Total No. of Questions : 08]

SEAT No. :

P4413

[Total No. of Pages : 3

[5462]-1
M.E. (Civil/Structures)
STRUCTURAL MATHEMATICS
(2008 Pattern)

Time : 3 Hours] *[Max. Marks : 100*

Instructions to the candidates:

1) ***Attempt three questions from Section I and three questions from Section II.***
2) ***Answer to the two sections should be written in separate books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Use of non programmable electronic calculator is allowed.***
6) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Analyse the given truss shown in Fig. 1 using member stiffness method. AE is constant. Length of all members is same. **[12]**

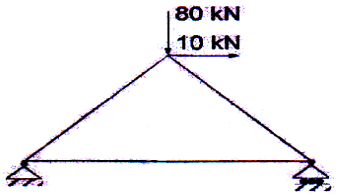

Fig. 1

b) Derive the transformation matrix for plane frame member. **[5]**

Q2) a) For a beam shown in the figure, find the rotation at C, using flexibility matrix approach. Take EI constant. **[11]**

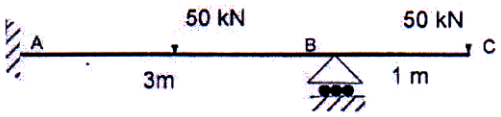

Fig. 2

b) For a space frame member, develop the member stiffness matrix with proper sketches. **[6]**

P.T.O.

Q3) a) Determine the member stiffness matrix for structure axes for the member 'AB' and transformation matrix for BC of the given grid using stiffness matrix method. Supports A and C are clamped. Properties of both the members: $E=1.5\times10^7 kN/m^2$; $A = 0.05\ m^2$; $I = 0.00045\ m^4$ **[10]**

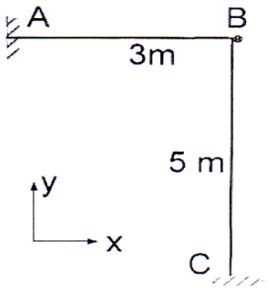

Fig. 3

b) Estimate the lowest buckling load of a uniform column of length L and flexural rigidity EI using Eigen value technique. The Column is fixed at one end and hinged at other. Divide the column in three parts. **[6]**

Q4) a) The temperature of a ball at time t = 0 s is 1200 K. It is allowed to cool down in air at an ambient temperature of 300 K. The differntial equation governing the fall in the temperature of the ball is given by. $\frac{d\theta}{dt} = -2.2067x10^{-12}\left(\theta^4 - 81x10^8\right)$, where θ is in K and t in seconds. Using Runge Kutta 4th order method. find the temperature at t = 480 s using. Assume a step size of h = 240 s. **[8]**

b) Solve the differential equation using method, of your choice. **[8]**

dy/dx=x+y ;y=.1 when x=0. Find y, when x = 0.3.

SECTION - II

Q5) a) Derive the finite difference operator for the governing differential equation to determine the deflection of plate subjected to transverse loading. **[8]**

b) A fixed beam of length L supports a uniformly varying load of intensity 'W' kN/m at one end and 0 kN/m at the other end. Calculate the maximum moment and deflection in the beam using central difference. Assume EI as constant. Divide the beam in four equal parts. **[9]**

Q6) a) State Lagrange interpolation technique. Give its advantages. How is it different from curve fitting techniques. **[9]**

b) Find f (2.6) using Lagrange interpolation using the following data. **[7]**

X	Y
1	2.7183
2	7.3891
3	20.0855

Q7) a) Write a short note on multiple regression analysis. **[8]**

b) State the conditions to check whether piecewise polynomials are spline or not. Give proper justification for your answers. **[8]**

Q8) a) The table below gives the velocity v of a moving particle at time t seconds. Find the distance covered by the particle in 12 seconds using simpson's rule. **[5]**

t	0	2	4	6	8	10	12
v	4	6	16	34	60	94	136

b) Write short note on the fourier Integral and Fast Fourier Transform. **[6]**

c) Differentiate between Trapezoidal rule, $3/8^{th}$ Simpson's rule and Gauss Quadrature method for numerical integration. **[6]**

Total No. of Questions : 6]

SEAT No. :

P4203

[Total No. of Pages : 2

[5462]-2
M.E. (Civil Structures)
ADVANCED DESIGN OF METAL STRUCTURE
(2008 Pattern) (Semester - I)

Time :3 Hours] *[Max. Marks : 100*

Instructions to the candidates:

1) ***Solve any two questions from each section.***
2) ***Answer to the two sections should be written in separate answer books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right side indicate full marks.***
5) ***Use of calculator and relevant is codes is allowed.***
6) ***Assume suitable data if necessary.***

SECTION - I

Q1) a) Suggest structural configuration of hoarding structure to be installed at height of 35 m above ground level. The display board is of dimensions 30 m wide, 15 m height. Calculate the loads due to wind on the members of support structure. Draw free body diagram of structures showing the forces and reactions. **[25]**

Q2) a) Explain fabrication of castellated beam. How does it affect sectional properties. **[10]**

b) Calculate the sectional properties of castellated beams with ISMB500 converted to castellated beam. **[15]**

Q3) a) Compare steel and aluminum structural sections. And its applications, advantages, disadvantages. **[12]**

b) Design simply supported beam when loaded with UDL of 50 KN/m on span of 6 m. Use suitable aluminum section. Sketch details of design.**[13]**

P.T.O.

SECTION - II

Q4) a) Explain with sketch structural configuration of Microwave tower Indicate all important structural components. Explain analysis and design philosophy for microwave tower. **[13]**

b) Draw free body diagram of Transmission tower with high tension wires attached. **[12]**

Q5) a) Sketch typical connections in tubular structures. use proper captions. **[6]**

b) What are the design considerations of tubular scaffolding structure. **[6]**

c) Design tubular scaffolding support structure for RCC bridge deck slab 300 mm thick, span between beams is 7 m. **[13]**

Q6) a) Explain manufacturing of light gauge structural members. Enlist its advantages over conventional sections. **[10]**

b) Design the light gauge strut to carry axial compression of 400 KN. The effective length of strut is 3.5 take fy=235N/mm^2. **[15]**

Total No. of Questions : 6]

SEAT No. :

P4204

[Total No. of Pages : 2

[5462]-3
M.E. (Civil) (Structure Engineering)
STRUCTURAL DESIGN OF STEEL BRIDGES
(2008 Pattern) (Elective - II)

Time :3 Hours] *[Max. Marks : 100*

Instructions to the candidates:

1) ***Attempt any two question from section - I and section - II.***
2) ***Answer to the two sections should be written in separate answer books.***
3) ***Figures to the right indicate full marks.***
4) ***Neat diagrams should be drawn wherever necessary.***
5) ***If necessary, assume suitable data and mention clearly.***
6) ***Use of nonprogrammable electronic pocket calculator, relevent Is codes and steel table are allowed.***

SECTION - I

Q1) a) Explain the load combinations adopted in the analysis of a railway steel bridges. **[10]**

b) Explain the functions of portal and sway bracings with suitable examples. **[10]**

c) Explain how CDA is computed. **[5]**

Q2) a) Explain with neat sketches the functions of stringers and cross-girders in a through type railway bridge. **[8]**

b) A through type plate girder railway bridge carries a single line broad gauge track. The span of the bridge is 30 m. The plate girders are provided at 4.5m c/c. The stringers are provided at 2.10 m c/c along the center line. The cross-girders are provided at 1.2 m c/c. The EUDL for BM is 860 kN and for SF is 680 kN and, CDA = 1.0. Design the stringers and the cross-girders. **[17]**

Q3) a) Explain how lateral loads are resisted in steel bridges. **10]**

P.T.O.

b) Determine the forces in the various members of the portal bracing system shown in Fig. 1 and plot the shear force, bending moment and axial force diagram for the member AB. **[15]**

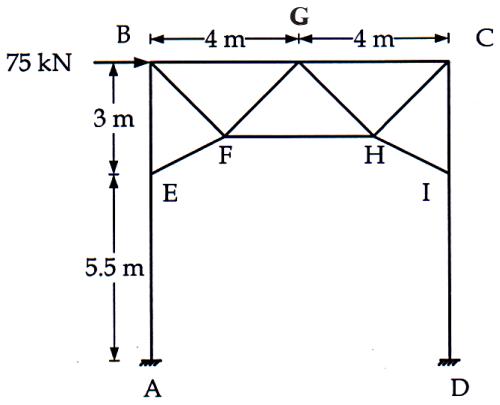

Fig. 1

SECTION - II

Q4) Design the plate girder for the highway bridge having an effective span of 55 m. The bridge carries a carriageway of 7.5 m with a footpath of 1.5 m on either side. The deck slab is 300 mm thick. The thickness of wearing coat is 60 mm. The bridge is to be supported on 4 number of plate girders. The loading class is IRC class A. **[25]**

Q5) The effective span of the through type highway bridge shown in Fig. 2 is 24 m. The bridge has a carriage way of 7.5 m along with two footpaths of 1.25 m on either side. The thickness of the deck slab is 275 mm. The thickness of wearing coat is 60 mm. The bridge is required to carry IRC class 70R loading. Design the members L_0U_1; L_1U_1; L_2U_1 and U_1U_2. Design the joint at L_1. Sketch the details of the connections. **[25]**

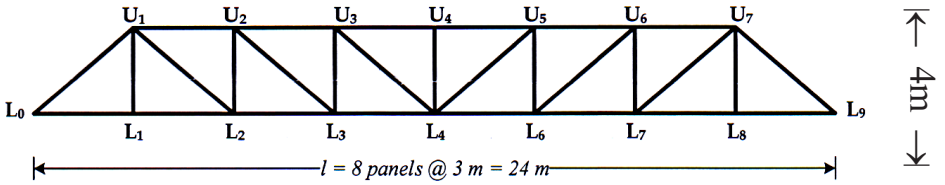

Fig. 2

Q6) a) Explain step-by-step design procedure of rocker bearing. **[10]**

b) Explain step-by-step design procedure of elastomeric bearings. **[15]**

Total No. of Questions : 6]

SEAT No. :

P4425

[Total No. of Pages : 2

[5462]-4
M.E. (Civil Structures)
MANAGEMENT IN STRUCTURAL ENGINEERING
(2008 Pattern)

Time : 3 Hours] *[Max. Marks : 100*

Instructions to the candidates:

1) ***Solve any two questions from each section.***
2) ***Answers to the two sections should be written in separate answer books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right side indicate full marks.***
5) ***Assume Suitable data if necessary.***

SECTION - I

Q1) a) Explain briefly role of resource management in building construction. **[7]**

b) What do you mean by logistic management? **[6]**

c) Write short note on selecting construction equipment. **[6]**

d) Write a note on human resources. **[6]**

Q2) a) Write a note on structural health monitoring. **[7]**

b) Explain in brief (any two) : **[10]**

i) Structural Safety

ii) Durability of concrete

iii) Fire safety

c) Explain the concept of T.Q.M. **[8]**

Q3) a) Explain the carbonation depth measurement test. **[7]**

b) List out the information required to be collected after visual inspection of distressed structure. **[6]**

c) Write a note on structural audit. **[6]**

d) State and explain different methods of NDT. **[6]**

P.T.O.

SECTION - II

Q4) a) What are the requirements of structural detailing? Also explain parameters for assessment for restoration strategies. **[10]**

b) Explain various techniques of retrofitting. **[8]**

c) Write a note on construction chemicals for restoration. **[7]**

Q5) a) Explain the structural aspects for formwork in building. **[7]**

b) Explain the design of formwork with following points. **[10]**

i) Load on formwork

ii) Design criteria

iii) Design procedure

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

i) Safety precautions working at height

ii) Material handling and stacking

Q6) Write short notes on (any five) : **[25]**

a) Planning and executing of demolition.

b) Role of structural drawing in demolition of structures.

c) Recycling of demolished materials.

d) Demolition safety.

e) Saw technique of demolition wire.

f) Factors influencing on reuse of demolished material.

g) Method of implosion.

Total No. of Questions : 6]

SEAT No. :

P4205

[Total No. of Pages : 2

[5462]-6
M.E. (Civil Structures)
MECHANICS OF MODERN MATERIALS
(2008 Pattern) (Elective - IV) (Semester - II)

Time :3 Hours] *[Max. Marks : 100*

Instructions to the candidates:

1) ***Answer any two questions from each section.***
2) ***Answers to the two sections should be written in separate answer books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right side indicate full marks.***
5) ***Use of nonprogrammable pocket calculator is allowed.***
6) ***Assume suitable data if necessary.***

SECTION - I

Q1) a) State classification of fiber composites and its engineering applications. **[8]**

b) What do you understand by Piezoelectric material? And its applications What is direct and converse effect. **[8]**

c) Explain classification of materials used in FRC and situations where these class of materials are advantageous.. **[9]**

Q2) a) Write short note on shape memory alloys (SMA) and Functionally graded materials (FGM) **[12]**

b) Explain Generalized Hookes Law for orthotropic material in 1-2-3 coordinates. **[13]**

Q3) a) Explain Tsai-Hill theory of failure applicable for FRC. **[16]**

b) Explain stress strain behavior of FRC. **[9]**

P.T.O.

SECTION - II

Q4) a) Derive naviers equation for FRP laminate with all side simply supported. **[9]**

b) Explain and sketch **[16]**

i) Orthotropic, Anisotropic laminate

ii) Symmetric, balanced laminate

iii) Antisymmetric and cross ply laminate

Q5) a) Explain factors affecting mechanical properties of composite laminate. **[7]**

b) Find coefficient of thermal expansion for a 90 degree orthotropic laminate **[18]**

E_1= 60 GPa, E_2=14 Gpa, E_3=14 GPA

$\mu_{12} = 0.29 = \mu_{21}$, $\alpha_1 = 0.9*10^{-6}$ /c^0, $\alpha_2 = 27*10^{-6}$ /c^0

Q6) a) Explain manufacturing process of composite. **[8]**

b) List tests carried out for determination of mechanical properties of composite. **[9]**

c) State advances in technology for high performance of composites. **[8]**

Total No. of Questions : 6]

SEAT No. :

P4206

[Total No. of Pages : 2

[5462]-7

M.E. (Civil Engineering)

STRUCTURAL ENGINEERING

Optimization Techniques

(2008 Pattern) (Elective - IV)

Time :3 Hours] *[Max. Marks : 100*

Instructions to the candidates:

1) ***Attempt any two questions from each section.***
2) ***Marks indicate to the right, indicate full marks.***

SECTION - I

Q1) a) Minimize the function using the golden section method with n=6.

$f(x) = 0.65 - [0.75 / (1 + x^2)] - 0.65 \times \tan^{-1}(1/x)$ **[12]**

b) Find the minimum of $f = \lambda^5 - 5\lambda^3 - 20\lambda + 5$ by the cubic Interpolation method. **[13]**

Q2) a) State six structural engineering applications of optimization. **[12]**

b) A beam of uniform rectangular cross-section is to be cut from a log having a circular cross-section of diameter 2a. The beam has to be used as a cantilever beam (the length is fixed) to carry a concentrated load at the free end. Find the dimension of the beam that correspond to the maximum tensile (bending) stress carrying capacity. **[13]**

Q3) a) Solve the following LP problems by the revised simplex method. **[13]**

Minimize $f = -5x_1 + 2x_2 + 5x_3 - 3x_4$

Subject to $2x_1 + x_2 - x_3 = 6$

$3x_1 + 8x_3 + x_4 = 7$

$x_i >= 0$, i = 1 to 4

b) Explain revised simplex method, Duality in linear programming, Decomposition principle, and Post-optimality analysis in Linear Programming. **[12]**

P.T.O.

SECTION - II

Q4) a) Explain **[15]**

i) Indirect search method and Direct search method,

ii) Random search method and Steepest Descent (Cauchy) method

iii) Univariate and pattern search method

b) Show that the Newton's method finds the minimum of a Quadratic function in one iteration,

$F(X) = \frac{1}{2} X^T [A] X + B^T X + C$ **[10]**

Q5) a) Minimize the interior penalty function **[13]**

$f(x_1, x_2) = 1/3 (x_1 + 1)^3 + x_2$

Subject to $g1(x_1, x_2) = -x_1 + 1 <= 0$

$g2(x_1, x_2) = -x_2 <= 0$

b) Design the cantilever beam with X_1 width, X_2 depth and point load P at the end of beam, formulate the problem of determining the cross-sectional dimensions of the cantilever beam for minimum weight. The maximum permissible bending stress is α_y. **[12]**

Q6) a) Differentiate biological neural network and artificial neural network? **[6]**

b) What are the activation functions in artificial neural networks? **[7]**

c) Explain with suitable sketch and examples Selection Operator, Crossover Operator and Mutation operator in Genetic Algorithms. **[12]**

Total No. of Questions : 10]

SEAT No. :

P4418

[Total No. of Pages : 3

[5462]-8
M.E. (Mechanical - Design Engineering)
ADVANCED MACHINE DESIGN
(2008 Pattern)

Time :3 Hours] *[Max. Marks : 100*

Instructions to the candidates:

1) ***Answer any THREE questions from each section.***
2) ***Answers to the two sections should be written in separate books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Use of scientific calculators is allowed.***
6) ***Assume suitable data if necessary.***

SECTION - I

Q1) a) Explain importance of simplex method in optimization with suitable example. **[8]**

b) Which optimization techniques are suitable for structural and shape optimization parameters. **[8]**

Q2) a) What is Design for Assembly? Explain the general principles followed while designing the parts for assembly. **[8]**

b) What is Design for Safety? Explain the general principles followed while designing the product for safety. **[8]**

Q3) Design a connecting rod for an IC engine with following data : **[16]**

Cylinder bore = 125 mm,
Length of connecting rod = 300 mm,
Maximum gas pressure = 3.5 MPa,
Length of stroke = 125 mm,
Mass of reciprocating parts = 1.6 kg,
Engine speed = 2200 rpm,
S_{yt} for material = 330 MPa
Factor of safety = 5
Assume suitable data and state the assumptions you make to solve above problem.

P.T.O.

Q4) Two 10 teeth gears are to mesh without undercutting. The gears are generated using a standard hob with 20° pressure angle. The module is 4 mm while the clearance is 0.2 mm. Using extended centre distance method find out ; **[16]**

a) Hob shift ;

b) blank diameter and depth of cutter setting ;

c) actual pressure angle

Take usual notations ; $\theta = \text{inv}\ \phi$

$$\phi = V - \frac{2}{15}V^3 + \frac{3}{175}V^5$$

where, $V = \sqrt[3]{3\theta}$ and θ & ϕ are in radian

Q5) Write short notes on **[18]**

a) Design for brittle fracture

b) Profile modification ingear design

c) Fault tree analysis

SECTION - II

Q6) a) Derive an expression for maximum space efficiency of helical springs.**[6]**

b) A semi-elliptic leaf spring used for automobile suspension consists of two extra full length leaves and ten graduated length leaves including master leaf. The centre to centre distance between the two eyes is 1.2 m. The leaves are made up of Steel (S_{yt}=1500 N/mm^2 & E = 207000 N/mm^2) and factor of safety is 2.5. The spring is to be designed for a maximum force of 30 kN. The leaves are pre-stressed so as to equalise the stress in all leaves

Determine the dimensions of cross section of the leaves and the deflection at the end of the spring. **[10]**

Q7) a) What is difference between design for finite and infinite life problems.**[6]**

b) The work cycle of a mechanical component subjected to completely reversed bending stress consist of the following three elements. **[10]**

i) ±350 N/mm^2 for 85% of time

ii) ±400 N/mm^2 for 12% of time

iii) ±500 N/mm^2 for 3% of time

The material for the component is 50C4 (S_{ut}=660 N/mm^2) and the corrected endurance limit of the component is 280 N/mm^2.

