An axial flow compressor is designed for 50% reaction with inlet and outlet air angles for rotor blades as 80° and 45° respectively measured from axial direction. The mean blade speed is 200m/s and axial velocity of flow is constant throughout. Assuming work factor of 0.88, find the number of stages required if total pressure ratio is 4:1 with an isentropic efficiency of 85%. The stagnation inlet temperature may be 290K. Assume isentropic process, R=287Nm/KgK, Cp= 1.005KJ/KgK. **[10]**

Total No. of Questions : 10]

SEAT No. :

PA-4313

[Total No. of Pages : 2

[5927]-3005

B.E. (Computer Engineering)

MOBILE APPLICATIONS

(2012 Pattern) (Semester-II) (410452C) (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, Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Why third party frame work is needed? Support your answer with suitable frame work? **[6]**

b) Explain mobile web with Advantages. **[4]**

OR

Q2) a) Write any six differences between mobile web and desktop web? **[6]**

b) Differentiate between WAP1 & WAP2? **[4]**

Q3) a) Write short note on XML & JSON? **[6]**

b) Write any four WML commands and explain them? **[4]**

OR

Q4) a) Explain WCSS Marquees extension with the help of attributes? **[6]**

b) Differentiate between HTML 4 & HTML 5? **[4]**

Q5) a) Explain different JAVA Script fallback, JAVA Script based UI frame work? **[8]**

b) What is HTML 5 mobile boiler plate? **[8]**

OR

Q6) a) What is CSS and CSS3 mobile web? **[8]**

b) Explain user agent spoofing and HTTP sniffing in detail. **[8]**

P.T.O.

Q7) a) Explain J2ME in detail? Also list out the tools for J2ME programming. **[6]**

b) Explain with example CSS selectors? **[6]**

c) Why cloud based browser's are faster than direct browsers? **[5]**

OR

Q8) a) Explain Enyo framework? **[6]**

b) Write a short note on DOM? **[6]**

c) Explain server side debugging techniques. **[5]**

Q9) a) Write a short note on web sockets, stating the need as web socket constructor? **[6]**

b) Explain in detail wifi positioning system? **[6]**

c) Explain mobile SEO? **[5]**

OR

Q10)a) Explain Assisted Global Positioning System (AGPS). **[6]**

b) Explain Advantages as Application Cache? **[6]**

c) Write short note on web storage? **[5]**

Total No. of Questions : 8]

SEAT No. :

PA-4314

[Total No. of Pages : 2

[5927]-3006

B.E. (Computer Engineering)

MOBILE COMPUTING

(2012 Pattern) (Semester-II) (Elective-III) (410451A)

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 main functions of HLR and VLR in GSM Networks. **[7]**

b) Draw and explain Mobile Computing architecture for a mobile device. **[6]**

c) Explain Wireless Communication System with Block Diagram. **[7]**

OR

Q2) a) What do you mean by handoff in cellular networks? Explain mobility management in detail. **[7]**

b) Differentiate cellular network and ad hoc networks. Why routing is challenging in mobile ad hoc networks? **[6]**

c) Explain using block diagram the process of authentication in a GSM Service. **[7]**

Q3) a) Give the advantages and disadvantages of Snooping TCP. Explain the working of Snooping TCP in details. **[8]**

b) What do you mean by tunneling? How does a tunnel differ from a route? **[8]**

OR

Q4) a) Why a MANET faces greater security threats than a fixed infrastructure network? **[8]**

b) Explain Cluster-head Gateway Switch Routing (CGSR) in MANET. **[8]**

P.T.O.

Q5) a) What are the different types of data synchronizations in mobile computing systems? Describe synchronization usage models in mobile applications. **[8]**

b) Describe pull-based data-delivery mechanism. What are the advantages and disadvantages of pull-based data-delivery? **[9]**

OR

Q6) a) Explain the reason for communication asymmetry in mobile network. Give examples of asymmetric communication architecture for data dissemination. **[8]**

b) Why selective tuning is required? Explain Direct and Hash-based methods. **[9]**

Q7) a) Explain Mobile-agent-based architecture. **[8]**

b) Explain the role of a gateway in connecting networks using different protocols. Describe a Residential Gateway architecture. **[9]**

OR

Q8) a) List and Explain various Operating Systems used as Mobile OS. **[8]**

b) What are the functions performed by Application Server? Explain Sun Java System Web Server-6. **[9]**

Total No. of Questions : 8]

SEAT No. :

PA-4315

[Total No. of Pages : 2

[5927]-3007

B.E. (Computer Engineering)

SOFTWARE DESIGN METHODOLOGY & TESTING

(2012 Pattern) (410449)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain real time software architecture with suitable example. **[5]**

b) Draw Use Case diagram for working of Chocolate Vending machine. **[5]**

Q2) a) Explain the Singleton pattern with example. **[5]**

b) Explain service oriented architecture with example. **[5]**

Q3) a) Explain in detail V-test model. **[6]**

b) Discuss different steps in defect management process. **[6]**

c) Is complete testing possible? When to stop testing? What are the test resumption criteria? **[6]**

OR

Q4) a) Differentiate between verification and validation. **[6]**

b) State and explain different software testing principles. **[6]**

c) Discuss the essential features of modern defect management tools. **[6]**

Q5) a) What is Integration testing? Explain its type. **[8]**

b) What is boundary value analysis? Explain boundary value analysis process. **[8]**

OR

P.T.O.

Q6) a) State difference between white box and black box testing. **[6]**

b) Write short notes (Any Two) **[8]**

i) Regression Testing.

ii) User Acceptance Testing.

iii) Smoke Testing.

c) What is alpha & beta testing? **[2]**

Q7) a) State the importance of GUI testing and functional testing. **[8]**

b) What are different components of Junit testing tool? **[8]**

OR

Q8) a) Write a short note on monkey talk & highlight its features. **[8]**

b) Explain different methods of mobile testing. Give any one suitable example. **[8]**

Total No. of Questions : 10]

SEAT No. :

PA-4316

[Total No. of Pages : 2

[5927]-3008

B.E. (Mechanical)

POWER PLANT ENGINEERING

(2012 Pattern) (Semester - II) (402047)

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 wherever necessary.***
3) ***Use of scientific calculator is allowed.***
4) ***Use of Steam Table and Mollier Chart is allowed.***
5) ***Assume suitable data wherever necessary.***
6) ***Figures to the right indicate full marks.***

Q1) a) Explain : **[4]**

i) Carbon credit

ii) Load shedding

b) Exhaust steam having a quality of 0.9 enters a surface condenser at an absolute pressure of 0.13 bar and comes out as water at 45°C. The circulating water enters at 30ºC and leaves at 40ºC. Estimate the quantity of circulating water and the condenser efficiency. **[6]**

OR

Q2) a) Draw Rankine cycle with reheat and regeneration on T-S plane. **[5]**

b) Give layout of unit system of pulverized fuel burning. List its advantages & disadvantages. **[5]**

Q3) a) Write a note on Hydrograph and Flow duration curve. **[4]**

b) The steam at 70 bar and 500ºC is supplied to the system turbine. Steam is expanded in high pressure turbine isentropically till it is dry saturated. The steam is reheated to 400ºC passing to reheater. Expansion after reheating is carried to condenser pressure up to 0.2 bar. Find efficiency of cycle and work output if flow of steam is 10 kg/sec. Neglect pump work. Represent cycle on T-S plot and Find **[6]**

i) Thermal efficiency of cycle

ii) Work ratio

OR

P.T.O.

Q4) a) What are the sources of Air leakage in Condenser? How it affects the condenser performance? **[4]**

b) Draw a neat diagram of CANDU type reactor & give its advantages & disadvantages over the other type of reactors. **[6]**

Q5) a) Discuss in detail factors for selection of site of Diesel power plant. **[6]**

b) A gas turbine unit receives air at 1 bar and 300 K and compresses it isentropically to 6.2 bar with efficiency of compressor 88%. The fuel has a heating value of 11180 kJ/kg and the fuel/ air ratio is 0.017 kg fuel/ kg of air. The turbine efficiency is 90%. Calculate the compressor work, turbine work and thermal efficiency. Take Cp (for air and gas) = lkJ/kgk and γ for air and gas = 1.4. **[10]**

OR

Q6) a) Explain flat plate and parabolic solar collectors with neat diagrams. **[8]**

b) Explain with neat sketch Hybrid and Tidal Power Plant. **[8]**

Q7) a) What is function of PV system? What are advantages and disadvantages? **[8]**

b) Discuss the parameters to be consider for selection of wind power plant. **[8]**

OR

Q8) a) Explain single basin and double basin tidal power plant with neat diagrams. **[8]**

b) What are the concentrating type of collector systems? Discuss their advantages. **[8]**

Q9) a) State the function of relay system. Explain any one relay with neat sketch. **[6]**

b) Draw the typical layout of electrical equipment & discuss the role of control room. **[6]**

c) What different methods are used to control SO_2 in the flue gases? Explain any two. **[6]**

OR

Q10)a) Explain with neat sketch construction and working of power transformer. **[6]**

b) Discuss the various methods in brief to control pollutants of power plants. **[6]**

c) Explain different method adopted to control Nuclear pollution. **[6]**

Total No. of Questions : 10]

SEAT No. :

PA-148

[Total No. of Pages : 3

[5927]-31

B.E (Chemical)

PROCESS ENGINEERING COSTING & PLANT DESIGN

(2015 Pattern) (Semester - II) (409350)

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

Instructions to the candidates:

1) ***Answer five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Use of logarithmic tables slide rule, electronic pocket calculator and steam tables is allowed.***
4) ***Assume Suitable data if necessary.***

Q1) What are the factors affecting on process selection and discuss the process flow sheet preparation. **[10]**

OR

Q2) What are the factors affecting on selection of Plant layout and plant location? **[10]**

Q3) A standard type of Reactor with a negligible scrap value costs $4000 and will have a useful life of 6 years. Another proposed Reactor of equivalent design capacity costs $6800 but will have a useful life of 10 years and a scrap value of $800. Assuming an effective compound interest rate of 8 percent per year, determine which Reactor is cheaper by comparing the capitalized costs. **[10]**

OR

Q4) The original value of a piece of equipment is $22,000, completely installed and ready for use. Its salvage value is estimated to be $2000 at the end of a service life estimated to be 10 years. Determine the asset value of the equipment at the end of 5 years using : **[10]**

a) Straight-line method.

b) Textbook declining-balance method.

P.T.O.

Q5) a) Describe the break even chart for production schedule and derive the formula to determine the Breakeven point. **[10]**

b) Discuss the optimum production rates in plant operation. **[6]**

OR

Q6) Following figures for profit and sales are obtained from the company account; **[16]**

Financial Year	Sales, $	Profit, $
2020-21	20,000	2,000
2021-22	30,000	4,000

Calculate the following :

a) Profit Volume Ratio

b) Fixed Cost

c) Break Even Point (Sales, $)

d) Profit at Sales of $40,000

e) Sales to earn profit of $ 5,000

Q7) a) The OD of an uninsulated steam pipe is 4.5 in. The outside-surface temperature of the pipe is constant at 300”F, and the pipe is located in a large room where the surrounding temperature is constant at 70°F. The heat content of the steam is valued at $1.60 per 1o6 Btu. The emissivity of the pipe surface is 0.7, and the heat-transfer coefficient for heat loss from the surface by convection is 1.4 Btu/(hXft2X”F). Under these conditions, determine the cost per year for heat losses from the uninsulated pipe if the length of the pipe is 100 ft. **[10]**

b) Discuss the Pinch technology analysis. **[8]**

OR

Q8) a) Prepare the techno-economic feasibility report of XYZ Fertilize company. **[10]**

b) Calculate the optimum design cost of Heat Exchanger. **[8]**

Q9) The following details are available regarding a project : **[16]**

Activity	Predecessor Activity	Duration (Weeks)
A	-	3
B	A	5
C	A	7
D	B	10
E	C	5
F	D,E	4

Determine the critical path, the critical activities and the project completion time.

OR

Q10) Differentiate between the CPM and PERT. Illustrate the same with suitable example. **[16]**

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Total No. of Questions : 10]

SEAT No. : ____

PA-149

[Total No. of Pages : 2

[5927]-32
B.E (Chemical)
ENERGY CONSERVATION IN CHEMICAL PROCESS INDUSTRIES
(2015 Pattern) (Semester - II) (Elective - III) (409351 A)

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

Instructions to the candidates:

1) ***Answer five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Use of logarithmic tables slide rule, electronic pocket calculator and steam tables is allowed.***
4) ***Assume Suitable data if necessary.***

Q1) Write short note on **:** **[10]**

1) Solar energy
2) Wind energy
3) Geothermal energy

OR

Q2) a) What do you mean by energy conservation and recycle?Explain its importance with suitable example. **[5]**

b) Explain methodology for forecasting industrial energy supply and demand. **[5]**

Q3) What do you mean by energy audit? Explain with its types and examples.**[10]**

OR

Q4) What do you mean by energy manager? Explain its roles, responsibilities and duties in detail. **[10]**

Q5) a) What are various elements of energy management program? Enlist and explain in detail. **[10]**

b) Enlist and Explain various human aspects of energy conservation programs. **[7]**

OR

P.T.O.

Q6) Write in detail note on Organization of energy conservation program along with its various types **[17]**

Q7) Write short note on : **[17]**

a) Energy conservation checklist

b) Potential Energy conservation in boilers

c) Heat pumps

OR

Q8) a) Explain how improvement in process operations can help in energy conservation by taking examples of heat exchangers, evaporators, distillation columns, heaters and coolers etc. **[10]**

b) Explain how housekeeping can help in energy conservation. **[3]**

c) Explain what improvements in lighting system and central air conditioning of the plants can be used in energy conservation. **[4]**

Q9) a) Take a case study of dairy industry and explain how waste minimization can help in energy conservation. **[8]**

b) Take a case study of sugar industry and explain how waste minimization can help in energy conservation. **[8]**

OR

Q10)Write short note on : **[16]**

a) Resource conservation for energy conservation in distilleries and fertilizer industries.

b) Resource conservation for energy conservation in cement and petroleum industries.

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Total No. of Questions : 10]

SEAT No. :

PA-150

[Total No. of Pages : 2

[5927]-33
B.E (Chemical Engineering)
CHEMICAL PROCESS SAFETY
(2015 Pattern) (Semester - II) (Elective - III) (409351B)

Time : 2½ Hour] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of Calculator is allowed.***
5) ***Assume Suitable data jf necessary.***

Q1) a) What is American Institute of Chemical Engineers Code of Professional Ethics for employed engineers? **[5]**

b) Explain methods to store toxic chemicals. **[5]**

OR

Q2) a) How Toxicants are eliminated from Biological Organisms? Explain in detail. **[5]**

b) With the help of sketch explain dose versus response curves. **[5]**

Q3) a) What are the government regulations pertaining to Industrial Hygiene? Explain in brief. **[5]**

b) How workers are evaluated for exposures to volatile toxicants by monitoring? **[5]**

OR

Q4) a) Explain briefly about boiling liquid expanding explosion (BLEVE). **[5]**

b) Distinguish between fire and explosion. **[5]**

Q5) a) With the help of Graph of concentration of flammable liquid vs. temperature, explain various flammability properties of fluids. **[10]**

b) Explain relief systems, its risks and management. **[7]**

OR

P.T.O.

Q6) a) List and explain miscellaneous design aspects for preventing Fires and Explosions. **[10]**

b) What is the difference between fire and explosion? Explain in detail. **[7]**

Q7) a) Explain various methods for Controlling Static Electricity. **[10]**

b) What are the objectives of hazard survey? How these surveys are conducted? **[7]**

OR

Q8) a) How interaction between different Process units is assessed for accidents, Explain in detail. **[10]**

b) Describe the role of chemical engineers in preventing hazards. **[7]**

Q9) a) Explain event trees and fault trees in the content of process safety. **[8]**

b) How disasters happen? Outline the process to tackle disasters. **[8]**

OR

Q10)a) Explain safety checklist for a chemical process plant. **[8]**

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

i) Tackling disaster.

ii) Plan for emergency.

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Total No. of Questions : 10]

SEAT No. :

PA-151

[Total No. of Pages : 2

[5927]-34
B.E (Chemical Engineering)
FOOD TECHNOLOGY
(2015 Pattern) (Semester - II) (409351C) (Elective - III)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Write Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Figures to the right indicate full marks.***
3) ***Draw suitable diagrams wherever necessary.***
4) ***Use of Scientific Calculator is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) a) Draw and explain the unit operations necessary in food engineering. **[5]**

b) Write the short notes on following. **[5]**

i) Food Additives

ii) Canning & sterilization

OR

Q2) Write the advantages and disadvantages of extrusion cooking and hydrostatic pressure cooking methods. **[10]**

Q3) a) Draw a milk powder processing flow diagram with stepwise procedure. **[5]**

b) Enlist the deteriorative factors affecting the food quality on storage and suggest the remedies to control over them. **[5]**

OR

Q4) a) Draw and explain the ice cream production with preservation. **[5]**

b) Enlist the different ways to categorize the cheese and explain any one in details. **[5]**

Q5) Write the note on following : **[18]**

a) Laws of size reduction for food grains processing

b) Freeze drying - freeze concentration

c) Hot air dehydration

OR

P.T.O.

Q6) a) How evaporation is useful in food processing? Illustrate with suitable examples. **[9]**

b) Explain the roasting and hot oil frying theory in detail. **[9]**

Q7) a) Write a note on bar code and other markings printed on food packets. Also explain combined packaging system. **[8]**

b) What are the functions of packaging materials? What are various factors important from marketing point of view for food products that can be achieved through proper packaging? **[8]**

OR

Q8) a) Write a short note on following packaging materials. **[8]**

i) Textiles and wood packing

ii) Metal packing

iii) Aluminum packing

b) Describe 'Active packaging'. Enlist and explain the various factors included into it. **[8]**

Q9) a) Write a note on 'Codex Almentarious' for food quality assurance. **[8]**

b) Justify the statement- "The concepts of rheology are useful in food quality assurance." **[8]**

OR

Q10)a) Write a detailed note on assessment of food materials such as fruits, vegetables, cereals, dairy products, meat, egg and processed food products. **[8]**

b) Write a note on US Food and drug administration. **[8]**

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Total No. of Questions : 10]

SEAT No. : ____

PA-152

[Total No. of Pages : 2

[5927]-35
B.E (Chemical)
ADVANCED MATERIALS
(2015 Pattern) (Semester - II) (409351D) (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, Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume Suitable data jf necessary.***

Q1) Give the application of steel. **[10]**

OR

Q2) Explain Fibre Technology. **[10]**

Q3) Explain advanced powder synthesis techniques. **[10]**

OR

Q4) Explain advanced metallic systems in detail. **[10]**

Q5) What is composite material? Explain the factors affecting the properties of composite material in detail. **[16]**

OR

Q6) a) Explain the reinforcing mechanism. **[8]**

b) Explain fiber winding techniques. **[8]**

Q7) a) Explain the crack propagation in metal composite materials. **[8]**

b) Explain the difference between metal composite and ceramic composite materials. **[8]**

OR

P.T.O.

Q8) Explain the fabrication processes, mechanical behaviour and properties of metal composite material. **[16]**

Q9) a) Explain carbon composite with properties in detail. **[9]**

b) Explain fabrication method of carbon composite material with application. **[9]**

OR

Q10)a) Explain ablative polymer with application in detail. **[9]**

b) Give the application of nanomaterial in detail. **[9]**

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Total No. of Questions :10]

SEAT No. :

PA-153

[Total No. of Pages : 2

[5927]-36
B.E. (Chemical)
CATALYSIS
(2015 Pattern) (Semester-II) (409352A) (Elective-IV)

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

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
3) ***Assume suitable data, if necessary.***

Q1) Explain the application of the catalysis to industrial processes in the fine organic chemical and biochemical industries. **[10]**

OR

Q2) Explain the heterogeneous catalysis with an example **[10]**

Q3) Give the experimental methods to determine the rate of solid-catalyzed reactions **[10]**

OR

Q4) The catalytic reaction A $\rightarrow$ 4R is run at 3.2 atm and 100C in tubular reactor which contains 0.01 kg of catalyst and uses a feed consisting of partially converted product of 20 lit/hr of pure A and following data was recorded. Determine the rate equation for this reaction. **[10]**

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

Q5) Write the short notes on the following **[16]**

a) BET method

b) Pore volume distribution

OR

P.T.O.

Q6) Explain the following terms in detail **[16]**

a) Catalyst deactivation

b) Void volume and solid density of the catalyst

Q7) a) Explain the catalyst cracking in detail. **[8]**

b) Explain the structure of the zeolites. **[8]**

OR

Q8) a) Explain the templated molecular sieves in detail with application. **[8]**

b) Explain in detail 'ZSM-5' **[8]**

Q9) a) Give the kinetics of noncompetitive inhibition of enzyme reaction. **[9]**

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

OR

Q10)a) Explain the enzyme and microbial fermentation in detail. **[8]**

b) A sucrose is hydrolysed at ambient temperature by the enzyme sucrose as follows:

Sucrose $\xrightarrow{sucrase}$ Products Starting with a sucrose concentration $C_{Ao} = 1 mol/m^3$ and a sucrase concentration CE0=0.01 mol/m^3 the following kinetic data are obtained in a batch reactor. **[10]**

t,h	2	6	10
CA, mol/m^3	0.68	0.16	0.006

Find a rate equation to represent the kinetics of this hydrolysis reaction.

Total No. of Questions :10]

SEAT No. : ____

PA-154

[Total No. of Pages : 2

[5927]-37
B.E. (Chemical)
NANOTECHNOLOGY
(2015 Pattern) (Semester-II) (409352B) (Elective-IV)

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

Instructions to the candidates:

1) ***Answer Q.No. 1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
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 the different types of carbon-based nanomaterial along with their physical properties and applications. **[5]**

b) Explain Different modes of classification of Nanomaterials. **[5]**

OR

Q2) a) Write a short note on fullerenes and metallofullerenes. **[5]**

b) Explain different methods of synthesis of carbon nanostructures **[5]**

Q3) a) Explain the list of stable carbon allotropes. **[5]**

b) Explain pulsed laser deposition with its schematic layout. List its advantages. **[5]**

OR

Q4) a) Explain the principle and operation of the transmission electron microscope. **[5]**

b) Explain the principle of working of the X-ray diffraction method. **[5]**

Q5) a) What are quantum dots, quantum well, and wire? Discuss its properties and applications. **[10]**

b) Explain the Heisenberg uncertainty principle with suitable expressions. **[7]**

OR

P.T.O.

Q6) a) Write a short note on extrinsic semiconductors and intrinsic semiconductors. **[10]**

b) Write down a short note on the law of mass action. **[7]**

Q7) a) Explain electrical phenomena at interfaces Van der Waals forces between colloidal particles. **[10]**

b) What are the factors affecting contact angles and colloidal stability. **[7]**

OR

Q8) a) Discuss in detail about self-assembly and catalysis. **[10]**

b) Explain the use of nanotechnology in drug delivery? **[7]**

Q9) a) Discuss Nano-biotechnology and explain how nanostructure mediated drug delivery helps for the treatment of various diseases? **[8]**

b) Explain the health and environmental impacts of nanotechnology? **[8]**

OR

Q10)Write short notes on.

a) Hydrophobic nanoparticles. **[4]**

b) Biological Nanomaterials. **[4]**

c) Nanoclay and its applications. **[4]**

d) Nano hydrogels. **[4]**

Total No. of Questions : 8]

SEAT No. : ____

PA-155

[Total No. of Pages : 2

[5927]-38
B.E. (Chemical)
FUEL CELL TECHNOLOGY
(2015 Pattern) (Semester-II) (Elective-IV) (409352C)

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 the functioning of Electrolytic cell. **[5]**

b) Derive Tafel equation from the first principles. **[8]**

c) Describe various sources of Hydrogen for Fuel cells. **[7]**

OR

Q2) a) What are inert and active electrodes? **[5]**

b) Describe various steps involved in an electrode reaction. **[8]**

c) What is reforming? How is ATR i.e Auto Thermal Reforming used to manufacture hydrogen needed for a fuel cell? Describe its advantages and disadvantages. **[7]**

Q3) Describe various cathodic catalyst materials used in the construction of a Proton Exchange Membrane Fuel Cell and their possible functions in its working. **[16]**

OR

Q4) Describe various over-potential losses and their importance in the design considerations of a Proton Exchange Membrane Fuel Cell. **[16]**

P.T.O.

Q5) With diagram, justify the statement:

Solid oxide fuel cells (SOFCs) offer a clean, low-pollution technology to electrochemically generate electricity at high efficiencies. **[17]**

OR

Q6) Describe completely the importance of sol gel process in the construction of a Solid Oxide Fuel Cell. **[17]**

Q7) Write a detailed note on auto-thermal reforming process and its need in fuel processing **[17]**

OR

Q8) Explain what is a hybrid fuel system. Describe any one arrangement of a hybrid fuel system. **[17]**

Total No. of Questions :10]

SEAT No. :

PA-156

[Total No. of Pages : 2

[5927]-39
B.E. (Chemical)
PETROCHEMICAL ENGINEERING
(2015 Pattern) (Semester-II) (409352D) (Elective-IV)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) Explain the importance of Petrochemicals and the role of Petrochemical industries in India. **[10]**

OR

Q2) What are the basic raw material for petrochemical synthesis and write note on their sources. **[10]**

Q3) Explain with neat diagram process for Benzene production and list out its derivatives. **[10]**

OR

Q4) Write in details about the various separation and purification techniques used in Petrochemical industry? **[10]**

Q5) a) Explain with neat sketches explain in detail about production amines as a second generation Intermediates. **[8]**

b) Write a note on furnaces used in Petrochemical plants. **[8]**

OR

Q6) Write a note on following. **[16]**

a) Fluid Catalytic cracking units

b) Delayed coking

P.T.O.

Q7) Explain bulk, emulsion and suspension different polymerization process along with its advantages and disadvantage. **[16]**

OR

Q8) a) With neat sketches explain in detail about production of polyethylene (PE). **[8]**

b) Write down the application of PE in various fields. **[8]**

Q9) a) Discuss about recent advances in petrochemical plants & refineries in India. **[10]**

b) Major petrochemical plants in India as well as in world. **[8]**

OR

Q10)Write a note on following. **[18]**

a) Pollution control aspects in Petrochemical industries

b) Integration of refinery and petrochemical plants.

Total No. of Questions : 10]

SEAT No. : ____

PA-122

[Total No. of Pages : 2

[5927]-4

B.E. (Automobile Engineering)

FUNDAMENTALS OF COMPUTATIONAL FLUID DYNAMICS

(2015 Pattern) (Semester - I) (416491A) (Elective - I)

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

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***

Q1) a) Explain Navier Stoke's model used in CFD solvers. **[6]**

b) Explain grid generation. **[4]**

OR

Q2) a) Explain the steps in CFD solution procedure. **[6]**

b) Short note on Couette flow equation. **[4]**

Q3) a) Write down a formula for Finite difference approximation using Taylor series (first order). **[2]**

b) Write short note on Alternating Direction Implicit method (ADI). **[8]**

OR

Q4) a) Explain explicit approaches. **[2]**

b) Explain Solution of two dimensional steady and unsteady heat conduction equation with Dirichlet. **[8]**

Q5) a) Write in brief about Lax Wendroff method and its stability criteria. **[8]**

b) Explain 1D steady Convection Diffusion system. **[8]**

OR

P.T.O.