Determine life of the component.

Q8) a) An 18% chromium and 8% nickel steel at 700°C had the following creep rates;

Stress σ_1 = 21 MPa; creep rate 0.128% per 1000 hrs.

σ_2 = 28 MPa; creep rate 0.64% per 1000 hrs.

Determine the constants of the hyperbolic sine law and the creep rate for a stress of 15 MPa. **[8]**

b) Explain the phenomenon of creep. What is the effect of temperature time and stress on it? How do you proceed to calculate permissible life under given stress? **[8]**

Q9) a) Explain use of composite material in mechanical engineering with suitable example. **[8]**

b) Consider a graphite-epoxy laminate whose elastic constants along and perpendicular to the fibres are as follows; **[8]**

E_{xx} = 181 GPa; E_{yy} = 10.3 GPa; G_{xy} = 7.17 GPa,

υ_{yx} = 0.28 ; υ_{xy} = 0.01594

obtain the compliance coefficient appropriate to x' y' axis which are at ;

i) + 30 to xy axis (counter clockwise)

ii) + 9 to xy axis

Q10) Write short notes on **[18]**

a) Vibration & surge of helical spring

b) Hybrid materials

c) True stress and true strain in creep

Total No. of Questions : 10]

SEAT No. :

P4422

[Total No. of Pages : 3

[5462]-9

M.E. (Mechanical Design Engineering)

RELIABILITY ENGINEERING

(2008 Pattern) (Elective - III)

Time : 3 Hours] *[Max. Marks : 100*

Instructions to the candidates:

1) ***Answer any three questions from each section.***
2) ***Neat Diagrams must be drawn wherever necessary.***
3) ***Assume suitable data, if necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Use non-programmable electronic calculators are allowed.***
6) ***Answers to the two sections should be written in separate books.***

SECTION - I

Q1) a) Explain failure density and Hazard rate. Draw a bath tub curve and explain the different zones in it. **[8]**

b) Calculate the reliability of the system shown in Fig. 1. The values in the block show the reliability of individual components in the system. **[8]**

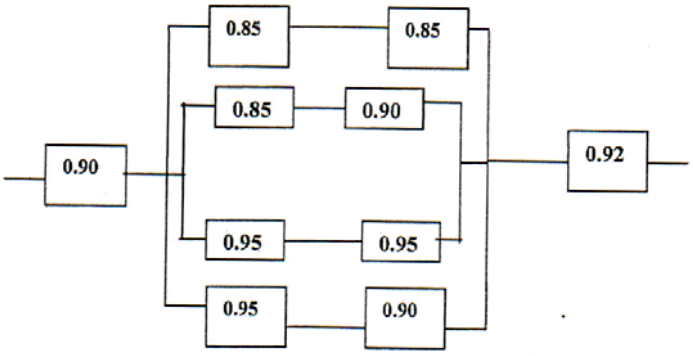

Fig. 1

Q2) a) Explain Normal and Weibull distributions. State their significance. **[8]**

b) Following data shows the test results for 100 components tested simultaneously. Evaluate Hazard rate, failure density function and reliability and plot these functions against time. Where T = operating time in Hrs and S = Number of components surviving. **[8]**

T(Hrs)	0	10	20	30	40	50	60	70	80	90	100
S	100	90	82	73	65	58	50	45	41	37	30

P.T.O.

Q3) a) What is mean by redundancy? Explain types of redundancies. **[8]**

b) Ten identical items with constant failure rate were put on test and their failure times (in hrs.) were observed to be 10, 17, 25, 33, 34, 41, 48, 59, 72, 79. Calculate the MTTF and hence reliability at 20 hours. **[8]**

Q4) a) Ten identical components are connected in parallel to achieve the system reliability of 0.92. Determine the reliability of each component. How many additional components to be added in parallel to increase the reliability upto 0.98. **[8]**

b) Fig. 2 shows a system configuration with reliability of elements given in blocks. Find the system reliability. **[8]**

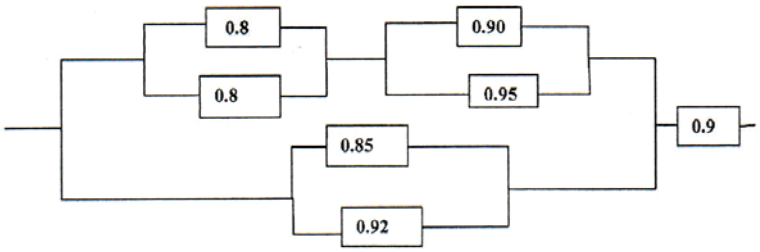

Fig. 2

Q5) Write short notes on followings : **[18]**

a) Quality and Reliability

b) MTTF and MTBF

c) Importance of reliability

SECTION - II

Q6) a) Explain AGREE method for Reliability allocation. **[8]**

b) Four units are connected in series with reliabilities Rl=0.85, R2=0.96, R3=0.8 and R4=0.95. Calculate the system reliability. If the reliability is to be increased to a value of 0.80, how this should be apportioned among the four units according to the minimum effort method. **[8]**

Q7) a) Explain the concept of safety margin and safety factor. **[8]**

b) The mean strength and the standard deviation of a bolted joint are 3000 Kg/cm^2 and 200 Kg/cm^2 respectively. The joint is loaded such that stress induced has a mean value of 2500 Kg/cm^2 with a standard deviation of 150 Kg/cm^2. Assuming that shear strength and the induced stresses are independent and normally distributed, find out the probability of survival of the bolted joint. Extract of data from statistical table is given below:**[8]**

Z	1.2	1.3	1.4	1.5	1.6	1.7	1.8
$\phi(z)$	0.8849	0.9032	0.9192	0.9331	0.9452	0.9550	0.9640

Q8) a) Explain the process of FMEA analysis. What is importance of RPN. **[8]**

b) Write Maintainability and Availability. Discuss factors affecting maintainability. **[8]**

Q9) a) Define accelerated life testing. Explain the life testing methods carried out for reliability analysis. **[8]**

b) In a short sample life testing of a system the following data is recorded as follows **[8]**

Failure No.	1	2	3	4	5	6	7	8	9	10
MTTF (Hrs)	20	21	16	26	30	38	30	19	25	25

Plot the variation of reliability against time using

i) Mean ranking and ii) Median Ranking Method.

Q10) a) Explain the symbols used in development of Fault tree. Draw a Fault tree for a system having 5 components of same configuration are connected in series. Assuming failure probability of each component as 0.01 , determine the reliability of system from FTA diagram. **[6]**

b) Explain ARINC Method of reliability allocation. **[6]**

c) Write a short note on 'Ishikawa Diagram'. **[6]**

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Total No. of Questions : 10]

SEAT No. :

P4207

[Total No. of Pages : 3

[5462]-10
M.E. (Mechanical) (Design Engineering)
INDUSTRIAL TRIBOLOGY
(2008 Pattern) (Elective - IV)

Time :3 Hours] *[Max. Marks : 100*

Instructions to the candidates:

1) ***Answer any three questions from each section.***
2) ***Answer to the two sections should be written in separate answer books.***
3) ***Figures to the right indicate full marks.***
4) ***Neat diagrams must be drawn wherever necessary.***

SECTION - I

Q1) a) Obtain Petroffs equation for friction coefficient and power lost in lightly loaded bearings. Also state the assumptions made. **[8]**

b) Discuss various types of friction and Explain Coulomb classical theory of friction. **[8]**

Q2) a) Derive an expression for load carrying capacity and oil flow rate for hydrodynamic step bearing .State the assumptions made. **[10]**

b) Write assumptions made while deriving Reynolds equation and limitations of Reynolds equation. **[6]**

Q3) a) Explain the term Wear. Explain in detail different types of wear experienced in mechanical systems? Discuss the effect of temperature and load on wear. **[8]**

b) What do you mean by rolling friction and rolling resistance? Explain Tomlinson's theory of molecular attraction. **[8]**

P.T.O.

Q4) a) The following data refers to a hydrostatic thrust bearing:

i) Shaft diameter = 500 mm

ii) Recess diameter=300 mm

iii) Shaft speed =750 rpm

iv) Suppy Pressure = 6 N/mm^2

v) Film thickness = 0.18 mm

vi) Viscosity of Lubricant = 28 Cp

vii) Specific gravity of Lubricant =0.86

viii) Specific heat of Lubricant = 1.76 KJ/Kg°C

Calculate:

i) Load carrying capacity of the bearing

ii) Flow requirement in Litres/Minutes

iii) Viscous power loss

iv) Pumping power loss

v) Temperature rise.

Assume that the total power loss in the bearing is converted into heat. **[10]**

b) What are the advantages and limitations of hydrostatic bearings over hydrodynamic bearings. **[6]**

Q5) Write a note on following (Any Three) **[18]**

a) Instabilities and stic-slip motion

b) Tribological properties of bearing materials and lubricants.

c) Tribology in industry

d) Heat in bearings

e) Infinitely short and infinitely long journal bearings

SECTION - II

Q6) a) Explain Gas lubricated bearings and state advantages and disadvantages of gas bearing. **[8]**

b) Rayleigh step bearing has the greatest load carrying capacity of all slider shapes. Explain. **[8]**

Q7) For Non -Newtonian behavior of lubrication oils explain the following. **[16]**

a) Bingham fluids

b) Thixotropy

c) Pseudo plastic flow

d) Dilitancy

e) Elasticity

Q8) a) With the simple sketch resolve the frictional effects in Tyre - road contact. **[8]**

b) Explain tribological aspect of rolling motion. **[8]**

Q9) Using modified Reynolds equation for Elasto-hydrodynamic lubrication , derive Ertel Grubin equation. State limitations of this equation. **[16]**

Q10) Write a note on following (Any Three) **[18]**

a) Tribological aspect of drawing and forging operations

b) Power losses in Hydrostatic step bearing

c) Piston pin lubrication.

d) Applications of squeeze film lubrication

e) Recycling and processing of used oil

Total No. of Questions : 12]

SEAT No. :

P4208

[Total No. of Pages : 4

[5462]-11
M.E. (Mechanical) (Heat Power)
TECHNOLOGY AND FINANCIAL MANAGEMENT
(2008 Pattern)

Time :3 Hours] *[Max. Marks : 100*

Instructions to the candidates:

1) ***Answer any three questions from each section.***
2) ***Answer to the two sections should be written in separate answer books.***
3) ***Figures to the right indicate full marks.***
4) ***Neat diagrams must be drawn wherever necessary.***

SECTION - I

Q1) a) Distinguish between : **[8]**

i) Primary and Secondary capital markets

ii) Shares and Debentures

b) Describe the scope and importance of finance function in the management of a corporation. **[8]**

OR

Q2) a) Explain different types of following long term finance: **[8]**

i) Preference shares

ii) Debentures

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

i) Sources of long term finance

ii) Financing and dividend decisions of finance

Q3) a) Distinguish between : **[8]**

i) Cost control and Cost reduction

ii) Direct and indirect labor cost

b) Explain with example, how the costs are classified based on the following: **[8]**

i) Controllability.

ii) Function.

OR

P.T.O.

Q4) a) Distinguish between 'absorption costing' and 'marginal costing'? Give the applications of each of these methods? **[8]**

b) The following data are available pertaining to a product after passing through two processes A and B. output transferred to process C from process B, 9120 units for Rs. 49,263. The expenses incurred in process C are as follows : **[8]**

Sundry materials	: Rs. 1,480
Direct labor	: Rs. 6,500
Direct expenses	: Rs.1,605

The wastage of process C is sold at Rs. 1.00 per unit. The overhead charges were 168% of direct labor. The final product was sold at Rs. 10.00 per unit fetching a profit of 20% on sales. Find the percentage of wastage in process C and prepare process C account.

Q5) a) How international trade does affect domestic trade? Explain. **[10]**

b) Explain the following types of unemployment : **[8]**

i) Structural unemployment.

ii) Classical unemployment.

iii) Hidden unemployment.

OR

Q6) Define the term 'inflation'? What are the causes of inflation? Explain in brief 'triangle model' of inflation? Explain the effect of inflation on business and economy. **[18]**

SECTION - II

Q7) a) Explain in brief the essential clauses of ISO-9000 and ISO-14000 family? **[8]**

b) Describe various elements of TQM. What are the benefits and limitations of TQM? **[8]**

OR

Q8) a) Define Bench marking. How it can be used as a tool for productivity improvement. **[8]**

b) Define JIT production system. Explain the pre-requisites of implementing JIT. **[8]**

Q9) a) Explain the stages involved in project life cycle with a neat line diagram? **[8]**

b) Construct the arrow diagram comprising activities A, B, C, D, E, F, G, H, I, J, K and L, such that the following relationships are satisfied. **[8]**

i) A, B and C the first activities of the project, can start simultaneously.

ii) A and B precede D.

iii) B precede E, F and H.

iv) F and C precede G.

v) E and H precede I and J.

vi) C, D, F and J precede K.

vii) K precedes L.

viii) I, G and L are the terminal activities of the project.

OR

Q10) a) Distinguish between PERT and CPM. **[8]**

b) A project schedule has following characteristics. **[8]**

Activity	Optimistic	Most likely	Pessimistic
1-2	1	2	3
2-3	1	2	3
2-4	1	3	5
3-5	3	4	5
4-5	2	3	4
4-6	3	5	7
5-7	4	5	6
6-7	6	7	8
7-8	2	4	6
7-9	4	6	8
8-10	1	2	3
9-10	3	5	7

Construct a PERT network and find out:

a) The earliest possible time (Te) to complete the different stages of the project.

b) The latest allowable time (Tl) for them.

c) The slack values.

d) The critical path.

e) The probability factor for completing the project in 30 weeks.

Q11) Write short note on : **[18]**

a) Man power planning

b) Difference between Merit rating and Job evaluation.

c) Steps involved for introducing management by objectives.

OR

Q12) a) Write short note on 'Essential welfare and motivational activities in an industry'. **[10]**

b) What methods of training are most suited for managerial training and why? **[8]**

Total No. of Questions : 8]

SEAT No. :

P4209

[Total No. of Pages : 2

[5462]-12
M.E. (Mechanical) (Heat Power)
INTERNAL COMBUSTION ENGINES
(2008 Pattern)

Time :3 Hours] *[Max. Marks : 100*

Instructions to the candidates:

1) ***Answers any three questions from each section.***
2) ***Answer to the two sections should be written in separate books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Use of logarithmic tables. slide rule, mollier charts, electronic pocket calculator and steam tables is allowed.***
6) ***Assume suitable data if necessary.***

SECTION - I

Q1) a) A petrol engine having stroke volume of 0.0012m^3 and CR 5..5 compresses the mixture to 8.5 bar and 350 0C. Ignition is stared so that the pressure rises along a straight line during explosion and attains its higher value of 28 bar after the piston has travelled 1/30 of working stroke. The A/F ratio is 16:1. Take R for mixture 0.274 kJ/kg, CV of fuel 43542 kJ/kg and Cv 0.962. Find the heat loss per kg of charge during explosion. **[8]**

b) Explain why the bmep of naturally aspirated diesel engine is lower than that of a naturally aspirated SI engine. **[8]**

Q2) a) Enlist the various material use for cylinder head, spark plug, gaskets, cylinder block, piston ,piston rings, gudgeon pin ,connecting rod, crankshaft. **[8]**

b) A SI engine working on otto cycle has compression ratio 10 receives 2700kJ of heat. The pressure and temperature at the beginning of compression is 1 bar and 40°C calculate the mean effective pressure and thermal efficiency of cycle. Also calculate the additional work developed if it were possible to expand isentropically the exhaust gases to their original pressure 1 bar. **[8]**

P.T.O.

Q3) a) Explain Actual engine air-fuel mixture requirements for SI Engine. **[8]**

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

Q4) a) Explain the instruments for measuring the following invisible emission. **[10]**

i) HC ii) CO

Write their approximate values for SI engine.

b) Explain the parameters affecting engine heat transfer. **[8]**

SECTION - II

Q5) a) Explain reasons for particulates generation in the exhaust of an automobile. **[8]**

b) Fuel injection systems are replacing carburetors in automobile spark ignition engines. Explain major advantages and any disadvantages of fuel metering with fuel injection relative to carburetion. **[8]**

Q6) a) Explain fluid mechanics based multidimensional models for IC engine. How it can improve the performance of engine. **[8]**

b) What are the causes of soot generation? How are they controlled? **[8]**

Q7) Discuss the effect of load on the following parameters of CI engines. **[16]**

a) Mechanical and Brake thermal efficiency.

b) HR and IHR

c) NOx and smoke.

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

a) 3 way catalytic convertors.

b) Supercharging in SI engine

c) Compare air swirl of CI engine and air swirl of SI engine

Total No. of Questions : 8]

SEAT No. : ____

P4416

[Total No. of Pages : 2

[5462]-13
M.E. (Computer Engineering)
PRINCIPLES AND PRACTICES FOR IT MANAGEMENT
(2008 Pattern)

Time : 3 Hours] ***[Max. Marks : 100***

Instructions to the candidates:

1) ***Answer any 3 questions from each section.***
2) ***Answers to the two sections should be written in separate books.***
3) ***Figures to the right indicate full marks.***

SECTION - I

Q1) a) Discuss process of management with its various functions. **[10]**

b) What are the ethics and social responsibilities? **[6]**

Q2) a) Define projects goals with project priorities. **[8]**

b) Explain requirement analysis process. **[8]**

Q3) a) Explain the project team formation process. **[8]**

b) What are the project constraints? **[8]**

Q4) Write short notes on any three : **[18]**

a) Principles of management

b) Work breakdown structure

c) Project delays

d) Change control

e) Resource procurement

P.T.O.

SECTION - II

Q5) a) What is energy management and energy audit? **[8]**

b) What is conflict management? Compare traditional vs modern view. **[8]**

Q6) a) What is knowledge? Explain knowledge management process. **[8]**

b) Describe supply chain management in detail. **[8]**

Q7) a) Discuss role of IT in product design and development. **[8]**

b) Explain effect of IT in finance and accounting in detail. **[8]**

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

a) Stress Management

b) CMM

c) Six Sigma

d) IPR

e) Team meeting

Total No. of Questions : 8]

SEAT No. :

P4210

[Total No. of Pages : 2

[5462]-14
M.E. (Computer) (Semester - II)
HIGH PERFORMANCE DATABASE SYSTEMS
(2008 Pattern)

Time :3 Hours] *[Max. Marks : 100*

Instructions to the candidates:

1) ***Question No. 1 & question No. 5 are compulsory. From Remaining answer any two questions from each section.***
2) ***Answers to each section should be written in separate answer books.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Consider the relation emp(eid,departmentid, post,salary)

Following is the statistical information about emp relation :

1) Hash index on primary key with no overflow
2) Clustering index on foreign key departmentid, height = 2
3) B+ tree index on salary, height = 4
4) number of tuples in emp = 60,000 blockfactor(emp = 600, number of block(emp) = 100
5) n distinct departmentid (emp) = 1000
6) n distinct post(emp) = 20
7) n distinct salary(emp) = 1000

Write the relational algebra queries for following & calculate cost for evaluating that query.

i) Display the employee information those who are getting salary >50,000

ii) Display the employee information those who are working in departmentid 50 **[6]**

b) Explain different transaction model. **[8]**

c) Describe the heuristic processing strategies for query optimization. **[4]**

P.T.O.

Q2) a) Explain Object Oriented Database Benchmarks. **[4]**

b) Explain any six selection Algorithms used in query optimization. **[12]**

Q3) a) Discuss different methods of Multi-attribute indexing. **[8]**

b) Explain 2 Phase Protocol & how failure of any site or coordinator is handled in it. **[8]**

Q4) a) Discuss different methods to handle deadlock in distributed databases. **[6]**

b) Explain components of Data warehouse with its architecture. **[10]**

SECTION - II

Q5) a) Explain Clustering & Classification with example. **[10]**

b) Explain Indexing techniques used in data warehousing **[8]**

Q6) a) Explain different OLAP operations with example. **[8]**

b) Explain Data Mining Architecture. **[8]**

Q7) a) Write short note on Business Intelligence. **[6]**

b) Explain Star Schema & Snowflake Schema with example. **[4]**

c) Write short note on main memory databases. **[6]**

Q8) Solve any two : **[16]**

a) Compare Active & Deductive databases

b) Explain LDAP Data Queries

c) Short note on Hibernate

Total No. of Questions : 8]

SEAT No. :

P4211

[Total No. of Pages : 2

[5462]-15
M.E. (Computer Engineering)
NETWORK DESIGN, MODELLING AND ANALYSIS
(2008 Pattern) (Semester - II)

Time :3 Hours] *[Max. Marks : 100*

Instructions to the candidates:

1) ***Answer any three questions from each section.***
2) ***Answer to the two sections should be written in separate books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Assume Suitable data, if necessary.***

SECTION - I

Q1) a) Explain in detail Continuous-valued Random Variable with its suitable example? **[8]**

b) Explain different basic operations on events. **[8]**

Q2) Describe following network data Models (Any Two) : **[16]**

a) M/M/1

b) D/M/2

c) 1-server loss system

Q3) Write a short note on : **[18]**

a) Delay in the Finite Buffer Case

b) Little's Formula to an M/M/m Queue

c) Advanced Queueing Models

Q4) a) Explain Bayes Formula with suitable example. **[8]**

b) Consider an M/M/1 system in which customers arrive according to a Poisson process of rate λ. Service rate is $\mu = 30$ customers/minute. The average number of customers is N=4. Calculate λ and w. **[8]**

P.T.O.

SECTION - II

Q5) a) Explain Queuing Network Model of Nodes in a peer to peer network. **[6]**

b) Solve Terminal Assignment problem for given data. **[10]**

Weight of node = 01

Max. capacity of concentrator = 04

	G	H	I	K
a	26	25	8	11
b	4	12	12	12
c	5	25	16	4
d	15	18	15	2
e	12	29	31	23
f	4	25	15	1

Q6) a) Describe different Security management tools. Explain importance of it. **[8]**

b) Explain Concentrator location algorithm with example. **[8]**

Q7) a) Explain QOS parameters for migrating wired network to wireless network. **[8]**

b) Explain different bandwidth management tools with their features. **[8]**

Q8) Write a short note on (Any Three) : **[18]**

a) CMST Algorithm

b) Closed Queing Network

c) Performance analysis of Network layer

d) Functions of network layer.

Total No. of Questions : 8]

SEAT No. :

P4212

[Total No. of Pages : 2

[5462]-16
M.E. (E & TC) (Signal Processing)
ADVANCED DIGITAL SIGNAL PROCESSING
(2008 Pattern)

Time :3 Hours] *[Max. Marks : 100*

Instructions to the candidates:

1) ***Answer any three questions from each section.***
2) ***Answers to the two sections should be written in separate books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right side indicate full marks.***
5) ***Your answers will be valued as a whole.***
6) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
7) ***Assume Suitable data, if necessary.***

SECTION - I

Q1) a) Explain the concept of multirate signal processing with the help of decimation and interpolation in detail. **[8]**

b) The sampling rate of a signal $x(n)$ is to be reduced by decimation from 96 KHZ to 1KHZ. The highest frequency of interest after decimation is 450 HZ. Assume that an optimal FIR filter is to be used, with an overall passband ripple, $\delta_p = 0.01$ and pass band deviation, $\delta_s = 0.001$. Design an efficient decimator. **[10]**

Q2) a) Explain the poly phase implementation of interpolators. **[8]**

b) Explain efficient digital to analog conversion in compact hi-fi system. **[8]**

Q3) a) Explain the least square estimation for filter design. **[8]**

b) When and where the adaptive filters are used? Explan the concept of adaptive filter as noise canceller. **[8]**

P.T.O.

Q4) a) Explain the prediction and deconvolution concept in system modeling. **[8]**

b) Explain linear prediction. Explain its various methods. **[8]**

SECTION - II

Q5) a) Explain the basic adaptive LMS algorithm. **[8]**

b) Explain Recursive least squares algorithm. **[8]**

Q6) a) Explain the DSP Processor architecture in detail. Justify that the pipelining increases the performance of DSP processor with suitable example. **[8]**

b) Explain implementation of FIR filter algorithm on DSP processor. **[8]**

Q7) a) Explain adaptive beam forming in detail. **[8]**

b) Explain the concept of lattice - ladder adaptive filter in detail. **[8]**

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

a) Adaptive filter for filtering of ocular artifacts from the human EEG.

b) Selection of DSP processors.

c) Comparison of fixed point and floating point DSP processor.

Total No. of Questions : 8]

SEAT No. :

P4366

[Total No. of Pages : 1

[5462] - 152
M.E. (Chemical Engineering)
PROCESS OPTIMIZATION
(2013 Pattern)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Attempt any five questions.***
2) ***Assume suitable data wherever necessary.***
3) ***Draw neat figures wherever necessary.***
4) ***Use of scientific Calculators is allowed.***
5) ***Figures to the right indicate full marks.***

Q1) Explain the Nature and scope of optimization. Also give general procedure for solving Optimization problems. **[10]**

Q2) Describe following terms: a) continuity of function b) uni-modal and multimodal functions c) convex and concave function. **[10]**

Q3) Explain golden search method for optimizing one dimensional functions. State its advantages and disadvantages. **[10]**

Q4) Describe steepest descent method for multivariable optimization problems. **[10]**

Q5) How optimization of multi staged distillation is carried out. Explain with any non linear method. **[10]**

Q6) Explain Lagrange multiplier method of optimization. State its advantages over other non - linear methods. **[10]**

Q7) Write short notes on. **[10]**

a) Optimization of dynamic processes
b) Non - traditional optimization algorithms

Q8) Write short notes on **[10]**

a) Penalty function method
b) Genetic algorithms

Total No. of Questions : 8]

SEAT No. : ____

P3747

[Total No. of Pages : 3

[5462] - 101
M.E. (Civil) (Structures)
DESIGN OF CONCRETE AND PRESTRESSED BRIDGES
(2013 Pattern)

Time : 3 Hours] ***[Max. Marks :50***

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***All answers should be written in same book.***
3) ***Figures to the right indicate full marks.***
4) ***Use of IRC - 5, 6, 18, 27, 45, 78 & 83 codes, IS 1343, IS 456 - 2000 is allowed.***
5) ***Mere reproduction of theory from IS or IRC codes as answer will not get full credit.***
6) ***Neat diagrams must be drawn wherever necessary.***
7) ***Assume any other data if necessary.***

Q1) a) Explain Economic Span of Bridge and how it is calculated. **[5]**

b) Classify the bridges according to material of construction. **[5]**

Q2) a) Explain importance of Impact load analysis on road bridges. **[5]**

b) Explain IRC Class AA and Class B standards of loadings **[5]**

Q3) Design only slab the slab culvert with the data : **[10]**
Clear span of the culvert = 6.0 m
Clear carriage way width = 7.5 m
Size of kerb = 200 mm × 400 mm
Average thickness of wearing coat 80 mm
Use material M 30, Fe 500
Loading class A
Draw the cross section showing details of reinforcement at mid - span and at junction of the slab are kerb.

P.T.O.

Q4) Design the deck slab only and calculate the maximum bending moment and shear force intermediate post tensioned prestressed concrete bridge girder for the following. Effective span = 18 m, width of carriage way = 7.5 m, No. of beams 3, equally spaced along the carriageway width, Spacing of cross girders = 3 m c/c, width of footpath on either side of carriageway = 1.5 m loading class = IRC class AA, kerb size = 200 × 600 mm, Material M25 & TMT for deck slab. **[10]**

Q5) a) Explain various types of rigid frame bridges. **[5]**

b) Explain factors affecting design of rigid frame bridges. **[5]**

Q6) Design a reinforced elastomeric bearing at a pinned end of a plate girder of a bridge with following data. **[10]**

Maximum vertical load = 1200 kN

Minimum vertical load = 400 KN

Dynamic vertical load = 75 kN

Transverse lateral load = 60 kN

Longitudinal load = 60 KN

Longitudinal total translation = 10 mm

Rotation at support = 0.002°

Shear modulus of elastomeric bearing = 1.2 N/mm^2

Allowable comp. stress for concrete = 8 N/mm^2

Allowable comp. stress for elastomer = 10 N/mm^2

Q7) a) Explain the selection criteria for wing wall. **[5]**

b) Explain with sketches various types of wing walls. **[5]**

Q8) Design open well type foundation for a pier in sandy soil for following : **[10]**

Diameter of pier at bottom = 1.5 m

Height of bearing above the maximum scour level = 20 m

Permissible horizontal displacement at bearing level = 10 mm

Total vertical load including self - weight of pier = 7500 kN

Total lateral force at scour level = 125 kN

Submerged unit weight of soil = 10 kN/m^3

Material of pier and footing = M30 & Fe500

Velocity of water current = 2.75 m/s consider cross current ratio

Design the RCC well and check the stresses at the staining

♦♦♦♦

Total No. of Questions : 6]

SEAT No. :

P3748

[Total No. of Pages : 2

[5462] - 102
M.E. (Civil) (Water Resource & Env. Engg)
ENVIRONMENTAL HYDRAULICS & ENV. STRUCTURES
(2013 Pattern) (Semester - II)

Time : 3 Hours] *[Max. Marks :50*

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Assume suitable data; if necessary.***
3) ***Use of non - programmable calculator is allowed.***

Q1) a) The impeller of a centrifugal pump has 1.5 m outside diameter. It is used to lift 1600 liters of water per second against a head of 8.5 m. It vanes make an angle of 40° with the direction of motion at outlet and runs at 350 rpm. If the radial velocity of flow at outlet is 3.5 m/sec. Find the manometric efficiency. Also find the power required if the overall efficiency is 85%. **[6]**

b) Explain working of screw pump & internal gear pump with sketch. **[4]**

Q2) a) Draw hydraulic circuit which contains 2 port actuator, $\frac{4}{2}$ valve, PRV, pressure gauge, pump motor tank for oil. **[5]**

b) Explain working of any one type of pressure reducing valve **[5]**

Q3) a) Find the rate of drying & the mixture content from the following table: **[6]**

wt. of wet saw dust	w.t of saw dust after drying	time (hrs)
230	208	0.5
230	210	0.5

dimensions of tray = 12 cm, square; w.t of dry saw dust on try is 200 gm.

b) Explain crystallization process. **[4]**

P.T.O.

Q4) A closed vessel is to be design to with stand internal pressure of 105 mpa having inside diameter of 550 mm; following properties assumed; estimate thickness on basis of

a) Max. principle stress theory

b) Max. shear stress theory

yield strength = 400 mpa; ultimate tensile strength = 500 mpa, poisson ratio = 0.5. **[10]**

Q5) a) Derive equation of pure bending of plate. **[5]**

b) Explain different types of liquid level measurement technique use. **[5]**

Q6) a) A three storey RC frame building with each storey having height of 3.5 m. Total load on each floor are 3500 KN on first floor, 3000 KN on second floor, 2500 KN on third floor and roof load 2000 KN. The soil below foundation is assumed to hard rock. Find out the total base shear force as per is code - 1983 - (part - I) - 2002. **[6]**

b) A beam having cross section arc of 150 mm square, length of 1.2 m is attached by two spring at end one at top & other is at bottom find natural frequency of vibration of system. Take $E = 200 \times 10^3$ mpa. **[4]**

♦♦♦♦

Total No. of Questions : 8]

SEAT No. :

P3749

[Total No. of Pages : 2

[5462] - 103
M.E. (Civil) (Water resources and Environmental Engineering)
DAM ENGINEERING
(2013 Pattern)

Time : 3 Hours] *[Max. Marks :50*

Instructions to the candidates:

1) ***Answer any five questions.***
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 seismic pressure consideration in dam design. **[6]**

b) Explain foundation treatments in gravity dams in case of faulty and jointed rock. **[4]**

Q2) a) What are basic principles of dam design? Explain step by step procedure for design of earthen dam. **[7]**

b) Discuss remedies to avoid seepage in earthen dam. **[3]**

Q3) a) Explain thin cylinder theory for design of arch dam. **[7]**

b) State various forces acting on arch dam with neat sketch. **[3]**

Q4) a) Explain various types of rock fill dams and draw the sketch of one of them. **[6]**

b) What is buttress dam? Explain the classification of buttress dam. **[4]**

Q5) a) Explain straight drop spillway and ogee spillway. **[6]**

b) A discharge of 1750 m^3/sec has to be passed over an ogee spillway with a coefficient of discharge of 2.25 at a head of 3.8 m. What should be the effective length of the spillway. Neglect velocity of approach. **[4]**

P.T.O.

Q6) a) Explain determination of settlement of earth dam embankments. **[6]**

b) Explain determination of settlement and lateral movements in dam. **[4]**

Q7) a) State common objectives of ICOLD and ICID. **[4]**

b) Explain functioning of global water partnership (GWP) **[6]**

Q8) a) How does global warming increased by large dams? **[6]**

b) What is the impact due to construction of dam on displacement and rehabilitation? **[4]**

♦♦♦♦

Total No. of Questions : 6]

SEAT No. :

P3750

[Total No. of Pages : 2

[5462] - 104
M.E. (Electrical) (Control Systems)
COMPUTER AIDED CONTROL SYSTEM DESIGN
(2013 Pattern)

Time : 3 Hours] *[Max. Marks :50*

Instructions to the candidates:

1) ***Figures to the right indicate full marks.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Use of algorithmic tables slide rule, Mollier charts, and electronic pocket calculator and steam table is allowed.***
4) ***Assume suitable data if necessary.***

Q1) a) Explain the computer method for determining the controllability and observability of control system. Draw the flow chart and give its algorithms **[6]**

b) Explain designing steps of full order and reduced order observer. **[6]**

c) Explain the terms :

i) Absolute stability

ii) Relative stability

Explain the measures of relative stability using polar plot and Bode diagrams. **[6]**

OR

Q2) a) Derive the transfer function of the following compensating network and draw the corresponding Bode diagram phase - lag network **[6]**

b) Define the following design specification of linear control system and show them on Bode diagrams and polar plot. **[6]**

i) Gain margin

ii) Phase margin

c) Explain the computer method for obtaining the solution of state and output equations of a closed loop control system represented by

$$\dot{x}(t) = Ax(t) + Bu(t)$$

$$y(t) = C\ x(t)$$

With usual notation. **[6]**

P.T.O.

Q3) a) Describe the computer method for obtaining the root - locus plot of a closed loop linear control system. **[8]**

b) Explain with the help of algorithm, the computer method for designing of PID controller using Ziegler - Nichol's method. **[8]**

OR

Q4) a) Consider a process control system with plant transfer function.

$$G_p(s) = \frac{36}{s^3 + 11s^2 + 36s + 36}$$

Design a PID controller for this system using Ziegler - Nichol's method. **[8]**

b) Draw the block diagram of a typical digital control system and explain clearly the working of each block. **[8]**

Q5) a) Explain clearly the standard compensator structures of P, PI and PID controller. **[8]**

b) Explain the effect of sampling period 'T' on stability of the digital control system. **[8]**

OR

Q6) a) Explain the computer method for obtaining closed loop control system response of a discrete time system. Draw flow chart and gives its algorithms. **[8]**

b) Discuss the advantages of digital controller over continuous time system controller. **[8]**

♦♦♦♦

Total No. of Questions : 6]

SEAT No. :

P3751

[Total No. of Pages : 2

[5462] - 105
M.E. Electrical (Control System)
PROCESS CONTROL MANAGEMENT
(2013 Pattern) (Semester - I)

Time : 3 Hours] *[Max. Marks :50*

Instructions to the candidates:

1) *Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6.*
2) *Marks to the right, indicate full marks.*

Q1) a) Define motivation and explain classification of motives. **[8]**

b) Write short note on mathematical modelling. **[10]**

OR

Q2) a) Describe models and theories of Leadership styles. **[8]**

b) Explain with suitable example control strategies for designing of control system. **[10]**

Q3) a) Explain PID controller for process management. **[8]**

b) Describe cascade control system for CSTR. **[8]**

OR

Q4) a) Draw the block diagram of direct digital control (DDC) loop & illustrate stability analysis of it. **[8]**

b) Explain feed forward performance by suitable example. **[8]**

Q5) a) Describe effect of Interaction on stability and tuning of multi loop control systems. **[8]**

b) Explain Relative Gain Array with suitable example. **[8]**

P.T.O.

OR

Q6) a) Describe interaction of control loops in a stirred tank heater with diagram. **[8]**

b) Explain one way and two way decoupling. **[8]**

♦♦♦♦

Total No. of Questions : 6]

SEAT No. : ____

P3752

[Total No. of Pages : 2

[5462] - 106
M.E. (Power Electronics & Drives)
POWER CONVERTERS
(2013 Pattern)

Time : 3 Hours] ***[Max. Marks :50***

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6.***
2) ***Figures to the right indicate full marks.***
3) ***Use of electronic calculator is allowed.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain with necessary diagrams and waveforms the operation of a three phase full converter. **[10]**

b) Explain the operation of Buck Boost converter with necessary waveforms. **[8]**

OR

Q2) a) Explain six step voltage source inverter (180 degree mode) with necessary waveforms and derive line - line output voltage equation using Fourier series. **[10]**

b) Discuss in detail the working principle of a single phase current source inverter. Write down its advantages and limitations over a voltage source inverter. **[8]**

Q3) a) Describe ZVS resonant converters with appropriate circuit diagram and waveforms. **[10]**

b) What are the advantages and limitations of ZVS converter. **[6]**

OR

Q4) a) Explain voltage source series resonant inverters. **[10]**

b) Compare ZCS and ZVS topologies of resonant converters. **[6]**

P.T.O.

Q5) a) Explain single phase bi directional controller with RL load. **[10]**

b) A single phase AC voltage regulator feeds an RL load having an impedance angle of 40°. For the conduction angle of 120°, determine the firing angle and load voltage as a ratio of the supply voltage. **[6]**

OR

Q6) a) Define cyclo - converter. Explain the operation of three phase cyclo converter with necessary diagram and waveforms. **[10]**

b) What are the merits and limitations of cyclo converters? **[6]**

♦♦♦♦

Total No. of Questions : 5]

SEAT No. :

P3753

[Total No. of Pages : 2

[5462] - 107
M.E. (Electrical)
POWER ELECTRONICS IN SMART GRID
(2013 Pattern)

Time : 3 Hours] *[Max. Marks :50*

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right indicate full marks.***
3) ***You are advised to attempt not more than 3 questions.***
4) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***

Q1) a) Explain concept of electric transportation in smart grid. **[4]**

b) Explain the causes of EMC cases in distributed power system. **[4]**

c) Write a short note on necessity of distributed generation. **[5]**

d) Explain Trapezoidal HFAC inverter - front end source with PFC. **[5]**

OR

Q2) a) Describe Electric network and local electric network. **[5]**

b) What are the issues of Interconnected Grid system. **[5]**

c) Discuss issues, monitoring, and mitigation methods of power quality. **[4]**

d) Explain the concept of microgrid and its benefits. **[4]**

Q3) Describe any two from the following : **[16]**

a) Comparison between Home Area Network (HAN) and wide Area Network (WAN).

b) Wi - Fi based communication.

c) Merits of Zig bee communication technology.

d) Cyber security and its role in smart grid.