Q6) a) Explain Stability Criteria concept and physical interpretation. **[8]**

b) Write down short note on Central difference approach and Peclet Number. **[8]**

Q7) a) Short note on Introduction to finite volume method. **[9]**

b) What are the applications to flow through pipe. **[9]**

OR

Q8) Explain solution of Navier-Stoke's equation for incompressible flow using SIMPLE algorithms and its variation (SIMPLER). **[18]**

Q9) a) Explain following boundary conditions in brief (any 2): **[8]**

i) no slip

ii) free slip

iii) rotating wall

b) Explain following solver models: **[8]**

i) K - €

ii) K - w

OR

Q10) Write short note on: **[16]**

a) Introduction to any CFD tool.

b) Steps in pre-processing.

c) Geometry creation.

d) Mesh generation.

Total No. of Questions : 10]

SEAT No. :

PA-157

[Total No. of Pages : 2

[5927]- 40
B.E. (Civil Engineering)
ENVIRONMENTAL ENGINEERING-II
(2015 Pattern) (Semester - I) (401001)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8. Q9 or Q10.***
2) ***Figures to the right indicate full marks.***
3) ***Draw neat figures wherever necessary.***
4) ***Assume suitable data, if necessary.***
5) ***Use of scientific calculators is allowed.***

Q1) a) Compare the methods of collection of sanitation of conservancy & water carriage systems. **[6]**

b) Explain effect or change of life style on sewage quantity? **[4]**

OR

Q2) a) How do you estimate the storm water by rational method and empirical formulae method? **[6]**

b) What do you understand by self-cleaning velocity? **[4]**

Q3) a) What is the necessity of appurtenances in sewerage system? Explain with sketch of the drop manhole. **[6]**

b) Differentiate between MLSS and MLVSS? **[4]**

OR

Q4) a) Explain the unit operations and processes for secondary treatment? **[6]**

b) Draw a flowchart of sewage treatment plant. **[4]**

Q5) a) i) Write a note on sludge volume index?

ii) Explain the effect of endogenous metabolism? **[10]**

b) Explain kinetics of biological growth? **[6]**

OR

P.T.O.

Q6) a) Explain the biological principle of trickling filter with neat sketch? **[10]**

b) Explain the Phytoremediation technology for wastewater treatment? **[6]**

Q7) a) Write advantages & disadvantages of aerated lagoons? **[5]**

b) State and explain theory and design of activated sludge process? **[5]**

c) Write advantages & disadvantages of septic tank? **[6]**

OR

Q8) a) Write short note on various methods of sludge treatment? Compare high rate and low-rate digester? **[10]**

b) Write short note on Up-flow Anaerobic Sludge Blanket (UASB) Reactor? **[6]**

Q9) a) What is the necessity of treatment of industrial effluent? Explain the equalization and neutralization process? **[9]**

b) Explain the flow sheet of manufacturing process and wastewater generation? **[9]**

OR

Q10)a) Draw and explain units of treated dairy wastewater? **[8]**

b) Draw and explain units of treatment of sugar wastewater? Also, explain sources of sugar waste generation with sketch? **[10]**

Total No. of Questions : 10]

SEAT No. : ____

PA-158

[Total No. of Pages : 2

[5927]-41
B.E. (Civil)
TRANSPORTATION ENGINEERING
(2015 Pattern) (Semester - I) (401002)

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

Instructions to the candidates:

1) ***Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***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) Define Alignment. Enlist the basic requirements of an ideal alignment between two terminal stations. **[5]**

b) What are the objectives of carrying out Traffic Volume Survey? **[5]**

OR

Q2) a) Explain with neat sketches Rectangular or Block pattern and Radial or Star and Circular Pattern. **[5]**

b) The radius of a horizontal circular curve is 100m. The design speed is 50 kmph and the design coefficient of lateral friction is 0.15. Calculate the coefficient of friction needed if no superelevation is provided. **[5]**

Q3) a) Enumerate the salient features of First Road Development Plan. **[5]**

b) What do you mean by camber? Discuss the factors on which the amount of camber to be provided depends. **[5]**

OR

Q4) a) Explain any two important pavement surface characteristics with respect to highway geometric design. **[5]**

b) With neat sketches, explain the various types of warning signs. **[5]**

P.T.O.

Q5) a) What is sub grade? How the strength of the sub grade is evaluated in the laboratory? **[5]**

b) What is Foamed Bitumen? How foamed bitumen is prepared and where it is used. **[5]**

c) Describe briefly the Marshall Method of preparing the mix design. **[7]**

OR

Q6) a) Differentiate between cutback bitumen and Emulsion. **[6]**

b) Explain how Flakiness Index Test on aggregates is done in the laboratory. How are the results of the test interpreted? **[7]**

c) Write a note on Crumb Rubber Modified Bitumen (CRMB) **[4]**

Q7) a) Briefly outline the merit and demerits of Rigid Pavements? **[7]**

b) Explian the importance of dowel bar in transveres joint of rigid pavements. **[5]**

c) How is the design traffic computed during the design of flexible pavements? **[5]**

OR

Q8) a) Explain briefly the CBR method of flexible pavement design. **[6]**

b) Define 'Vehicle Damage Factor' and explain its importance. **[6]**

c) Explain the concept of ESWL. **[5]**

Q9) a) Mention the specification of material used and construction steps for Bituminous Concrete. **[8]**

b) Explain in brief wheel load stresses and Temperature stresses in rigid pavement. **[8]**

OR

Q10)a) Enlist the advantages of Reclaimed Asphalt Pavements (RAP). **[5]**

b) Describe the importance of prime coat, tack coat and seal coat during the road construction process. **[6]**

c) Write a note on Dry Lean Concrete (DLC). **[5]**

Total No. of Questions : 10]

SEAT No. :

PA-159

[Total No. of Pages : 3

[5927]-42
B.E. (Civil)
STRUCTURAL DESIGN AND DRAWING - III
(2015 Pattern) (Semester - I) (401003)

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

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Figures to the right indicate full marks.***
3) ***Latest IS 456, IS 1343, IS 3370, IS 1893 are allowed in the examination.***
4) ***The designs should be as per the latest IS codal provisions.***
5) ***If necessary, assume suitable data and indicate clearly.***
6) ***Use of electronic pocket calculator is allowed.***

Q1) a) What is the necessity of using high strength concrete & high tensile steel in prestressed concrete? **[3]**

b) A prestressed concrete beam is prestressed by a cable with an initial prestressing force of 300 kN. The cross-sectional area of the cable is 300 mm^2. Calculate % loss due to shrinkage of concrete as per IS 1343, if the beam is a) pre tensioned and b) post tensioned with age of concrete at transfer is 8 days. Assume Es = 210 kN/mm^2. **[7]**

OR

Q2) a) Explain with help of sketches the principles used in the anchorage systems of post-tensioning systems. **[3]**

b) A post-tensioned prestressed concrete beam with top flange 500 mm wide × 120 mm deep, web 120 mm wide × 600 mm deep and bottom flange 350 mm wide × 350 mm deep is simply supported over a span of 19m and carries a UDL of 15kN/m over entire span exclusive of its self-weight. It is prestressed with 5 numbers of 12/5 Freyssinet with zero eccentricity at supports and 400 at midspan. If initial prestress is 1030 MPa. Calculate extreme fibre stress at initial and final stage. Assume loss ratio 0.85. Unit weight of prestressed concrete 25 kN/m^3. **[7]**

P.T.O.

Q3) a) Briefly outline the salient design features of continuous prestressed concrete flat slab. **[3]**

b) Design a post tensioned concrete two way slab 6m×9m with discontinuous edge to support imposed load of 3 kN/m^2 Cables of 4 wires of 5 mm diameter carrying effective prestressing force of 100 kN are available for use. Design the spacing of the cables in both directions. Assume f_{ck}= 40 N/mm^2, f_p = 1600 N/mm^2. Ec = 38kN/mm^2. **[7]**

OR

Q4) a) Explain the design of a prestress section for shear using the codal provisions. **[4]**

b) How is the cable zone and cable profile determined in a prestressed flatslab? **[6]**

Q5) Design a RCC T-shaped retaining wall to retain earthen embankment of 3.0 m height above the ground level. Embankment is sloping at an angle of 16° with horizontal. Unit weight of earth is 18 kN/m^3. Angle of repose is 30°. Good foundation is available at depth of 1.0 m below ground level. SBC of soil is 100 kN/m^2. Coefficient of friction between concrete and soil may be taken as 0.5. Use M20 and Fe 415. Sketch reinforcement details. **[17]**

OR

Q6) Design a RCC T-shaped retaining wall to retain earthen embankment of 4.0 m height above the ground level. The backfill is horizontal. Unit weight of earth is 18 kN/m^3. Angle of repose is 30°. Good foundation is available at depth of 1.0 m below ground level. SBC of soil is 200 kN/m^2. Coefficient of friction between concrete and soil may be taken as 0.6. Use M20 and Fe 500. Draw reinforcement details. **[17]**

Q7) 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. **[12]**

b) Explain the procedure to assess the crack width of flexure in water retaining structures as per latest codal provisions. **[4]**

OR

Q8) Design a rectangular water tank open at top resting on ground having a size of 4.0 m × 6.0 m × 3.0 m high. Use M 20 and Fe 415 grade material. Sketch the details of reinforcement. **[16]**

Q9) Estimate the base shear and its distribution for a G + 3 building situated in Pune by using seismic coefficient method using following data.

Plan of the building: 3 panels each of 3 m × 3 m in horizontal and also vertical directions.

Elevation of the building: 3 bays each 3 m in horizontal direction and 4 storeys (including ground) each of 3 m in vertical direction.

Live Load on floors 2.5 kN/sq.m

Floor Finish = 1.0 kN/sq.m

Live Load on roof = 1.5 kN/sq.m

Water Proofing = 1.0 kN/sq.m

Thickness of slabs: 125 mm

Sizes of all beams: 230 mm × 425 mm

Sizes of all columns: 230 mm × 425 mm

Width of Brick Wall: 230 mm on each beam on typical floors. **[17]**

OR

Q10)a) Derive the equation of motion for un damped free vibration of a SDOF system. **[8]**

b) Explain in details approximate method for analysis of lateral and vertical loading on G+2 storeyed structure. **[9]**

Total No. of Questions : 10]

SEAT No. : ____

PA-160

[Total No. of Pages : 2

[5927]-43

B.E. (Civil)

STRUCTURAL DESIGN OF BRIDGES

(2015 Pattern) (Semester - I) (Elective - I) (401004A)

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

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Neat diagrams should be drawn wherever necessary.***
3) ***If necessary, assume suitable data and indicate clearly.***
4) ***Use of electronic pocket calculator is allowed.***

Q1) How are impact loads calculated for highway bridges? **[10]**

OR

Q2) Explain for a three-lane bridge the arrangement of live loads. **[10]**

Q3) How is the deck slab of a highway bridge analyzed? Explain with a step-by-step procedure. **[10]**

OR

Q4) An interior panel of a T-beam deck slab bridge is 2.8 m × 4.1 m. The thickness of the slab is 200 mm. Design the slab for IRC class AA tracked vehicle. Consider $m_1 = m_2 = 0.2$. **[10]**

Q5) Design the inclined members of a Pratt truss of a railway bridge having 8 panels of 4.0 m each. The height of the truss along the center line of the top chord and the bottom chord is 4.85 m. The details of the bridge are given below. **[18]**

a) weight of stock rail = 0.45 kN/m,

b) weight of check rail = 0.30 kN/m

c) sleepers of size = (0.18 × 0.18 × 2.5) m @ 0.50 m c/c

d) center-to-center spacing of truss = 6 m

e) EUDL for BM and SF are 5,890 kN and 6,866 kN respectively

f) CDA = 0.20

OR

P.T.O.

Q6) For the problem given in Q.5, design the vertical members and the bottom chord members. **[18]**

Q7) How elastomeric bearings function? Explain how these bearings are designed. **[16]**

OR

Q8) Explain step-by-step design procedure for a steel roller bearing. **[16]**

Q9) What are piers? Explain how piers are analysed. **[16]**

OR

Q10) Explain step-by-step design procedure of well foundation. **[16]**

Total No. of Questions : 10]

SEAT No. : ____

PA-161

[Total No. of Pages : 4

[5927]-44

B.E. (Civil)

SYSTEMS APPROACH IN CIVIL ENGINEERING

(2015 Pattern) (Semester - I) (Elective - I) (401004B)

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

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Figures to the right side indicates full marks.***
3) ***Use of calculator is allowed.***
4) ***Assume Suitable data if necessary.***

Q1) a) Explain how the transportation model can be used to solve problems in Civil Engineering in some areas. **[4]**

b) Solve following problem graphically: **[6]**

Maximize $Z = x_1 + 2x_2$

Subject to

$x_1 - x_2 \leq 2$

$x_1 + x_2 \leq 2$

$x_1, x_2 \geq 0$

OR

Q2) a) Explain difference between unimodal and multimodal function. **[4]**

b) Give the values of *x* so that the following function is a concave function. **[6]**

i) $F(x) = 6x^3 - 6x^2 - 6$

ii) $F(x) = 2x^4 - x^2$

P.T.O.

Q3) a) Elaborate on the Simulation technique and its application in the field of Civil Engineering. **[4]**

b) Seven jobs are to be processed on two machines A and B in order A-B. Processing time is in hours. Find the optimal sequence of the jobs, total elapsed time and idle time of machines A and B. **[6]**

Jobs	1	2	3	4	5	6	7
Machine A	6	7	4	8	3	9	7
Machine B	8	5	1	5	9	3	8

OR

Q4) a) Solve following transportation problem using row minima and column minima method. Find the total transportation cost. **[4]**

Warehouses	Godowns G1	G2	G3	Supply
W1	2	7	4	20
W2	3	3	1	25
W3	5	4	7	15
W4	1	6	2	30
	35	35	20	

b) A company manufactures around 200 precast and prestressed pipes everyday. Depending upon the availability of raw materials and other conditions, daily production varies with probability distribution as follows.

Production/day	196	197	198	199	200	201	202	203	204
Probability	0.05	0.09	0.12	0.14	0.20	0.15	0.11	0.08	0.06

The finished pipes are transported in a lorry which can accommodate 200 pipes only. Simulate the process for 10 days and find out: **[6]**

i) Average number of pipes manufactured in the factory

ii) Number of empty spaces in the lorry each day accommodating the remaining pipes not accommodated in the previous day.

Random numbers : 34, 78, 54, 10, 45, 89, 91, 02, 67 99

Q5) a) Use simplex method to **[8]**

Maximize $Z = 2x_1 + x_2$

Subject to

$x_1 + x_2 \leq 40$

$4x_1 + x_2 \leq 100$

$x_1, x_2 \geq 0$

b) Explain the structure of linear programming model by considering any problem. **[8]**

OR

Q6) a) Solve the following example using simplex method. **[8]**

Maximize $Z = x_1 + 2x_2$

Subject to

$-x_1 + 2x_2 \leq 8$

$x_1 + 2x_2 \leq 12$

$x_1 - 2x_2 \leq 3$

$x_1, x_2 \geq 0$

b) What is Duality in LPP and what are its applications? Explain following terms with suitable example which are related to duality in linear programming. **[8]**

i) Primal Programme

ii) Dual Programme

iii) Dual variables

Q7) a) Maximize $z = -2x_1^2 + 5x_1x_2 - 4x_1^2 + 18x_1$ using Lagragian multiplier technique **[8]**

Subject to

$x_1 + x_2 = 7$

$x_1, x_2 \geq 0$

b) Explain with neat sketch, Dichotomous search method and steps to solve single variable unconstrained optimization with this method. **[8]**

OR

Q8) a) What is Hessian Matrix? Explain the significance of Hessian Matrix w.r.t. suitable example. **[8]**

b) Minimize $f(x) = 3x_1^2 - 4x_1 - 2x_1x_2 + x_2^2 + 2$

with initial value(–1, 2) using Steepest Ascent / Descent Method. **[8]**

Q9) a) Explain the multi stage decision process? What are the types of problems that are solved using this method? **[6]**

b) Find the value of game as given below: **[6]**

		B		
A	10	–2	–6	8
	–5	–2	–7	0
	4	9	–8	–7
	9	5	–9	7

c) A firm is considering replacement an excavator, whose cost price is Rs. 10, 20, 200 and the scrap value is Rs. 20,000. The running (Maintenance and operating) costs are found from experience to be as follows: **[6]**

Year	1	2	3	4	5	6	7	8
Running cost	20000	50000	80000	120000	180000	250000	320000	400000

When should the machine to be replaced?

OR

Q10) a) Explain with suitable example, how the Games theory is applicable to Civil Engineering domain? **[6]**

b) What types of civil engineering problems can be solved using Simulation techniques? **[6]**

c) A firm is considering replacement of machine, whose purchase cost is Rs. 10,000. The running (maintenance and operating) costs are found from experience to be as follows: **[6]**

Year	1	2	3	4	5	6	7
Operating cost (Rs.)	1500	1900	2300	2900	3600	4500	5500
Resale value (Rs.)	5000	2500	1250	600	400	400	400

When should the machine to be replaced?

Total No. of Questions : 10]

SEAT No. :

PA-162

[Total No. of Pages : 2

[5927]-45
B.E. (Civil)
ADVANCED CONCRETE TECHNOLOGY
(2015 Pattern) (Semester - I) (Elective - I) (401004C)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Your answers will be valued as a whole.***
5) ***Use of electronic pocket calculator is allowed.***
6) ***Assume suitable data, if necessary.***
7) ***Use of IS code 10262, 456 is not allowed.***

Q1) a) Write short note on gel-space ratio. **[4]**

b) Write note on Problems on maturity concept. **[6]**

OR

Q2) a) What are the guidelines for quality control and quality assurance of concrete? **[4]**

b) What are the factors affecting strength of concrete? Describe the influence of gel space ratio on strength of concrete. **[6]**

Q3) a) Explain Light weight concrete. **[4]**

b) Compare the high performance concrete and High strength concrete with respect to material, mechanical properties and elastic properties. **[6]**

OR

Q4) a) Explain step by step procedure to design the Self compacting concrete. **[4]**

b) State advanced non-destructive testing methods. Explain any one in details. **[6]**

Q5) a) Explain basic concept of Fibre reinforced concrete. Give examples of fibres suitable to improve. **[4]**

i) flexural strength

ii) impact strength

iii) shear strength

P.T.O.

b) Explain the metal fiber, polymeric fiber and carbon fiber. **[6]**

c) Write note on: Untracked and cracked matrix. **[6]**

OR

Q6) a) Explain the behaviour of SFRC under tension, compression and flexure. **[4]**

b) Explain Steel fibre and Polymeric fibres. **[6]**

c) What is GFRC? Explain the procedure to develop this material and its applications. **[6]**

Q7) a) Explain the various properties of hardened FRC. **[4]**

b) Explain the quality control test to be conducted on fibre reinforced concrete. **[6]**

c) Explain natural and artificial fibres with suitable examples and their applications. **[6]**

OR

Q8) a) Explain the quality control test to be conducted on polymeric fibre reinforce concrete. **[6]**

b) Explain the procedure to mix fibres in concrete. Why workability of concrete reduces with addition of fibres? **[6]**

c) Explain properties of SIFCON. **[4]**

Q9) a) Explain the properties and specifications of ferrocement material. **[6]**

b) Write the short notes on merits and demerits of ferrocement. **[6]**

c) Write about tensile property of ferrocement. Explain how ferrocement differs than concrete? **[4]**

OR

Q10) a) Explain the manufacturing process of electric poles and industrial precase pipes. **[4]**

b) What are the different tests conducted on cement mortar as a ferrocement material? Explain any one in detail. **[6]**

c) Explain close mould techniques of ferrocement construction. **[6]**

Total No. of Questions : 8]

SEAT No. : [ ]

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[Total No. of Pages : 2

[5927]-46

B.E. (Civil Engineering)

ARCHITECTURE AND TOWN PLANNING

(2015 Pattern) (Semester - I) (Elective - I) (401004D)

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

Instructions to the candidates:

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

Q1) a) Explain in detail any two principles of architectural composition with sketches. **[7]**

b) Establish the relation between "Quality of Life" and "Urban Renewal". **[7]**

c) Elaborate importance of planning cities and mention levels of planning. **[6]**

OR

Q2) a) Explain in brief user friendly and eco-friendly architecture. **[6]**

b) Justify the statement "clean and healthy cities are outcome of open space and landscaping". **[7]**

c) Explain the steps to be followed in preparation of DP Proposal as per MRTP Act 1966. **[7]**

Q3) a) Explain functioning of any one planning agency in details. **[8]**

b) Write a short note on 'Intelligent Traffic System (ITS sketch is essential). **[9]**

OR

P.T.O.

Q4) a) Explain Role of MMRDA and PMRDA. **[8]**

b) Explain various types of urban road pattern (sketches are essential). **[9]**

Q5) a) Explain salient features of 'The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013. **[8]**

b) Explain salient features of "URDPFI guidelines". **[9]**

OR

Q6) a) What is the importance of RERA and MAHARERA. **[8]**

b) What details are observed for land use and water supply in URDPFI. **[9]**

Q7) a) Explain Smart City concept in depth. **[8]**

b) Write a short note on 'SEZ' and its impact on economy. **[8]**

OR

Q8) a) Write down the importance of new techniques like GIS, GPS in relation with town planning. **[8]**

b) Write down the importance of AMRUT guidelines with salient features. **[8]**

Total No. of Questions : 6]

SEAT No. : [ ]

PA-164

[Total No. of Pages : 3

[5927]-47

B.E. (Civil Engineering)

ADVANCED ENGINEERING GEOLOGY WITH ROCK MECHANICS

(2015 Pattern) (Semester - I) (Elective - I) (401004E)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams should be drawn wherever necessary.***

Q1) a) Differentiate between joint, fractures and fault. **[6]**

OR

b) Describe the physiographic divisions of India. **[6]**

Q2) a) Enlist various parameters of morphometric analysis of river basin. **[7]**

OR

b) Scarcity of sand in Maharashtra. **[7]**

Q3) a) Dam building activity in seismic prone area. **[7]**

OR

b) Write a note on amygdaloidal basalt as construction material. **[7]**

P.T.O.

Q4) a) Write in detail the Wickeham concept of classification of rock masses. **[8]**

b) Calculate RQD recovery and Core recovery from following table. **[8]**

Run in m	Piece No.	Length in cm.	Nature of fracture
3 - 6 m	1	10	J
	2	11	J
	3	100	M
	4	45	M
	5	55	M
	6	13	J
	7	50	J
	8	6	J
	9	8	J
6 - 9 m	10	90	M
	11	80	M
	12	120	M
	13	10	M

OR

a) Describe Q-system of classification of rock masses. **[8]**

b) Calculate Apparent resistivity values at different depth zones. **[8]**

Sr. No.	R	a	$2\pi aR$
1	1.87	1	
2	1.66	2	
3	1.47	3	
4	1.32	4	
5	1.19	5	
6	1.09	10	

Q5) a) Write a note on Engineering significance of fracture from dam foundation point of view Give case history. **[10]**

b) Write a note on Engineering significance of Tachylytic Basalt. **[7]**

OR

a) Discuss relationship between local Geology and location of Spillway in Deccan Trap. **[10]**

b) What treatment is to be given to a dyke occurring at a Dam site. **[7]**

Q6) a) Discuss with suitable examples suitability of volcanic breccia from tunneling point of view. **[10]**

b) Describe various unfavorable field characters of rocks during tunneling.**[7]**

OR

a) Under what conditions scouring of pier of bridge take place? Discuss with suitable examples. **[10]**

b) Whether the tunnels are suitable through limestone and quartzite. **[7]**

Total No. of Questions : 8]

SEAT No. :

PA-165

[Total No. of Pages : 4

[5927]-48
B.E. (Civil Engineering)
MATRIX METHODS OF STRUCTURAL ANALYSIS
(2015 Pattern) (Semester-I) (Elective - II) (401005A)

Time : 2½ Hours] *[Max. Marks : 70*

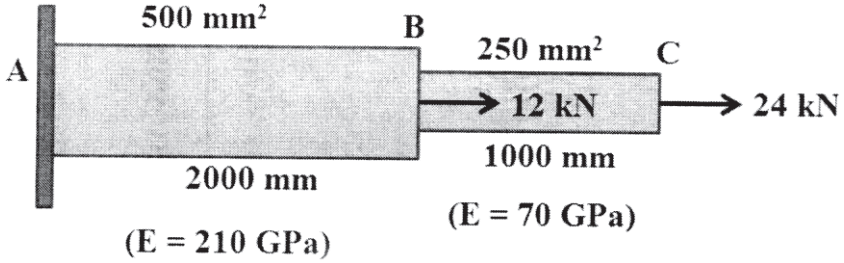
Instructions to the candidates:

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 electronic pocket calculator is allowed.***
5) ***Assume suitable data, if necessary.***

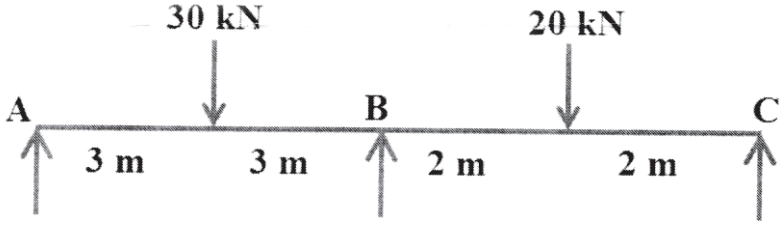
Q1) a) Solve using Gauss Jordon Method **[6]**

$$x + 3y + z = 10$$
$$x - 2y - z = -6$$
$$2x + y + 2z = 10$$

b) Determine displacement at joint B and C in the bar structure as shown in figure using stiffness matrix method. Area of c/s and the modulus of elasticity of each bar are shown in figure. **[6]**



c) Determine support reactions of continuous beam ABC as shown in figure using flexibility matrix method. Take EI constant. **[8]**



OR

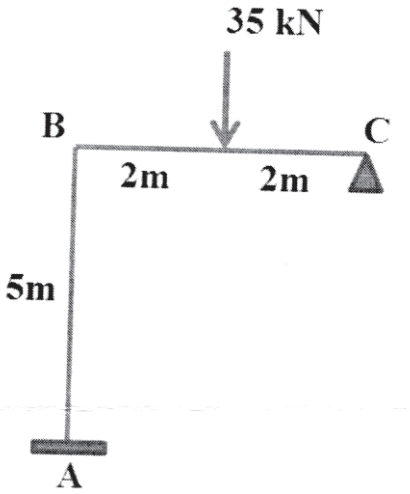
P.T.O.

Q2) a) Write computer algorithms for following numerical methods. **[6]**

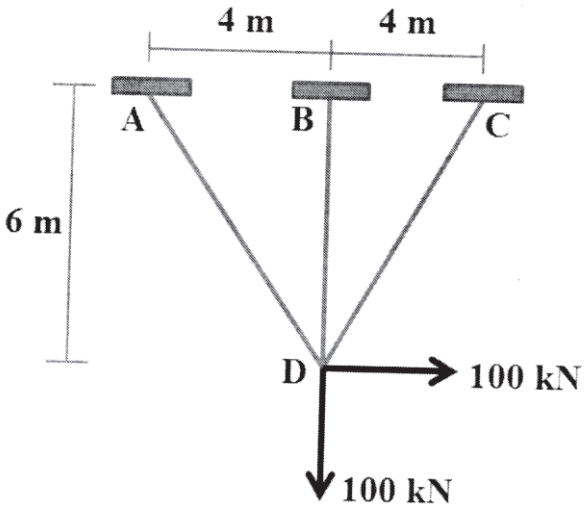
i) Gauss Jordon Method

ii) Gauss Seidel Method

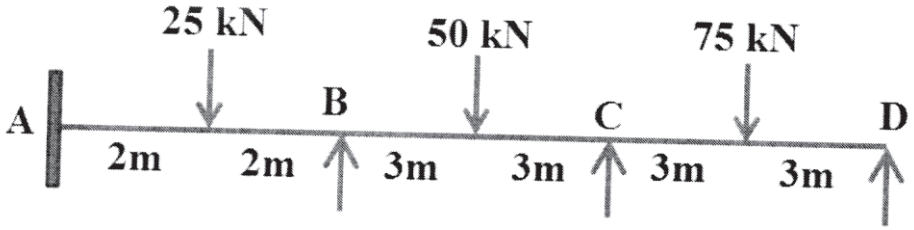
b) Determine support reactions of the portal frame ABC as shown in figure using flexibility matrix method. Take El constant. **[8]**



c) Determine deflections at loaded joint of the truss supported as shown in figure. Take cross- sectional area of all the members 1000 mm^2 and E = 200 GPa. **[6]**

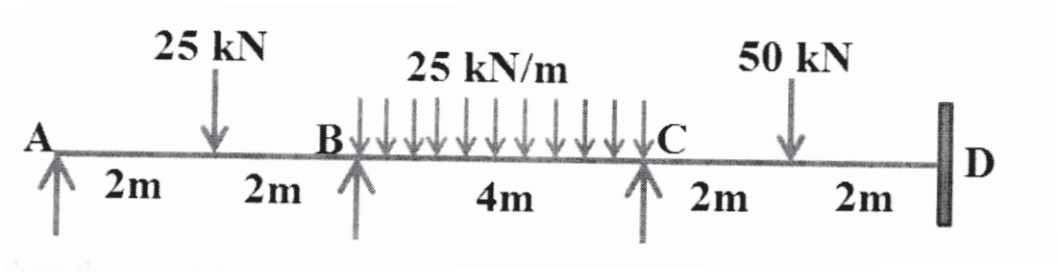


Q3) Analyze the continuous beam ABCD as shown in figure using structure approach of stiffness matrix method. Take El constant. Draw BMD. **[18]**

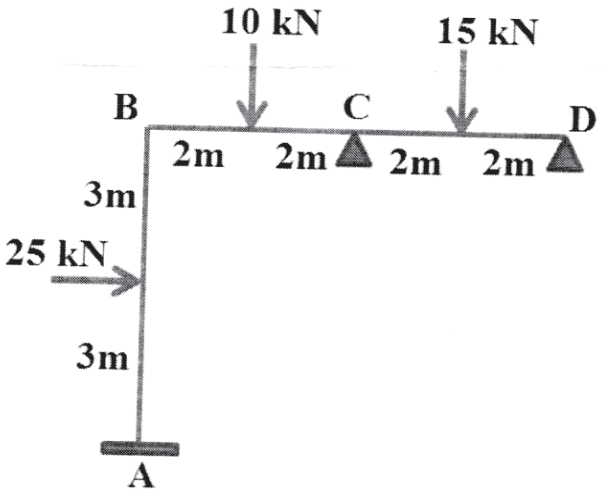


OR

Q4) Analyze the continuous beam ABCD as shown in figure using member approach of stiffness matrix method. Take El constant. Draw BM. **[18]**

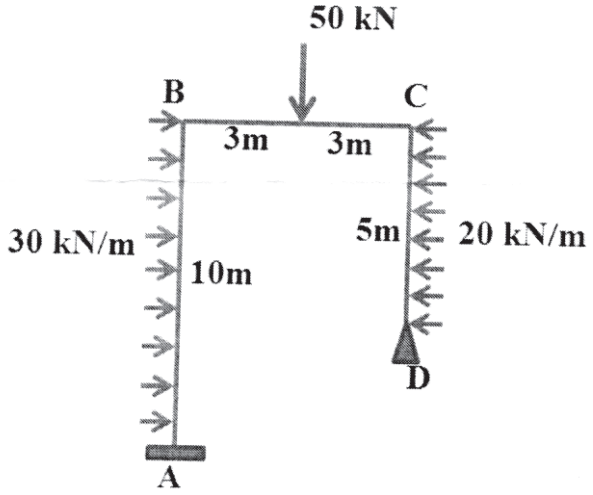


Q5) Analyze the portal frame ABCD as shown in figure using structure approach of stiffness matrix method. Neglect axial deformation. Take El constant. Draw BMD. **[16]**

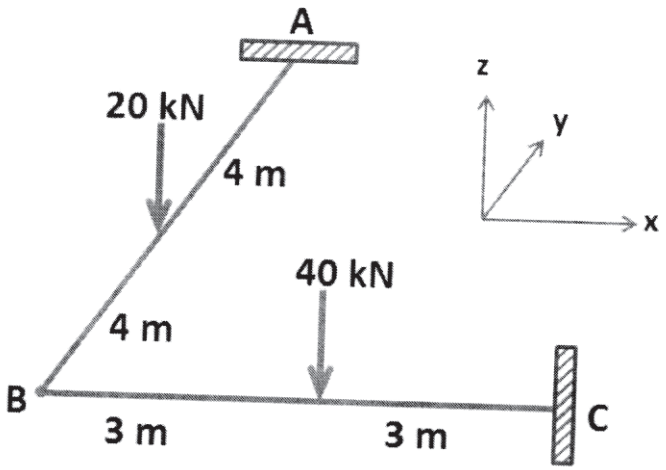


OR

Q6) Analyze the portal frame ABCD as shown in figure using member approach of stiffness matrix method. Neglect axial deformation. Take El constant. Draw BMD. **[16]**

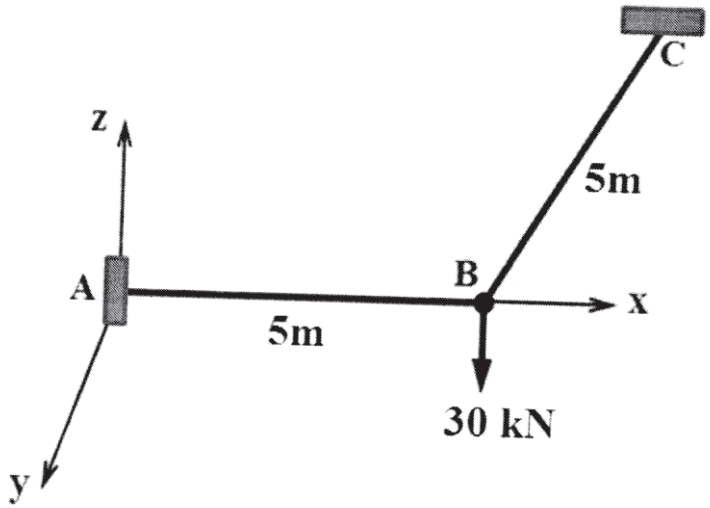


Q7) Determine unknown displacements at joint B of the orthogonal grid as shown in figure using structure approach of stiffness matrix method. Take El = 1000 kN.m^2 and GJ = 500 kN.m^2. **[16]**



OR

Q8) Determine moments and reactions of the two member grid structure as shown in figure using member approach of stiffness matrix method. EI=3000 kNm^2 and GJ = 1500 kNm^2 **[16]**



❍❍❍❍

Total No. of Questions : 12]

SEAT No. :

PA-166

[Total No. of Pages : 2

[5927]-49

B.E. (Civil)

INTEGRATED WATER RESOURCES PLANNING AND MANAGEMENT

(2015 Pattern) (Semester - I) (Elective-II) (401005B)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q12.***
2) ***Neat diagrams wherever necessary.***
3) ***Figures to the right side Indicate full marks.***
4) ***Assume suitable data, If necessary and mention it clearly.***
5) ***Use of non-programmable pocket calculator is allowed.***

Q1) a) Write a note on : Water resources in India. **[3]**

b) What is meant by Ground water owner ship? **[3]**

OR

Q2) a) What is meant by permit system? **[3]**

b) Write any two water infrastructures in supply of water. **[3]**

Q3) a) Write a note on : Water as economic good. **[3]**

b) Write a note on : Sustainability principles for water management. **[3]**

OR

Q4) a) How the benefit cost analysis is carried out in IWRP explain? **[3]**

b) Write a note on : Requirement of water for human and nature. **[3]**

Q5) a) What is meant by export of water? **[4]**

b) Write a note on : Estimation of ground water draft. **[4]**

OR

Q6) a) How the Flood & Drought can be managed? **[4]**

b) How the Recycling and reuse of water can be done? **[4]**

P.T.O.

Q7) a) Explain in detail necessity of water management in irrigation sector. **[8]**

b) What is thermal and nuclear water demand? Explain how it is estimated. **[8]**

OR

Q8) a) Explain in detail necessity of water management in urban sector. **[8]**

b) How the irrigation water utilization is done? **[8]**

Q9) a) Write a note on water quality management for various uses. **[8]**

b) Write a note on: Social impact of water resources development on co-operative movement. **[8]**

OR

Q10)a) How to protect the vital ecosystem by environmental management? **[8]**

b) Write a note on Aquaculture. **[8]**

Q11)a) How the management of IWRM is carried out by use of data driven techniques like Genetic programming is done. **[8]**

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

i) Contour Bunding

ii) Strip Cropping

iii) Bench Terracing

iv) Check Dams

OR

Q12)a) How the management of (IWRM) by use of data driven techniques like Artificial Neural networks is done? **[8]**

b) Define Watershed. How the watersheds are classified? Explain integrated approach for watershed management. **[10]**

Total No. of Questions : 8]

SEAT No. : ____

PA-123

[Total No. of Pages : 4

[5927]-5

B.E. (Automobile Engineering)

FUNDAMENTALS OF FINITE ELEMENT ANALYSIS

(2015 Pattern) (Semester - I) (Elective - I) (416491B)

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 Logarithmic tables, slide rule, electronic pocket calculator is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) a) Write and Explain the 'Principle total potential energy approach' in finite element analysis. **[6]**

b) Find the stresses in the below bar shown in fig. (1), due to the forces 10 KN and 5 KN. Use below data **[8]**

$A_1 = 150\ mm^2$ $l_1 = 50\ mm$ $E_1 = 200\ GPa$

$A_2 = 100\ mm^2$ $l_2 = 50\ mm$ $E_2 = 70\ GPa$

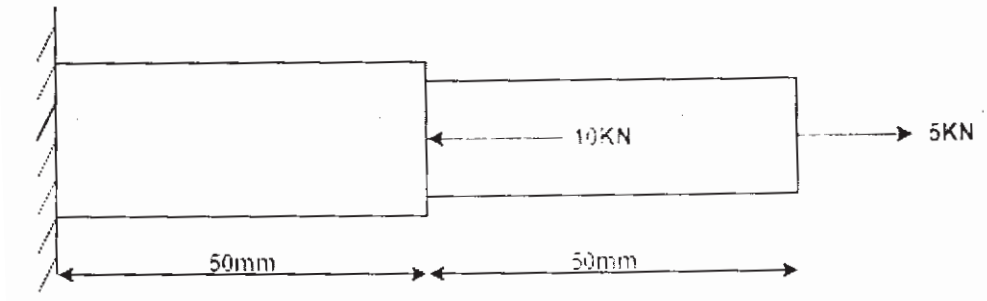


Figure (1)

c) Explain the global coordinate and local coordinate system. **[6]**

OR

P.T.O.

Q2) a) Explain the 'Weighted residual approach' in finite element analysis. **[6]**

b) Find the nodal displacement of truss structure shown in fig. (2). Take E = 200 MPa and A = 1500 mm^2. **[8]**

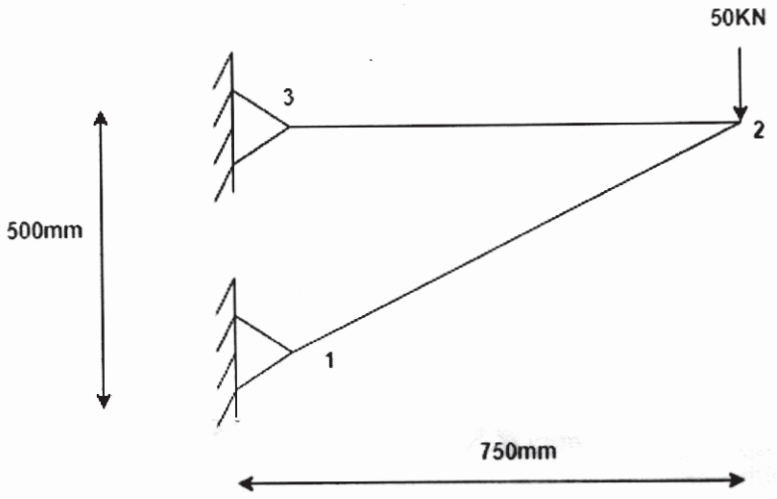


Figure 2

c) Write the short note on: **[6]**

i) Pascal's Triangle

ii) Axi-symmetrical Element

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

i) Iso-parametric elements

ii) Sub parametric elements

iii) Super parametric elements

iv) Sub modelling

b) Evaluate the integrals using three points Gaussian quadrature method: **[10]**

i) $\int_{-1}^{1}\left(e^x + x^3 + x^{23}\right)dx$

ii) $\int_{-1}^{1}\left(e^x + x\right)dx$

OR

Q4) a) Derive the shape function of 3 node bar element using iso-parametric formulation. **[8]**

b) For a point P located inside the triangle, as shown in fig. (3), find the shape function: **[10]**

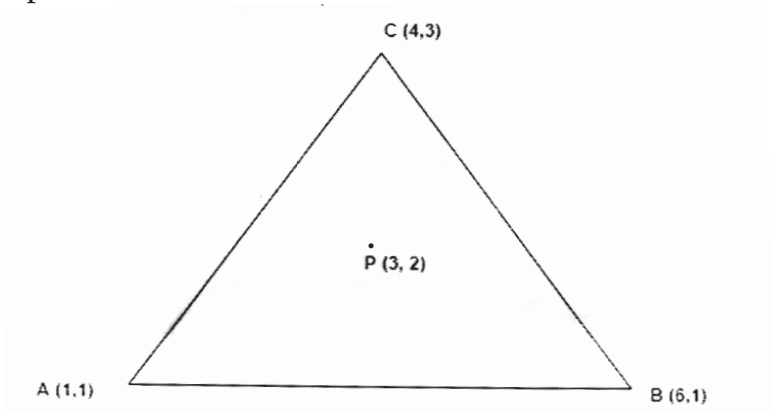


Figure 3

Q5) a) Formulate the lD steady state conduction heat transfer equation using the Galerkin approach. **[8]**

b) A composite wall consisting of two material shown in figure (4). The outer temperature is T_0 = 20°C, convection heat transfer takes place on inner wall $T_\infty = 800°C$ and h = 25 W/m²°C. Determine the temperature distribution in wall. **[8]**

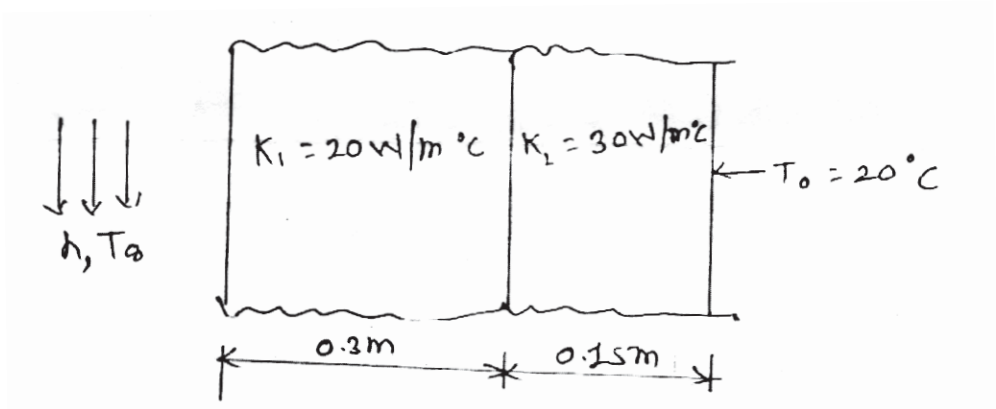


Figure 4

OR

Q6) A metallic fin, with thermal conductivity 70 W/m °K, 1 cm radius and 5 cm long extends from a plane wall whose temperature is 140°C. Determine the temperature distribution along the fin if heat is transferred to ambient air at 20°C with heat transfer coefficient of 5 W/m^{2}K. Take two elements along the fin. **[16]**

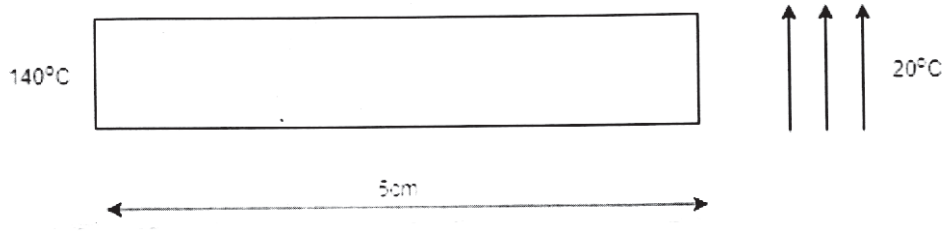


Figure 5

Q7) a) Formulate the consistent matrices for 1 D bar element. **[8]**

b) Find the natural frequency of bar shown in figure (6), using consistent and lumped mass matrix method. Use one element for bar. Take modules elasticity of E = 200 GPa, density of material ρ = 7800 kg/m^2 and length of rad l = 2m. **[8]**

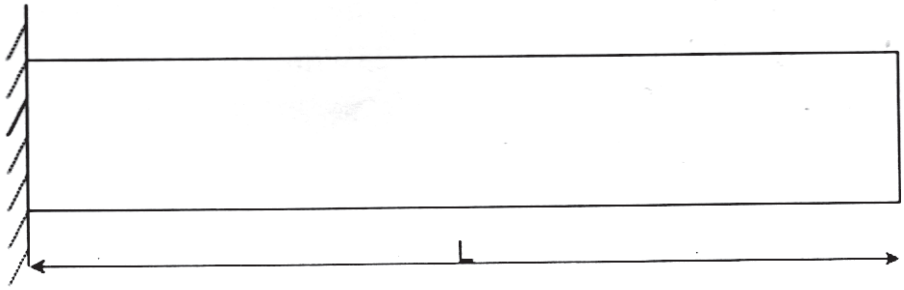


Figure 6

OR

Q8) a) Explain the difference between lumped mass matrix and consistent mass matrix. **[8]**

b) Write the notes on error analysis. **[8]**

Total No. of Questions : 10]

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[Total No. of Pages : 2

[5927]-50
B.E. (Civil)
TQM & MIS IN CIVIL ENGINEERING
(2015 Pattern) (Semester - I) (Elective-II) (401005C)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side Indicate full marks.***

Q1) a) State the importance of Quality in construction. **[6]**

b) Write short note on Six Sigma. **[4]**

OR

Q2) a) Explain the following quality control tools. **[6]**

1. Scatter diagram 2. Check sheet

b) What ate the barriers in implementation of TQM. **[4]**

Q3) a) Discuss the objectives of ISO Principles. **[6]**

b) Write short note on Non Conformity Reports. **[4]**

OR

Q4) a) Develop a checklist formwork activity. **[6]**

b) Explain causes and preventive measure of any two construction defects. **[4]**

Q5) a) Define the term benchmarking. Explain internal benchmarking in detail. **[8]**

b) Explain the following. **[10]**

1. Prevention cost 2. Appraisal cost

OR

Q6) a) Write short note on Kaizen in TQM. **[8]**

b) Explain the steps followed in benchmarking process. **[10]**

P.T.O.

Q7) a) Explain in detail Seiso and Seiketsu. **[8]**

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

1. Malcom Baldrige National Quality Award 2. Deming Prize award

OR

Q8) a) What is FMEA. What are the objectives of FMEA. **[8]**

b) Exp1ain the following in detail. **[8]**

1. Management Kaizen 2. Group Kaizen

Q9) a) Explain the subsystems of MIS in brief. **[8]**

b) Discuss the various definitions of MIS. Also explain the importance of ERP in construction sector. **[8]**

OR

Q10)a) Elaborate the benefits and limitations of MIS in Construction sector. **[8]**

b) Explain in detail various characteristic of information in details. **[8]**

Total No. of Questions : 12]

SEAT No. :

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[Total No. of Pages : 2

[5927]-51
B.E. (Civil)
EARTHQUAKE ENGINEERING
(2015 Pattern) (401005D) (Elective - II) (Semester - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.***
2) ***Use IS 456-2000, IS 1893 and electronic pocket calculator is allowed.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicates full marks.***
5) ***Assume suitable data, if necessary.***

Q1) a) What is mean earthquakes? **[3]**

b) Explain types of wave generated during earthquake? **[3]**

OR

Q2) a) Explain the various causes of earthquake? **[3]**

b) Explain in details the classification of earthquake seismic zoning in India? **[3]**

Q3) Derive the equation of motion for a damped free vibration of a SDOF system. **[6]**

OR

Q4) A cantilever beam 3 m long supports mass of 500kg at its upper end. Find the natural period and natural frequency. E = 2. 1 × 10^6 kg/cm^2 & 1 = 1300 m^4. **[6]**

Q5) Explain step by step procedure to calculate base shear? **[8]**

OR

Q6) Summarized philosophy of seismic design? **[8]**

Q7) a) Explain various irregulaties in building structures and their impact on seismic behaviours structural system. **[8]**

b) Explain the concept of shear wall & its behaviour. **[8]**

OR

P.T.O.

Q8) a) Explain the following terms **[8]**

i) Torsion irregularity.

ii) Weak storey.

b) Explain the effects of unsymmetrical geometry and masses of the structure? **[8]**

Q9) a) What are the various methods available to control the lateral forces acting on a structure? Explain in details? **[10]**

b) Explain with neat sketches concept of Ductile detailing of column beam joint. **[8]**

OR

Q10)a) Write short note on **[8]**

i) Response Spectra

ii) Effect of shear wall

b) Explain the procedure for estimation of combined effect of lateral forces and vertical loading on multistory frame? **[10]**

Q11)a) What is retrofitting and rehabilitation of structures? **[8]**

b) Explain the various techniques of retrofitting. **[8]**

OR

Q12)a) Define Active and Passive control. Write different types of the passive control system and explain any one example. **[8]**

b) What is disaster management? Explain various phases of disaster Management? **[8]**

▽▽▽▽

Total No. of Questions : 10]

SEAT No. :

PA-169

[Total No. of Pages : 2

[5927]-52

B.E. (Civil)

ADVANCED GEOTECHNICAL ENGINEERING

(2015 Pattern) (401005E) (Semester - I) (Elective - II)

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

Instructions to the candidates :

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data, if necessary.***
4) ***Use of electronic pocket calculator is allowed in the examination.***
5) ***Neat diagrams must be drawn wherever necessary.***

Q1) a) Explain the soil classification based on the grain size and plasticity. **[5]**

b) Explain with suitable diagram. **[5]**

i) Flocculated Structure

ii) Dispersed Structure

OR

Q2) a) Explain in detail timbering and bracings for open cut. **[5]**

b) Distinguish between “at rest”, active and passive earth pressure. Derive the expression for the coefficient of “at rest” earth pressure Ko. **[5]**

Q3) a) Explain in detail coulomb theory of earth pressure. **[5]**

b) Explain different properties and functional requirements of geosynthetics. **[5]**

OR

Q4) a) Determine the active resultant thrust at a depth of 7m in sand whose angle of friction is 25° and density of 17 kN/m^3 in dry state. **[5]**

b) What do you mean by Reinforced Earth? Give advantages of reinforced earth structures. **[5]**

P.T.O.

Q5) a) Discuss the following in detail. **[8]**

i) Cyclic loading and Impact loading.

ii) Soil properties relevant to dynamic loading.

b) Explain the following methods. **[8]**

i) Elastic half space method.

ii) Linear elastic weightless spring method.

OR

Q6) a) Explain different types of machine foundations with suitable sketch. **[8]**

b) Explain in detail soil properties relevant for dynamic loading & its determination. **[8]**

Q7) Discuss following terms in detail, **[6 × 3 = 18]**

a) Compaction pile.

b) Ground improvement by sand drains.

c) Various grouting techniques with their suitability.

OR

Q8) a) Explain the steps for vibrofloation with inserting reinforcement with neat sketch. **[6]**

b) Discuss any three methods of soil improvement. **[6]**

c) Explain in detail technique of deep mixing. **[6]**

Q9) a) Explain the concept of Rheology and Rheological model. **[6]**

b) Explain viscous model with spring and dashpot. **[6]**

c) Discuss creep by giving suitable example. **[4]**

OR

Q10)a) Explain basic and composite Rheological model. **[6]**

b) Explain in detail secondary consolidation. **[6]**

c) What are the limitations of Rheological models? **[4]**

▽▽▽▽

Total No. of Questions : 12]

SEAT No. :

PA-170

[Total No. of Pages : 3

[5927] - 53

B.E. (Civil)

DAMS AND HYDRAULIC STRUCTURES

(2015 Pattern) (Semester - II) (401007)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12,***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of electronic non-programmable calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) Write a short note on Dams and Social Issues. **[3]**

b) Explain types of measurements in Dams safety. **[3]**

OR

Q2) a) Differentiate between Large Dam and Small Dam. **[3]**

b) Write Short note on Piezometers and its working principle. **[3]**

Q3) a) Explain various forces acting on Gravity Dam. **[5]**

b) State advantages and limitations of butters dam. **[3]**

OR

Q4) a) What are the Modes of failure of gravity dam? What is Middle third rule? **[4 + 2]**

b) What are the factors affecting selection of arch dam? **[2]**

P.T.O.