P.T.O.

Q4) a) Explain voltage control scheme used with D - STATCOM. **[8]**

b) Explain operation of D - STATCOM along with decoupled current control method. **[8]**

OR

Q5) a) Explain AC/AC electromechanical voltage regulator. **[8]**

b) Explain DVR and control strategies of DVR arrangements. **[8]**

♦♦♦♦

Total No. of Questions : 6]

SEAT No. :

P3754

[Total No. of Pages : 2

[5462] - 108
M.E. (Electrical) (Power Electronics and Drives)
POWER ELECTRONICS APPLICATIONS
(2013 Pattern) (Semester - III)

Time : 3 Hours] *[Max. Marks :50*

Instructions to the candidates:

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

Q1) a) What is the need of power flow controllers in the power system? Explain any one controller in detail. **[6]**

b) Discuss criteria of design of ac filters. Also mention various types of ac filters with their circuit configurations. **[6]**

c) Explain TSC & TCR covering the following points. **[6]**

i) Diagram

ii) Operation

iii) V - I characteristics

iv) Loss characteristics

OR

Q2) a) Draw the block diagram of the solar PV system and explain the operation in detail. **[6]**

b) Draw the diagram of HVDC substation and explain each of the component with its function. **[6]**

c) Explain with a neat sketch and waveforms the SSSC type of series controller. **[6]**

P.T.O.

Q3) a) Develop and describe the connection diagram for twelve pulse STATCOM for three phase system. **[10]**

b) Draw and explain the VI characteristics of STATCOM. **[6]**

OR

Q4) a) How an UPFC scheme can be implemented using two back to back voltage source converters? **[10]**

b) Describe the principle of following controls in UPFC. **[6]**
Control of series converter.

Q5) a) Identify the various voltage disturbances likely to occur in power system operation. How can it be control using uninterrupted power supplies? Explain its working with the help of block diagram. **[10]**

b) Draw and explain the schematic diagram of switched mode power supply. **[6]**

OR

Q6) Elaborate on the role of power electronics in following applications : **[16]**

a) AC – DC locomotives

b) Illumination

♦♦♦♦

Total No. of Questions : 4]

SEAT No. :

P3755

[Total No. of Pages : 2

[5462] - 109
M.E. (Power Electronics and Drives)
ADVANCED CONTROL SYSTEMS
(2013 Pattern)

Time : 3 Hours] *[Max. Marks :50*

Instructions to the candidates:

1) ***All questions are compulsory.***
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) Consider a plant described by $\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u$ and has a performance index

$$J = \int_0^\infty (x^T Q x + u^2) dt \text{ where } Q = \begin{bmatrix} 1 & 0 \\ 0 & \mu \end{bmatrix} (\mu \geq 0)$$

Determine

a) Riccati Matrix P.

b) Optimal feedback gain matrix K.

c) The closed loop eigenvalues.

[9]

Q2) a) Explain all signal and system norms. **[4]**

b) Write note on optimal control problems. **[5]**

P.T.O.

Q3) a) Define and explain concept of sliding mode control. Explain how chattering can be attenuated. **[8]**

b) $$\dot{x} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -2 & 3 & 1 \end{bmatrix} x + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} u + \begin{bmatrix} 0 \\ 0 \\ 0.6\sin(t) \end{bmatrix}$$

Design a sliding surface for the system to get $\xi = 0.8$ and $\omega_n = 5$. **[8]**

Q4) Explain the following in detail (any two) **[16]**

a) Transfer function of boost converter.

b) Control of solar system.

c) Distribution generation.

♦♦♦♦

Total No. of Questions : 8]

SEAT No. :

P3756

[Total No. of Pages : 2

[5462] - 110
M.E. (Electrical) (Power Electronics and Drives)
DESIGN OF POWER ELECTRONIC SYSTEMS
(2013 Pattern)

Time : 3 Hours] *[Max. Marks :50*

Instructions to the candidates:

1) ***Answer any one from 1 & 2, 3 & 4, 5 & 6, 7 & 8.***
2) ***Neat diagrams to the right indicate full marks.***
3) ***Use of calculator is allowed.***
4) ***Assume suitable data if necessary.***

Q1) Derive mathematical model of MOSFET. **[9]**

OR

Q2) Derive the mathematical modeling of Buck boost converter using circuit averaging method. **[9]**

Q3) a) Design a heat sink for a dc - dc Buck system. **[6]**

b) For the Buck converter, find the peak device current, the peak dissipation and the case to ambient thermal resistance. Use maximum junction temperature of 150°C and the ambient temperature to be at 40°C and the case temperature should not exceed 60°C. Duty ratio is 40%. The thermal impedance at 400mS is Z=0.4 °C/W. **[3]**

OR

Q4) An inductor is to be designed to meet the following specifications. L = 5 millihenries ; I rms = 3 A sinewave ; f = 100 kHz ;Ts = 90 C and Ta = 30 C . The inductor is to be fabricated on a double-E core made from 3F3 ferrite. The windings are be made with foil conductors which have kcu = 0.6. A core size of a = 2 cm is chosen for the design. The emissivity E of the surface of the completed inductor equals 0.9 and that the vertical height is 3a. **[9]**

a) Determine the conductor cross-sectional area, Acu, and number of turns N. Ignore eddy currents and the proximity effect.

b) Specify the length of the airgaps in the core. Assume four distributed airgaps.

P.T.O.

Q5) Explain the zero current switching technique in a Buck converter with necessary diagrams and waveforms. **[16]**

OR

Q6) Design a 2.5V, 1A Buck converter from a 12V dc source. The output voltage ripple should be less than 1% of the dc output voltage magnitude. The switching frequency is required to be 50 kHz . Consider the minimum load current to be 10% of load to maintain Continuous conduction mode. **[16]**

Q7) a) Explain gate drive circuit requirement. Explain any one firing circuit for thyristor. **[7]**

b) For step down converter circuit, the dc input voltage V_d = 500V , the load current I_o = 500A, and the switching frequency is 1kHz. The free wheeling diode has a reverse recovery time t_{rr} = 10 μs. The GTO has a current fall time t_{fl} = 1 μs, a maximum applied voltage rate dv/dt = 50 V/ μs, and a maximum controllable anode current I_{AM} = 1000A **[9]**

i) Find the appropriate values for resistance R_s and capacitance C_s for the turn-off snubber circuit.

ii) Estimate the power dissipated in the snubber resistance.

OR

Q8) a) Explain how gate drive of MOSFET is provided with isolation using optical isolator. **[8]**

b) Explain how snubbers are used for protection of power devices. Explain turn off snubber in detail. **[8]**

♦♦♦♦

Total No. of Questions : 08]

SEAT No. :

P3757

[Total No. of Pages : 3

[5462] - 111
M.E. (Electronics) (Digital System) (Semester - I)
DIGITAL SIGNAL PROCESSING ARCHITECTURES
(2013 Pattern)

Time : 3 Hours] *[Max. Marks :50*

Instructions to the candidates:

1) ***Answer any five questions.***

2) ***Figures to the right indicate full marks.***

3) ***Use of scientific calculator is allowed.***

4) ***Neat diagram must be drawn wherever necessary.***

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

Q1) Answer in short :

a) Under what condition, the result of convolution and correlation will be same. **[2]**

b) When we say. "DCT has high energy compaction". what do mean by that? **[3]**

c) For a similar input, the result of DFT and FFT are same, then why do we prefer FFT over DFT? **[2]**

d) How is Short Time Fourier Transform (STFT) a midway between Fourier transform and Wavelet transform. **[3]**

Q2) a) What is time domain aliasing, when does it occur? Suggest ways to overcome it. You may take an example to explain this. **[6]**

say $x_1(n) = \{5\ 2\ 3\}$ & $x_2(n) = \{2, 4\}$

b) With the aid of suitable block diagram and mathematical support explain sampling rate Conversion by a rational factor I/D. **[4]**

P.T.O.

Q3) a) In relation to DFT, explain the significance of Zero padding for different cases. What are its different advantages? **[4]**

b) Design a digital LPF, using Butterworth approximation, to meet the following specifications. **[6]**

Passband 0 - 500 Hz
Stopband 2 - 4 KHz
Passband ripple : 3dB
Stopband attenuation : 20 dB
Sampling rate : 8000 samples/sec
Use Bilinear transformation. Assume 2/Ts = 1

Q4) a) Compare the FIR filter design approach based on Windowing method' and Frequency Sampling method. **[4]**

b) Design a two - stage decimator that down samples an audio signal by a factor of 30, Satisfying the following constraints. Input sampling frequency : 240 KHz Highest frequency of interest : 3.4 KHz Passband ripple : 0.05. Stopband attenuation : 0.01 **[4]**

c) State True or false, Justify your answer. Butter worth filter approximation is preferred over chebyshev filter approximation. **[2]**

Q5) a) Explain Chirp Z transform algorithm in short. **[4]**

b) Compute DCT of the sequence, x(n) = {1, 2, 1, 2} **[4]**

c) What is the significance of Wavelet Packets over Traditional Wavelets. **[2]**

Q6) a) Convolve the following sequences using overlap add method **[4]**

x[n] = [1, –1, 2, 1, 2, –1, 1, 3, 1} h[n] = [1, 2, 1].

b) Explain Gibbs phenomenon in relation to FIR filter design. **[3]**

c) In short, explain Software Defined Radio architecture. **[3]**

Q7) a) In relation to Texas TMS 320 C XX processor, explain

i) Pipeling **[3]**

ii) VLIW architecture **[3]**

b) Write a short note on booth's algorithm. **[4]**

Q8) Answer in short :

a) What is the significance of MAC Block (Multiplier and Accumulator block) in any DSP Processor? **[2]**

b) In the generation of DTMF signal, we require two IIR filters. Why one is not sufficient? **[3]**

c) State True or false. Justify your answer, Interpolation process is lossy while decimation is non - lossy. **[3]**

d) State a filter which cannot be digitally designed. Justify your answer? **[2]**

♦♦♦♦

Total No. of Questions : 8]

SEAT No. :

P3758

[Total No. of Pages : 3

[5462] - 112
M.E. (Electronics) (Digital Systems)
MICRO ELECTRONICS
(2013 Pattern) (Semester - I)

Time : 3 Hours] *[Max. Marks :50*

Instructions to the candidates:

1) ***Solve any five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) Draw the VTC of CMOS inverter and explain in detail the different regions of operation. **[5]**

b) Draw the stick diagram and layout of the following functions. **[5]**

i) Inverter

ii) Two input OR gate

Q2) a) Draw and explain fabrication steps for following processes. **[5]**

i) n - well process

ii) p - well process

b) Draw CMOS inverter using static CMOS logic and explain the impact of W/L on propagation delay and power dissipation. **[5]**

Q3) a) Compare Bi CMOS and CMOS technologies with respect to following parameters. **[4]**

i) speed

ii) Noise margin

iii) Input resistance

iv) power dissipation

P.T.O.

b) Explain static power dissipation and dynamic power dissipation in CMOS logic circuit. **[4]**

c) Explain how CMOS inverter can be used as amplifier. **[2]**

Q4) a) Explain MOS gate capacitance model and diffusion capacitance model. **[4]**

b) Design 2 : 1 MUX using transmission gate and conventional static CMOS logic. Compare these two circuits with respect to speed and power. **[4]**

c) Explain why PMOS devices are used as pull up network and NMOS devices are pull down network? **[2]**

Q5) a) Design static CMOS logic circuits for the following expressions : **[4]**

i) $F = \overline{ABCD}$

ii) $F = \overline{A} + \overline{B}.\overline{C}$

iii) F = A. B. C + D

b) Write short note on the following (Any two) **[4]**

i) Layout design rules

ii) Channel length modulation

iii) Low power design techniques

c) Explain in brief logical effort and transistor sizing. **[2]**

Q6) a) Implement two input XOR gate in pass transistor logic. Explain its operation in brief. List drawbacks of pass transistor logic. **[4]**

b) Explain parasitic delay in CMOS VLSI circuit. In detail explain Elmore model for parasitic delay. **[4]**

c) Explain Lambda based design rules. **[2]**

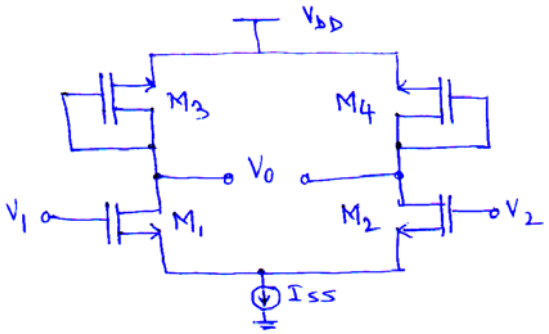
Q7) a) Draw the CMOS circuit of negative edge triggered D Flip - Flop and explain its operation. **[4]**

b) Why NAND is a preferred gate? How does mobility of electrons and holes affect size of gates in CMOS logic? **[4]**

c) Explain beta ratio effect on VTC of CMOS inverter. **[2]**

Q8) a) What are the various parasitic components in a CMOS circuit? With reference to CMOS inverter circuit explain parasitic delay. **[4]**

b) Determine the voltage gain of the circuit shown in figure below. Assume $\lambda \neq 0$, M_1 is identical to M_2 and M_3 is identical to M_4. **[4]**



c) Why NAND implementation is preferred over NOR implementation for implementing generic logic? **[2]**

♦♦♦♦

Total No. of Questions : 08]

SEAT No. :

P3759

[Total No. of Pages : 3

[5462] - 113
M.E. (Electronics) (Digital Systems)
RANDOM SIGNALS AND PROCESSES
(2013 Pattern) (Revised)

Time : 3 Hours] *[Max. Marks :50*

Instructions to the candidates:

1) ***Answer any 5 questions out of 8 questions.***
2) ***Answers to all the questions must be written in detail to its fullest length.***
3) ***Use of scientific calculator is allowed.***
4) ***Assume suitable data wherever required.***
5) ***Figures to the right indicate full marks.***

Q1) a) If a single (fair) die is rolled, determine the probability of each of the following event. **[5]**

i) Obtaining the number 3

ii) Obtaining a number greater than 4

iii) Obtaining a number less than 3 and obtaining a number greater than or equal to 2.

b) Find the characteristic function of the random variable X having density function. **[5]**

$$f_X(x) = e^{-\frac{1}{2}|x|} \text{ for all x}$$

What is a moment generating function?

Q2) a) Given the joint probability density function for two random variables X and Y **[5]**

$$f(x,y) = \begin{cases} 9\exp(-3x)\exp(-3y) & x, y \geq 0 \\ 0 & elsewhere \end{cases}$$

Check if it is a valid density function? Find the probability that X and Y lie between the limits 0 to 1. Find the marginal density functions.

b) Explain Bayes risk criterion and Neyman Pearson criterion. **[5]**

P.T.O.

Q3) a) Given the pdf for different x values as follows. x = 1, pdf = 0.2, x = 2, pdf = 0.1, x = 3, pdf = 0.3, x = 4, pdf = 0.3, x = 5, pdf = 0.1. Draw the pdf and its corresponding CDF. **[4]**

b) Define a wide sense stationary random process. What is ergodic process? **[3]**

c) A box contains five red, three green, four blue, and two white balls. What is the probability of selecting a sample size of six balls containing two red, one green, two blue, and one white ball? **[3]**

Q4) a) A random variable has probability density function given by the following equation. **[3]**

$$f(x) = \begin{cases} 0.1 & -3 \le x \le 7 \\ 0 & elsewhere \end{cases}$$

i) Find the mean value

ii) find the mean square value

b) Define a Gaussian random variable. How will you generate a normal distribution? How will you use a table for normal distribution to find the probability? **[4]**

c) Define skewness and kurtosis for a random variable. Draw the diagrams for distribution showing positive and negative skew. **[3]**

Q5) a) Describe the K - S test for fitting a distribution function for a continuous random variable. **[3]**

b) The density function of the variable X is given by **[4]**

$$f_x(x) = \left\{ \begin{matrix} \frac{1}{4} & -2 \le x \le 2 \\ 0 & otherwise \end{matrix} \right\}$$

Determine :

i) $P(X \le x)$

ii) $P(|x| \le 1)$

iii) The mean and the variance

c) State the central limit theorem. Write a procedure for evaluating the histogram from the data samples. **[3]**

Q6) a) Let event A be drawing a heart card from the pack of cards. Event B is drawing a king and event C be drawing a jack. Find which two events are statistically independent and which two events are mutually exclusive. **[3]**

b) Find the autocorrelation of the function $x(t) = e^{-4t}u(t)$. **[4]**

c) Define a power signal. Explain the relation between power spectral density and the autocorrelation function. **[3]**

Q7) a) Given the joint probability density function for two random variables X and Y. **[4]**

$$f(x, y) = \begin{cases} kx(1+y) & 0 < x \le 2, 0 < y \le 1 \\ 0 & elsewhere \end{cases}$$

Find value of k. Find marginal density functions.

b) Explain Bayes theorem. Explain use of Bayes theorem. **[3]**

c) Consider a random process given by $x(t) = A\cos(\omega_0 t + \vartheta)$ where A and ω_0 are constants. The variable ϑ is uniformly distributed between 0 to 2π. Find the autocorrelation and check if the process is wide sense stationary. **[3]**

Q8) a) Explain the a posteriori probability criterion for taking a decision for Hypothesis H_1. **[3]**

b) A random variable X has a mean value of 10 and a variance of 36. Another random variable Y has a mean value of – 5 and a variance of 64. The correlation coefficient for X and Y is – 0.25. Find the variance of the random variable Z = X + Y. **[4]**

c) Describe Bayes estimator. **[3]**

♦♦♦♦

Total No. of Questions : 8]

SEAT No. :

P3760

[Total No. of Pages : 2

[5462] - 114
M.E. (Electronic) (Digital System)
DESIGN FOR TESTABILITY
(2013 Pattern)

Time : 3 Hours] *[Max. Marks :50*

Instructions to the candidates:

1) ***Answer any five questions.***
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.***

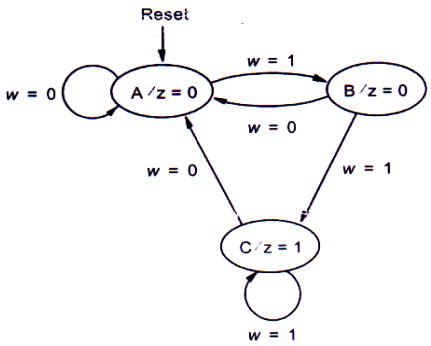
Q1) a) Derive minimum cost SOP expression for f(x1,.....x4) = Σm(0,1,3,4,7,11,13,15) + d(9, 12, 14) use tabular method. **[5]**

b) For the function f($w_1 \oplus w_2 \oplus w_3$) implement three input XOR using 4 : 1. **[5]**

Q2) a) Implement $f = \overline{w}_2 w_3 + \overline{w}_1 w_2 \overline{w}_3 + w_2 \overline{w}_3 w_4 + w_1 \overline{w}_2 \overline{w}_4$ Using three input look up table. **[5]**

b) Write VHDL code for 4 bit adder using instantial Statements. **[5]**

Q3) a) Give the state table, ASM Chart and VHDL program for the state diagram shown in following Fig. **[5]**



b) Derive state diagram of serial adder with the help of state assigned table. **[5]**

P.T.O.