Q5) Correlation between jump height and tail water depth. **[6]**

OR

Q6) What is a spillway gate? Briefly explain any two types of gates. **[2 + 2 + 2]**

Q7) a) Differentiate between a weir and a barrage. **[6]**

b) Explain Classification of an earth dam based on materials, method of construction. **[6]**

c) Write the procedure of stability analysis of an earth dam by Swedish slip circle method. **[6]**

OR

Q8) a) Briefly outline Khosla's theory on the design of weir on permeable foundations. **[6]**

b) How would you proceed to determine the phreatic line through homogenous earthen dams provided **[3 + 3]**

i) with a horizontal filter.

ii) without a horizontal filter.

c) Draw a neat layout of diversion head works and indicate the various components along with explain their functions in brief. **[6]**

Q9) a) What is a canal? Explain three types of canals based on function. **[8]**

b) Design an irrigation channel in alluvial soil from following data using Lacey's theory : **[8]**

Discharge 20.0 cumec ;

Lacey's silt factor 1.0 ;

Side slope = ½ : 1

OR

Q10) a) What is a Canal Fall? Discuss the necessity of it and also explain any two types of falls. **[4 + 2 + 2]**

b) Design an irrigation channel by Kennedy's theory to carry a discharge of 5 cumecs. Take m = 1.0, N = 0.0225 and B/D = 4.4. **[8]**

Q11) a) Enlist objective of river training works. State and explain any three river training works in detail. **[2 + 6]**

b) What are the cross drainage works? Explain aqueduct with neat sketch. **[2 + 6]**

OR

Q12) a) Classification of Cross Drainage works according to drain over canal and canal over drain. **[4 + 4]**

b) Write a short note on : **[2 + 3 + 3]**

i) Guide Bunds.

ii) Attracting groyne.

iii) Deflecting groyne.

Total No. of Questions : 12]

SEAT No. : ____

PA-171

[Total No. of Pages : 5

[5927] - 54

B.E. (Civil)

QUANTITY SURVEYING CONTRACTS & TENDERS

(2015 Pattern) (Semester - II) (401008)

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

Instructions to the candidates :

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Distinguish between estimate & estimation, Detailed & approximate estimate. **[3]**

b) Prepare the measurement sheet for detailed estimated. What is the difference between measurement sheet & abstract sheet? **[3]**

OR

Q2) Prepare a preliminary estimate for a multistoried building for 5 floors, having carpet area per floor of 1000 sqm. Area occupied by walls is 10%, area occupied by Corridor, WC - bath, staircase is 25%. The plinth area rate may be assumed as Rs. 86,000/sqm of built up area. Following data may be assumed **[6]**

a) Water Supply & Sanitary Connection at 10%.

b) Electrification at 8%.

c) Architectural finish at 2%.

d) Lawn & Roads at 6%.

Assume suitable value as per norms for contingencies & workcharge establishment.

P.T.O.

Q3) An RCC framed structure is shown in fig 1. Work out the following quantities for the item of works.

a) RCC footing c.c 1 : 1: 5 : 3 M15 upto ground level. **[4]**

b) RCC Column in M15. **[2]**

c) Quantity of steel assuming 1% for footing, 2% for column (volume of concrete percentage of steel). **[2]**

OR

Q4) A simply supported beam resting on two wall support is shown in fig2. Calculate the quantity of steel in beam & quantity of steel. **[8]**

Q5) a) How is rate of an item of work prepared? Explain the purpose of rate analysis. **[2]**

b) Workout the quantity of M15 grade (1 : 2 : 4) concrete and workout the unit rate for the details given below. Assume 10 m^3 quantity of Cement Concrete Work. **[4]**

Description	Quantity	Unit	Rate	Amount
40mm aggregate	?	m^3	800/-	
Sand	?	m^3	1,750/-	
Cement	?	bags	350/-	
Head mason	?	NO	950/day	
Mason	?	NO	700/day	
Mazdoor	?	NO	500/day	
Man or Women	?	NO	350/day	
Forwork	LS	LS	1,000/-	
Sundries T & P	LS	LS	1,000/-	

OR

Q6) a) Although detailed engineering drawing is available for an Civil engineering work, detailed specification for each item of work is necessary, justify the statement with example. **[2]**

b) Draft a detailed specification for I class brick work with respect to

i) Material of Construction.

ii) Laying.

[4]

Q7) a) What is the necessity of valuation of a property? Explain any four purpose of valuation. **[6]**

b) Explain the importance of "Year's Purchase" & Sinking fund in valuation of property. **[6]**

c) Differentiate between Cost, Price & Value with suitable example & explain

i) Book value &

ii) Sentimental value in context to valuation of property.

[6]

OR

Q8) a) Why should the depreciation be considered in valuation of a property & what are the possible reason for depreciation and types of depreciation. **[6]**

b) What are the different method of valuation of building and land & valuation of open land.

A particular land has less frontage & mere depth, which type of valuation you will suggest, explain how such land is valued. **[6]**

c) A concrete mixer is purchased at Rs. 1,50,000/-. Assume a salvage value to be Rs. 18,750/- after 5 years. Calculate depreciation for each year by

i) Straight line method.

ii) Constant percentage method.

[6]

Q9) a) How are different types of PWD works classified & explain Original work & Repair work carried out by PWD. **[4]**

b) Explain sequential procedure for obtaining Administrative approval & technical sanction for any PWD work. **[6]**

c) Explain Earnest money Deposit & Security Money with respect to

i) Necessity & when collected.

ii) Percentage & Mode of Collection.

iii) Refund to Contractor.

[6]

OR

Q10) a) Tendering for Civil Engineering work is necessary, explain. What are the different details to be included while drafting a tender notice. **[6]**

b) Draft a tender notice for Construction of 5 floor Engineering College building Costing Rs. 5 Crore. **[6]**

c) Explain piece work & day work for executing PWD works. **[4]**

Q11) a) How can a contract be defined as per Indian Contract act (1872) & what are the essentials required for a Contract. Explain any two requirement of valid Contract. **[6]**

b) What are the different types of contracts in Civil Engineering & explain any two with example. **[6]**

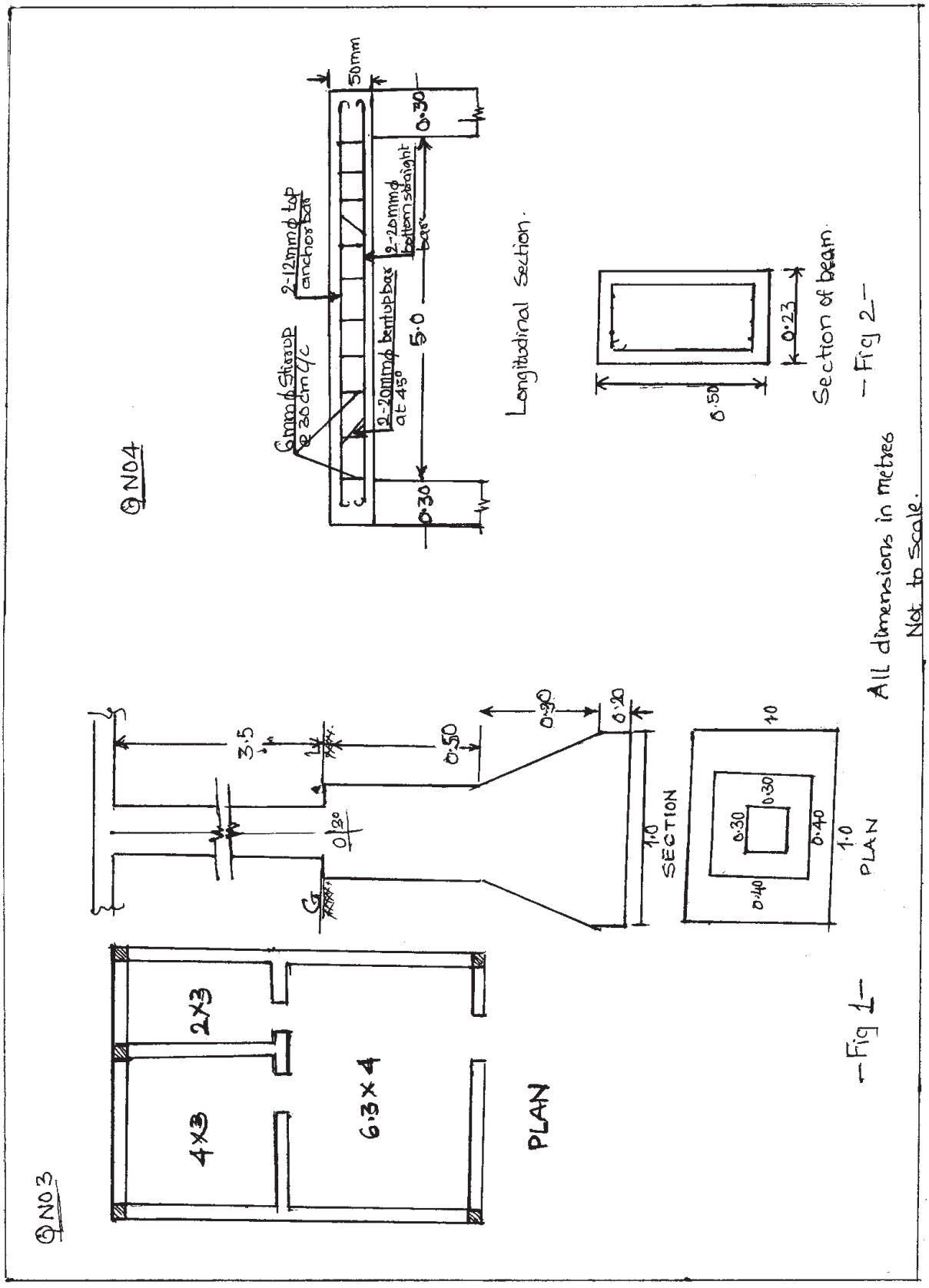
c) Under what different conditions a contract can be terminated & explain termination by performance in detail. **[4]**

OR

Q12) a) What is arbitration & its advantages? What are the matters which can be referred to arbitrator. **[6]**

b) A lowest tender can be rejected, state true or false with justification. **[6]**

c) Explain Adhoc & Fast track arbitration. **[4]**


Q NO3
4×3
2×3
6.3×4
PLAN
3.5
0.50
0.90
0.20
1.0
SECTION
1.0
0.30
0.30
0.40
0.40
1.0
PLAN
All dimensions in metres
Not to Scale.
Q NO4
50mm
0.30
2-12mm ϕ top anchor bar
2-20mm ϕ bent up bar at 45°
2-20mm ϕ bottom straight bar
5.0
8mm ϕ Stirrup @ 20cm c/c
0.30
Longitudinal Section.
0.50
0.23
Section of beam.

– Fig 1 –

– Fig 2 –

Total No. of Questions : 10]

SEAT No. : ____

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[Total No. of Pages : 3

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B.E. (Civil-Structures)

ADVANCED STRUCTURAL DESIGN

(2015 Pattern) (Semester - II) (Elective - III) (401009 A)

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

Instructions to the candidates :

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8 and Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicates 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) Explain the design procedure for cold form light gauge tension members. **[10]**

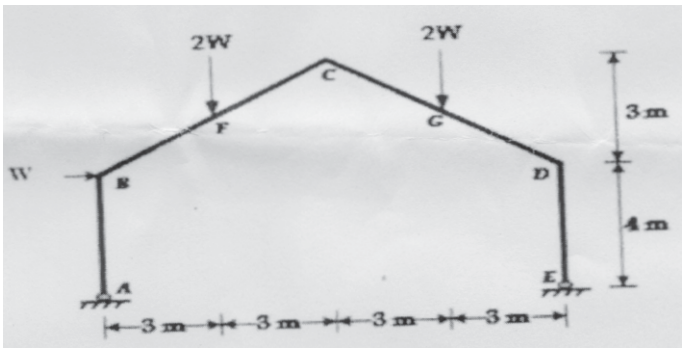
OR

Q2) Explain the joint mechanism in a frame with a suitable example. **[10]**

Q3) Explain how stability analysis of steel chimney is carried out? **[10]**

OR

Q4) Analyze the gable frame shown in Fig. 1 and design member BC. Take W = 25kN. **[10]**



P.T.O.

Q5) Determine the uniformly distributed collapse load for the slab shown in Fig.2. **[16]**

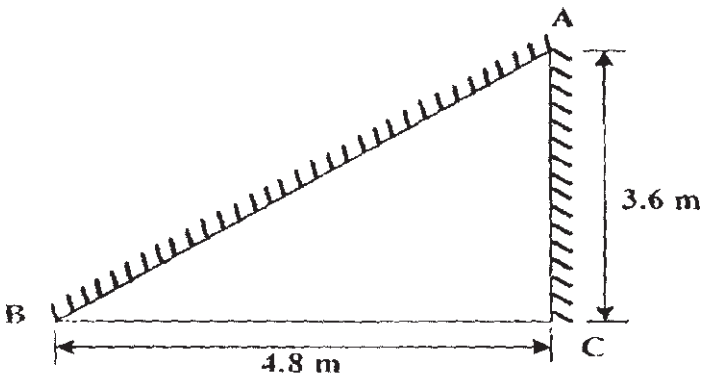


Fig. 2.

OR

Q6) Explain the following : **[16]**

a) Lower bound theorem.

b) Upper bound theorem.

c) Uniqueness theorem.

d) Corner levers.

Q7) For the elevated water tank shown in Fig. 3, analyze the staging for tank- full condition and calculate the resultant moment at the base of the staging. The tank is located on soft soil in seismic zone III. The staging confirms the ductile detailing of IS 13920. The weights of various components are given below. **[18]**

Roof slab = 120 kN ; wall = 275 kN ; floor slab = 200 kN ; floor beam = 85 kN ; gallery = 100 kN ; columns 250 kN ; braces = 300 kN.

The total stiffness of the columns may be taken as 7,000 kN/m.

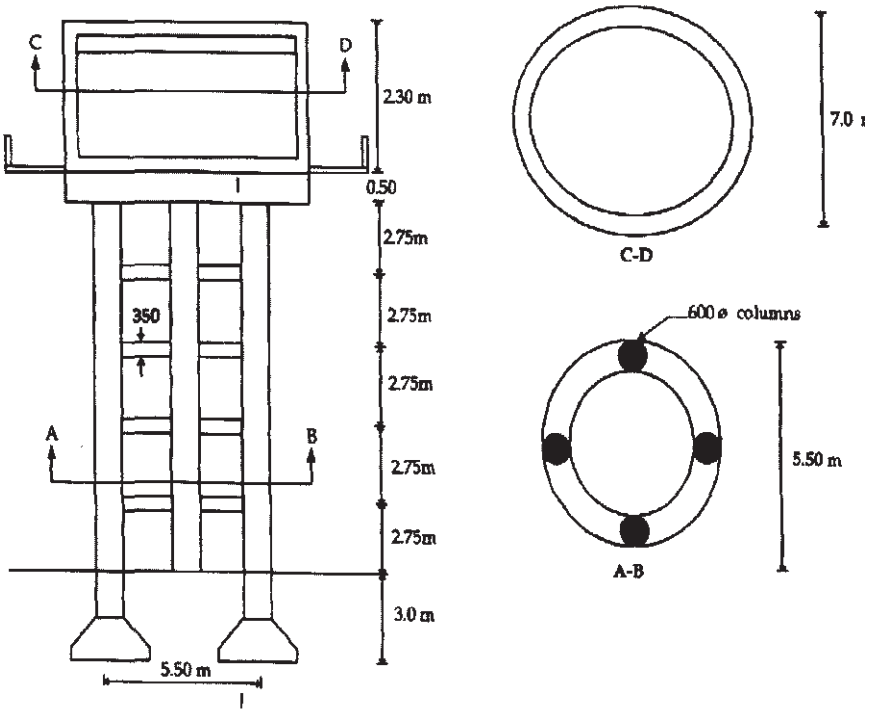


Fig.3.

OR

Q8) State IS 3370 code provisions for water tanks. Write a detailed design procedure for the water tank. **[18]**

Q9) Explain the concept of shear walls with types. **[16]**

OR

Q10) Explain the Design procedure of the shear wall with an example. **[16]**

Total No. of Questions : 10]

SEAT No. : ____

PA-173

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B.E. (Civil)

STATISTICAL ANALYSIS AND COMPUTATIONAL METHODS IN CIVIL ENGINEERING

(2015 Pattern) (Semester - II) (Elective - III) (401009B)

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

Instructions to the candidates :

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Figures to the right indicate full marks.***
3) ***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) Explain secant method and its procedure with a suitable example. **[4]**

b) Find a real root of the equation $x^3 - 2x - 5 = 0$ using false position method, correct up to three decimal places. **[6]**

OR

Q2) a) Explain Trapezoidal Rule and Simpson's $1/3^{rd}$ and $3/8^{th}$ Rule, give applications of Simpson's Rule. **[4]**

b) The velocity v of a particle at distance s from a point on its path is given in the following table : **[6]**

S (ft)	0	10	20	30	40	50	60
V (ft/sec)	47	58	64	65	61	52	38

Estimate the time taken to travel 60 feet by using Simpson's 1/3 rule and compare the answer with Simpson's 3/8 rule.

Q3) a) Explain optimization techniques and use of solution of linear equations and its methods in brief. **[4]**

b) Solve using Gauss Seidel Method, Following set of equations : **[6]**

$2x + y + 6z = 9$, $8x + 3y + 2z = 13$, $x + 5y + z = 7$

OR

P.T.O.

Q4) a) Write a short note on Gauss Jordan Method. **[4]**

b) Apply Gauss elimination method to solve following set of equations :**[6]**

$10x - 7y + 3z + 5u = 6$, $-6x + 8y - z - 4u = 5$, $3x + y + 4z + 11u = 2$, $5x - 9y - 2z + 4u = 7$.

Q5) a) Write a short note on data sampling and various methods. **[4]**

b) Find Geometric and Arithmetic mean for following data **[5]**

Marks	4-8	8-12	12-16	16-20	20-24	24-28	28-32	32-36	36-40
Frequencies	6	10	18	30	15	12	10	6	2

c) Find the missing frequency. If arithmetic mean is 28 of the data given below, find the median of the series **[7]**

Profits	0-10	10-20	20-30	30-40	40-50	50-60
No. of shops	12	18	27	--	17	6

OR

Q6) a) Explain formula 3 methods of finding mean and which method is to be selected for which type of data characteristics. **[4]**

b) For a group containing 100 observations, the arithmetic mean and standard deviation are 8 and $\sqrt{10.5}$ For 50 observations selected from these 100 observations the mean and the standard deviation are 10 and 2 respectively. Find the arithmetic mean and the standard deviation of the other half.**[6]**

c) Calculate Standard Deviation and its coefficient, from following data **[6]**

Mid values	12.5	13	13.5	14	14.5	15	15.5	16	16.5
Frequency	4	19	30	63	66	29	18	1	1

Q7) a) Calculate the probability of picking a card that was a heart or a spade.**[4]**

b) A bag contains 10 white and 6 black balls. 4 balls are successively drawn out and not replaced. What is the probability that they are alternately of different colours? **[7]**

c) i) A can solve 90% problems given in a book and B can solve 70%. What is the probability that at least one of them will solve a problem selected at random?

ii) In a single throw of two dice, what is the probability of obtaining a total of at least 10?

[6]

OR

Q8) a) Explain Chi Square distribution with suitable example. **[4]**

b) 8 coins are tossed simultaneously. Find the chance of obtaining : **[6]**

i) At least 6 heads

ii) No heads

iii) All heads

c) The probabilities of X, Y and Z becoming managers are 4/9, 2/9 and 1/3 respectively. The probabilities that the bonus scheme will be introduced if X, Y and Z become managers are 3/10, ½ and 4/5 respectively. **[7]**

i) What is the probability that the bonus scheme will be introduced?

ii) If the bonus scheme has been introduced, what is the probability that the manager appointed was X.

Q9) a) Explain various types of correlation and Karl Pearson's Coefficient of correlation. **[4]**

b) Calculate Karl Pearson's coefficient of correlation from the following data : Arithmetic means of X and Y series are 6 and 8 respectively. **[6]**

X	6	2	10	4	8
Y	9	11	--	8	--

c) Given the following data : **[7]**

X	6	2	10	4	8
Y	9	11	5	8	7

Find the two regression equations and calculate the standard error of the estimate (S_{yx} and S_{xy}).

OR

Q10)a) Explain regression analysis, types and applications with suitable examples. **[4]**

b) Calculate the regression equations of X on Y and Y on X from the following data and estimate X when Y = 26. Calculate coefficient of correlation also. **[7]**

X	10	12	13	17	18	20	24	30
Y	5	6	7	9	13	15	20	21

c) For certain X and Y series which are correlated, the two lines of regression are : $5x - 6y + 90 = 0$ and $15x - 8y - 130 = 0$. Find the means of the two series and the correlation Coefficients. **[6]**

▽▽▽▽

Total No. of Questions : 12]

SEAT No. :

PA-174

[Total No. of Pages : 2

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B.E. (Civil) (Semester - II)

HYDROPOWER ENGINEERING

(2015 Pattern) (401009C) (Elective - III)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.***
2) ***Figures to the right indicates full marks.***
3) ***Neat figures must be drawn wherever necessary.***
4) ***Assume suitable data if required.***

Q1) Explain renewable and non-renewable energy sources with their advantages and disadvantages. **[6]**

OR

Q2) Write note on: Base load and peak load plant. **[6]**

Q3) a) Explain the location and main components of tidal plant in detail. **[6]**

b) Write a short note on valley dam plant. **[2]**

OR

Q4) a) Write a detail note on: Pumped Storage plant. **[6]**

b) State various types of classification of hydropower Plant. **[2]**

Q5) Explain load duration curve on the basis of **[6]**

a) Concept
b) Significance
c) Application

OR

Q6) A run-of-stream station with an installed capacity of 15,000 kW operates at 15% weekly load factor when it serves as a peak load station and its entire capacity is firm capacity. What should be the lowest discharge in the stream so that the station may serve as the base load station? It is given that the plant efficiency is 75% when working under a head of 20 m. Also calculate the daily load factor of the plant when the discharge in the stream rises to 20 cumec.**[6]**

P.T.O.

Q7) a) Explain the three main divisions of power house structure with neat sketch. **[8]**

b) What is instrumentation in power house? How instrumentation and control is achieved in case of powerhouse? **[8]**

OR

Q8) a) Explain underground powerhouse and types of layouts of underground powerhouse with neat sketches. **[8]**

b) Explain any four electrical equipment for the power house. **[8]**

Q9) a) What is draft tube? What are the functions of draft tube? Explain different types with figures. **[8]**

b) The internal and external diameters of an outward flow reaction turbine are 2.5m & 3m respectively. The turbine is running at 275 rpm and the rate of flow of water through the turbine is 7 m^3/sec. The width of runner at inlet and outlet is equal to 300 mm. The head on turbine is 150m. Neglecting the thickness of vanes and taking the discharge radial at outlet, determine **[10]**

i) Velocity of flow at inlet and outlet

ii) Vane angle at inlet and outlet

OR

Q10)a) Write short notes on **[8]**

i) Governing of turbines

ii) Water hammer in turbines

b) Determine the number of turbines and diameter of runner for a power plant having 40 cumecs inflow, 20 m head. The efficiency of turbine is 85 % with the speed of 225 rpm. Assume the specific speed as 250 and speed ratio as 0.8. **[10]**

Q11)a) Explain the concept of carbon credit? Give its significance. **[8]**

b) What are the provisions related to licensing in case of hydroelectric power generation as per electricity act 2003? **[8]**

OR

Q12)a) What are the factors governing the pricing of electricity? **[8]**

b) Explain economic considerations of hydroelectric power plant. **[8]**

▽▽▽▽

Total No. of Questions : 10]

SEAT No. :

PA-175

[Total No. of Pages : 2

[5927]-58

B.E. (Civil)

AIR POLLUTION AND CONTROL

(2015 Pattern) (Elective - III) (401009D) (Semester - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Figures to the right indicates full marks.***
3) ***Draw neat figures wherever necessary.***

Q1) a) Explain the plume rise and how is it estimated? **[5]**

b) Enlist various zones of atmosphere. Explain with neat sketch and in detail: Troposphere and Ionosphere. **[5]**

OR

Q2) a) What is inversion? Briefly explain radiation and subsidence inversion? **[5]**

b) What are the effects of stack height? Enlist various formulae to calculate minimum stack height. **[5]**

Q3) a) Explain in detail with neat sketch working of a High Volume Sampler. **[6]**

b) What is sick building syndrome? Explain in detail. **[4]**

OR

Q4) a) Explain Radiation and Subsidence Inversion. **[6]**

b) Write methods of measurement of odour and explain any one method. **[4]**

Q5) a) Explain in detail: working principle and design of Fabric Filter as control equipment. **[8]**

b) Write advantages and disadvantages of **[8]**

i) Settling chamber

ii) Cyclone

OR

P.T.O.

Q6) a) Explain in detail working principle and design of electrostatic precipitator as a control equipment. **[8]**

b) Explain in brief **[8]**

i) Control of air pollution by process modification

ii) Control of air pollution by change of raw materials

Q7) a) How Land Use Planning is used as a method of control for air pollution? Explain in detail. **[8]**

b) Explain the important provisions made in Environment (Protection) Act 1986. **[8]**

OR

Q8) a) Enlist emission standards for stationary and mobile sources of air pollution. **[8]**

b) Explain in detail: Environment (Protection) Act 1986. **[8]**

Q9) a) Explain in detail: Role of regulatory agencies and control boards in obtaining environmental clearance for project. **[9]**

b) Explain in detail: Environmental Management Plan. **[9]**

OR

Q10)a) Explain in detail: environmental impact assessment (ETA) of a sugar industry. **[9]**

b) Explain in detail: the role of different authorities in EIA process. **[9]**

▽▽▽▽

Total No. of Questions : 8]

SEAT No. :

PA-176

[Total No. of Pages : 3

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B.E. (Civil Engineering) (Semester - II)

FINITE ELEMENT METHOD IN CIVIL ENGINEERING

(2015 Pattern) (401009E) (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 electronic pocket calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) Explain plane stress and plane strain elasticity problem with example. Write stress-strain relationship. **[8]**

b) State and explain the convergence criteria for the choice of the displacement function in FEM with examples. **[6]**

c) Give two dimensional and three dimensional Pascal's triangle. Explain its use in FEM analysis. **[6]**

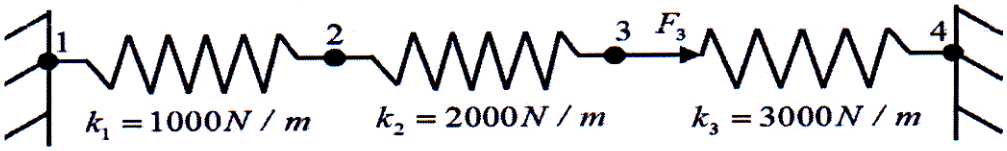
OR

Q2) a) Derive element stiffness matrix for a truss element by using Principle of minimum potential energy. **[8]**

b) Derive strain-displacement relations for 3D elasticity problems. **[6]**

c) Enlist the various types elements used in finite element analysis with their applications. **[6]**

Q3) a) Determine elongations at each node of the spring assembly for F3= 5000N as shown in Figure **[10]**

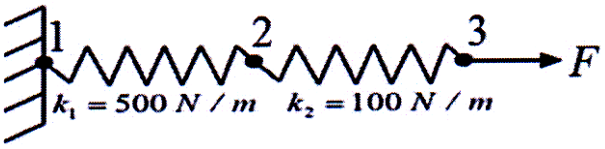


b) Derive area coordinates of triangular CST element. **[6]**

OR

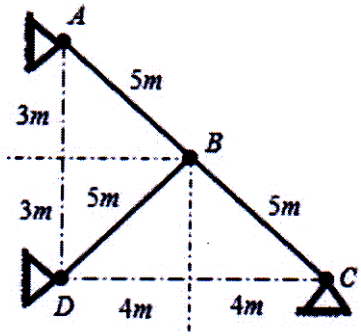
P.T.O.

Q4) a) Determine elongation at node 2 and pulling force (F) at node 3 for the spring assembly given below. Consider displacement at node 3 as $0.06m$. **[10]**



b) Write displacement polynomial for CST and LST elements. **[6]**

Q5) a) For the truss as shown in figure determine deflections at joint B. The joint B is subjected to 50 kN horizontal force towards left and 80 kN force vertically downward. Take cross sectional area of all members 1000 mm^2 Young modulus is 200 GPa. **[10]**



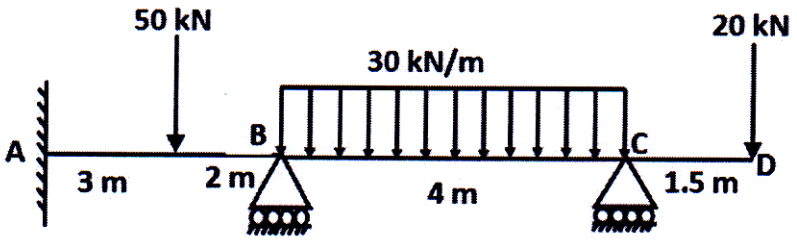
b) Derive shape functions of eight noded serendipity element. **[6]**

OR

Q6) a) Derive shape functions for four noded and nine noded rectangular element in natural coordinate (ξ, η) system using Lagrange's interpolation function. **[10]**

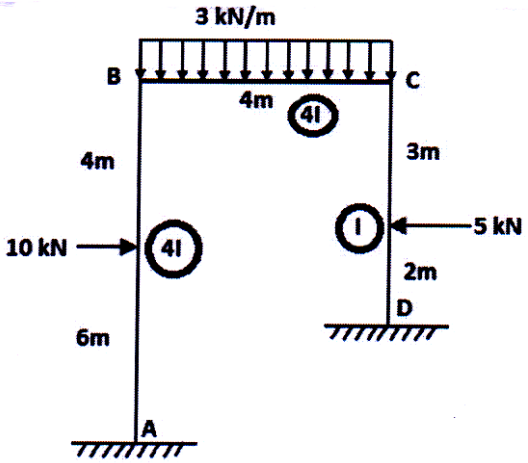
b) What are isoparametric, subparametric and superparametric elements? **[6]**

Q7) Analyse the continuous beam as shown in figure using finite element method. Take EI constant. **[18]**



OR

Q8) Analyze the portal frame as shown in figure using finite element method. Take EI constant. Neglect axial deformation. **[18]**



▽▽▽▽

Total No. of Questions : 10]

SEAT No. : ____

PA-124

[Total No. of Pages : 2

[5927]-6

B.E. (Automobile)

CAE & AUTOMATION

(2015 Pattern) (Semester - I) (Elective - I) (416491C)

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

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Write a short note on Hermite cubic spline curve. **[4]**

b) A line AB with A(4, 6) and B(20, 30) is rotated by 30° CCW about point A. Obtain concatenated transformation matrix and find new co-ordinates of points. **[6]**

OR

Q2) a) Determine the concatenated transformation matrix to reflect or mirror any entity about the line $y = mx + c$. **[6]**

b) What do you understand by "parametric representation" explain in brief. **[4]**

Q3) a) Derive an elemental stiffness matrix for two noded 1D bar element. **[6]**

b) Explain Raylich-Ritz approximation method. **[4]**

OR

Q4) A stepped metallic bar with circular cross section consists of two segments. The first segment is of length 350 mm and its cross sectional area is 275 mm^2. The second one has length of 250 mm and cross sectional area of 175 mm^2. If one end of the bigger segment is fixed and the axial tensile force acting on the free end of smaller segment is 700 KN, determine: **[10]**

a) the nodal displacements

b) the element stresses

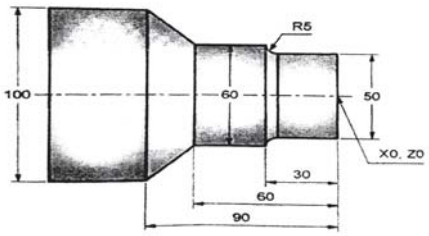
c) the support reaction. Take E = 200 Gpa.

P.T.O.

Q5) a) Explain cutter radius compensation with suitable G code. **[4]**

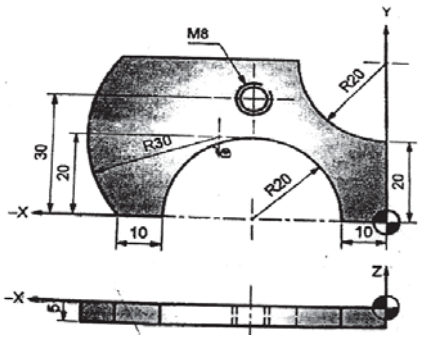
b) Explain codes G00, G01, G02 and M03 in part programming. **[4]**

c) Write a CNC part program to take a finish cut for the shape shown in fig. Assume suitable machining data. **[10]**



OR

Q6) a) Write a CNC program for the part as shown in figure. Assume suitable data. **[12]**



b) Explain the steps in NC manufacturing. **[6]**

Q7) a) Why automation is required? Discuss Hard, soft and flexible automation. **[8]**

b) What is FMS? Explain different elements of FMS. **[8]**

OR

Q8) a) Write short note on AGV. Write down advantages and disadvantages of AGV. **[8]**

b) What is Group Technology? Explain any one method in detail for grouping the parts into part families. **[8]**

Q9) a) What is Gripper? State different types of grippers. Explain any one gripper. **[8]**

b) State and explain parameters used in robot specifications. **[8]**

OR

Q10) Write short note on- **[16]**

a) Robot programming Languages.

b) Sensors used in robots.

c) Application of robot in Industry.

d) Methods of robot programming.

Total No. of Questions : 10]

SEAT No. :

PA-177

[Total No. of Pages : 3

[5927] - 60

B.E. (Civil) (Semester - II)

AIRPORT AND BRIDGE ENGINEERING

(2015 Pattern) (401009F) (Elective - III)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Figures to the right indicates full marks.***
3) ***Draw neat figures wherever necessary.***
4) ***Assume necessary data.***
5) ***Use of scientific calculators is allowed.***

Q1) a) Discuss the followings **[6]**

i) Apron turntable

ii) Hanger site locations

b) What is Air traffic control Network system? **[4]**

OR

Q2) a) Explain Cross wind component and Wind Coverage with respect to Airport Runway planning. **[6]**

b) What are the advantages and limitations of air transportation. **[4]**

Q3) a) What are the points to be considered during site selection for airport? What is their importance? **[6]**

b) What is the importance of airport drainage system? **[4]**

OR

Q4) a) The length of the runway under the Standard condition is 1600m. The airport site has an Elevation of 320m. And the reference temperature of the airport is 33.60 °C . It is decoded to construct the runway with can effective Gradient of 0.25%. Determine the Corrected length of the Runway. **[6]**

b) What are the Characteristics of good airport layout. **[4]**

P.T.O.

Q5) a) What are the equipment needed for a Heliport? **[6]**

b) What developmental issues might you face with a heliport? **[4]**

c) Discuss the followings **[6]**

i) Tie-down Configuration

ii) Aiming Circle

OR

Q6) a) What is VTOL? Are there different types of VTOL? **[5]**

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

i) Hovering Flight

ii) Vertical Flight

iii) Forward Flight

c) Discuss with suitable sketch about Aiming Circle marking. **[5]**

Q7) a) What is the classification of bridges according to **[6]**

i) Road engineers

ii) Indian Railways

b) The flood discharge under a bridge is 750m^3/sec. The bridge site is at right angled bend. Assuming Lacey's silt factor for river bed as 0.85, calculate the maximum scour depth. **[5]**

c) What are the different forces acting on components of a bridge? **[5]**

OR

Q8) a) What are the Selection Criteria for Bridge Site? **[6]**

b) Differentiate between **[4]**

i) Minor bridges and Major brides

ii) Natural waterway and linear waterway

c) What are the sub-structures of a bridge? Mention the functions of each of them. **[6]**

Q9) a) Why the cable stayed decks are less prone to the wind induced oscillations than the suspension bridges. **[6]**

b) Define temporary bridge and mention the materials and fastenings employed in its construction. **[6]**

c) Write brief notes on followings - **[6]**

i) Neoprene bridge bearing

ii) Rubber bearing

OR

Q10)a) Describe the any two types of bridge bearings with suitable sketches.**[6]**

b) Write explanatory note on **[6]**

i) Expansion bearing for girders

c) Differentiate between followings **[6]**

i) Ramp bridge and sling bridge

ii) Boat bridge and pontoon bridge

▽▽▽▽

Total No. of Questions :10]

SEAT No. :

PA-178

[Total No. of Pages : 2

[5927]-61
B.E. (Civil)
CONSTRUCTION MANAGEMENT
(2015 Pattern) (Semester-II) (Elective-IV) (401010A)

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

Instructions to the candidates:

1) ***Answer any one from questions 1 or 2,3 or 4,5 or 6,7 or 8,9 or 10.***
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 role of Infrastructure development in employment generation. **[5]**

b) Explain WBS along with suitable example. **[5]**

OR

Q2) a) What are the objectives of work study **[5]**

b) Write short note on Interstate migrant act. **[5]**

Q3) a) Explain Workmen compensation Act 1923. **[5]**

b) Explain String diagram and activity charts. **[5]**

OR

Q4) a) Write short note on balance sheet. **[5]**

b) Explain LOB technique. **[5]**

Q5) a) Write short note on energy cost escalation. **[8]**

b) Explain Value engineering along with suitable example. **[8]**

OR

Q6) a) Explain Sensitivity analysis and decision tree analysis. **[8]**

b) Explain the role of insurance in risk management. **[8]**

P.T.O.

Q7) a) Explain the role of material manager. **[8]**

b) Explain the Human resource development process. **[8]**

OR

Q8) a) Explain the concept of logistics and supply chain management. **[8]**

b) Write short note on Codification of material along with suitable example. **[8]**

Q9) a) Explain: Genetic algorithm? **[10]**

b) Explain Biological neural network and its application. **[8]**

OR

Q10)a) What are the applications of ANN. **[10]**

b) Explain fuzzy logic in detail. **[8]**

Total No. of Questions :10]

SEAT No. : ____

PA-179

[Total No. of Pages : 3

[5927]-62
B.E. (Civil Engineering)
ADVANCED TRANSPORTATION ENGINEERING
(2015 Pattern) (Semester-II) (401010B) (Elective-IV)

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

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Figures to the right indicate full marks.***
3) ***Draw neat figures wherever necessary.***
4) ***Assume necessary data.***
5) ***Use of scientific calculators is allowed.***

Q1) a) Give note on following. **[6]**

i) Travel demand forecasting

ii) Trip generation

iii) Modal spilt analysis

b) What is the difference between Metro rail and Bullet train? **[4]**

OR

Q2) a) Give note on following. **[6]**

i) Medium transit system

ii) Mass transit system

iii) Rapid transit system

b) What is Comprehensive Mobility Plan (CMP)? **[4]**

Q3) a) What is Transportation planning process? Discuss in details. **[6]**

b) What is road damage cost? Why it is important? **[4]**

OR

Q4) a) Answer the following in details. **[6]**

i) What is Vehicle operations cost?

ii) What is value of travel time?

b) What is Bus Rapid Transit (BRT)? **[4]**

P.T.O.

Q5) a) What will be theoretical maximum capacity (to nearest 10 units) for a single lane of highways given that the speed of the traffic stream is 41 km/hr. **[6]**

b) What are the steps involved in the process of traffic study? **[4]**

c) With suitable sketches discuss the following **[6]**

i) Rotary Intersection

ii) Cloverleaf Interchange (Any one)

OR

Q6) a) Discuss the provisions made in bicycle and pedestrian facilities? **[6]**

b) Enlist the principles on which traffic studies should be conducted? **[4]**

c) Calculate the theoretical capacity (C) of a traffic lane with one-way traffic flow for the given data. **[6]**

i) Traffic flow at a stream speed = 40 kmph

ii) Average center to center spacing of vehicles = 12.8 mtrs

Q7) a) What are the factors to be considered for the design of flexible pavements? Discuss significance of each? **[6]**

b) Describe the various maintenance strategy to be carried out for flexible pavements. **[4]**

c) Explain with suitable sketches types of distresses occuring in flexible pavements, their reasons and how they are measured. **[6]**

OR

Q8) a) What are the steps involved in the design of flexible pavements? **[6]**

b) Draw a typical cross-section showing all the basic layers of flexible pavement. **[4]**

c) With reference to Benkelman beam deflection study, explain the correction for pavement temperature. Correction for seasonal variation in subgrade moisture content. **[6]**

Q9) a) Explain the severity levels and extent level of distress in rigid pavements with the help of an example. **[6]**

b) Determine the stresses at interior, edge and corner regions of a cement concrete pavement using Westergaard's stress equations. Use the following data: **[6]**

Wheel load, P = 5200 Kg

Modulus of elasticity of cement concrete, E = 3.0 × 105 kg/cm^2

Pavement thickness, h = 18 cm

Poisson's ratio of concrete, μ = 0.15

Modulus of subgrade reaction, K = 6.0 kg/cm^3

Radius of contact area, a = 15cm

c) Compare with the limitations of Flexible Pavement and Rigid Pavement. **[6]**

OR

Q10)a) A cement concrete pavement of thickness 18cm, has two lanes of 7.0 m with a joint. Design the tie bars by using following Data:

Thickness - h =18cm, Allowable Tensile Stress - Ss - 1700 kg/cm^2,

Unit weight of Concrete - W-2400kg/cm^2, Allowable Bond Stress - Sb -24.6 kg/cm^2, Coefficient of Friction - f = 1.5, Width of Panel - b = 7.2/2 = 3.6 m. **[6]**

b) Discuss the failure criteria of rigid pavements? **[6]**

c) Discuss the advantages and limitations of rigid pavements over flexible pavements. **[6]**

Total No. of Questions :12]

SEAT No. : ____

PA-180

[Total No. of Pages : 3

[5927]-63
B.E. (Civil Engineering)
ADVANCED FOUNDATION ENGINEERING
(2015 Pattern) (Semester-II) (Elective-IV) (401010C)

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

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***
5) ***Use of non-programmable calculator is allowed.***

Q1) a) Explain in brief the IS code provision for subsoil exploration of canals. **[3]**

b) Explain the significance of subsoil exploration in Civil Engineering structures. **[3]**

OR

Q2) a) Explain the IRC provision for exploration of roads. **[3]**

b) What are the various design features which are responsible for disturbance of soil? **[3]**

Q3) a) Explain the friction piles and bearing piles. **[3]**

b) Explain cyclic load test with neat sketch. **[3]**

OR

Q4) a) Write a short note on design of pile subjected to tensile load. **[3]**

b) Give the classification of pile foundation. **[3]**

P.T.O.

Q5) a) For what type of soil is under reamed pile suitable? Discuss two considerations for design of Under-ream piles. **[4]**

b) Discuss vibro-replacement method with neat labelled sketch for stone column design and construction. **[4]**

OR

Q6) a) Discuss the advantages of vertical drain, its efficiency and types of vertical drains. **[4]**

b) Discuss the steps for Priebe's method of stone columns design. **[4]**

Q7) a) Discuss Meyerhof's relationship for the vertical component of the average ultimate load per unit area of the foundation based on the effective area concept, with neat sketch. **[6]**

b) What are the ways of accounting for eccentricity in case of shallow foundations? **[6]**

c) What do you understand by one way eccentricity? Explain with an example. **[4]**

OR

Q8) a) Describe the conventional method of raft foundation design, along with IS Code provisions. **[6]**

b) What are the types of raft foundation used depending on the condition of soil and the load imposed on the foundation? Discuss & justify. **[6]**

c) According to IS - 2950:1965, state the design criteria of raft footings with neat sketch. **[4]**

Q9) a) What are the circumstances under which a well foundation is more suited than other types? **[6]**

b) Discuss the various kinds of forces likely to act on a well foundation. **[6]**

c) State and explain the advantages of well foundation. **[4]**

OR

Q10)a) With neat sketches, explain the different shapes of wells. **[6]**

b) Write a note on Rock fill coffer dams. **[6]**

c) Enlist the disadvantages fo rockfill coffer dams. **[4]**

Q11)a) Explain in detail: Underground conduits. **[6]**

b) What is ditch conduit? **[6]**

c) Explain how the load on conduit due to line load is evaluated. **[6]**

OR

Q12)a) Write a note on negative projecting conduits. **[6]**

b) What are the factors affecting external forces acting on the conduit. **[6]**

c) Explain the stress distribution around tunnels in case of **[6]**

i) Elastic case and

ii) Plastic case

Total No. of Questions : 12]

SEAT No. :

PA-181

[Total No. of Pages : 2

[5927]-64
B.E. (Civil)
COASTAL ENGINEERING
(2015 Pattern) (Semester - II) (Elective - IV) (401010D)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer any one from questions 1 or 2, 3 or 4, 5 or 6, 7 or 8, 9 or 10, 11 or 12.***
2) ***Neat diagrams must be drawn whenever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary and mention it clearly.***
5) ***Use of non- programmable calculator is allowed.***

Q1) a) Write short note on classification of ocean waves. **[3]**

b) Define - Wave diffraction, wave refection, wave breaking. **[3]**

OR

Q2) a) Write short note on tide producing forces-earth moon and earth sun system. **[3]**

b) Derive expression for group wave velocity. **[3]**

Q3) a) What is effect of construction of coastal structures on stability of shoreline/beaches. **[3]**

b) Explain the Coastal process - Erosion/accretion due to waves, bed forms, long shore transport. **[3]**

OR

Q4) a) Write assumptions in tidal theory. Distinguish between tides in rivers - estuaries and tides in shallow sea. **[3]**

b) Write assumptions in tidal theory. **[3]**

Q5) a) What are different bed forms and their characteristics? **[4]**

b) Enlist different factors affecting the littoral process. **[4]**

OR

Q6) a) What is wave induced sediment? Enlist any two effects of such sediment on shoreline. **[4]**

b) What are the effects of high tides on stability of inlets? **[4]**

P.T.O.

Q7) a) Write a note on Rubble mound jetties. Draw neat diagram. **[8]**

b) What are revetments? Why the revetments are provided? Classify the revetments on functional basis. **[8]**

OR

Q8) a) Explain in detail ant four types of dredgers. **[8]**

b) Draw neat diagram of curved face sea wall and explain in depth. **[8]**

Q9) a) Write on design of disposal methods of dredged materials and Environmental aspect of dredging. **[8]**

b) Enlist different feasibility criteria of dumping ground for dredged materials. **[8]**

OR

Q10)a) Explain various environmental aspects of dredging with good effects and bad effects. **[8]**

b) Explain the necessity of dredging in coastal zones. Explain any one method of disposal of dredged materials. **[8]**

Q11)a) What are the different methods for disposal of waste (dredged spoils) in coastal zone. **[8]**

b) What are the design criteria for coastal outfall systems? Write a detail note on "pollution in Coastal zone". **[10]**

OR

Q12)a) Explain in detail any case study of oil spill to quantify its effects on coastal ecosystem. **[8]**

b) Explain the necessity to regulate the coastal zone. How coastal area is regulated in different zones? What are the different factors affecting the growth of coastal zone considering to regulate the space as criterion and pollution as criterion. **[10]**

Total No. of Questions : 10]

SEAT No. :

PA-182

[Total No. of Pages : 2

[5927]-65
B.E. (Civil Engineering)
PLUMBING ENGINEERING
(2015 Pattern) (Semester - II) (Open Elective) (401010EA)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.No 1 or Q.No 2, Q.No 3 or Q.No 4, Q.No 5 or Q.No 6, Q.No7 or Q.No 8, Q.No 9 or Q.No 10.***
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 UPC-I and GPCS-I. **[5]**

b) How Plumbing engineering is related with physical health engineering. **[5]**

OR

Q2) a) Describe the role of Plumbing contractor while executing plumbing work in the building industry. **[6]**

b) Explain PE-AL-PE Pipes. **[4]**

Q3) a) Draw a neat sketch (section and elevation) of male public urinals with standards dimensions. **[5]**

b) Explain importance of architectural and structural coordination while executing plumbing work. **[5]**

OR

Q4) a) Explain importance fluid mechanics in plumbing design. **[6]**

b) How backflow is prevented in water supply and what is its importance in plumbing. **[4]**

Q5) a) Explain horizontal wet vent and vertical wet vent with neat sketch. **[8]**

b) Comment on “plumbing system needs to breathe”. State maximum value of pneumatic pressure difference in Pascal’s so that the seal is protected. State vent terminals as per code. **[10]**

OR

P.T.O.

Q6) a) Explain drainage system for three star hotel building (G+4), Include explanation of drainage from kitchen. **[8]**

b) State the trap requirements as per uniform plumbing code for **[10]**

i) Design of trap

ii) Trap seal and trap seal protection

iii) Trap setting and protection

Q7) a) State requirements of a sanitary closet. Explain Indian pattern water closets & European type Closets with neat sketch. **[8]**

b) Explain drainage air test & drainage water test procedures. **[8]**

OR

Q8) a) Explain sizing of house drain & sizing its vent pipe. **[8]**

b) Explain basic guide to calculate falls and gradients for drainage. **[8]**

Q9) a) Explain RCC, PVC, Nu-Drain, and Stoneware for building sewers. Also explain ancient stone ware drainage of Mohenjo-Daro. **[10]**

b) Explain with neat sketch requirements for brick built inspection chamber and Gully trap for drainage line of G+2 structures. **[6]**

OR

Q10)a) Explain design of plumbing systems for multi-storey buildings. **[8]**

b) Explain storm water design considerations as per CPHEEO manuals.**[8]**

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

PA-183 **[Total No. of Pages : 2**

[5927]-66
B.E. (Civil)
GREEN BUILDING TECHNOLOGY
(2015 Pattern) (Semester - II) (Open Elective) (401010EB)

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) ***Figures to the right indicate full marks.***

Q1) a) What is IEQ? Mention impact of construction materials on, "Indoor environmental quality". **[6]**

b) Enlist the factors for sustainable site planning and explain the role of materials and waterbodies in relation with sustainable site planning.**[7]**

c) What is the importance of, "Life Cycle Assessment of materials"? Give suitable example. **[7]**

OR

Q2) a) "Reuse and recycle of construction waste reduces liability on natural resources", explain by giving suitable examples. **[6]**

b) Write a note on, 'heat flow through materials and mechanical ventilation and mention its relation with climatic behavior'. **[7]**

c) Explain the need and process of EIA. **[7]**

Q3) a) What is the importance and meaning of water conservation? Elaborate in relation with today's scenario by suitable example. **[8]**

b) What is the importance of solar energy? Elaborate in relation with today's scenario by suitable example of any Green Building. **[9]**

OR

Q4) a) Enlist various methods of composting and elaborate any two composting methods. **[8]**

b) How maximum daylight and ventilation is based on orientation? Sketches are essential. **[9]**

P.T.O.

Q5) a) Explain with flow chart, various stages under CDM. **[9]**

b) Elaborate in depth the salient features of ECBC code. **[8]**

OR

Q6) a) Write a note on Kyoto protocol. **[8]**

b) What is the importance of CDM? What is its impact in relation with developed and developing countries? **[9]**

Q7) a) Compare and contrast between "BREEAM and CASBEE". **[8]**

b) What advantages are given to, "Rated Buildings" by local authorities? Explain with a case study. **[8]**

OR

Q8) a) Explain in detail, "LEED - India" rating system. **[8]**

b) What is the need of rating? Explain any two salient points for rating. **[8]**

Total No. of Questions : 8]

SEAT No. :

PA-1156

[Total No. of Pages : 2

[5927]-67A
B.E. (Civil)
FERROCEMENT TECHNOLOGY
(2015 Pattern) (401010EC) (Open Elective)

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 the full marks.***

Q1) a) Compare ferrocement with fiber reinforced concrete with examples? **[7]**

b) Define volume fraction, specific surface? Also explain how to calculate the same? **[7]**

c) Discuss limit state method for the design of ferrocement elements? **[6]**

OR

Q2) a) Explain the expanded steel mesh and crimped woven wire mesh as a reinforcement in Ferrocrete structure? **[7]**

b) Explain tying of the mesh and mortaring the mesh during construction of the ferrocrete structure in detail? **[7]**

c) Explain in detail transformed area method for cracked section of ferrocement? **[6]**

Q3) a) How to calculate cost and value of ferrocement construction. Explain with examples? **[8]**

b) Explain special characteristics of ferrocement to earthquake proof structure? **[9]**

OR

Q4) a) Write in detail various steps involved in the cost analysis of ferrocrete water tank and staircase? **[8]**

b) Explain in detail “Ferrocement in foundation”? **[9]**

P.T.O.

Q5) a) Write a short note on fabrication and casting of cylindrical water storage tanks along with the special hints of construction? **[8]**

b) Discuss failures of different types of ferrocrete retaining walls? **[9]**

OR

Q6) a) Explain the benefits of constructing conical tanks, spherical tanks and hopper bottom tanks using ferrocrete? **[8]**

b) Explain the benefits of ferrocement cantilever retaining walls? **[9]**

Q7) a) Write notes on:- **[8]**

i) Pyramid,

ii) Shells,

iii) Transmission poles?

b) Explain in detail "Ferrocement for precasting"? **[8]**

OR

Q8) a) Explain the special applications of ferrocrete such as for ferrocrete boats, catemarines and large size digesters? **[8]**

b) Write short notes on precast ferrocement doors, window frames and corrugated sheets? **[8]**

Total No. of Questions : 8]

SEAT No. :

PA-185

[Total No. of Pages : 3

[5927]-68
B.E. (Civil Engineering)
SUB SEA ENGINEERING
(2015 Pattern) (Semester - II) (Open Elective) (401010ED)

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) Discuss the general view of oil and gas industry, technological challenges and future developments. **[6]**

b) Discuss how the water depth influences the architecture of any structure which is to be constructed in the sub sea region. **[6]**

c) Write a short note on prevention, mitigation of flow assurance issues in the sub sea region. **[6]**

OR

Q2) a) What are the challenges for sub sea oil extreactions? Discuss various points based on economical, oceanographic and political impacts related to these challenges. **[6]**

b) Explain the precautionary measures to be taken in the infrasturcture development in the sub sea region in detail. **[6]**

c) Discuss the main intervention methods including AUVs, ROVs and divers. **[6]**

Q3) a) Write a short note on reliability and risk Assessment in the development of sub-sea construction works. **[6]**

b) Elaborate in detail present and future challenges in the data Management Construction of oil industries in the subsea zone. **[6]**

c) Discuss in detail the HAZOPS system for subsea construction works related to oil industries. **[6]**

OR

P.T.O.