Q4) a) Explain Partitioning minimization procedure for suitable FSM with the help of state table. **[5]**

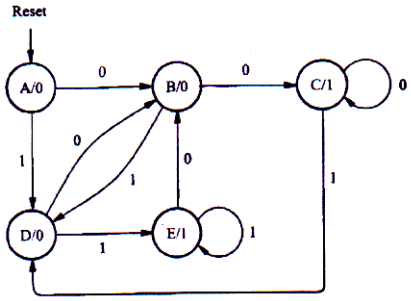
b) Write VHDL code to expand 8 - to - 1 multiplexer using component 2 - to - 1 multiplexer. **[5]**

Q5) a) Explain the significance of enable input in digital circuits with example. **[5]**

b) Explain the working of SRAM Cell. **[5]**

Q6) a) Explain what is clock skew and its effect on digital circuits. **[5]**

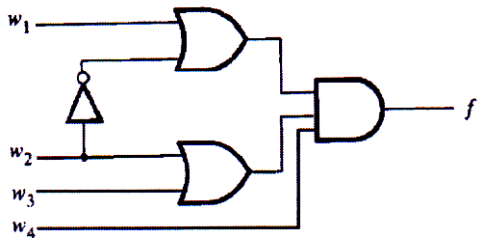
b) Write VHDL code to implement the FSM given in figure. **[5]**



Q7) a) Implement the function $f = W_1W_2 + W_1W_3 + W_1W_2$ using Shanon's expansion method with 4 : 1 multiplexer. **[5]**

b) Explain in detail static hazard with example. **[5]**

Q8) a) For the circuit shown in following Fig. sensitize each path in this circuit to obtain complete test set that comprises a minimum number of tests. **[5]**



b) What is meant by design for testability? What are the characteristics of DFT. **[5]**

♦♦♦♦

Total No. of Questions : 8]

SEAT No. :

P3761

[Total No. of Pages : 2

[5462] - 115
M.E. (E & TC) (Communication Networks)
DIGITAL COMMUNICATION RECEIVERS
(2013 Credit Pattern) (Semester - III)

Time : 3 Hours] *[Max. Marks :50*

Instructions to the candidates:

1) ***Answer any 5 questions out of 8.***
2) ***Neat diagrams and waveforms 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 on linear and non - linear modulation techniques. **[5]**

b) Describe in detail the two fair ways of comparing different curves that depict biterror probability versus Eb/No. **[5]**

Q2) a) Draw signal space and spectral diagram of 16 QAM, 16 - ary PSK, QPSK and MSK digital CW modulation. **[5]**

b) Binary data is transmitted using PSK at a rate 3 Mbps over RF link having bandwidth 10 MHz. Find signal power required at receiver input so that error probability is less than or equal to 10^{-4}. Assume noise PSD to be 10^{-10} watt/Hz. ($Q(3.71) = 10^{-4}$). **[5]**

Q3) a) Write a note on maximum likelihood sequence detector. **[5]**

b) Consider the signal S(t) shown in fig. **[5]**

Determine the impulse response of a filter matched to this signal and sketch it as a function of time, Plot the matched filter output as a function of time.

P.T.O.

Q4) a) Explain how the probability of error is reduced by using Envelope detection for M - ary signal. **[5]**

b) Explain the Maximum a Posteriori probability rule (MAP) and Maximum Likelihood Rule (ML) for receiver. What is difference between them. **[5]**

Q5) a) For each of the fading - effect cateegories below, name an application that generally fits that category. Provide numerical justification. **[5]**

i) Frequency – selective, fast - fading

ii) Frequency – selective, show - fading

iii) Flat – fading, fast - fading

iv) Flat - fading, slow - fading

b) Explain the RAKE demodulator in detail. **[5]**

Q6) a) What are the statistical models for multipath fading channels? Explain them. **[5]**

b) What is small scale fading? Explain the factors influencing small scale fading. **[5]**

Q7) a) Explain feedback equalizer, and equalization of Trellis - coded signals. **[6]**

b) Explain Non - Decision - directed PLL for carrier phase estimation of PAM signals. **[4]**

Q8) a) With reference to Adaptive Equalization describe **[6]**

i) Blind equalizers

ii) Echo cancellation

b) What are decision directed loops for carrier phase estimation? Explain in detail. **[4]**

♦♦♦♦

Total No. of Questions : 8]

SEAT No. :

P3762

[Total No. of Pages : 2

[5462] - 116
M.E. (E & T.C.) (Communication Network)
MOBILE COMPUTING
(Semester - III)
(2013 Pattern)

Time : 3 Hours] *[Max. Marks :50*

Instructions to the candidates:

1) ***Answers any Five questions out of Q. 1 to Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) What are the functional differences in various generation of computing? **[5]**

b) Discuss Call routing mechanism in GSM. **[5]**

Q2) a) Discuss the various aspects of 3G mobile technology. **[5]**

b) Explain wireless LAN architecture. **[5]**

Q3) a) Discuss GSM signaling protocol architecture. **[4]**

b) Explain 802.16 Wi - Max architecture. **[4]**

c) Write short note on 4G technology. **[2]**

Q4) a) Discuss the benefits and features of 3G Mobile Technology. **[4]**

b) How are mobility and handoff managed in wireless LAN? **[4]**

c) Explain paging process in cellular technology. **[2]**

P.T.O.

Q5) a) Explain GSM speech signal processing with necessary schematic. **[4]**

b) Explain various security models used in mobile computing. **[4]**

c) Compare OFDM and CDMA techniques. **[2]**

Q6) a) Give six functions where CDMA is different from GSM? **[4]**

b) Write a short note on GSM token based registration. **[4]**

c) Describe the protocol stack of Bluetooth. **[2]**

Q7) a) What is H.323? Explain in details? **[4]**

b) How do you performing handoff during roaming. **[4]**

c) Write note on wireless security standards. **[2]**

Q8) a) What are the different realtime protocols available for realtime data transmission over IP. **[4]**

b) What is the difference between cell sectoring and cell splitting. **[4]**

c) Write note on VOIP system. **[2]**

♦♦♦♦

Total No. of Questions : 8]

SEAT No. :

P3763

[Total No. of Pages : 2

[5462] - 117
M.E. (E & TC) (Signal Processing)
SIGNAL PROCESSING TECHNIQUES
(2013 Pattern)

Time : 3 Hours] *[Max. Marks :50*

Instructions to the candidates:

1) ***Answer any Five questions.***

2) ***Neat diagrams must be drawn wherever necessary.***

3) ***Figures to the right indicate full marks.***

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

Q1) a) Design a LP Butterworth filter to meet following specifications. **[5]**

Minimum pass band gain = 0.89

Maximum stop band gain = 0.2

Pass band edge frequency = 30 Hz

Stop band edge frequency = 75 Hz

b) Derive the expression for impulse response of FIR bandstop filter. **[5]**

Q2) a) Design LPF using Frequency sampling method. **[5]**

Pass band : 0 - 5 KHz

Sampling rate : 18 KHz.

M : 9

b) Explain the use of adaptive filter in removing the artifacts of EEG signal. **[5]**

P.T.O.

Q3) a) Design a two stage decimator to reduce the sampling rate from 96 KHz to 1 KHz. **[4]**

Decimation factors : 32, 3

Pass band deviation : 0.01

Stop band deviation : 0.001

Highest frequency of interest : 450Hz

b) Explain the FIR filter design using window method. **[3]**

c) State three important differences between FIR & IIR filter. **[3]**

Q4) a) Explain the decimation and interpolation process. **[4]**

b) Explain software implementation of decimator. **[3]**

c) Explain the desirable features of a digital signal processor. **[3]**

Q5) a) First six values of the signal are

$x(n) = [1 \quad 1.5 \quad 0.75 \quad 0.375 \quad 1.875 \quad 0.0938]$ use Pade approximation to find a model containing one pole and one zero. **[4]**

b) Explain VLIW architecture of digital signal processor. **[3]**

c) Explain the application of multirate DSP in oversampling of ADC. **[3]**

Q6) a) Explain pipelining and parallel processing in digital signal processor. **[4]**

b) Explain with an example, algorithm of unfolding. **[4]**

c) What is saturation arithmetic in DSP? **[2]**

Q7) a) How adaptive filter is used for channel equalization? **[4]**

b) Explain, with example, Pade approximation method. **[4]**

c) What is the role of gaurd bits in DSP. **[2]**

Q8) a) What are the uses of refining. Explain any one with the help of example. **[4]**

b) Explain the optimal ripple FIR filter design method. **[4]**

c) What minimum size FFT must be used to compute a DFT of 40 points? What must be done to samples before FFT is applied? **[2]**

♦♦♦♦

Total No. of Questions : 8]

SEAT No. :

P3764

[Total No. of Pages : 3

[5462] - 118
M.E. (E & Tc) (Signal Processing)
IMAGE PROCESSING AND ANALYSIS
(2013 Pattern)

Time : 3 Hours] *[Max. Marks :50*

Instructions to the candidates:

1) ***Attempt not more than 05 questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***All questions carry equal marks.***
5) ***Use of logarithmic tables slide rule, mollier charts, electronic pocket calculator and steam tables is allowed.***
6) ***Assume suitable data, if necessary.***

Q1) a) What is histogram & histogram equilization? Find out equalized histogram for the following : **[6]**

Gray Level	0	1	2	3	4	5	6	7
Count	10	50	75	75	100	60	20	10

b) How uniform sampling and quantization is used in image digitization. Explain gray level resolution. What is False contour effect? **[4]**

Q2) a) Justify the statement, median filter is an effective tool than average filter to minimize salt and pepper noise considering the image. **[6]**

$$I = \begin{bmatrix} 24 & 23 & 20 & 25 & 22 & 23 \\ 21 & 250 & 21 & 0 & 23 & 24 \\ 22 & 23 & 24 & 30 & 25 & 22 \end{bmatrix}$$

b) With the help of block diagram explain frequency domain smoothening of an image. **[4]**

P.T.O.

Q3) a) What is KL transform? Discuss its properties & application. What is it drawback and why DCT is preferred over it. **[6]**

b) Explain the difference between image enhancement & image restoration? How inverse filtering is used in image restoration. **[4]**

Q4) a) Define following statistical parameters for an image and calculate all these parameters for segment of an image given below **[6]**

i) Mean

ii) Variance

iii) Standard deviation

iv) Histogram

$$\text{Img} = \begin{bmatrix} 20 & 140 & 100 & 20 \\ 20 & 140 & 100 & 20 \\ 240 & 140 & 240 & 240 \\ 240 & 140 & 240 & 240 \end{bmatrix}$$

b) What is the need of different colour model? Explain RGB to HSI colour model & its importance. **[4]**

Q5) a) Perform Erosion & Dilation of an image 'A' given below using structuring element 'B'. **[6]**

$$A = \begin{bmatrix} 0 & 0 & 0 & 0 \\ 0 & 1 & 1 & 0 \\ 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix} \quad B = \begin{bmatrix} 0 & 1 & 0 \\ 1 & \boxed{1} & 1 \\ 0 & 1 & 0 \end{bmatrix}$$

b) What is Fourier Descriptors? How they obtained and used to represent boundary. what is its advantage? **[4]**

Q6) a) The image matrix for an 8 bit image is given as follows **[6]**

$$I = \begin{bmatrix} 16 & 64 & 208 & 160 & 16 \\ 16 & 64 & 16 & 160 & 16 \\ 16 & 64 & 16 & 160 & 16 \\ 16 & 64 & 16 & 160 & 16 \\ 16 & 64 & 208 & 160 & 16 \end{bmatrix}$$

Find out

i) Entropy of the image

ii) Compression ratio possible through coding and inter pixel redundancy removal

iii) Huffman code

b) Explain the algorithm for finding out skeleton of an image. **[4]**

Q7) a) Explain DCT. Explain JPEG base line encoder using DCT. Why DCT is preferred in JPEG compared to other transform. **[6]**

b) Draw a transformation that will highlight range of intensity values between A and B and will preserve all other. Explain it. **[4]**

Q8) a) A skilled medical technician is charged with the job of inspecting a certain class of monochrome images generated by electron microscope. To facilitate the inspection the technician uses image processing aids. However when technician examines the images, he finds following problems

i) Presence of bright isolated dots that are not of interest.

ii) Lack of sharpness

iii) Poor contrast

Propose and explain sequence of pre - processing steps that technician may use to overcome the above problems. **[6]**

b) Explain region splitting & merging algorithm for image segmentation. **[4]**

♦♦♦♦

Total No. of Questions : 10]

SEAT No. :

P3765

[Total No. of Pages : 2

[5462] - 119
M.E. (E & Tc) (VLSI & Embedded Systems)
EMBEDDED SIGNAL PROCESSORS
(2013 Pattern) (Semester - II)

Time : 3 Hours] *[Max. Marks :50*

Instructions to the candidates:

1) ***Attempt any five questions.***
2) ***Draw neat diagrams wherever necessary.***
3) ***All questions carry equal marks.***
4) ***Assume suitable data wherever required.***
5) ***Figures to right indicates full marks.***

Q1) a) Explain in brief real time embedded signal processing. **[4]**

b) Discuss Linear Convolution with suitable example. **[3]**

c) Explain the terms convolution, correlation & covariance. **[3]**

Q2) a) Compare FIR & IIR filters. Which types of filters are used more in practice? Why? **[4]**

b) What is zero - padding? Explain its significance. **[3]**

c) Write a short note Digital Filters. **[3]**

Q3) a) Explain Linear & Non - Linear filters with suitable examples. **[4]**

b) Explain use of Adaptive Filters for noise cancellation & system identification. **[3]**

c) Describe Sampling & Ouantization. **[3]**

P.T.O.

Q4) a) Discuss design steps of IIR filters using Bilinear Transformation method. **[4]**

b) Write a short note on DFT. **[3]**

c) Explain FFT. **[3]**

Q5) a) What are structures? Explain its types. **[4]**

b) Explain the characteristics of Window Function. **[3]**

c) Write short note on Gibb's phenomenon. **[3]**

Q6) a) Describe MAC and Barrel shifter in DSP processors. **[4]**

b) Explain application of DSP in image processing. **[3]**

c) Draw and Explain architecture overview of Black fin processor. **[3]**

Q7) a) Explain the architecture of DSP processor with neat diagram. **[4]**

b) Give different addressing formats of DSP processors. **[3]**

c) With neat block diagram explain the software development tools used for designing DSP system. **[3]**

Q8) a) Explain Wavelet algorithm in brief. **[4]**

b) Discuss the DSP application in image enhancement **[3]**

c) Explain any one adaptive filtering algorithm. **[3]**

♦♦♦♦

Total No. of Questions : 8]

SEAT No. :

P3766

[Total No. of Pages : 3

[5462] - 120
M.E. (E & TC) (VLSI & Embedded Systems)
FAULT TOLERANT SYSTEMS
(2013 Pattern)

Time : 3 Hours] *[Max. Marks :50*

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***

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

3) ***Solve any five questions.***

Q1) a) For full adder shown in Figure 1, draw binary decision diagrams for i) Sum ii) Carry. Consider A as a root node. **[8]**

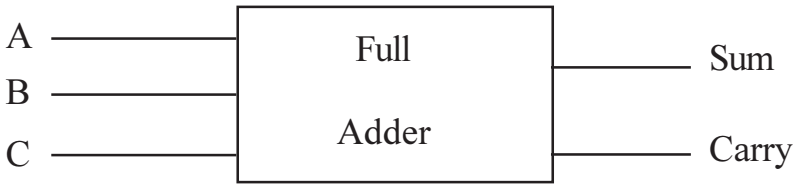


Figure 1

b) Briefly explain the concept hardcore. **[2]**

Q2) a) List & briefly explain all types of cross point faults. **[8]**

b) Discuss the term pin - fault model. **[2]**

Q3) a) Construct all primitive cubes for $z = \overline{b} + \overline{a}\ c$. **[4]**

b) Discuss the concept of self checking checkers. **[6]**

P.T.O.

Q4) a) Define bridging fault. Find test vector that determine the OR bridging fault between input A & B in Figure 2. **[4]**

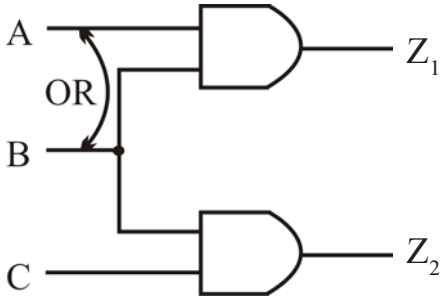


Figure 2

b) Explain with block diagram the working of compression technique. **[6]**

Q5) a) How to detect hazards present in asynchronous circuits? **[5]**

b) Describe the working of boundary - scan cell with the help of an example. **[5]**

Q6) a) List & explain types of inertial delay model. **[5]**

b) Discuss the functional & structural forms of off - line BIST techniques. **[5]**

Q7) a) Find all test vectors that determine the stuck - at - zero fault present at input D in Figure 3. **[8]**

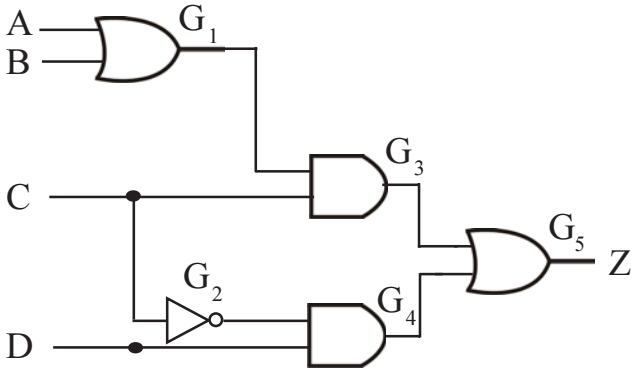


Figure 3

b) List any four benefits of on - line testing. **[2]**

Q8) a) Write a short note on syndrome testing. **[6]**

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

i) Structural faults

ii) Functional faults

♦♦♦♦

Total No. of Questions : 8]

SEAT No. :

P3767

[Total No. of Pages : 3

[5462] - 121

M.E. Instrumentation and Control

(Biomedical/Process Instrumentation)

MATHEMATICAL METHODS IN INSTRUMENTATION

(2013 Pattern)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Assume suitale data if necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of calculator is allowed.***

Q1) a) Explain orthonormal vectors with suitable examples. **[2]**

b) Examine whether the following vectors are linearly dependent or independent (1, 1, 0, 0), (0, 1, –1, 0), (0, 0, 0, 3) in R^4. **[4]**

c) Show that the set {(1, 2, 1), (2, 1, 0), (1, –1, 2)} form a basis for V_3 (F). **[4]**

Q2) a) Let $\overline{v}_1=(1,0,1)$ $\overline{v}_2=(-1,1,0)$ be an orthonormal set of vectors in R^3, if $\overline{u}=(1,2,3)$ find orthogonal projection $\overline{u}$ on W and orthogonal component of $\overline{u}$ to W. **[5]**

b) Obtain orthonormal vectors from the following vectors (Use Gram-Schmidt method) $\overline{u}_1=(1,1,1)$ $\overline{u}_2=(-1,1,0)$, $\overline{u}_3=(1,2,1)$. **[5]**

Q3) a) Find Square root of 29 by Newton Raphson method. **[3]**

P.T.O.

b) Solve by Gauss Elimination method. **[5]**

$$5x+y+z=6$$
$$3x+3y+4z=20,$$
$$2x+y+3z=13$$

c) Explain role of Numerical method in Mathematics. **[2]**

Q4) a) Determine the value of y when $x = 0.1$, by Euler modified method given that $\frac{dy}{dx}=x^2+y^2$, $y(0) = 1$ and $h = 0.05$. **[5]**

b) Show that in a poisons distribution with unit mean, mean deviation about mean is (2/e) times the standard deviation. **[5]**

Q5) a) Let X be a random variable define by a density function **[5]**

$f(x)=e^{-x}, x\geq 0$. and $f(x) = 0$, otherwise. Find i) E(X), ii) $E(X^2)$

b) Explain the terms skewness and kurtosis with suitable examples. **[5]**

Q6) a) A joint PDF of two continuous random variable X and Y is **[5]**

$f(x, y) = c(2x + y)$, $0 < x < 1$, $0 < y < 2$. and $f(x, y) = 0$, otherwise.

i) Find the value of constant C.

ii) Find $p\left[X>\frac{1}{2}, Y<\frac{3}{2}\right]$.

b) A random variable X has a probability density function given by **[5]**

$f(x)=2e^{-x}, x\geq 0$. and $f(x) = 0$, $x < 0$. Find

i) Moment generating function.

ii) The first four moment about origin.