Q4) a) Differentiate between the shallow and deep sea methods of investigation and monitoring of different construction works. **[6]**

b) What are the Reliability and Integrity management issues in the oil industry and gas industry constructions in the subsea region? Discuss one by one in short. **[6]**

c) Discuss in detail the FMECA system for subsea construction works related to oil industries. **[6]**

Q5) a) Explain in depth the various types of corrosion found in the oilfield with emphasis on the effects of acid gases (CO_2 and H_2S). **[6]**

b) How subsea field equipment, structures and architectures are dependent on each other with respect to the scale of operations and environmental factors? **[5]**

c) Which are the different pipeline materials are useful in the construction works for gas industry specifically in the sub sea region? And explain their chemical compositions suitable for the non-corrosion conditions in the subsea region. **[6]**

OR

Q6) a) Enlist different precautionary measures to reduce the corrosion in the oilfield industries and explain any two of them in detail. **[6]**

b) Give a detail description of flow lines, risers, moorings and their role in subsea infrastructure development. **[5]**

c) Criticize each of the pieces of the subsea infrastructure, its use and its interconnection with subsea trees, flow lines and how it effects on the development of subsea infrastructures? **[6]**

Q7) a) Intricate in detail the geotechnical aspects of pipeline design and its installation. **[6]**

b) What are the deep water risers? What is their use? Explain different design options available for deep water risers and define the key design drivers for each. **[5]**

c) Compare the two design methods of pipeline that address stress analysis, buckling and collapse of deep water pipelines. **[6]**

OR

Q8) a) Discuss the general principles of stress analysis in the main pipe line designing. **[6]**

b) What are the different technical challenges for the design of main pipeline in deep water and how these challenges should be handled in specific cases? **[5]**

c) Write the step wise procedure for limit state based design method for pipelines in the sub sea region. **[6]**

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

PA-186 **[Total No. of Pages : 2**

[5927]-69
B.E. (Civil)
GEOINFORMATICS
(2015 Pattern) (Semester - II) (Open Elective - IV) (401010EE)

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 questions from the following.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to right indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Define remote sensing. What is the scope of remote sensing? **[7]**

b) Explain in detail regarding electromagnetic spectrum. **[7]**

c) Write a short note on thermal remote sensing. **[6]**

OR

Q2) a) Write a short note on microwave remote sensing. **[6]**

b) What are the steps involved in image processing? Explain in detail. **[7]**

c) Explain in detail on image classification. **[7]**

Q3) a) State the advantages and disadvantages of raster data. **[6]**

b) Explain in detail on open source GIS software GRASS. **[5]**

c) Define GIS database. What are the methods of storing in database? **[5]**

OR

Q4) a) State the advantages and disadvantages of vector data. **[6]**

b) Define Geo-referencing of GIS data. What are the various methods of it? **[5]**

c) Explain in detail on open source GIS software OSSIM. **[5]**

P.T.O.

Q5) a) Explain in detail on role of aspects in map projections. **[5]**

b) Explain map projection for hemispheres. **[6]**

c) Explain in detail on map coordinate systems. **[6]**

OR

Q6) a) Explain Indian maps and projection in detail. **[6]**

b) Explain in detail on projections for hemispheres. **[6]**

c) Explain in detail on Concepts of sphere, ellipsoid and geoid. **[5]**

Q7) a) Explain Reduced, Geodetic and geocentric latitude. **[6]**

b) Explain in detail on mean radius of curvature in any azimuth? **[5]**

c) Explain in detail on reference surfaces and their relationship? Explain. **[6]**

OR

Q8) a) Explain in detail on the applications of geodesy in engineering? **[6]**

b) Explain Curves on the ellipsoid. **[5]**

c) Explain in detail on properties of geodesic. **[6]**

♦ ♦ ♦

Total No. of Questions : 10]

SEAT No. : ____

PA-125

[Total No. of Pages : 2

[5927]-7
B.E. (Automobile Engineering)
SPECIAL PURPOSE VEHICLE (Elective - II)
(2015 Pattern) (Semester - I) (416492A)

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, and Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***

Q1) a) Name the four special purpose vehicles and explain their applications. **[8]**

b) Explain about the power plant used in road construction. **[8]**

OR

Q2) a) Narrate the chassis and transmission considerations in an off road vehicle. **[8]**

b) Explain about the construction and working of Grader. **[8]**

Q3) Explain about the attachments of bulldozers. **[4]**

OR

Q4) What are the applications of self propelled scraper? **[4]**

Q5) a) With neat sketch explain about tanker. **[10]**

b) Compare transmission drive P.T.O. and Independent drive P.T.O. **[8]**

OR

P.T.O.

Q6) Explain about the following : **[18]**

a) Gun Carriers

b) Transport Vehicles

c) Pulverizes & Rollers

Q7) a) With neat sketch explain the working of Independent drive PTO. **[8]**

b) Explain OCDB and dry disc caliper brake system of the vehicle. **[8]**

OR

Q8) a) Narrate the design aspects of the dumper body. **[8]**

b) Explain the safe warning system for a dumper. **[8]**

Q9) a) Explain the characteristics of soil. **[8]**

b) Describe the main components of hydraulic system with the help of block diagram. **[8]**

OR

Q10) Explain the following :

a) Soil Horizons with neat sketch. **[8]**

b) i) Distinguish between Ground pressure and Nominal ground pressure

ii) Mobility index (mi) **[8]**

Total No. of Questions : 8]

SEAT No. :

PA-187

[Total No. of Pages : 2

[5927]-70
B.E. (Civil Engineering)
REPAIRS AND REHABILITATION OF CONCRETE STRUCTURES
(2015 Pattern) (Semester - II) (Open Elective) (401010EF)

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 right indicate the marks to the question.***
4) ***Use of Calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) Explain in brief various actions causing damages to concrete. **[7]**

b) Discuss in brief chloride induced corrosion and carbonation induced corrosion. **[7]**

c) Discuss protective materials and their properties for protection of concrete structures. **[6]**

OR

Q2) a) Explain corrosion induced by leaching of concrete. **[7]**

b) Discuss non-destructive techniques for determination of concrete properties. **[7]**

c) Explain solar reflective coatings. **[6]**

Q3) a) Discuss in detail. **[8]**

i) Polymer modified mortar.

ii) Polymer modified concrete.

b) Discuss restoration of heritage structures. **[9]**

OR

Q4) a) Discuss methodologies of crack and patch repair. **[8]**

b) What is seismic strengthening, discuss in brief. **[9]**

P.T.O.

Q5) a) Explain mechanism of corrosion of reinforcement. **[8]**

b) Discuss in detail repair for underwater structures. **[8]**

OR

Q6) a) Discuss preventive measures for corrosion and repair methods. **[8]**

b) Discuss repair of damaged hydranlic structures. **[8]**

Q7) a) Discuss axial and tensile behaviour of Fiber Reinforced Polymer. **[8]**

b) Discuss retrofitting of RC beams using Fiber Reinforced Polymer. **[9]**

OR

Q8) a) What is Retrofitting? Explain its significance and discuss methods. **[9]**

b) Discuss development of Fiber Reinfored polymers and its applications for Retrofitting. **[8]**

♦ ♦ ♦

Total No. of Questions : 8]

SEAT No. :

PA-188

[Total No. of Pages : 2

[5927]-71

B.E. (Computer Engineering)
HIGH PERFORMANCE COMPUTING
(2015 Pattern) (Semester - I) (410241)

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 wherever necessary.***
3) ***Assume suitable data if necessary.***
4) ***Figures to the right indicate full marks.***

Q1) a) What is load balancing? Explain Static mapping technique for load balancing. **[6]**

b) Explain basic architecture and working of VLIW Processor. **[6]**

c) Explain any 4 methods for containing interaction overheads. **[8]**

OR

Q2) a) Explain basic working principle of Super Scalar Processors. **[6]**

b) Write a short note on All-to-one reduction with suitable example. **[6]**

c) Elaborate upon the four subclasses of the Parallel Random Access Machine (PRAM). **[8]**

Q3) a) Explain Parallel Matrix - Vector Multiplication algorithm with example. **[8]**

b) Explain the Performance Meterics for Parallel Systems. **[8]**

OR

Q4) a) Explain Parallel Matrix - Matrix Multiplication algorithm with example. **[8]**

b) Interpret the effect of Granularity on Performance of parallel execution. **[8]**

P.T.O.

Q5) a) Compare an algorithm for sequential and parallel Quick Sort. Analyze the complexity for the same. **[8]**

b) Modify Depth first search for parallel execution and Analyze its complexity. **[8]**

OR

Q6) a) Discuss the issues in sorting for parallel computers? **[8]**

b) Explain Dijkstra's shortest path Algorithm with example. **[8]**

Q7) a) Explain parallelism in best first search algorithm. Give appropriate example. **[8]**

b) Design a simple CUDA kernel function to multiply two integers. **[6]**

c) List APIs for dealing with CUDA device memory. **[4]**

OR

Q8) a) Write a CUDA kernel to add addition of two vectors using threads and explain the process. **[8]**

b) Explain Grid, Block and Thread in CUDA with diagram. **[5]**

c) Give five applications of CUDA. **[5]**

Total No. of Questions : 10]

SEAT No. : [ ]

PA-189

[Total No. of Pages : 2

[5927]-72

B.E. (Computer Engineering)
ARTIFICIAL INTELLIGENCE AND ROBOTICS
(2015 Pattern) (Semester - I) (410242)

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

Instructions to the candidates:

1) ***Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***
5) ***Justify your answer with an example wherever necessary.***

Q1) a) With an example explain A star algorithm. State the properties of A star algorithm. **[6]**

b) Illustrate the tabu search and beam search with proper example. **[6]**

OR

Q2) a) Comment on Backtracking and look ahead strategies in constraint satisfaction problems. **[6]**

b) Define planning. Explain goal stack planning with example. **[6]**

Q3) a) Write the short note on first order logic and second order log. **[6]**

b) Draw the architecture of an expert system. Explain each functional block in detail. **[6]**

OR

Q4) a) What is the difference between blind search and heuristic search. **[6]**

b) Describe PEAS for WUMPUS world problem. **[6]**

P.T.O.

Q5) a) What is Artificial Neural Network? Describe three applications of artificial neural networks. **[6]**

b) Expalin the following term : **[6]**

Supervised learning. • Unsupervised learning. • Reinforcement learning.

c) Comment on the hardware components of a mobile robot. **[6]**

OR

Q6) a) What is ANN? Explain feed forward and feedback ANN. **[6]**

b) Explain machine translation using natural language processing (NLP). **[6]**

c) Write short note on sonar sensing. **[6]**

Q7) a) What are the hardware requirements in mobile robot. **[6]**

b) Compare the various weighting functions used in pose estimation. **[4]**

c) How the horizontal and vertical decomposition is done in robot control system. **[4]**

OR

Q8) a) Explain the use of following sensors **[6]**

• Biological sensor. • Sonar and Radar.

b) Explain the applications of Natural Language Processing. **[4]**

c) Comment on how robotics can be used to design intelligent vehicles. **[4]**

Q9) a) Explain the following terms : **[6]**

• Sensorial map. • Topological map.

b) How the landmark is measured in robot localization. **[4]**

c) What is mobile robot localization? Why it is important. **[4]**

OR

Q10) a) How robotics can be used to design intelligent vehicles and autonomous aircraft. **[6]**

b) Comment on issues regarding natural language processing in information retrieval. **[4]**

c) Explain use of robots in agriculture and forestry. **[4]**

Total No. of Questions : 10]

SEAT No. : ____

PA-190

[Total No. of Pages : 2

[5927]-73

B.E. (Computer Engineering)

DATA ANALYTICS

(2015 Pattern) (Semester - I) (410243)

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

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Discuss with example Data Devices and Data Aggregators of emerging Big data Ecosystem. **[5]**

b) Demonstrate the overview of Data Analytics Life Cycle. Explain any 2 phases. **[5]**

OR

Q2) a) Discuss the applications of k-means. **[5]**

b) Give the approaches to improve Apriori's efficiency. **[5]**

Q3) a) What is Regression? List the types of regression. Explain any one type. **[5]**

b) Solve: Consider following transactional data. Min. Support count = 2, min. confidence = 70% **[5]**

i) List the frequent itemsets.

ii) List all the strong association rules with support and confidence.

TID	Itemset
T100	I1, I2, I5
T200	I2, I4
T300	I2, I3
T400	I1, I2, I4
T500	I1, I3
T600	I2, I3
T700	I1, I3
T800	I1, I2, I3, I5
T900	I1, I2, I3

OR

P.T.O.

Q4) a) What is Hypothesis Testinig? Explain Null and Alternative Hypothetical testing. **[5]**

b) Compare Type I and Type II errors. **[5]**

Q5) a) What is a Decision tree? Give its applications. **[6]**

b) Compare C4.5 and CART decision tree algorithms. **[6]**

c) Write short note on Diagnostics of Classifiers. **[5]**

OR

Q6) a) Explain Bayes' theorem. Explain Naïve Bayes' classifier. **[7]**

b) What are the advantages of Decision Trees? **[5]**

c) Explain conditional probability with an example. **[5]**

Q7) a) What are analytical techniques used in Big Data Visualization? Explain any two. **[8]**

b) What are the open source visualization tools? Explain any 2. **[8]**

OR

Q8) a) What is data visualization? What are the challenges to Big Data Visualization? **[8]**

b) What kinds of problems occur in big data visualization? Discuss some of the solutions. **[8]**

Q9) a) Explain the categories of NoSQL databases. **[8]**

b) Compare SQL and NoSQL. **[5]**

c) What are the different data structures used in case of Big Data? **[4]**

OR

Q10)a) Explain in detail Hadoop Distributed File System. **[9]**

b) Write short note on (any 2) : **[8]**

- Map Reduce
- HIVE
- HBase

Total No. of Questions : 8]

SEAT No. : ____

PA-191

[Total No. of Pages : 2

[5927]-74

B.E. (Computer Engineering)

DIGITAL SIGNAL PROCESSING

(2015 Pattern) (Semester - I) (Elective - I) (410244A)

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

Instructions to the candidates:

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

Q1) a) Explain the process of Quantization with block diagram? **[5]**

b) Solve the linear convolution using mathematical formula method stepwise. **[5]**

i) $x(n) = \{1, 3, 5, 6\}$

ii) $h(n) = \{1, 2, 1, 2\}$

Q2) a) Determine Z-transform of following function? **[5]**

$x(n) = \{1, 2, 3, 1, 4, 5, 7\}$

b) Explain Twiddle factor properties with mathematical formula? **[5]**

Q3) a) What is ROC? Explain its properties also define ROC for both sided sequence? **[8]**

b) Determine Impulse response of an LTI System if $h(n) = \{1, 0, 4, -2\}$. Find the response of the system for the input $x(n)=\{1, 2, 2, 3\}$ using linear convolution? **[8]**

OR

Q4) a) Find the Direct form - I and Direct form - II realizations of a discrete time system represented by transfer function.

$H(Z) = (3Z^3 - 4Z^2 + 7Z - 11) / (Z-4)(Z^2 - Z + 6)$. **[8]**

b) Explain Pole Zero plot? Explain relation between X-plane & Z-plane? **[8]**

P.T.O.

Q5) a) Design a Linear plan FIR low pass filter using Blackman window by taking 7 samples of window sequence & cutoff frequency wc = 0.2π rad/sample? **[8]**

b) Explain Gibbs phenomenon in detail? **[5]**

c) Distinguish between Direct Form - I, IIR & FIR filters Design? **[5]**

OR

Q6) a) Write the procedure for Designing IIR filter using IIM Method? **[6]**

b) For the analog transfer function $H(S) = 2/S^2 + 3S + 2$, Determine H(Z) using Impulse invariant transformation if (a) T = 1 sec & (b) T = 0.1 sec? **[7]**

c) In brief explain frequency warping? Explain BLT of IIR filter? **[5]**

Q7) a) Explain S-plane to Z-plane mapping for order of n = 5? **[8]**

b) Write a short note on features of ADSP 21XX processors? Explain Barrel Shifter? **[8]**

OR

Q8) a) Explain in detail architecture of SHARC DSP processor? **[8]**

b) Write short note on Circular to Linear Convolution Conversion process? **[8]**

Total No. of Questions : 10]

SEAT No. :

PA-192

[Total No. of Pages : 2

[5927]-75

B.E. (Computer Engineering)

SOFTWARE ARCHITECTURE & DESIGN

(2015 Pattern) (Semester - I) (Elective - I) (410244B)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Why architectural design is important in software engineering? **[5]**

b) Describe the different views in architecture? Explain architecture qualities in detail? **[5]**

OR

Q2) a) Who are the stakeholders that exert the most influence over the architecture of systems in organization? **[5]**

b) What are the different business quality attributes? Explain with suitable examples. **[5]**

Q3) a) How to address resource demand in performance tactics? How resource arbitration is done? **[5]**

b) What are the different modules of the air vehicle model executive? Explain with suitable UML diagrams. **[5]**

OR

Q4) a) Explain business qualities in detail? **[5]**

b) How to achieve various quality attributes? Explain in detail. **[5]**

P.T.O.

Q5) a) What is significance of observer design pattern? How it is used in software design? **[8]**

b) Write a short note on structural pattern? **[8]**

OR

Q6) a) Discuss singleton design pattern in detail. **[8]**

b) Compare and contrast factory method and object factory design patterns. **[8]**

Q7) a) What is Active X control? Explain with suitable examples. **[8]**

b) Discuss HTML and DHTML as client side technologies with suitable examples. Compare and contrast HTML and DHTML. **[8]**

OR

Q8) a) What do you mean by SOA? What are the benefits of using SOA in software development? **[8]**

b) Explain the purpose of AJAX. How it works? **[8]**

Q9) a) What do you understand by server side technology? Explain MVC architecture. **[9]**

b) Describe EJB 3.0 architecture in detail. **[9]**

OR

Q10)a) Explain XML and XSLT. **[9]**

b) What is middleware? What are the types of middleware. **[9]**

Total No. of Questions : 10]

SEAT No. : ____

PA-193

[Total No. of Pages : 2

[5927]-76

B.E. (Computer Engineering)

PERVASIVE & UBIQUITOUS COMPUTING

(2015 Pattern) (Semester - I) (Elective - I) (410244C)

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

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Define Pervasive Computing? List and explain any two applications of Pervasive Computing. **[6]**

b) Describe four paradigms of pervasive computing. **[4]**

OR

Q2) a) Describe in brief about the device connectivity with suitable examples and available technologies for. **[6]**

b) Define ambient service? Explain the concept of ambient service in detail. **[4]**

Q3) a) Describe the architecture of WAP. What are the advantages and disadvantages of WAP? **[6]**

b) Explain the two classes of cryptographic algorithms. **[4]**

OR

Q4) a) Draw & explain the Jini service discovery technology in detail. What are the advantages and disadvantages of Jini technology? **[6]**

b) Write short note on Java Speech API and its components. **[4]**

Q5) a) What is Servlet? Write a program to access a bean holding consumer data to print out the first and last name of a consumer using JSP. **[8]**

b) With a neat diagram explain the architecture of J2EE application model. **[8]**

OR

P.T.O.

Q6) a) Explain SOAP web services and its parts. What are the steps to creating and using web services? **[8]**

b) Is JSP too inflexible for web applications? Justify. Explain the pattern which is used to overcome the problem for separation of responsibilities? **[8]**

Q7) a) What is user interfaces? How it becomes intelligent? **[5]**

b) Explain star model for user-centered design with suitable diagram. **[6]**

c) Explain various security issues while designing user interfaces. **[6]**

OR

Q8) a) What is smart card? Write it's applications. **[5]**

b) What are the five application areas where we felt that touche could have the largest impact? **[6]**

c) What are the different wearable input output devices? Explain with examples. **[6]**

Q9) a) Explain different smart phone sensors with examples. **[7]**

b) What is augmented reality? Where is augmented reality being used? What are the applications of augmented reality with illustration of each? **[10]**

OR

Q10)a) Define context? Comment on context Awareness? **[7]**

b) Explain Wearble Computing applications in Healthcare and Assistive Technologies. **[10]**

Total No. of Questions : 8]

SEAT No. :

PA-194

[Total No. of Pages : 3

[5927]-77

B.E. (Computer Engineering)

DATA MINING & WAREHOUSING

(2015 Pattern) (Semester - I) (410244D) (Elective - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***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 Knowledge Discovery of Data in detail. **[6]**

b) Calculate the Mean, Median and Mode for the following attribute marks values : 35, 40, 45, 50, 55, 60, 65, 75 Also, compute a five-number summary of the data. **[6]**

c) Compare and contrast OLAP and OLTP. **[8]**

OR

Q2) a) Briefly compare snowflake schema, fact constellation, and star net query model you may use an appropriate example to explain the concept. **[6]**

b) What are Binning techniques? Explain with example. **[6]**

c) How to measure dissimilarity in the following attributes. Write an appropriate example for each. **[8]**

i) Nominal attributes

ii) Binary attributes

Q3) a) Explains steps of FP Growth algorithm. **[4]**

b) Explain mining multi-level association rules with suitable example. **[6]**

c) Briefly with an example explain the following : **[8]**

i) Frequent itemset

ii) Closed frequent Itemset

OR

P.T.O.

Q4) a) How can we improve the efficiency of the a-priori algorithm? **[4]**

b) Define the following terms : **[6]**

i) Constraint base rule mining

ii) Closed and Maximal Frequent Itemset

c) Consider an example of the following set of transactions in Market Analysis. Assuming minimum support of 50% and minimum confidence of 80%. Find : **[8]**

i) All frequent itemset using a-priori algorithm.

ii) All association rules using a-priori algorithm.

Transaction ID	Items Brought
T1	M, A, B, D
T2	A, D, C, B, F
T3	A, C, B, F
T4	A, B, D

Q5) a) What is the difference between classification and Regression? **[6]**

b) Explain the following terms : **[6]**

i) Gini index

ii) Gain ratio

iii) Information gain

c) Explain the use of the regression model in the prediction of real estate prices. **[4]**

OR

Q6) a) What is a Bayesian belief network explain with a suitable example? **[6]**

b) Describe the K-nearest neighbor classifier with a suitable example. **[6]**

c) Differentiate supervised learning and unsupervised learning. **[4]**

Q7) a) Discuss reinforcement learning? What are its applications in a real-time environment? **[6]**

b) How is the performance of classifier algorithms evaluated? Discuss in detail. **[6]**

c) Explain the following measures for evaluating classifier accuracy. **[4]**

i) Recall

ii) Precision

OR

Q8) a) Discuss Multiclass classification with suitable example. **[6]**

b) Explain in detail the following techniques to evaluate the accuracy of the classifier. **[6]**

i) Random Subsampling

ii) Cross-Validation

c) Differentiate between holistic learning and multi-perspective learning. **[4]**

Total No. of Questions : 8]

SEAT No. :

PA-195

[Total No. of Pages : 2

[5927]-78

B.E. (Computer Engineering)

DISTRIBUTED SYSTEMS

(2015 Pattern) (Semester - I) (410245A) (Elective - II)

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) ***Neat diagram must be drawn wherever necessary.***
4) ***Assume suitable data if necessary.***

Q1) a) Define distributed system. Explain the characteristics of distributed system. **[6]**

b) Explain architectural models in distributed system. **[6]**

c) List mutual exclusion algorithms. Explain any one of the mutual exclusion algorithms in distributed system. **[8]**

OR

Q2) a) Explain RPC in detail. **[6]**

b) Explain Bully election algorithm. **[6]**

c) Explain algorithms for internal clock synchronization. **[8]**

Q3) a) What is distributed consensus? Explain how consensus is applicable in synchronous and asynchronous systems. **[9]**

b) Explain how PAXO's algorithm is used for implementing the fault-tolerant consensus. **[8]**

P.T.O.

OR

Q4) a) Explain different ways of implementing the atomic commit protocols. **[9]**

b) What are failure detectors? Explain basic properties of failure detectors. **[8]**

Q5) a) Explain the architecture of replica data management. **[9]**

b) Describe data-centric consistency models. **[8]**

OR

Q6) a) Explain with suitable example, Brewer's CAP algorithm. **[9]**

b) Describe the following : **[8]**

i) Atomic multicast

ii) Ordered multicast

Q7) a) Explain the security mechanisms to thwart various attacks in DS. **[8]**

b) Describe peer to peer networks with metrics of social networks. **[8]**

OR

Q8) a) What is distributed simulation? Explain different types of simulation. **[8]**

b) Explain what is Bit-torrent and free riding. **[8]**

Total No. of Questions : 12]

SEAT No. :

PA-196

[Total No. of Pages : 3

[5927]-79

B.E. (Computer Engineering)

SOFTWARE TESTING AND QUALITY ASSURANCE

(2015 Pattern) (Semester - I) (Elective - II) (410245B)

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

Instructions to the candidates :

1) ***Assume Suitable Data if necessary. Mention your assumptions.***
2) ***Right indicates the full marks and Bifurcation for sub questions.***
3) ***Draw suitable diagrams and tables if necessary.***

Q1) a) Explain processes related to software Quality.

b) What are the constraints of software requirement specifications?

[3 + 3 = 6]

OR

Q2) a) What is impact of defect in different phases of software development?

b) What is bug tracking, bug fixing & bug verification in software testing?

[3 + 3 = 6]

Q3) a) What do you mean by following software testing terms: Error, Fault and Failure?

b) What is Test Plan Document? List and explain any two components of the Test Plan document.

[3 + 4 = 7]

OR

Q4) a) Explain features of JUnit.

b) Write short note on Requirement Traceability Matrix.

[3 + 4 = 7]

P.T.O.

Q5) a) What are the challenges faced by testers.

b) What is test automation? How test automation can help in addressing several problems in manual testing.

[3 + 4 = 7]

OR

Q6) a) What are the criteria for selecting a test tools?

b) What are some of the challenges in automating the testing of GUI portions of an application?

[3 + 4 = 7]

Q7) a) What is Selenium? What are different components of Selenium?

b) State various advantages and disadvantages of Selenium Web Driver.

c) What are different features of Selenium IDE.

[6 + 6 + 5 = 17]

OR

Q8) a) Define SQA. What practices are applied by software team to achieve high software quality?

b) State & explain Principles of Quality management.

c) What is ISO standard? What are its advantages?

[6 + 6 + 5 = 17]

Q9) a) What are different automated testing tools? Explain QTP in detail.

b) Describe Selenium Grid architecture with the help of neat diagram.

c) Differentiate between Selenium RC and Selenium Web Driver.

[6 + 5 + 5 = 16]

OR

Q10) a) What is Six Sigma methodology? List benefits of Six Sigma.

b) State and explain McCall's quality factors with Product Quality Model.

c) How cost and risk factors are affecting software quality.

[6 + 5 + 5 = 16]

Q11) a) Write short note on Total Quality Management (TQM) approach.

b) Explain following terms (any two)

Checklists

Control Chart

Run Charts

c) Describe in detail Defect Removal Effectiveness

[6 + 6 + 5 = 17]

OR

Q12) a) Enumerate Ishikawa's seven basic quality tools. Explain any two in detail.

b) Describe key elements of Total Quality Management.

c) Explain with example Product Quality Metric.

[6 + 6 + 5 = 17]

Total No. of Questions : 10]

SEAT No. :

PA-126

[Total No. of Pages : 2

[5927]-8
B.E. (Automobile Engineering)
VEHICLE MAINTENANCE (Elective - II)
(2015 Pattern) (Semester - I) (416492B)

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

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***

Q1) a) Explain breakdown maintenance & its demerits. **[4]**

b) Explain hydraulic car lift and hydraulic floor jacks used in automotive service station. **[6]**

OR

Q2) a) Differentiate between preventive and predictive maintenance. **[4]**

b) Draw the layout of a modern automobile service station and describe various activities carried in the same. **[6]**

Q3) a) Enlist the possible causes and remedies for the following : **[4]**

i) Clutch noisy while engaged

ii) Clutch chatters or grabs while engaging.

b) What do you mean by job card? Prepare a job card and inspection card for four wheeler. **[6]**

OR

Q4) a) Explain Cylinder Boring Process. **[4]**

b) Give detail maintenance & repair of electrical and ignition system? **[6]**

P.T.O.

Q5) a) Explain cylinder honing process. **[8]**

b) Explain bleeding of brake. **[8]**

OR

Q6) a) Explain tyre rotation. **[8]**

b) Enlist the possible causes and remedies for the following : **[8]**

i) Hard shifting into gear

ii) Transmission sticks in gear

Q7) a) Explain the step by step procedure of crankshaft servicing. **[8]**

b) Explain the function of lubrication system. **[8]**

OR

Q8) a) List out the method of fuel consumption measurement; Explain any one method for measurement of fuel consumption? **[8]**

b) Explain cylinder compression tester. **[8]**

Q9) a) Explain Oh-board diagnosis. **[10]**

b) Explain brakes adjustments & maintenance. **[8]**

OR

Q10) a) Explain Reliability Availability and Maintainability (RAM). **[10]**

b) Write short note on Wheel Balancing and Alignment. **[8]**

Total No. of Questions : 8]

SEAT No. :

PA-197

[Total No. of Pages : 4

[5927]-80

B.E. (Computer Engineering)

OPERATION RESEARCH (Elective - II)

(2015 Pattern) (Semester - I) (410245C)

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 data if necessary.***

Q1) a) A plant manufactures 2 products A and B. The profit contribution of each product has been estimated as Rs. 20 for product A and Rs. 24 for product B. Each product passes through 3 departments of the plant. The time required for each product and total time available in each department are as follows:

Department	Hours Requied		Available hours during the month
	Product A	Product B	
1	2	3	1500
2	3	2	1500
3	1	1	600

The company has a contract to supply at least 250 units of product B per month. Formulate the problem as L.P.P. **[6]**

b) Solve using Graphical Method **[8]**

Maximize $Z = 6x_1 + 8x_2$

Subject to the constraints

$5x_1 + 10x_2 \leq 60$,

$4x_1 + 4x_2 \leq 40$ and $x_1, x_2 > 0$.

c) In LPP, what are the situations where the solution may be i) unbounded ii) Infeasible solutions. **[6]**

OR

P.T.O.

Q2) a) Explain simplex method for solving LPP. **[8]**

b) For the transportation problem, whose data is given in the following table, find the initial basic feasible solution using **[8]**

i) Northwest corner method
ii) Least cost method

	X	Y	Z	Availability
A	8	7	3	60
B	3	8	9	70
C	11	3	5	80
Required	50	80	80	210

c) Enlist few applications of operations research. **[4]**

Q3) a) Solve the following by principle of dominance. Ai are strategies for Player A and Bi are strategies for player B. **[7]**

	A1	A2	A3	A4
B1	25	27	35	2
B2	20	16	8	8
B3	14	12	15	13
B4	30	14	19	00

b) Solve the following m × 2 game using graphical method. **[10]**

		Player B	
		1	2
Player A	1	6	–7
	2	1	3
	3	3	1
	4	5	–1

OR

Q4) a) Determine Optimum Strategies and Value of Game. **[7]**

	B1	B2	B3	B4	B5
A1	10	4	2	9	1
A2	7	6	5	7	8
A3	3	5	4	4	9
A4	6	7	3	3	2

b) Explain forward recursion and backward recursion in dynamic programming? Comment on the effective method among these two. **[10]**

Q5) a) We are given with four items. Their weights and values are given in the following table. Solve this 0/1 Knapsack problem using dynamic programming approach. The knapsack bag has weight capacity of 5.**[10]**

Weight	Value
1	10
2	7
1	11
3	15

b) Solve the following integer programming problem using Branch and Bound method Maximize $3x_1 + 5x_2$. **[7]**

Subject to $2x_1 + 4x_2 < 25$

$x_1 < 8$

$2x_2 < 10$

$xi > 0$, xi's are integers

OR

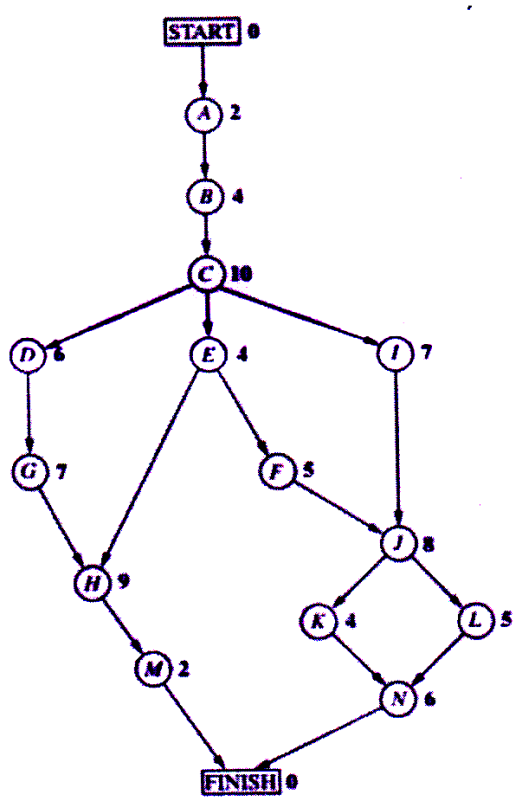
Q6) a) What are the rules for drawing network diagram? Explain. **[6]**

b) A project consists of a series of tasks labeled A, B, ..., H, I. Construct the network diagram having the following constraints : **[8]**

A < D, E; B, D < F; C < G; B < H; F, G < 1.

c) What is PERT and CPM? **[3]**

Q7) a) Consider the following network diagram. Compute the earliest start time and earliest finish time for all the activities. **[10]**



b) Briefly explain how simulation is useful in queuing theory. **[6]**

OR

Q8) a) What do you understand by "sensitivity analysis"? What does it try to analyze? Explain. **[8]**

b) Write short note on preemptive goal programming. **[8]**

Total No. of Questions : 10]

SEAT No. :

PA-198

[Total No. of Pages : 2

[5927]-81

B.E. (Computer Engineering)

MOBILE COMMUNICATION

(2015 Pattern) (Semester - I) (Elective -II) (410245D)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figure to the right side indicates full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) What is PCS? Explain PCS architecture in detail. **[6]**

b) Write a short note on Handoff and Handover. **[4]**

OR

Q2) a) Write a short note on mobility management in GSM and CDMA. **[6]**

b) Explain Frequency Hopping Spread Spectrum (FHSS) in detail. **[4]**

Q3) a) What is specialized MAC? Explain Hidden and Exposed Terminal. **[6]**

b) Define Line of sight transmission and describe in detail. **[4]**

OR

Q4) a) Write a short note on : **[6]**

i) Radio Spectrum

ii) Cell Splitting.

b) Describe GMSK modulation and give its types. **[4]**

P.T.O.

Q5) a) Explain GSM architecture in detail. **[6]**

b) Write a short note on Incoming and Outgoing call setup. **[6]**

c) Describe Logical channel in GSM. **[4]**

OR

Q6) a) Explain GPRS with block diagram. **[6]**

b) Write a short note on GSM encoding and decoding. **[6]**

c) Give detail explanation on GSM identifiers. **[4]**

Q7) a) Explain Block diagram for UMTS in detail. **[6]**

b) Describe HSPA in detail. **[6]**

c) Write a short note on 3 GPP2 family CDMA 2000. **[6]**

OR

Q8) a) Explain three main CDMA 2000 std in detail. **[6]**

b) Describe EDGE in detail. **[6]**

c) Write a short note on LTE in 4G. **[6]**

Q9) a) Explain Virtual Reality and Augmented Reality in detail. **[8]**

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

i) URLCC

ii) LTEA (Advanced)

OR

Q10) a) Draw a diagram for millimeter wave and explain it. **[8]**

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

i) LTE based MULTIFIRE

ii) 5GAA (Autonomous Automation)

Total No. of Questions : 8]

SEAT No. :

PA-199

[Total No. of Pages : 3

[5927]-82

B.E. (Computer Engineering)

MACHINE LEARNING

(2015 Pattern) (410250) (Semester - 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) ***Figure to the right indicates full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Discuss the process of managing missing features in a dataset. How is scikit- learn library used to manage missing features. **[6]**

b) Explain the concepts of classic and adaptive machines. How to choose the right machine learning model? **[6]**

c) Discuss the following Regression Models: Ridge, Lasso and ElasticNet. Give a brief comparison of these models. **[8]**

OR

Q2) a) Discuss the role of Machine Learning in the following applications: **[6]**

i) Vehicle Automation

ii) Google Assistant or Alexa

b) With reference to Machine Learning, explain the terms, Overfitting, underfitting. What are the methods to reduce overfitting in Machine Learning Models? **[6]**

c) What is Regression? Logistic regression is a linear classification algorithm. Justify with suitable example. **[8]**

P.T.O.

Q3) a) How does the *Naive Bayes* classifier work? Explain with example. **[4]**

b) Explain linear support vector machine and its implementation in scikit-learn. **[6]**

c) Explain the concept of Ensemble Learning. Explain with example Random Forest and AdaBoost algorithms. **[8]**

OR

Q4) a) What are Weak and eager Learners. Write a note on Voting Classifier. **[4]**

b) Write a short note on the following: **[6]**

i) Controlled Support Vector Machines.

ii) Support Vector Regression.

c) What are the types of Naïve Bayes in Scikit- learn. Explain Bernoulli Naïve Bayes in detail. **[8]**

Q5) a) Write-a brief note on-DBSCAN. Why DBSCAN is better than K-means. **[6]**

b) What is the difference between bagging and boosting techniques in Machine Learning? **[6]**

c) With the reference to clustering, explain the issue of "optimization of clusters". **[4]**

OR

Q6) a) Explain in brief evaluation methods for clustering algorithms. **[6]**

b) With the reference of Meta classifiers, explain the concept of Weak and Eager learner. **[6]**

c) What is node impurity/purity in decision trees? **[4]**

Q7) a) Classify the filter techniques in recommender system. Explain content-based filtering technique with suitable example. **[8]**

b) Write a note on Deep learning and its applications. Explain various building blocks of deep networks. **[8]**

OR

Q8) a) What is agglomerative clustering? What is it used for? Explain types of agglomerative clustering. **[8]**

b) What is Hierarchical clustering? What is the advantage of using hierarchical clustering over K-means clustering? **[8]**

Total No. of Questions : 10]

SEAT No. :

PA-200

[Total No. of Pages : 2

[5927]-83

B.E. (Computer Engineering)
INFORMATION AND CYBER SECURITY
(2015 Pattern) (Semester - II) (410251)

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

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Distinguish between Substitution and transposition ciphers. **[5]**

b) Explain Deffie hellman key exchange with example. **[5]**

OR

Q2) a) What is Transposition Cipher? Use Transposition Cipher to encrypt the plain text “WE ARE THE BEST” use key “HEAVEN”. **[5]**

b) Describe Elliptic Curve Cryptography. **[5]**

Q3) a) List and briefly define categories of security services. **[5]**

b) Explain operation of Kerberos. **[5]**

OR

Q4) a) Draw and explain operational model of security. **[5]**

b) Describe linear and differential cryptanalysis with suitable example. **[5]**

Q5) a) Explain Pretty Good Privacy in detail. **[9]**

b) Describe Backdoors and Key Escrow in PGP? **[9]**

OR

P.T.O.

Q6) a) Describe IPsec protocol with its components and security services. **[9]**

b) Explain ISAKMP protocol for IPsec. **[9]**

Q7) a) List various types of firewall? Discuss limitations of firewall. **[8]**

b) Explain need and challenges of intrusion detection system. Describe signature based IDS. **[8]**

OR

Q8) a) Explain Packet filter and application gateway firewall. **[8]**

b) Describe briefly how IPsec works and enlist its applications. Distinguish between tunnel and transport mode of IPsec. **[8]**

Q9) a) Discuss PII confidentiality safeguards. **[8]**

b) List different phases of cyber forensics? Explain with suitable diagram. **[8]**

OR

Q10) a) Write note on Information Protection Law : Indian perspective. **[8]**

b) Describe cyber stalking? How to identify and detect cyber stalking. **[8]**

Total No. of Questions : 10]

SEAT No. : ____

PA-201

[Total No. of Pages : 2

[5927]-84

B.E. (Computer Engineering)

ADVANCED DIGITAL SIGNAL PROCESSING

(2015 Pattern) (Semester - II) (410252A) (Elective - III)

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

Instructions to the candidates :

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 , Q.7 or Q.8 Q.9 or Q.10.***
2) ***Neat Diagrams must be drawn wherever necessary.***
3) ***Assume suitable data if necessary.***

Q1) a) Define 2-D DFT. How DFT can be used in linear filtering? **[5]**

b) What is adaptive filter? Explain in brief application of Adaptive FIR filter in Echo Cancellation. **[5]**

OR

Q2) a) Explain in brief the Encoder and Decoder-operation of sub-band coding Technique. **[5]**

b) Write the algorithmic steps for the steepest descent algorithm. **[5]**

Q3) a) State in brief any two applications of DFT in speech processing. **[5]**

b) List any 3 windows with mathematical models used in the design of FIR filters. **[5]**

OR

Q4) a) Discuss in brief the sampling rate conversion by a factor of I/D. **[5]**

b) Give a brief account of poly phase filter structures. **[5]**

P.T.O.

Q5) a) How DCT can be used for signal filtering? Explain with example. **[9]**

b) With mathematical model explain AR/ARMA/MA Model parameters used for power spectrum estimation. **[9]**

OR

Q6) a) Define WT and explain the terms basis function, wavelet coefficient and mother wavelets. **[9]**

b) What is Harr Wavelet? Explain how you will decompose a signal using Haar Wavelet. **[9]**

Q7) a) Explain in brief Voice Response System. Compare Speaker Identification system with Speaker Verification system. **[8]**

b) Explain LTI model for speech production system. What are their limitations? **[8]**

OR

Q8) a) Explain the basic principal of linear predictive analysis. Explain any one method for finding the LPC coefficients. **[8]**

b) What do you mean by Speech Synthesis and Recognition? What do you understand by feature extraction? State at least 2 methods in brief. **[8]**

Q9) a) With block diagram, describe the functions of elements of digital image processing system. **[8]**

b) What do you mean by image enhancement? With mathematical form, explain any two gray level transforms used for image enhancement. **[8]**

OR

Q10)a) With example, explain the process of Histogram equalization and Histogram stretching. **[8]**

b) Discuss how the various filter masks are generated to sharpen images in spatial filters. **[8]**

◆ ◆ ◆

Total No. of Questions : 10]

SEAT No. :

PA-202

[Total No. of Pages : 2

[5927]-85
B.E. (Computer Engineering)
COMPILERS
(2015 Pattern) (Semester - II) (410252B) (Elective - III)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 , Q.7 or Q.8 Q.9 or Q.10.***
2) ***Neat Diagrams must be drawn wherever necessary.***
3) ***Figure to right indicate full marks.***
4) ***Assume Suitable Data if necessary.***

Q1) a) What is role of Lexical Analyzer explain in detail. **[4]**

b) Write LEX specification for recognizing integer, variable, keywords and data types. **[4]**

c) List data structures used for implementation of Symbol Table. **[2]**

OR

Q2) a) Explain Triple, Quadruple and Indirect Triple with Example. **[6]**

b) Write lex specification for counting words, characters, numbers and number of lines in given input file. **[4]**

Q3) a) Write YACC specification for expression grammar. **[6]**

b) Explain elimination of left recursion from the grammar. **[4]**

OR

Q4) a) Calculate first and follow for the following grammar. **[6]**

E->TE' E'->+TE'| ε T->FT'

T'->*FT'|ε F->(E) |id

b) Explain Syntax Directed Translation for calculator. **[4]**

P.T.O.

Q5) a) Compare Static and dynamic storage allocation and explain following storage allocation scheme-

Stack, static and heap storage allocation **[8]**

b) Explain in detail general Activation Record. **[8]**

OR

Q6) a) Explain the following

i) Access Links ii) Displays **[8]**

b) Explain with example access to dynamically allocated arrays using activation record. **[8]**

Q7) a) Write note on peephole Optimization. **[8]**

b) What are issues in code generation? **[8]**

OR

Q8) a) What is need of next- use information? Explain how to compute next-use information. **[6]**

b) Write algorithm for labeling of tree with Ershov Numbers. Give example of tree labelled with Ershov Numbers. **[6]**

c) Explain register allocation and assignment problem. **[4]**

Q9) a) What is Need of Optimization? Write short note on DAG based local optimization **[8]**

b) Explain semantic preserving transformation with example. **[5]**

c) Explain global data flow analysis. **[5]**

OR

Q10)a) Explain following optimization with example: **[10]**

- common sub expression elimination.
- strength reduction
- code movement
- variable propagation
- dead code elimination

b) Write short note on Data flow equations and iterative data flow analysis. **[8]**

◆ ◆ ◆

Total No. of Questions : 10]

SEAT No. : ____

PA-203

[Total No. of Pages : 2

[5927]-86

B.E. (Computer Engineering)

EMBEDDED AND REAL TIME OPERATING SYSTEM

(2015 Pattern) (Semester - II) (410252C) (Elective - III)

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

Instructions to the candidates :

1) ***Solve questions Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 , Q.7 or Q.8 Q.9 or Q.10.***
2) ***Neat Diagrams must be drawn wherever necessary.***
3) ***Figure to right indicate full marks.***
4) ***Assume Suitable Data if necessary.***

Q1) a) Draw the architecture of ARM processor. **[5]**

b) Compare the difference between the Harvard & Von-Neumann architecture? **[5]**

OR

Q2) a) Mention the reasons that makes embedded computing machines design difficult. **[5]**

b) List the various blocks of an embedded system in detail. **[5]**

Q3) a) Mention the challenges in embedded computing system design. **[5]**

b) Draw and explain Parallel ports and its interfacing with the stepper motor. **[5]**

OR

Q4) a) Explain Serial protocol RS - 232C in detail with neat diagram? **[5]**

b) What is HDLC? Explain different frame types and data transfer modes of HDLC. **[5]**

P.T.O.

Q5) a) Explain Hard versus soft real - time systems and their timing constraints. **[5]**

b) Explain Latest - Release - Time (LRT)? **[5]**

c) How to represent precedence constraints and data dependency among real - time tasks? Explain with diagram. **[6]**

OR

Q6) a) How Rate Monotonic (RM) algorithm checks the schedulability of tasks? What are limitations of RM algorithm? **[5]**

b) Explain Earliest - Deadline - First (EDF)? **[5]**

c) Write short note on on-line and off-line scheduling. **[6]**

Q7) a) Explain priority inversion problem with neat diagram? **[6]**

b) Explain shared data problem in interrupts handling? **[5]**

c) What is interrupt latency? Justify its role in handling interrupts in RTOS environment **[5]**

OR

Q8) a) What is priority inheritance in real-time systems? Explain with diagram. **[6]**

b) Explain semaphores message queues, mailboxes? **[5]**

c) With the help of example, demonstrate the concept of critical section. **[5]**

Q9) a) Explain priority-based service disciplines for switched networks in multiprocessor systems for real-time communication. **[6]**

b) What are issues in resource reservation? Explain resource reservation protocol with diagram. **[6]**

c) Draw and explain model of real-time communication with related terminologies. **[6]**

OR

Q10) a) Explain with example validation and debugging in an embedded system. **[6]**

b) Describe the embedded software development process. **[6]**

c) Explain Architecture and design of an embedded system. **[6]**

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Total No. of Questions : 8]

SEAT No. :

PA-204

[Total No. of Pages : 3

[5927]-87

B.E. (Computer Engineering)

SOFT COMPUTING AND OPTIMIZATION ALGORITHMS

(2015 Pattern) (Semester - II) (410252D) (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) ***Figure to right indicate full marks.***
4) ***Use of Non-Programmable Scientific Calculators is allowed.***
5) ***Assume Suitable Data if necessary.***

Q1) a) Mention the application areas of neurofuzzy hybrid soft computing approach. **[8]**

b) Define and explain classical relation and fuzzy relations. **[8]**

OR

Q2) a) Describe any three defuzzification methods with neat diagrams. **[9]**

b) What is fuzzification? Illustrate the procedure with the help of an example. **[7]**

Q3) a) Draw a generalized flowchart for the disign of FLC. Illustrate the formation of rules and decision making logic with the help of a case study. **[10]**

b) Explain the difference between genotypic representation and phenotypic representation. Give an example of each. **[6]**

OR

Q4) a) Outline the similiarities and differences between genetic algorithm and evolutionary strategies. **[8]**

b) Define the term chromosome, fitness function, crossover and mutation as used in Genetic Algorithm. Explain how Genetic Algorithm works.**[8]**

P.T.O.

Q5) a) With reference to Ant colony optimization describe these algorithmic elements:

i) Evaporation

ii) Visibility

iii) Transition Probability **[9]**

b) It is advisable to apply genetic algorithm for all kinds of optimization problems? Justify. **[9]**

OR

Q6) a) What are types of crossover and mutation techniques. **[9]**

b) Using travelling salesman problem as an example, describe the following terms in relation to ant colony optimization.

i) Visibility

ii) Evaporation

iii) Transition Probability **[9]**

Q7) a) Suppose a genetic algorithm uses chromosome of the form X = abcdefgh with a fixed length of 8 genes. Each gene can be any digit between 0 and 9. Let the fitness of individual X be calculated as:

$f(x) = (a + b) - (c + d) + (e + f) - (g + h)$

and let the initial population consists of four individuals with the following chromosomes:

$X_1 = 6\ 5\ 4\ 1\ 3\ 5\ 3\ 2$

$X_2 = 8\ 7\ 1\ 2\ 6\ 6\ 0\ 1$

$X_3 = 2\ 3\ 9\ 2\ 1\ 2\ 8\ 5$

$X_4 = 4\ 1\ 8\ 5\ 2\ 0\ 9\ 4$

Evaluate the fitness of each individual showing all your working and arrange them in order with the fitness first and least fit last. **[10]**

b) Write short note on genetic algorithm parent selection. **[5]**

c) With neat flowchart explain operation of simple genetic algorithm. **[5]**

OR

Q8) a) Consider the problem of finding the shortest route through several cities, such that each city is visited only once and in the end return to the starting city (The TSP). Suppose that in order to solve this problem we use a genetic algorithm in which genes represent links between Pairs of cities. e.g. a link between London and Paris is represented by a single gene 'LP'. Let also assume that the direction in which we travel is not important so that LP = PL. How many gene will be used in a chromosome of each individual if the no. of cities is 10? **[10]**

b) Write short note on evolutionary computation. **[5]**

c) Explain particle Swarm Optimization Algorithm. **[5]**

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Total No. of Questions : 10]

SEAT No. :

PA-205

[Total No. of Pages : 2

[5927]-88
B.E. (Computer Engineering)
SOFTWARE DEFINED NETWORKS
(2015 Pattern) (Semester - II) (Elective - IV) (410253A)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of Calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) Explain the need of SDN over traditional networks. **[4]**

b) Define Open Flow. Differentiate between Proactive and Reactive Flow. **[6]**

OR

Q2) a) Explain message types and how pipeline processing is carried out in Open Flow. **[4]**

b) What are the fundamental characteristics of SDN? Explain in brief. **[6]**

Q3) a) Define use of POX, Beacon, Floodlight, Ryu and Open Daylight. **[4]**

b) What are the merits and demerits of Open Flow? **[6]**

OR

Q4) a) Is there any difference between ONF and SDN Devices? Justify your answer. **[4]**

b) Enlist Open Source Controllers available for SDN implementation and explain any three in brief. **[6]**

Q5) a) Explain Data Centers Demand with suitable examples. **[8]**

b) State various Tunneling Technologies required for Data Centers and explain in brief. **[8]**

OR

P.T.O.

Q6) a) Write Short note on Failure recovery and Multi Tenancy issues in Data Centers. **[8]**

b) Compare Open, SDN, Overlays and APIs. **[8]**

Q7) a) State and Explain various in line network functions in brief. **[9]**

b) List and illustrate various benefits of Network Function Virtualization. **[9]**

OR

Q8) a) What are the challenges for Network Function Virtualization? Explain any four in detail. **[9]**

b) Define NFV? Compare SDN and NFV. **[9]**

Q9) a) Demonstrate the use of Service Networks and Carrier Networks with proper explanation. **[8]**

b) What are the Campus Networks? Where are they used? Justify your answer with suitable applications. **[8]**

OR

Q10)a) What is networking? Explain any THREE networks in brief. **[8]**

b) What are the Hospitality Networks? Explain its usages with suitable real-time application as an example. **[8]**

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

PA-206 **[Total No. of Pages : 2**

[5927]-89
B.E. (Computer Engineering)
HUMAN COMPUTER INTERFACE
(2015 Pattern) (Semester - II) (Elective - IV) (410253B)

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

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***All questions are compulsory.***
3) ***Figures to the right indicate the marks to the question.***
4) ***Assume suitable data whenever necessary.***

Q1) a) What are different approaches for Human Computer interfaces evaluation? Explain in brief. **[8]**

b) Discuss about HCI design principles? **[6]**

c) What is a prototype? Explain different approaches to prototyping. Describe with suitable figures. **[6]**

OR

Q2) a) What is significant role of thinking in reasoning and problem solving abilities of Human. **[8]**

b) What is the GOMS model? Explain stepwise use of GOMS in HCI? **[6]**

c) What do you mean by user centered design? **[6]**

Q3) a) How do we extract data and information by using Conceptual Model. **[6]**

b) Explain S/W phases applied for the development of HCI system. **[6]**

c) What is role of Psychology, Ergonomics, and Understanding in HCI? **[6]**

OR

Q4) a) Describe the golden rules used in heuristics? **[6]**

b) What is Color Palette, Color Depth and Resolution? **[6]**

c) Explain role of HCI in design of mobile device. **[6]**

P.T.O.