Q7) a) Find singular value decomposition of the matrix **[5]**

$$A=\begin{bmatrix} -3 & 0 \\ 0 & 0 \end{bmatrix}.$$

b) Find the probability that in a family of 4 children there will be **[5]**

i) At least 1 boy,

ii) At least 1 boy and 1 girl.

Assume that the probability of male birth is ½.

Q8) a) Show that the vectors $\overline{v}_1=\left(-\frac{3}{5},\frac{4}{5},0\right)$, $\overline{v}_2=\left(\frac{4}{5},\frac{3}{5},0\right)$, $\overline{v}_3=(0,0,1)$ form an orthonormal basis of R^3. With Euclidean inner product. Find the coordinate of (1, –1, 2) relative to the basis. **[5]**

b) Assume that the probability of an individual coal miner being killed in a mine accident during a year is $\frac{1}{2400}$. Use appropriate statistical distribution to calculate probability that in a mine employing 200 miners, there will be at least one fatal accident in a year. **[5]**

Total No. of Questions : 8]

SEAT No. :

P3768

[Total No. of Pages : 2

[5462] - 122

M.E. (Instrumentation & Control)

BIOMEDICAL INSTRUMENTATION

Bio-Signal Processing

(2013 Pattern)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any 5 questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Use of electronic pocket calculator is allowed.***
4) ***Assume suitable data, if necessary.***

Q1) Determine the unit step response of the system described by the difference equation :

$y(n)=0.9\,y(n-1)-0.81\,y(n-2)+x(n)$

under the initial conditions $y(-1)=y(-2)=1$. **[10]**

Q2) Determine the convolution and auto-correlation for

$x_1(n)=x_2(n)=\{1,2,3\}$. **[10]**

Q3) Define a system function. What is pole-zero plot of a system? Determine system function and sketch a pole-zero plot for a system given by:

$$y(n)+\frac{3}{4}y(n-1)+\frac{1}{8}y(n-2)=x(n)+x(n-1).$$ **[10]**

Q4) a) Determine the circular convolution of the following sequences using DFT-IDFT method : **[6]**

$x_1(n) = \{5, 3, 2, 6\}$

$x_2(n) = (7, 8, 9, 10\}$

b) State the following properties of DTFT : **[4]**

i) Time reverse.

ii) Frequency shift.

P.T.O.

Q5) a) Determine the order and poles of a low-pass Butterworth filter that has a –3dB bandwidth of 500 Hz and an attenuation of 40 dB at 1000 Hz. **[5]**

b) Determine the order and poles of a low-pass type-I Chebyshev filter that has a 1dB ripple in the passband, cut-off frequency $\Omega_p = 1000\pi$, a stopband frequency of $\Omega_s = 2000\pi$ and an attenuation of 40 dB or more for $\Omega \geq \Omega_s$. **[5]**

Q6) a) Explain how the adaptive filtering techniques are used for eliminating noise interference in biomedical signal processing. **[5]**

b) Explain the RLS algorithm in adaptive filtering. **[5]**

Q7) Compute the 8-point DFT of sequence $x(n) = \cos(2\pi n)$ using decimation-in-frequency radix-2 FFT algorithm. **[10]**

Q8) Design an FIR high-pass filter with $\omega_c = \pi/4$ rad/sec and M = 15. Use Blackman and Barlet window functions. **[10]**

Total No. of Questions : 7]

SEAT No. :

P3809

[Total No. of Pages : 2

[5462]-123

M.E (Biomedical Instrumentation & Control)

Analytical Instrumentation

(2013 Pattern) (Semester - I)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagram must be drawn whenever necessary.***
3) ***Figure to the right candidates indicate full marks.***
4) ***Use of logarithmic tables slide rule, mollier charts, electronic pocket calculator and steam table is allowed.***
5) ***Assume suitable data, if nessacary.***

Q1) a) Give Detail Classification of Instrumental Method of Chemical Analysis. **[5]**

b) Explain following term with suitable example. **[5]**

Qualitative analysis

Q2) a) Draw electromagnetic spectrum show one source and one detector in each region. **[5]**

b) Explain in detail Premix burner used in flame photometer with neat sketch. **[5]**

Q3) a) Explain with neat sketch Ratio Recording flouriometer. **[5]**

b) Explain with neat sketch Spectroflouriometer. **[5]**

Q4) a) Explain Time of flight mass spectrometer with neat sketch. **[5]**

b) Explain HPLC with neat sketch. **[5]**

Q5) a) Explain Any one type of detector used in HPLC with neat sketch. **[5]**

b) Explain Thin Layer chromatography with neat sketch. **[5]**

P.T.O.

Q6) a) Explain Instrumentation for 'X-ray Spectroscopy. **[5]**

b) Explain with neat sketch GM Counter. **[5]**

Q7) a) Explain NMR Spectroscopy with neat sketch. **[5]**

b) Explain experimental set up of Voltametry with neat sketch. **[5]**

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Total No. of Questions : 6]

SEAT No. :

P3769

[Total No. of Pages : 2

[5462] - 124

M.E. (Instrumentation & Control) (Process & Biomedical)

RESEARCH METHODOLOGY

(2013 Pattern) (Semester - I)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Solve any five questions.***
2) ***Neat diagram must be drawn whenever necessary.***
3) ***Figures to the right candidates indicate full marks.***
4) ***Use of electronic pocket calculator.***
5) ***Assume suitable data, if necessary.***

Q1) a) Discuss in brief with suitable example parameter estimation. **[5]**

b) Write short note on Depth Interviews. **[5]**

Q2) a) What are static characteristics of instruments used in experimental setup? **[5]**

b) Explain different types of variables used in research. **[5]**

Q3) a) What are sources of research problem? **[5]**

b) Explain criteria of good research. **[5]**

Q4) a) How do objectives help in hypothesis formulation? Explain and illustrate. **[5]**

b) Explain different steps in writing research report. **[5]**

P.T.O.

Q5) a) Which method of primary data, do you think, is the best and why? **[5]**

b) Explain different plots to shows the performance curves in research study. **[5]**

Q6) a) Describe the techniques of defining a research problem. **[5]**

b) What is the relevance of setting objectives in research? How are the objectives set? **[5]**

Total No. of Questions : 5]

SEAT No. :

P3770

[Total No. of Pages : 2

[5462] - 125

M.E. (Instrumentation & Control) (Semester - II)

TRANSDUCER DESIGN

(2013 Pattern)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Neat diagram must be drawn whenever necessary.***
3) ***Figures to the right candidates indicate full marks.***
4) ***Use of electronic pocket calculator.***
5) ***Assume suitable data, if necessary.***

Q1) Attempt any two of the following :

a) List different characteristics of sensors and its importance in selection of sensors. **[5]**

b) Give importance of proximity sensors. Explain any one in detail. **[5]**

c) List applications of transducers in Biomedical and explain any one in detail. **[5]**

Q2) Attempt any two of the following :

a) Explain important characteristics of semiconductor type strain gauges in detail. **[5]**

b) Explain construction and working of digital thermometer used for measurement of human body temperature. **[5]**

c) Explain design of electromechanical transducer for level measurement. **[5]**

P.T.O.

Q3) Attempt any two of the following :

a) Explain design of weight measurement system using strain gauge load cell. **[5]**

b) Explain different primary force sensors in detail. **[5]**

c) Explain industrial applications of gas sensors. **[5]**

Q4) Attempt any two of the following :

a) Give general selection criteria for any flowmeter. **[5]**

b) Explain biosensors and its applications. **[5]**

c) Explain manufacturing process of MEMS with neat sketch. **[5]**

Q5) Attempt any two of the following :

a) List different gas sensor with its application. **[5]**

b) What are chemical sensors? Explain their importance in measurement systems. **[5]**

c) Write short note on LASER applications. **[5]**

Total No. of Questions : 8]

SEAT No. :

P3771

[Total No. of Pages : 2

[5462] - 126

M.E. (Instrumentation and Control)

BIOMEDICAL INSTRUMENTATION

Digital Image Processing

(2013 Pattern)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Solve any five questions.***
2) ***Assume suitable data if necessary.***
3) ***Use of calculators, log tables, charts is allowed.***
4) ***Figures to the right indicate full marks.***

Q1) a) What is the difference between Gray Scale Image and Color Image? Explain various Color Image models. **[5]**

b) Explain hardware for digital image processing systems. **[5]**

Q2) a) Explain brightness adaption and descrimination. **[5]**

b) Explain various image transformations. **[5]**

Q3) a) Define 2D DCT. Explain its properties. **[5]**

b) Define 2D DFT. Explain its properties. **[5]**

Q4) a) How do you enhance the image by Contrast Intensification? Explain in detail. **[6]**

b) Explain Image Enhancement in the frequency domain. **[4]**

P.T.O.

Q5) a) Explain the following terms : **[6]**

i) Histogram Equalization.

ii) Image sharpening.

b) Write a note on "Homomorphic Filtering". **[4]**

Q6) a) Explain image restoration with suitable example. **[5]**

b) Discuss the need of image restoration. **[5]**

Q7) a) Explain Edge Linking in Image Segmentation. **[5]**

b) Describe Region Growing and Region Splitting method of Image Segmentation. **[5]**

Q8) a) Detect the edges in the following image using Robert operator. **[5]**

10	20	30
20	10	20
30	20	10

b) Explain line detection with suitable example. **[5]**

Total No. of Questions : 8]

SEAT No. :

P3772

[Total No. of Pages : 2

[5462] - 127

M.E. (Instrumentation & Control) (Biomedical)

COMMUNICATION PROTOCOLS FOR INSTRUMENTATION

(2013 Pattern)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any 5 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 physical layer of HART. **[4]**

b) With respect to Communication Basics, explain **[4]**

i) Synchronous Communication and Manchester Encoding.

ii) Cyclic Redundancy Codes.

c) What is a data frame in communication? List any two fields used in a frame. **[2]**

Q2) a) Explain the steps involved in calibrating the HART field devices. **[4]**

b) Compare MODBUS and MODBUS plus protocols. **[4]**

c) What is the difference between conventional and Fieldbus devices. **[2]**

Q3) a) Explain the Token passing Bus Arbitration Method. **[4]**

b) Explain the hierarchical communication model in Process Automation. Also discuss the Network requirements at different levels. **[4]**

c) Draw a neat diagram of OSI reference model. **[2]**

P.T.O.

Q4) a) List and explain the information contained in segment drawings. **[4]**

b) With neat diagrams, explain the following topologies used in process industry **[4]**

i) Daisy chain.

ii) Chicken foot.

iii) Point to point.

iv) Spur.

c) Explain terminations and its use with respect to Fieldbus devices. **[2]**

Q5) a) Explain the Resource block, Transducer block and function block in Fieldbus devices. **[5]**

b) Explain the Bluetooth Protocol with respect to the mapping on OSI layer. **[3]**

c) List any two physical network design rules applying to Spurs in Profibus PA. **[2]**

Q6) a) What is the ZWave Protocol? Explain its applications in brief. **[5]**

b) Explain the role of Ethernet in communication protocol. **[3]**

c) Explain Synchronous Communication with neat waveform. **[2]**

Q7) a) With neat sketches, explain the physical layer of Foundation Fieldbus H1. **[5]**

b) With neat diagrams, explain the hybrid method used for regulating media access in Profibus DP systems. **[5]**

Q8) Write short notes :

a) Wi Fi. **[5]**

b) Grounding Schemes for IC 61158 - 2 segment. **[5]**

Total No. of Questions : 8]

SEAT No. :

P3773

[Total No. of Pages : 2

[5462] - 128

M.E. (Biomedical Instrumentation) (Semester - III)

MEDICAL IMAGING TECHNIQUES

(2013 Pattern)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Use of scientific calculator is allowed.***
3) ***Draw diagrams wherever necessary.***
4) ***Figures to the right indicate full marks.***

Q1) a) Explain the role of energy in medical imaging. **[4]**

b) How does the sensitivity and specificity describe the performance of any imaging technique? **[4]**

c) What is Characteristic X ray? **[2]**

Q2) a) Explain how image quality characteristics like contrast, noise and artifacts affect visibility. **[4]**

b) What are front panel controls for an Xray machine and which internal blocks do they control? **[4]**

c) What is the advantage of using high frequency generator in Xray Machine? **[2]**

Q3) a) Compare fluroscopy and radiography. **[5]**

b) What is the need of automatic exposure control in Mammography unit? How it is achieved? **[2 + 3 = 5]**

Q4) a) Define Contrast. Explain Gray scale of contrast. **[4]**

b) Explain the Calibration procedure used for CT Scanner. **[4]**

c) What is Doppler Effect in ultrasound? **[2]**

P.T.O.

Q5) a) Describe various scanning techniques used in CT. Explain how the progressive development in scanning techniques have helped reduce the scanning time. **[5]**

b) Write short note on 'Colour Doppler Flow Imaging'. **[5]**

Q6) a) What is the need of compression in Mammography? **[3]**

b) What is the M mode display of Ultrasound system? Name the application that uses M mode. **[5]**

c) What is the purpose of guide wire in Angiography? **[2]**

Q7) a) What is Stefan Boltzman law? What is the basic principle of thermal imaging? **[4]**

b) What are the advantages of Nuclear magnetic resonance over other imaging techniques? **[4]**

c) What is the need of mechanical matching in ultrasound transducer? How it is achieved? **[2]**

Q8) a) Explain with the help of a diagram the working of Gamma Camera. **[5]**

b) Describe the process of generation of relaxation time T1 and T2 in MRI. How is it used in disease identification? **[5]**

Total No. of Questions : 6]

SEAT No. :

P3775

[Total No. of Pages : 2

[5462] - 130

M.E. (Computer Engineering)

HIGH PERFORMANCE DATABASES

(2013 Course)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

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

Q1) a) How Database Tuning relate to Database performance? What are the scenarios to be followed for weak normal forms, demoralization and decomposition? **[4]**

b) While creating an Index what is your consideration in following : **[5]**

i) Choosing primary index.

ii) Hash versus Tree index.

Q2) a) Define Database fragmentation. Explain the translation of global queries to fragment queries. **[4]**

b) Describe mathematical model for evaluating costs and benefits of the Allocation of horizontal fragments and vertical fragments of global relation R in distributed database. **[5]**

Q3) a) Write a short note on following (Any One): **[4]**

i) TP Monitors.

ii) Transactional workflow.

b) Explain the key properties of Multi Databases. Suggest any way where Multi database guarantees that there is at most one active global transaction at any time. **[5]**

P.T.O.

Q4) a) Design a XML, DTD and schema for a book store where we need to maintain the data for multiple books. Demonstrate at least three book details. **[5]**

b) Explain SOAP architecture for web databases. **[4]**

Q5) a) Explain Spatial Data Model and Spatial Database Queries. **[4]**

b) Write a short note on (Any One) : **[3]**

i) Mobility and Personal Database.

ii) Temporal Database.

Q6) a) Case Study : For a professional social media application you are about to create a large amount of storage. Explore your ideologies for the same in concern with Database Design and storage. **[4]**

b) Explain the use of Task Tracker in the Hadoop cluster. **[3]**

Total No. of Questions : 8]

SEAT No. :

P3776

[Total No. of Pages : 3

[5462] - 131

M.E. (Computer Engineering) (Semester - I)

APPLIED ALGORITHMS

(2013 Pattern)

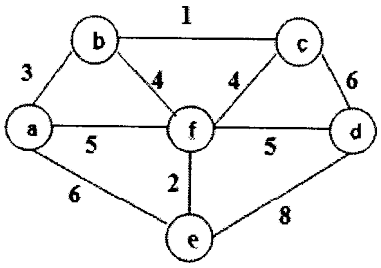
Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Q.No. 1 is compulsory. Solve any five questions from Q.No. 2 to Q.No. 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 asymptotic notations : Big O, Omega, and Theta notations with suitable example. **[5]**

b) Write PRIM's algorithm of minimum spanning tree using greedy approach. Find the cost of minimum spanning tree of the given graph by using PRIM's algorithm. **[5]**



Q2) a) Write an algorithm for binary search. Write its complexity and remove the recurrence from the equation. **[4]**

P.T.O.

b) Find out minimum spanning tree using KRUSKAL's algorithm. **[4]**

Edge	Cost	Edge	Cost
(V_1, V_7)	1	(V_4, V_5)	7
(V_3, V_4)	3	(V_1, V_2)	20
(V_2, V_7)	4	(V_1, V_6)	23
(V_3, V_7)	9	(V_5, V_7)	25
(V_2, V_3)	15	(V_5, V_6)	28
(V_4, V_7)	16	(V_6, V_7)	36

Q3) a) Write an algorithm for quick sort and discuss its complexity. **[4]**

b) Explain all pairs shortest path algorithm with example. **[4]**

Q4) a) Explain Approximation algorithm with example of traveling-salesman problem. **[4]**

b) Solve the following instance of Bin Packing using approximation algorithm

$L = 10, n = 6, (l_1, l_2, l_3, l_4, l_5, l_6) = (5, 6, 3, 7, 5, 4)$. **[4]**

Q5) a) Explain the standard and slack forms of linear programming. **[4]**

b) Explain vertex cover problem using linear programming. **[4]**

Q6) a) State and prove Linear Translation theorem. **[4]**

b) Write an algorithm to compute convex hull using divide and conquer approach. **[4]**

Q7) a) Write an algorithm to compute convex hull using Jarvis March algorithm. **[4]**

b) The number of hardware failures of a computer system in a week of operation has the following probability mass function **[4]**

No. of failures	0	1	2	3	4	5	6
Probability	0.18	0.28	0.25	0.18	0.06	0.04	0.01

Find the variance of the number of failures in a week.

Q8) a) Write short notes on inequalities and limit theorems. **[4]**

b) Define Expectation, Moments, and variance and give significance of small and large variance. **[4]**

Total No. of Questions : 6]

SEAT No. :

P3777

[Total No. of Pages : 2

[5462] - 132

M.E. (Computer Engineering) (Semester - I)

RESEARCH METHODOLOGY

(2013 Pattern)

Time : 3 Hours] *[Max. Marks : 50*

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) ***Assume suitable data if required.***

Q1) a) Distinguish between Research methods and Research methodology. Explain different types of research. **[8]**

OR

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

i) Motivation in research.

ii) Objectives of research.

Q2) a) What is the necessity of defining the problem? What are the techniques involved in defining a problem. **[9]**

OR

b) What is hypothesis and hypothesis formulation? What characteristics it must possess in order to be a good research hypothesis? **[9]**

Q3) a) Give your understanding of a good research design. Is single research design suitable in all research Studies? If not, why? What are the characteristic of research? **[8]**

OR

b) Explain sampling concept with different sampling design in brief. **[8]**

P.T.O.

Q4) a) Explain the meaning of analysis of variance (ANOVA). Describe briefly the technique of analysis of variance for one way and two way classification. **[8]**

OR

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

i) Non-parametric statistics.

ii) Chi-square test.