Q5) a) What are the goals of Evaluation? Discuss about DECIDE evaluation Framework. **[8]**

b) Describe two programming paradigm which can be used to organize the flow of control within the application. **[8]**

OR

Q6) a) Discuss about Cognitive model in detail. **[8]**

b) Write short note on Socio-organizational Issues in HCI. **[8]**

Q7) a) Discuss with figure the multi-agent architecture Presentation - abstraction-control PAC Model. **[8]**

b) Define DOET? **[4]**

c) Write about next generation interface? **[4]**

OR

Q8) a) Describe the roles of a windowing system with suitable figure and explain. **[8]**

b) Write short note on any two following. **[8]**

i) User Testing

ii) Usability Testing

iii) User Acceptance Testing

Total No. of Questions : 10]

SEAT No. : ____

PA-127

[Total No. of Pages : 2

[5927]-9
B.E. (Automobile Engineering)
PRODUCT DESIGN AND DEVELOPMENT (Elective - II)
(2015 Pattern) (Semester - I) (416492C)

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

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8 and Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***

Q1) What is Rapid Prototyping? Explain any two methods of prototyping with neat sketch. **[10]**

OR

Q2) Explain "Pugh's concept selection method" with suitable example. **[10]**

Q3) What is customer population? Discuss any four types of customers with example. **[10]**

OR

Q4) Explain "Substract and operate procedure" with suitable example. **[10]**

Q5) a) What is Benchmarking? Explain "Indented Assembly Cost Analysis" in detail. **[10]**

b) What are types of product modularity? Discuss any one in detail. **[8]**

OR

Q6) What is product portfolio? Classify and discuss portfolio Architecture. **[18]**

P.T.O.

Q7) a) Explain "Design for Manufacturing" with suitable example. **[8]**

b) Explain "Design for Environment" in detail. **[8]**

OR

Q8) a) Explain the design guideline for Machining. **[8]**

b) Explain the concept of piece part production. **[8]**

Q9) a) Discuss the link between product data and product workflow. **[8]**

b) Discuss the different components of product data management. **[8]**

OR

Q10) Explain product Life cycle management with reference to : **[16]**

a) Need

b) Benefits

c) Emergence

□□□

Total No. of Questions : 8]

SEAT No. :

PA-207

[Total No. of Pages : 2

[5927]-90
B.E. (Computer)
CLOUD COMPUTING
(2015 Pattern) (Semester - II) (Elective - IV) (410253C)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve questions Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Assume suitable data, if necessary.***

Q1) a) How to improve performance through load balancing? **[7]**

b) Write a note on business continuity and disaster recovery? **[7]**

c) Explain various standards of cloud computing. **[6]**

OR

Q2) a) Explain cloud computing applications? **[7]**

b) Explain the term Dynamo cloud? **[7]**

c) Explain in brief virtual clusters and Resource management? **[6]**

Q3) a) Explain in detail Amazon EBS with its advantages? **[8]**

b) Explain in details steps to create an Amazon S3 Bucket and managing associated objects. **[9]**

OR

Q4) a) Explain steps to configure server for EC2? **[8]**

b) Explain details on adding an EBS volume to an instance? **[9]**

Q5) a) Explain in details on Large scale private clouds on NASA and CERN? **[8]**

b) Explain in details graph Theoretic analysis of social network? **[9]**

OR

P.T.O.

Q6) a) Explain in brief on cloud mashups? **[8]**

b) Explain sensor Networks and Zigbee Technology? **[9]**

Q7) a) Explain the comet cloud Architecture with diagram? **[8]**

b) Explain traditional as well as Docker deployment workflow? **[8]**

OR

Q8) a) Explain cloud bridging in details with Autonomic cloud bridging diagram? **[8]**

b) Explain Jungle computing indetails. **[8]**

Total No. of Questions : 10]

SEAT No. :

PA-208

[Total No. of Pages : 2

[5927]-91
B.E. (Computer Engineering)
BUSINESS INTELLIGENCE
(2015 Pattern) (Open Elective - IV) (Semester - II) (410253DA)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable data, if necessary.***

Q1) a) What are different business intelligent system components? **[5]**

b) Explain how Business Intelligence & Decision support system are inter-related. **[5]**

OR

Q2) a) What are different business intelligent system components? **[5]**

b) Define Charts, Graphs, Widgets, Scorecards and Dashboards. **[5]**

Q3) a) Explain Geographic Visualization with the help of real life application. **[5]**

b) Define decision support system and explain different types of DSS. **[5]**

OR

Q4) a) What is parameterizing reports and self-service reporting? **[5]**

b) Write Role of Business Intelligence in DSS? **[5]**

Q5) a) Explain strategies of data discretization. **[6]**

b) Explain the techniques to handle noisy data. **[5]**

c) What are the data preprocessing requirement? **[6]**

OR

P.T.O.

Q6) a) Explain phases of data pre-processing? **[6]**

b) Write a short note on data reduction techniques. **[5]**

c) What are the typical OLAP operations? Explain any two in detail. **[6]**

Q7) a) Determine the frequent itemsets & association rules using the a-priory algorithm (Min Support:- 30% & min confidence : - 80%) **[10]**

Transaction	Items
T1	Bread, Jelly, Butter
T2	Bread, Butter
T3	Bread, Milk, Butter
T4	Coke, Bread
T5	Coke, Milk

b) What is clustering? Explain partitioning method of clustering. **[7]**

OR

Q8) a) Explain ID3 algorithm with suitable example for finding root node. **[10]**

b) What are outliers? Discuss various types of outliers with suitable. **[7]**

Q9) a) Explain BI Applications in Telecommunications. **[5]**

b) Explain BI Applications is Logistics & Productions. **[5]**

c) Define Role of BI in Finance with example. **[6]**

OR

Q10)a) Write a short note on ERP & BI Applications. **[5]**

b) Define role of business analytics with example. **[5]**

c) Differentiate between Business analytics & Data analytics. **[6]**

Total No. of Questions : 10]

SEAT No. :

PA-209

[Total No. of Pages : 3

[5927]-92
B.E. (Computer Engineering)
ENTERPRISE RESOURCE PLANNING
(2015 Pattern) (Semester - II) (Elective - IV) (410253 DB)

Time : 2½ Hour] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Figures to the right indicate full marks.***

Q1) a) What are the sub-entities of an Item Data record in Infor LN? **[4]**

b) List the roles of a business partner as a customer and a supplier. What is the use of defining a purchase Office, Sales office and purchase and sales user profiles in Infor LN? **[6]**

OR

Q2) a) Define ERP and Illustrate the benefits of ERP in detail. **[4]**

b) Draw a block diagram showing a logistic & finance company for Enterprise Resource Planning being implemented showing Master data and transactional data in an Infor LN? **[6]**

Q3) a) List down the typical routing components of a routing operation in a Manufacturing organization and explain how it is managed? **[4]**

b) Explain the following terms in detail. **[6]**

i) ITEM structure and order policies

ii) ITEM standard Cost and Cost calculation

OR

Q4) a) What is a session and what are session components in Infor LN? Describe session flow with a flow chart diagram. **[4]**

b) What are the typical modules made available in an ERP application? Explain the function of any two modules. **[6]**

P.T.O.

Q5) a) Explain role of Warehousing department in Procure to Pay Process of Infor LN in details. **[4]**

b) List the steps required to complete Reverse Logistics in Infor LN. **[6]**

c) List out the various departments and activities that are encountered in a Procure to Pay cycle using a small flow chart in Infor LN. **[6]**

OR

Q6) a) Draw and explain Purchase Agreement Process in Procure to Pay process in Infor LN. **[4]**

b) Write a short note on: **[6]**

i) ATP/CTP

ii) Cost Price of an item

c) List and explain the steps required to complete Procure to Pay Process in Infor LN. **[6]**

Q7) a) List out the various departments and activities that are encountered in Order to Cash cycle (both external and internal) using a small flow chart in Infor LN. **[6]**

b) Explain goods (Out) in shipping process in Infor LN. **[6]**

c) Explain the Central invoicing in the Order to Cash Process in Infor LN. **[6]**

OR

Q8) a) List out the steps in the sales order process with suitable example. **[6]**

b) Explain Order to Cash Process using a Real time Scenario in Infor LN. **[6]**

c) Write a short note on following terms. **[6]**

i) Sales user profile.

ii) Sales order fulfilment workbench.

Q9) a) Differentiate and explain trial balance and a balance sheet? **[4]**

b) Draw and explain a department structure of following departments. **[6]**

i) Production Department

ii) Warehouse Department

iii) Accounts Payable Dept.

c) In Enterprise application parlance, expand MTS, MTO, ATO, ETO and give an example of each where this is applicable. **[6]**

OR

Q10)a) Draw and explain a department structure of following departments. **[4]**

i) Purchase Department

ii) Sales Department

b) Explain the golden rules of accounting with their examples. **[6]**

c) Using the organization chart explain the roles of all the key Managers that report to a Chief Finance Officer (CFO)? **[6]**

Total No. of Questions : 8]

SEAT No. :

PA-210

[Total No. of Pages : 2

[5927]-93

B.E. (Computer Engineering)

BIG DATA & DATA ANALYTICS

(2015 Pattern) (Semester - II) (Open Elective - IV) (410253DC)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) What is DSS? Explain with diagram structure of Decision support system. **[8]**

b) Explain the application of Big data Analytics in Health Care sector. **[6]**

c) Explain following phases of data Analytics lifecycle. **[6]**

i) Data Preparation

ii) Model Building

OR

Q2) a) What is Big Data Analytics? Explain components of Big data analytics. **[8]**

b) Differentiate between Business Intelligence and Data Science. **[6]**

c) Write short notes on Operationalization phase of Data analytic lifecycle. **[6]**

Q3) a) Explain with example how supervised learning technique helps in training the model. **[8]**

b) Explain Logistic Regression. List metrics used for Logistic Regression model. **[5]**

c) Write short note on time series analysis. **[4]**

OR

Q4) a) Explain with example any one application Binary classification problem. **[8]**

b) Differentiate between Linear Regression and Logistics Regression. **[5]**

c) Write short notes on Support Vector Machine. **[4]**

P.T.O.

Q5) a) Explain with example how Association mining helps for market basket analysis. **[8]**

b) Explain with example how clustering technique helps to form groups of similar data points. **[5]**

c) Write short notes on Classification Trees. **[4]**

OR

Q6) a) What is Classification model? Explain with example how Bayesian classifier helps for classifying the data. **[8]**

b) Explain with example the role of the following terms in model building: **[5]**

i) Training dataset

ii) Testing dataset

c) Explain with example Hierarchical methods of Clustering. **[4]**

Q7) Write short notes on:

a) Basic Features of R. **[5]**

b) Data Frames and Lists. **[5]**

c) Reading Data Sets and Exploring Data from R. **[6]**

OR

Q8) Write short notes on:

a) Exploring R GUI. **[5]**

b) Handling Data in R Workspace. **[5]**

c) Manipulating and Processing Data in R. **[6]**

Total No. of Questions : 10]

SEAT No. : ____

PA-211

[Total No. of Pages : 3

[5927]-94

B.E. (Electrical)

POWER SYSTEM OPERATION AND CONTROL

(2015 Pattern) (Semester - I) (403141)

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

Instructions to the candidates:

1) ***Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of Calculator is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) a) What are the different methods to improve steady state stability? **[2]**

b) A power system engineer has the following options for compensation: Shunt reactor, shunt capacitor, series capacitor, and series inductor. Suggest the proper compensating device with reasons from the above options in the following situations: **[8]**

i) Increase in power handling capacity

ii) Reduction in Ferranti effect

iii) Power factor improvement

iv) Fault current limiter.

OR

Q2) a) Draw schematic diagram of STATCOM. Indicating all connections and parts. **[3]**

b) An alternator having reactance of 0.5 p.u. is connected to an infinite bus through 0.5 p.u. reactance. The voltage at infinite bus is 1 p.u. Steady state stability limit and load angle if generator is delivering **[7]**

i) 1 p.u. current at 0.8 p.f. lagging.

ii) 1 p.u. current at 0.8 p.f. leading.

P.T.O.

Q3) a) What is the difference between synchronous motor and synchronous condenser? **[3]**

b) Draw diagram and VI characteristic for following combinations **[7]**

i) TCR

ii) SSSC

OR

Q4) a) Draw generator capability curve indicating all limits with respect to reactive power management. **[3]**

b) A synchronous generator is connected to infinite bus through a transformer and transmission network. A three phase fault is occurred at generator bus bar. Derive the critical clearing angle for transient stability using equal area criteria. **[7]**

Q5) a) Draw and explain complete block diagram of automatic voltage regulator. **[8]**

b) Total generating capacity of a control area is 2000MW and normal load is 1500MW. Machine has inertia H=4.8sec, droop characteristic D=1.2%, frequency f=50Hz and regulation R=2.5Hz/pu MW. If the load is increased by 0.02 Pu. **[8]**

i) Determine power system gain and time constant

ii) Find the frequency drop without governor control

iii) Find the frequency drop with governor control

Find the frequency drop with governor control considering D=0.

OR

Q6) a) Derive transfer function of speed governor system used in single area load frequency control. **[8]**

b) With a suitable control system diagram, explain two area load frequency system. **[8]**

Q7) a) A generating station is having two units, the incremental cost curve of two units are given by

$$\frac{dF_1}{dP_1} = 0.1P_1 + 20 \text{ Rs/MW}hr \text{ and } \frac{dF_2}{dP_2} = 0.12P_2 + 16 \text{ Rs/MW}hr$$

For the load of 200MW determine annual saving for economical loading instead of equal loading. **[8]**

b) Define following thermal constraints on unit commitment. **[8]**

i) Minimum up time

ii) Minimum down time

iii) Crew constraints

iv) Fuel constraints

OR

Q8) Read the following statements carefully and state whether it is true or false with proper justification **[16]**

a) In economical load sharing, the load shared by is depends on ratings of plant as well as fuel cost curve of a plant.

b) The generator is having less operating cost should share less load than other generators operating in parallel in economical load dispatch.

c) In economic load dispatch with considerable power loss, equality constraints is $\Sigma_{i=1}^{n} P_{Gi} = P_D + P_L$. Where P_{Gi} is generation, P_D is load and P_L is power loss.

d) Once the unit is committed, there is minimum time required to run. It is known as minimum down time in thermal constraints.

Q9) a) What do you mean by power pool? What is the role of power pool in energy control? **[9]**

b) Define following terms **[9]**

i) LOLE

ii) LOEE

iii) LOLF

OR

Q10)a) Define following terms **[9]**

i) CAIFI

ii) CAIDI

iii) SAIFI

b) Write short note on "Diversity interchange and Capacity interchange". **[9]**

Total No. of Questions : 8]

SEAT No. :

PA-212

[Total No. of Pages : 2

[5927]-95
B.E. (Electrical)
PLC AND SCADA APPLICATIONS
(2015 Pattern) (Semester - I) (403142)

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) Draw & explain overall PLC system. **[7]**

b) Explain input analog devices. **[7]**

c) Explain retentive timer in detail. **[6]**

OR

Q2) a) Write a short note on necessity of PLC. **[7]**

b) Explain level measurement by using level sensor. **[7]**

c) Draw a Ladder diagram for the annunciation for the flasher lights circuits two lights flashed after every 5 seconds in alternate manner. **[6]**

Q3) a) Explain the effect of change of integral gain K_i & derivative gain K_d of PID controller on response of system. **[8]**

b) How liquid level of the tank is measured by using float type switches, explain in detail. **[8]**

OR

Q4) a) Explain AC motor overload protection. **[8]**

b) Explain speed control of DC motor using PLC. **[8]**

P.T.O.

Q5) a) Draw and explain SCADA architecture in details. **[8]**

b) State advantages & disadvantages of SCADA system. **[8]**

OR

Q6) a) Explain application of SCADA system in Petroleum Refining Process. **[8]**

b) State the desirable properties of SCADA system. **[8]**

Q7) a) Draw & explain OSI model. **[9]**

b) Write a short note on TCP/IP protocol. **[9]**

OR

Q8) a) Explain IEC61850 architecture. **[9]**

b) Write a short note on Flexible Function Block process (FFB). **[9]**

◆ ◆ ◆

Total No. of Questions : 8]

SEAT No. : ____

PA-213

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B.E. (Electrical)

CONTROL SYSTEM - II

(2015 Pattern) (Semester - I) (403145)

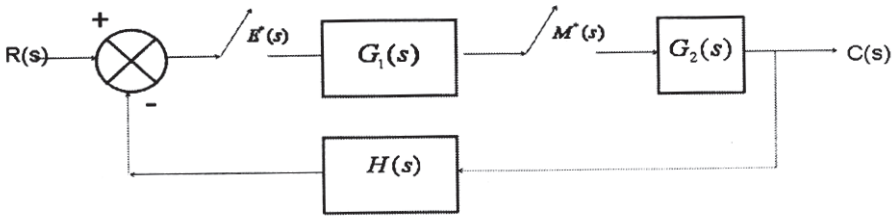
Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Figures to the right indicate full marks.***

Q1) a) Explain first data hold and show that transfer function of zero order hold is $G_{ho}(s)=\frac{1-e^{-Ts}}{s}$. **[6]**

b) Obtain pulse transfer of closed loop system shown in figure C(z)/R(z). **[7]**



c) Determine stability of system using Jury's Test whose characteristic polynomial is $2z^4 + 8z^3 + 12z^2 + 5z + 1 = 0$. **[7]**

OR

Q2) a) Explain in detail basic building blocks of discrete time control system. **[7]**

b) Determine inverse Z transform of the following function using partial fraction $F(z)=\frac{1}{1-1.5z^{-1}+0.5z^{-2}}$. **[7]**

c) Show how a mapping of left half of the S-plane is done into the Z-plane. **[6]**

P.T.O.

Q3) a) $\frac{Y(s)}{U(s)} = \frac{s+1}{s^2+1.3s+0.4}$ Given system represent in **[8]**

i) Controllable canonical form

ii) Observable canonical form

b) Define the terms : **[8]**

i) State

ii) State variables

iii) State vector

iv) State space

OR

Q4) a) Derive the state model of armature control DC motor with block diagram. **[8]**

b) Evaluate the transfer function $\frac{Y(s)}{U(s)}$ from the state variable model of a discrete time system with usual notation $X = \begin{bmatrix} 0.8 & 1 \\ 0 & 0.5 \end{bmatrix} x + \begin{bmatrix} 1 \\ 0.5 \end{bmatrix} u$. **[8]**
$Y = \begin{bmatrix} 1 & 0 \end{bmatrix} x$

Q5) a) Obtain the solution for homogeneous state equation & State properties of STM. **[8]**

b) For a given system $A = \begin{bmatrix} -3 & 1 \\ 0 & -1 \end{bmatrix}, x(0) = \begin{bmatrix} 1 & 0 \end{bmatrix}^T$ Obtain STM & find its solution. **[8]**

OR

Q6) a) Diagonalized the plant matrix using similarity transform method. **[10]**

$$A = \begin{bmatrix} 2 & 1 & 4 \\ 0 & 2 & 0 \\ 0 & 3 & 1 \end{bmatrix}.$$

b) Explain Vander monde's matrix & its application. **[6]**

Q7) a) What is principle of duality? Explain the effect of pole-zero cancellation on controllability & observability. **[8]**

b) Consider system defined by $x(t)=\begin{bmatrix} 0 & 1 \\ -0.16 & -1 \end{bmatrix}x+\begin{bmatrix} 0 \\ 1 \end{bmatrix}u$.

Determine the suitable state feedback gain matrix K such that system will have the close loop poles at S1 = 0.5 + j0.5, S2 = 0.5 – j0.5. **[10]**

OR

Q8) a) A system is described by $x(t)=\begin{bmatrix} 0 & 1 \\ -12 & -7 \end{bmatrix}x+\begin{bmatrix} 1 \\ 1 \end{bmatrix}u$,

$y(t)=\begin{bmatrix} 1 & -1 \end{bmatrix}x$ Verify its Duality theorem. **[8]**

b) For a given system $A=\begin{bmatrix} 0 & 15 \\ 1 & 0 \end{bmatrix} B=\begin{bmatrix} 0 \\ 1 \end{bmatrix} C=\begin{bmatrix} 0 & 2 \end{bmatrix}$.

Determine observer gain matrix Ke such that S_1, $S_2 = -2 \pm j3$ are eigen values of observer gain matrix. **[10]**

Total No. of Questions : 10]

SEAT No. : ____

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B.E. (Electrical)

FUNDAMENTALS OF MICROCONTROLLER MSP430 AND ITS APPLICATIONS

(2015 Pattern) (Semester - I) (Elective - I) (403143A)

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

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Figures to the right indicate full marks.***

Q1) a) Interface an LED with MSP 430 and write a program of blinking display of LED using suitable software delay. **[6]**

b) Draw neat diagram the status register of a MSP430 microcontroller. **[4]**

OR

Q2) a) Explain the following registers associated with the ports : **[6]**

i) Direction register

ii) Input register

b) Differentiate between Von-Neuman and Harward architecture. **[4]**

Q3) a) Write a note on application development tools used for MSP430 microcontroller. **[6]**

b) Explain the PWM mode of MSP430 microcontroller. **[4]**

OR

Q4) a) Explain the compare mode of MSP430 microcontroller. **[6]**

b) Explain the operation and use of Watch dog timer in MSP430 microcontroller. **[4]**

Q5) a) Explain the low power modes of MSP430 microcontroller. **[8]**

b) Explain the basic operation of the ADC10. **[8]**

OR

P.T.O.

Q6) a) Explain working of successive approximation register (SAR) ADC. **[8]**

b) Explain the following functions associated with A to D converter. **[8]**

i) Sample and Hold

ii) Filtering

Q7) a) Explain Universal Serial Communication Interface (USCI) in MSP430. **[8]**

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

OR

Q8) a) With a neat diagram explain the SPI protocol of data transfer. **[8]**

b) Write a short note on I2C protocol. **[9]**

Q9) a) Write a short note on wireless sensor network. **[8]**

b) Write a short note on NFC (Near Field Communication) protocol. **[9]**

OR

Q10)a) Write a short note on ZigBee communication protocol. **[8]**

b) Explain with a block diagram how a smart electric meter can be implemented using MSP430 microcontroller. **[9]**

Total No. of Questions : 10]

SEAT No. : ____

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[Total No. of Pages : 2

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B.E. (Electrical Engg.)

POWER QUALITY

(2015 Pattern) (Semester - I) (Elective - I) (403143B)

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

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
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) What are the various power quality issues? Explain in brief. **[4]**

b) Referring to IEEE 1159, categorize the type of Voltage variations for following cases with Justification for a 3 phase system of 11 kV. **[6]**

Case No.	Available Voltage/ph	Event Duration	Category of Voltage Variation	Justification
1	5800 V	1 min		
2	5650 V	500 msec		
3	600 V	1 sec		

OR

Q2) a) Explain the reasons for increased concern in power quality. **[5]**

b) What are the grounding requirements of sensitive electronic equipment in IEEE STD 1100? **[5]**

Q3) a) What are the factors governing severity of voltage sag? **[5]**

b) If three phase voltages available from 3 phase, 415 V supply are of 233 V, 236 V and 228 V respectively. Calculate the % voltage unbalance. **[5]**

OR

Q4) a) Explain the Voltage sag due to large motor starting. **[5]**

b) Explain the factors governing severity of flicker. **[5]**

P.T.O.

Q5) a) How harmonics are classified based on various principles? Explain with examples. **[8]**

b) What are triplen harmonics? What are their effects? **[8]**

OR

Q6) a) Briefly explain the harmonic effects on transformers and motors. **[8]**

b) Give the power definitions under non sinusoidal conditions. Explain briefly. **[8]**

Q7) a) Define THD and TDD with reference to harmonic measurements. Explain the problems associated with Ferro resonance. **[8]**

b) What is the need of locating harmonic sources? How capacitors affect the power system characteristics? **[8]**

OR

Q8) a) Explain series resonance and its effects caused due to harmonic sources. **[8]**

b) List the harmonic mitigation techniques? Explain any one in detail. **[8]**

Q9) a) How power quality monitoring equipment is selected for cost effective monitoring? Explain with example. **[10]**

b) What computer tools are used for effective power quality analysis? Explain in brief. **[8]**

OR

Q10)a) What are the desirable characteristics of power quality measurement equipments? Explain with example. **[10]**

b) Explain Active filters and detuned filters with reference to harmonic mitigation. **[8]**

Total No. of Questions : 8]

SEAT No. : ____

PA-216

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B.E. (Electrical)

RENEWABLE ENERGY SYSTEMS

(2015 Pattern) (Semester - I) (403143C) (Elective - I)

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

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Figures to the right indicate full marks.***

Q1) a) Write a note on direct and diffused radiation and its effect on power generation. **[5]**

b) What is LAT? **[5]**

c) What are the various components of stand alone PV system? **[5]**

d) Compare single crystalline and polycrystalline PV cell. **[5]**

OR

Q2) a) Define : **[5]**

i) Solar constant

ii) Latitude

iii) Zenith angle

iv) Declination

v) Slope

b) Explain the factors affecting the electrical design of solar array. **[5]**

c) What are the various components of wind electric system. **[5]**

d) Explain any one control mechanism used for wind turbine. **[5]**

Q3) a) What are the factors affecting biodigestion? **[8]**

b) Explain fluidized bed type biomass gasifier in detail with diagram. **[8]**

OR

P.T.O.

Q4) a) What is biogas? Explain briefly the factors affecting biogas generation. **[8]**

b) Discuss a method of power generation from liquid waste land fill gas. **[8]**

Q5) a) What is a fuel cell? Describe the principle of Hydrogen oxygen fuel cell with diagram. **[8]**

b) Name various energy storage systems. Explain any two energy storage system. **[8]**

OR

Q6) a) Write briefly on the various methods of hydrogen storage. **[8]**

b) Explain the principle of working of a battery. Describe a lead acid battery. **[8]**

Q7) a) Draw the grid connected wind generator. What are the necessary parameters required to be checked before integration with grid. **[8]**

b) Define and explain with examples : **[10]**

i) Simple payback period

ii) Life cycle cost

iii) Inflation rate

iv) Initial rate of return

v) Net present value

OR

Q8) a) Explain grid connected PV system with neat diagram. Also, state the necessary parameters required before integration with grid. **[8]**

b) A co-generation system installation is expected to reduce the company's annual energy bill by Rs. 20 Lacs. If the capital cost of new co-generation installation is Rs. 70 Lacs and the annual operating & maintenance cost is Rs. 6 Lacs. **[10]**

i) What will be the expected payback period for the project?

ii) What will be the initial (Simple) rate of return/return on investment (ROI)?