Q5) a) What is the role of data analysis in statistics? Explain role of descriptive and inferential statistics in research. **[8]**

OR

b) What is hypothesis testing? Define Null hypothesis and Alternative hypothesis. Explain type 1 and type 2 error with suitable example. **[8]**

Q6) a) Describe the layout of the research report and state types of report. **[9]**

OR

b) What is the queuing theory? What is little's law and explain its use in queuing theory with suitable examples. **[9]**

Total No. of Questions : 6] **SEAT No. :**

P3778 **[Total No. of Pages : 3**

[5462] - 133

M.E. (Computer Engineering) (Semester - I)

ADVANCED COMPUTER ARCHITECTURE

(2013 Pattern)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Neat diagrams must be drawn whenever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) State the following terms with respect to various interconnect architecture. **[5]**

i) Network size.

ii) Node degree.

iii) Network diameter.

iv) Bisection width.

v) Routing function.

b) Classify hazards and state different types of hazards. State Bernestein's condition. **[4]**

OR

a) Compare between static and dynamic interconnection networks used in array processor system. **[5]**

b) Discuss various parameters which enhance network performance. **[4]**

Q2) a) Explain and compare Amdahl's law and Gustofson's law for speed up performance. **[4]**

b) Define the term degree of parallism (DOP). Describe average parallism interms of DOP. **[4]**

OR

P.T.O.

a) How quality of parallelism is related to speed up? Also list applications of parallel processing. **[4]**

b) Brief about standard performance measures. **[4]**

Q3) a) Compare the features and performance of CISC and RISC processor architectures. **[4]**

b) Discuss about bus arbitration schemes in multiprocessor system. **[4]**

OR

a) State the following terms with respect to pipelining & superscalar computers. **[4]**

i) Reservation table.

ii) Clock cycle.

iii) Pipeline throughput.

iv) Linear pipeline processors.

b) How the data transfer takes place between adjacent levels of a memory hierarchy? **[4]**

Q4) a) Discuss about Cache Coherancy in multiprocessor system and also explain snoopy bus protocol. **[5]**

b) Brief about context switching policies in multithreading system. **[4]**

OR

a) Explain the use of Compound Vector Function (CVF) to perform the vector operation with an example. **[5]**

b) What is multithreading architecture? Discuss about 4 performance parameter of Multithreaded System. **[4]**

Q5) a) Discuss on 5 models of parallel programming. **[4]**

b) Compare PVM and MPI message passing libraries. **[4]**

OR

a) Explain the features of C-Linda. Also state different Linda primitives. **[4]**

b) Explain code optimization & scheduling is carried out in parallel compilers. **[4]**

Q6) a) Compare Grid and Cloud Computing. What is cloud middleware? **[4]**

b) Discuss in brief how neural network can be used for parallel computing. **[4]**

OR

a) Discuss important features of Quatum Computing. How these features can be used for distributed parallel processing. **[4]**

b) Explain Saas, Paas & Iaas services offered by cloud with an example. **[4]**

Total No. of Questions : 6]

SEAT No. :

P3779

[Total No. of Pages : 2

[5462] - 134

M.E. (Computer Engineering)

SOFTWARE DESIGN AND ARCHITECTURE

(2013 Pattern) (Semester - II)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Solve question number 1 or 2, 3 or 4 and 5 or 6.***
2) ***Neat diagram must be drawn whenever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Write in short the applicability, structure and implementation of : **[8]**

i) Proxy.

ii) Flyweight.

b) Design as a '**wicked**' problem. Argue different views of Software Design Process. **[8]**

OR

Q2) a) Explain design patterns. How they are documented using a template. Explain the way they are documented with examples to illustrate from **Singleton** pattern. **[8]**

b) Describe the role of the architectural concept in knowledge transfer. What are the different types and challenges of knowledge. **[8]**

Q3) a) Illustrate the mapping quality factors to quality criteria for assessing design quality. List different quality attributes. **[8]**

b) Differentiate between reference architectural and an architectural pattern in terms of organizational planning and architectural analysis. Explain with suitable example. **[8]**

OR

P.T.O.

Q4) a) Explain the concept of systematic reuse and its particular implementation using product lines. **[8]**

b) Explain Execution architecture view and Code architecture view. **[8]**

Q5) a) Describe the concepts of Heterogenous architecture and Data flow architecture. Evaluate the benefits and limitations of both. **[9]**

b) Define Customer Relationship Management (CRM). Discuss about CRM approaches and tools. **[9]**

OR

Q6) a) Describe Quantity archetype pattern and Rule archetype pattern with example. **[9]**

b) Describe the concepts of the Interaction oriented software architecture. Discuss the benefits and limitations of the Interaction oriented software architecture. **[9]**

Total No. of Questions : 12]

SEAT No. :

P3780

[Total No. of Pages : 3

[5462] - 135
M.E. (Computer Engineering)
OPERATING SYSTEM DESIGN
(2013 Pattern)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***All six questions are compulsory.***
2) ***Neat diagram must be drawn whenever necessary.***
3) ***Assume suitable data, if necessary.***

Q1) a) How process is created in UNIX? How process is created using fork system call in UNIX? Summarize the UNIX process related system call. **[5]**

b) List and explain CPU registers. **[4]**

OR

Q2) a) How good design follows design process? Considering the specific context of software engineering state and explain the steps in the process of creating software product. **[5]**

b) Should a terminating a process also terminates all of its children? Give an example where this is a good idea and another example where it is a bad idea. **[4]**

Q3) a) Discuss process switching in detail. **[4]**

b) Why do we call operating system an event handler and table manager? **[2]**

c) How the System stack is used in Kernel mode processes? **[2]**

OR

P.T.O.

Q4) a) Draw and explain in detail architecture of simple operating system. **[4]**

b) How do you decide what data to duplicate for each processor and what data to share between the processors when converting an operating system to the multiprocessor operating system? Why do we call operating system an event handler and table manager? **[4]**

Q5) a) Why mutual exclusion is the most important IPC pattern for competition the resources? Why busy waiting cannot be used for solving general mutual exclusion problem? **[4]**

b) Why is first-come-first-serve scheduling is fair? What is the main advantage of shortest job first scheduling over first-come first-serve scheduling? **[4]**

OR

Q6) a) Give an analysis between massages and semaphores, Why are semaphores more efficient than massage priority? **[4]**

b) What is response ratio? What is the advantage of highest response ratio next scheduling over shortest job first scheduling. **[4]**

Q7) a) Compare the *brk* and allocate memory system calls described in memory management. **[4]**

b) Give two reason why every NEW or MALLOC request is not handled by a system call to the Operating System. **[4]**

OR

Q8) a) What is paging daemon, what does it do? Relates it with interrupt and holes. **[4]**

b) Compare segment and pages. How can the logic address space be contiguous if the physical address space is not configured? **[4]**

Q9) a) What is Shortest Seek Time First (SSTF)? How elevator algorithm is useful in SSTF? State and explain the elevator algorithm with batch processing in detail. **[4]**

b) What is DMA Controller? Why it is used? Give any two advantages of a DMA device controller over a Non-DMA Device controller. **[4]**

OR

Q10) a) Some file system keeps versions of files. In such a file system one can go back access old versions of a file. Compare this with a text editor that keeps history of all edits and allow you to undo edits. Describe pros and cons of unifying these two mechanism. **[4]**

b) State and explain the difference between caching and hinting. **[4]**

Q11) a) State and explain the model of resource management. What are the tasks for which resource manager is responsible? **[5]**

b) Suppose we wanted to integrate the memory scheduler and processor scheduler. What information would they exchange, How would they use that information? **[4]**

OR

Q12) a) What is authentication? What do you mean when we say an operation is "authorized"? How are passwords used for authentication? **[5]**

b) What is the relationship between users and processes in terms of protection? Why protection of resources is important? **[4]**

Total No. of Questions : 6]

SEAT No. :

P3781

[Total No. of Pages : 2

[5462] - 136

M.E. (Computer Engineering) (Semester - II)

ADVANCED COMPUTER NETWORKS

(2013 Pattern)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***All questions are compulsory.***
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) Enlist and explain different network functions and discuss the various issue of "where to implement the capability" with suitable examples. **[9]**

OR

b) Describe the process of network design and explain key concepts involved in the design of reliable data delivery. **[9]**

Q2) a) Explain memory less property of exponential distribution, with suitable examples based on networks. **[8]**

OR

b) Explain what state transition diagram is and compare M/M/1 Queue, M/M/2 Queue and M/M/m Queue with the help of state transition diagram and relevant applications. **[8]**

Q3) a) Enlist and explain different issues associated with centralized network design. **[8]**

OR

b) Explain, with the help of suitable example, Bin Packing Algorithm. **[8]**

P.T.O.

Q4) a) What are different requirements of smart devices used for Ubiquitous computing? Explain with suitable examples. **[8]**

OR

b) Explain different QOS mechanisms and use of resource reservation in achieving Quality of service in networks. **[8]**

Q5) a) What is fragmentation? In case of IP packet, what if the size of IP datagram exceeds the MTU? What if the route contains networks with different MTU? **[8]**

OR

b) Enlist and explain major difference between IPv4 and IPv6 header formats. Explain aggregation feature in IPv6. **[8]**

Q6) a) Describe content distribution network with suitable examples. Explain different issues to be considered while designing content distribution networks. **[9]**

OR

b) Define cyber physical system. Enlist and explain its various components and compare it with existing technologies like robotics, embedded systems, etc. **[9]**

Total No. of Questions : 8]

SEAT No. :

P3782

[Total No. of Pages : 2

[5462] - 137

M.E. (Computer Engineering) (Semester - III)

ADVANCED UNIX PROGRAMMING

(2013 Pattern)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Attempt any five out of 8 questions.***
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) Differentiate between a system call and a library function. **[6]**

b) Explain the Register Stack Engine (RSE) in brief. **[4]**

Q2) a) What are different IPC mechanisms? Explain semaphores and shared memory. **[6]**

b) Explain Stack unwinding in brief. **[4]**

Q3) a) Explain in brief how Kernel uses data structures to represent an open file. **[6]**

b) Write a short note on readv & writev functions. **[4]**

Q4) a) Write a short note on readn & written functions. **[4]**

b) Write a note on Virtual Memory Management. **[4]**

c) Write a short note on Nonblocking I/O. **[2]**

P.T.O.

Q5) a) What are different IPC mechanisms? Explain semaphores and shared memory. **[6]**

b) Explain characteristics of message queue and data structures used for message passing. **[4]**

Q6) a) Write a short notes on : **[6]**

i) Linux Locking Principles.

ii) Thread Synchronization.

b) Explain Multiplexing and Multithreading models of concurrent server design. **[4]**

Q7) a) Explain Unix file system in detail. **[5]**

b) What is difference between relative and absolute path specification? Explain with example. **[5]**

Q8) a) Write a program for echo server using socket programming. **[5]**

b) What is difference between TCP and UDP socket? **[5]**

Total No. of Questions : 6]

SEAT No. :

P3783

[Total No. of Pages : 2

[5462] - 138

M.E. (Computer Engineering) (Semester - III)

ADVANCED STORAGE SYSTEMS & INFRASTRUCTURE MANAGEMENT

(2013 Pattern)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Attempt any five 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 following components of a disk drive. **[5]**

(Draw diagrams wherever necessary)

i) Platter.

ii) Spindle.

iii) Read/Write Head.

iv) Actuator Arm Assemble.

v) Drive Controller Board.

b) Explain the RAID techniques, that form the basis for defining various RAID levels. **[5]**

Q2) a) Explain following common NAS implementations. **[5]**

i) Unified.

ii) Gateway.

iii) Scale-out.

b) Explain components of FCoE network. **[5]**

P.T.O.

Q3) a) Explain 'failure analysis' in the context of business continuity. **[5]**

b) Explain four backup topologies used in backup environment with suitable diagrams. **[5]**

Q4) a) How various factors contributing to the complexity of today's computing environment affect the management of infrastructure? Explain in detail. **[5]**

b) Enlist and explain: **[5]**

i) Current business demands.

ii) Current IT system issues.

Q5) a) What are the methods or techniques to determine customer requirements? Explain in detail. **[5]**

b) With the help of neat diagram, elaborate on Availability Management Process. **[5]**

Q6) a) Enlist and explain five most important options available to organise a service desk. **[5]**

b) Explain in brief Change Management Process. Also, draw a block schematic representing the scope of Change Management. **[5]**

Total No. of Questions : 8]

SEAT No. :

P3784

[Total No. of Pages : 2

[5462] - 139

M.E. (Computer) (Computer Networks)

WIRELESS COMMUNICATION

(2013 Pattern)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume suitable data, if necessary.***

Q1) a) What are the number of optional advanced features Wi-MAX defines for improving the performance? **[6]**

b) What are the Technical Challenges for Broadband Wireless and Wi-MAX? **[6]**

OR

Q2) a) Draw and explain in brief IP - based WiMAX network architecture. Also explain functions performed across reference points. **[6]**

b) Explain Free-space propagation model and also discuss about free-space pathloss formula. **[6]**

Q3) a) Draw the figure showing Mobile IP components and explain Mobile IP limitations especially triangular routing. **[6]**

b) What do know about ARQ? Explain the HARQ process with incremental redundancy. **[6]**

OR

Q4) a) To make the handover seamless that is, fast and error free which are the number of mechanisms could be used? **[6]**

b) Explain the basic components of a SIP architecture also discuss on simple call setup using SIP. **[6]**

P.T.O.

Q5) a) Explain logical representation of the WiMAX network reference model (NRM). **[6]**

b) Draw and explain in detail QoS functional architecture proposed by WiMAX NWG. **[7]**

OR

Q6) a) Explain various handover scenarios supported in WiMAX with figure. **[7]**

b) What are the important general design principles that guided the development of the Wi-MAX network systems architecture. **[6]**

Q7) a) Explain Methodology for Link Level simulation. **[6]**

b) Explain Multichannel Multipoint Distribution system. **[7]**

OR

Q8) Write Short Notes on (ANY TWO): **[13]**

a) Advanced Receiver Structures and Their Benefits for WiMAX.

b) System - Level Results of Basic and Enhanced Configurations.

c) Internetworking between WLANS and 3G.

Total No. of Questions : 12]

SEAT No. :

P3785

[Total No. of Pages : 2

[5462] - 140

M.E. (Computer Engineering)

COMPUTER NETWORKS

Advanced Network Algorithms

(2013 Pattern) (Credit Pattern)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Attempt 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, Q.11 or Q.12.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume suitable data, if necessary.***

Q1) Explain the term "Network Algorithms". What is relevance of term "systems Thinking" with respect to "Network Algorithms"? **[8]**

OR

Q2) Explain the example of scenting evil packets as Strawman's solution. **[8]**

Q3) a) Explain what is the role of a timer module in a system? **[3]**

b) Specify 3 groups of 15 Implementation principles in details. **[6]**

OR

Q4) a) Explain the difference between Design and Implementation principles. **[4]**

b) Explain the problem of policing traffic patterns. **[5]**

Q5) a) In what situations timers in a system fail? **[4]**

b) In what cases the operating systems offer timers of coarse granularity? **[4]**

OR

P.T.O.

Q6) Write a short note on : **[8]**

a) Protocol Processing.

b) Buffer Management.

Q7) Explain the process of Prefix - matching. Explain how binary search helps to find longest prefix match? **[8]**

OR

Q8) a) Write a short note on packet repeater. **[4]**

b) Write a short note on filtering repeater. **[4]**

Q9) a) Summarize the principles used in the packet classification algorithms. **[4]**

b) Explain with a neat diagram the problem of packet classification. **[4]**

OR

Q10) a) Explain divide and conquer in packet classification. **[4]**

b) With respect to packet classification explain decision tree approach. **[4]**

Q11) What are traffic matrices? How they are computed? **[9]**

OR

Q12) a) With reference to Bloom Filter Implementation, explain Packet Logging. **[5]**

b) What are the techniques used for worm detection? **[4]**

Total No. of Questions : 8]

SEAT No. :

P3787

[Total No. of Pages : 2

[5462]-142

M.E. (Computer Networks)

ADVANCED DATABASES

(2013 Pattern) (Semester - I)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right indicates full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Discuss the indexing based on the following questions **[6]**

i) Decision to make

ii) What index should we create?

iii) Which relations should have indexes? What fields should be the search key?

iv) Should we built several indexes?

v) How does an index improve performance?

vi) What kind of data structure is an index?

b) Discuss the data fragmentation in distributed database design and briefly explain the different types of fragments. **[6]**

OR

Q2) a) What are the three broad levels database systems can be tuned to improve performance. What decisions to be made while tuning of indices. Explain with proper example. **[6]**

b) Define and explain the concurrency control for distributed transactions. **[6]**

Q3) a) Explain the Main memory databases. **[6]**

b) Write a short note on: (Attempt any two). **[6]**

i) Xpath

ii) Xpointer

iii) Xlink

P.T.O.

OR

Q4) a) Explain transaction management in Multi-databases. **[6]**

b) Define DTD. Explain the structure and element of DTD with example. **[6]**

Q5) a) What is temporal database? Explain the need of it. **[7]**

b) Explain spatial database in detail. How it is different from GIS? **[6]**

OR

Q6) a) Explain how the indexing of spatial database is done? **[7]**

b) How the following terms are addressed in real time database? **[6]**

i) Transaction Processing

ii) Locking

Q7) a) Explain the need of standardization and briefly describe any standard. **[7]**

b) Discuss about tuning, benchmark in databases. **[6]**

OR

Q8) a) What is CouchDB? Discuss the data model and architecture of CouchDB. **[7]**

b) Explain any three of the following : **[6]**

i) E-Commerce

ii) Distributed computing with MAPREDUCE

iii) Data Management with HADOOP

iv) Standardization

Total No. of Questions : 12]

SEAT No. :

P3788

[Total No. of Pages : 2

[5462]-143

M.E. (Computer Networks)

HIGH PERFORMANCE NETWORKS

(2013 Pattern) (Semester - II)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

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

Q1) a) Write a short note on : **[4]**

i) Frame Relay

ii) 802.11

b) Explain 3G and 4G Networks in detail. **[4]**

OR

Q2) a) Distinguish between Fast Ethernet and Gigabit Ethernet. **[4]**

b) Draw X.25 frame format and explain in details. **[4]**

Q3) a) Draw architecture of Ethernet Gigabit standard and explain in detail. **[4]**

b) Distinguish between ATM and X.25. **[4]**

OR

Q4) a) Describe in detail Ethernet frame structure. **[4]**

b) Explain the Flow Control of Gigabit Ethernet. **[4]**

Q5) a) Explain in detail Basic principles of ATM. **[5]**

b) Explain the Research area in ATM. **[4]**

P.T.O.

OR

Q6) a) Describe IP over ATM in detail. **[5]**

b) Explain the MAC layer devices in detail with its function. **[4]**

Q7) a) Explain in details MPLS forwarding operation. **[5]**

b) What are the MPLS Distribution Control Protocol Attributes? **[4]**

OR

Q8) a) Draw and Explain Control Plane Components of MPLS label switching routers. **[5]**

b) Describe considerations in the choice of cells Vs frames in detail. **[4]**

Q9) a) Write a note on fixed broadband wireless network. **[4]**

b) Write a comparison of Wimax and Wi-Fi. **[4]**

OR

Q10)a) Write a note on MAC layer of WiMax. **[4]**

b) Write a short note on WiMax Security. **[4]**

Q11)a) Explain in detail HSUPA RPM architecture. **[4]**

b) Distinguish between GPRS and WCDMA. **[4]**

OR

Q12)Write a short note on :

a) HSPDA Architecture **[4]**

b) LTE **[4]**

Total No. of Questions : 7]

SEAT No. :

P3789

[Total No. of Pages : 2

[5462]-144

M.E. (Computer Networks)

NETWORK DESIGN, MODELING AND ANALYSIS

(2013 Pattern) (Semester - II)

Time : 3 Hours] *[Max. Marks : 50*

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) a) Explain probabilities defined on events with the help of an example. **[5]**

b) What is distribution? Explain Exponential distribution along with its properties. **[5]**

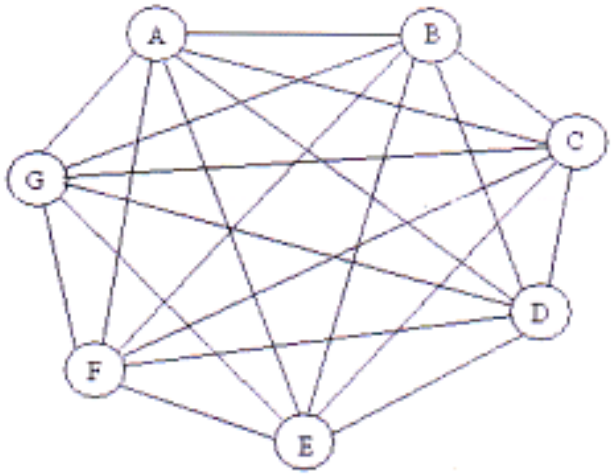
Q2) a) Explain M/M/2 queuing model along with state transition diagram. **[5]**

b) What is Little's theorem? Give probabilistic form of Little's theorem and explain two applications of it in network design. **[5]**

Q3) a) Using Essau-Williams algorithm, find CMST for the network with link cost given below- **[7]**

Consider node A as center/hub, all nodes have weight 1 except D which has weight 2

• The link capacity is W = 3



P.T.O.

Node	B	C	D	E	F	G
A	5	6	9	10	11	15
B		9	6	6	8	17
C			7	9	8	12
D				10	5	11
E					14	9
F						8

Link Costs

b) Explain Sharma's algorithm with the help of an example. **[3]**

Q4) a) Explain concept of One Speed One Center Design with suitable example. **[5]**

b) Explan Center of Mass (COM) concentrator location algorithm. **[5]**

Q5) a) Explain MENTOR algorithm for router design. **[5]**

b) Explain different techniques for merging two networks. **[5]**

Q6) a) How network design can be a good design? Explain parameters of good design. **[5]**

b) Explain the need of Access Network Design with suitable example. **[5]**

Q7) Write a short note on any TWO : **[10]**

a) Rerouting algorithm.

b) Backbone network vs, Peer-to-Peer network.

c) Network design issues.

Total No. of Questions : 8]

SEAT No. :

P3790

[Total No. of Pages : 2

[5462]-145

M.E. (Computer Engineering) (Computer Networks)

DISTRIBUTED SYSTEMS

(2013 Pattern) (Semester - II)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Solve any three questions from Q.1, 2, 3, 4 and any three questions from Q.5, 6, 7 , 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) Explain in detail challenges encountered during the design of distributed systems. **[4]**

b) Discuss various commonly used models for building distributed systems. **[5]**

Q2) a) Write short note on distributed objects. **[4]**

b) Write short note on distributed transaction. **[4]**

Q3) a) Discuss Lamport's logical clock and vector clock. **[4]**

b) Explain Suzuki Kasami broadcast algorithm. **[4]**

Q4) a) Discuss distributed deadlock detection strategies. **[4]**

b) Discuss Lodha and Kshemkalyani's fair mutual exclusion algorithm. **[4]**

Q5) a) Write short note on distributed scheduling. **[4]**

b) Explain log structured file system along with its advantages. **[4]**

P.T.O.

Q6) a) Discuss synchronous and asynchronous check pointing and recovery. **[4]**

b) Explain distributed shared memory architecture. **[4]**

Q7) a) Write short note on UDDI. **[4]**

b) Write a short note on distributed multimedia systems. **[4]**

Q8) a) What is JMS? Discuss in brief with the perspective of distributed systems. **[5]**

b) Explain WSDL. **[4]**

Total No. of Questions : 12] **SEAT No. :**

P3791 **[Total No. of Pages : 2**

[5462]-146

M.E. (Computer Networking)

SYSTEM OPERATIONS AND MAINTENANCE

(2013 Pattern)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Attempt Q. No. 1 or 2, Q. No.3 or 4, Q, No. 5 or 6, Q. 7 or 8., Q. 9 or 10., Q. 11 or 12.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable data, if necessary.***

Q1) Explain basic functions offered by an operating system process scheduling; interrupt handling, memory management, inter-process communication, and common routines (or library). **[9]**

OR

Q2) Draw and explain IOS XR Layered High Availability Architecture. **[9]**

Q3) What is "TURBOBOOT"? Give the steps needed to boot the IOS XR software on a router. **[8]**

OR

Q4) What is two stage configuration model? Explain with suitable example. **[8]**

Q5) What is SNMP? Which different versions of SNMP those are supported by Cisco IOS XR software? Also explain basic steps are needed to configure SNMP on an IOS XR router. **[8]**

OR

Q6) What is role of Access Control Lists in forwarding plane? Give key features of Access Control Lists. **[8]**

P.T.O.

Q7) List 4 different types of Interior Gateway Protocol (IGP), Explain any two in details. **[8]**

OR

Q8) Explain in details Enhanced Interior Gateway Routing Protocol. **[8]**

Q9) Draw and explain Cisco IOS XR MPLS Architecture. Also explain following MPLS Label Operations: Push, Pop, De-aggregate, Swap and push. **[8]**

OR

Q10) What is MPLS Traffic Engineering? Also explain TE configuration tasks. **[8]**

Q11) Explain different components of SDR Shared Resources. Give step by step configuration of Secure Domain Router. **[9]**

OR

Q12) Explain the following components of Multishelf. **[9]**

a) Line Card Chassis.

b) Fabric Card Chassis

c) Switch Card Chassis

Total No. of Questions : 6]

SEAT No. :

P3792

[Total No. of Pages : 2

[5462]-147

M.E. (Computer Networks)

ADVANCED TCP/IP

(2013 Pattern) (Credit) (Semester - III)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Attempt any three questions from Q1, Q2, Q3, Q4 and one from Q5, Q6.***
2) ***Figures to right indicate full marks.***
3) ***Neat diagram must be drawn whenever necessary.***
4) ***Assume suitable data, if necessary.***

Q1) a) Why DHCP is required? Explain Address Acquisition States with message types in DHCP operation? **[6]**

b) Explain FTP communication over control and data connection? **[6]**

Q2) a) A client and server can both run on the same computer and use a TCP socket to communicate. Explain how it is possible to build a client and server that can communicate on a single machine without learning the host's IP address? **[6]**

b) Explain the modes of operation of telnet. Explain with diagram the use of SUPRESS GO AHEAD and ECHO options? **[6]**

Q3) a) Explain option negotiation in telnet. Show the sequence of character exchanged between client and server to switch from line mode to default mode? **[6]**

b) How DHCP exchanges different messages? Explain DHCP options. **[6]**

Q4) a) What is a DNS query and response message? Discuss response message in detail? **[6]**

b) Write in details system calls used for socket programming using TCP/IP protocol? **[6]**

P.T.O.

Q5) a) Explain security issues in network layer? **[7]**

b) Explain VPN in details? **[7]**

Q6) a) Write difference between TCP Tahoe and TCP Reno ? **[7]**

b) Write difference between IPv4 and IPv6 protocol? **[7]**

Total No. of Questions : 8]

SEAT No. :

P3793

[Total No. of Pages : 2

[5462]-148

M.E. (Information Technology)

ADVANCE COMPUTER ARCHITECTURE

(2013 Pattern) (Semester - II)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any five questions.***
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 is need of parallel processing in computation?Explain the different levels of functional parallelism in detail. **[4]**

b) Discuss the basic parallel techniques for parallel processing. **[2]**

c) Explain the classification of parallel architectures in detail based on Flynn's Classification. **[4]**

Q2) a) What is role of speculation in Dynamic Scheduling? Explain Dynamic Branch Prediction in brief. **[4]**

b) Write a note on Multiple Issue Processors. **[2]**

c) Explain how Instruction Level Parallelism is exploited in pipelining. **[4]**

Q3) a) Discuss the various Compiler techniques for exposing ILP. **[4]**

b) What is the Multithreading? Explain how Multithreading supports thread level parallelism. **[4]**

c) Discuss the limitations of instruction level parallelism in brief. **[2]**

Q4) a) What is an Interconnection Network? Explain the role of Crossbar and Multistage Switches for realization of Interconnection Network. **[4]**

b) What is the need to maintain memory consistency? Explain the different models of memory consistency in detail. **[3]**

c) Discuss Cache Coherence Issues in brief. **[3]**

P.T.O.

Q5) a) Discuss the features, architecture and design issues of Simultaneous Multithreaded (SMT) processor. **[4]**

b) Write a note on Intel Multi-core Architecture. **[3]**

c) Differentiate between software and hardware multithreading. **[3]**

Q6) a) Discuss the issues in the design of memory hierarchies. **[4]**

b) Explain how memory protection is achieved using Virtual Memory and Virtual Machines. **[4]**

c) Explain any two methods of optimizing cache performance. **[2]**

Q7) a) Write a note on Data Flow architecture. Explain any two examples of Data Flow Architecture in detail. **[5]**

b) What is SIMD Architecture? How is Data Parallelism realized in Fine Grain SIMD and Coarse Grain SIMD architectures? **[5]**

Q8) a) Explain the different issues in multicore processor architecture. Explain Intel Core Duo Architecture as a case study. **[5]**

b) Explain Multi-Core System Organization with example. **[5]**

Total No. of Questions : 8]

SEAT No. :

P3794

[Total No. of Pages : 2

[5462]-149

M.E. (Information Technology)

NETWORK PROGRAMMING

(2013 Pattern) (Semester - III)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any five questions.***
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) Write about the usefulness of state transition diagram in association with TCP connection between client and server. Also points out about different states for connection establishment and connection termination. **[4]**

b) Describe the reasons due to which TIME_WAIT state occurs in TCP connections with specific mention about TIME_WAIT state in TCP with respect to network programming? **[4]**

c) What is passive open and active open in TCP client/server communication? **[2]**

Q2) a) With diagrammatic representation describe about four segments required in TCP connection termination. **[4]**

b) There are certain limits affect the size of datagrams, describe how these limits can affect the data transmits by an application? **[2]**

c) Explain about routing socket with clear description of different types of messages exchanged across a routing socket. **[4]**

Q3) a) Write a program using TCP socket to perform operations like multiplication and division of two integer numbers, where multiple clients can request to the concurrent server for a specific task to be performed.**[4]**

b) Discuss about the listening socket's working with diagrammatic representation using two queues. Also mention about the two actions performed by the listen function. **[4]**

c) Describe UDP echo server and echo client with pseudo codes of client and server processes using UDP sockets. **[2]**

P.T.O.

Q4) a) Explain about the working behavior of unicast and broadcast with examples of unicast and broadcast UDP datagrams. **[4]**

b) SNTP is used to synchronize clocks across a WAN or a LAN, how it works to provide clock synchronization in communication? Give some examples of NTP packet formats used for synchronization. **[3]**

c) Write logical points about multicasting on a single LAN. How multicasting is beneficial on WANs, discuss with example in which five LANs connected with five multicast routers. **[3]**

Q5) a) Discuss the interoperability features used in communications between IPv4 and IPv6 applications. Also describe about the combinations of clients and servers using either IPv4 or IPv6. **[4]**

b) Write different steps Ipv6 server uses in handling of Ipv4 TCP clients. **[3]**

c) Describe the working of IPv6 server on dual -stack host with diagrammatic representation. **[3]**

Q6) a) Explain the working of SNTP with a detail example showing its use in the communications. **[4]**

b) Describe the working of resolvers along with clients and name servers with appropriate diagrammatic representations. **[4]**

c) Explain the working of DNS used to map between hostname and IP address. **[2]**

Q7) a) How TCP concurrent server and client works, describe it with proper pseudo code and comments. **[5]**

b) Describe the working of TCP preforked server in detail with diagrammatic representation. **[5]**

Q8) a) Discuss about the POSIX threads' working in the networking environments. Also discuss the issues related to thread specific data in detail. **[5]**

b) Write a program using POSIX thread to implement echo server using one thread per client. Program should contain clear comments about the functions used in the program. **[5]**

Total No. of Questions : 6]

SEAT No. :

P3795

[Total No. of Pages : 1

[5462]-150

M.E. (Production Engineering) (CAD/CAM)

ADVANCED STRESS ANALYSIS

(2013 Pattern)

Time : 3 Hours] *[Max. Marks : 50*

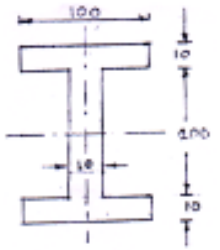
Instructions to the candidates:

1) ***Question no 5 & 6 are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Use of logarithmic tables, slide rule and non-programmable electronic pocket calculator is allowed.***
4) ***Assume suitable data, if necessary.***

Q1) Derive the compatibility equation in Cartesian co-ordinate system. **[10]**

OR

Q2) Determine the shape factor for I section shown in figure. **[10]**



Q3) Explain the fracture mechanics approach for estimation of residual life of component. What is critical stress intensity factor? How it is useful in design of cracked components? **[10]**

OR

Q4) Explain Paris equation and its application. **[10]**

Q5) a) Discuss in detail Spring back effect in plastic bending. **[10]**

b) Write note on J- Integral. **[5]**

Q6) Derive the governing equations for evaluation of stresses and deflections in circular plate with edges clamped and subjected to central concentrated force 'P'. State any assumptions that you make and explain limitations if any. **[15]**

● ● ●

Total No. of Questions : 8]

SEAT No. :

P4415

[Total No. of Pages : 2

[5462]-151
M.E. (Production-CAD/CAM Engineering)
OPTIMIZATION TECHNIQUES
(2013 Pattern) (Semester - II)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any five questions.***
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) Formulate an optimization problem for minimum weight design of a helical spring subjected to an axial load F. Wire diameter, coil diameter, and number of turns are design variables. Constraint is to ensure that shear stress in spring should not exceed shear yield strength of the spring material. **[8]**

b) State Kuhn-Tucker necessary and sufficient conditions in non-linear programming. **[2]**

Q2) a) Minimize the function $f(x) = x(x - 1.5)$ in the interval (0, 1) using Exhaustive search method to within 10% of the exact value. **[8]**

b) What are Fibonacci numbers? How they are obtained? **[2]**

Q3) a) Perform one iteration of steepest descent method to minimize the function

$$f(x) = 100\left(x_2 - x_1^2\right)^2 + \left(1 - x_1\right)^2.$$

Consider starting point as $x_1 = -1.2$ and $x_2 = 1$. **[6]**

b) Write an algorithm and draw flowchart for Conjugate gradient method. **[4]**

Q4) Write short notes on : **[10]**

a) Lagrange multiplier method

b) Quasi Newton Method

P.T.O.

Q5) a) Calculate function '∅' for optimization problem given below using interior penalty method. Consider penalty parameter '*r*' = 100. **[6]**

$$Min\ f(x)=2x_1^2+x_2^2 \quad Subject\ to: g_1(x)=3-2x_1-x_2\leq 0;\ g_2(x)=x_1\geq$$

b) Explain Exterior penalty function method. **[4]**

Q6) a) What is the real value of a variable corresponding to its coded value 11001 in genetic algorithm if the bounds of variables are 1 and 4? **[6]**

b) Draw flowchart of simulated annealing algorithm. **[4]**

Q7) a) Explain application of theory of constraints in operations management. **[8]**

b) List 5 steps of theory of constraints. **[2]**

Q8) Write short notes on : **[10]**

a) Artificial neural networks.

b) Optimized Production Technology (OPT)

Total No. of Questions : 8]

SEAT No. :

P4366

[Total No. of Pages : 1

[5462] - 152
M.E. (Chemical Engineering)
PROCESS OPTIMIZATION
(2013 Pattern)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Attempt any five questions.***
2) ***Assume suitable data wherever necessary.***
3) ***Draw neat figures wherever necessary.***
4) ***Use of scientific Calculators is allowed.***
5) ***Figures to the right indicate full marks.***

Q1) Explain the Nature and scope of optimization. Also give general procedure for solving Optimization problems. **[10]**

Q2) Describe following terms: a) continuity of function b) uni-modal and multimodal functions c) convex and concave function. **[10]**

Q3) Explain golden search method for optimizing one dimensional functions. State its advantages and disadvantages. **[10]**

Q4) Describe steepest descent method for multivariable optimization problems. **[10]**

Q5) How optimization of multi staged distillation is carried out. Explain with any non linear method. **[10]**

Q6) Explain Lagrange multiplier method of optimization. State its advantages over other non - linear methods. **[10]**

Q7) Write short notes on. **[10]**

a) Optimization of dynamic processes
b) Non - traditional optimization algorithms

Q8) Write short notes on **[10]**

a) Penalty function method
b) Genetic algorithms

Total No. of Questions : 8]

SEAT No. :

P3796

[Total No. of Pages : 2

[5462]-156

M.E. (Petroleum Engineering)

RESEARCH METHODOLOGY

(2013 Credit Pattern) (Semester - I)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Attempt Any Five questions.***
2) ***Figures to the right side indicate full marks.***
3) ***Illustrate your answers with suitable examples and diagrams, wherever necessary.***
4) ***Write relevant question number before writing the answer.***

Q1) a) When you plan to initiate the research, what questions arise for the research directions? **[3]**

b) What is a research problem? Define the necessity of identifying a research problem. Also briefly examine the sources of research problem. **[3]**

c) Make a comparative study between primary and secondary data. Evaluate the different techniques for collecting primary data. **[4]**

Q2) a) Formulate a research plan for investigating any petroleum engineering problem of your choice and explain important steps involved in it. **[4]**

b) Data can collect by interview methods or observation method. What is the difference between two? Which method will produce quality data? Why? **[4]**

c) State the importance of references in scientific research. **[2]**

Q3) a) Examine the merits and demerits of the survey method in data collection. Illustrate your answer with suitable examples. **[4]**

b) Define and explain the term 'hypothesis', and describe its usefulness in conducting research. **[4]**

c) Point out two main differences between applied research and fundamental research regarding researcher's qualities. **[2]**

P.T.O.

Q4) a) What is research design? Explain the different types of research designs and formulate a research design for your research problem. **[4]**

b) What is mean by sampling design? Critically examine the various types of sampling design techniques. **[4]**

c) Explain the importance of citations in research. **[2]**

Q5) a) Discuss the different tools and techniques of data collection and analysis used in research. Support your answer by giving suitable example. **[4]**

b) Write the steps involved in report writing and elaborate the importance in effective report writing. **[4]**

c) Define and explain the term 'hypothesis'. **[2]**

Q6) a) What is a blog? Explain the different steps in creation of blog. Mention also popular blogging sites. **[4]**

b) Differentiate between descriptive statistics and inferential Statistics by giving suitable examples. **[3]**

c) Write a brief note on: "Threats and Challenges to Good Research". **[3]**

Q7) a) What is literature review? State Creswell's five steps to conduct literature review. Discuss the various sources of literate review. **[5]**

b) What is need of research design? Discuss in brief various types of research designs. **[5]**

Q8) a) Write notes on : **[5]**

i) Intellectual Property Rights (IPR)

ii) Interview method for data collection

b) Explain Trade secrets, Licensing and Technology Transfer (TOT) with stakeholder groups for oil and gas industry. **[5]**

Total No. of Questions : 8]

SEAT No. :

P3797

[Total No. of Pages : 2

[5462]-157

M.E. (Petroleum Engineering)

ADVANCED RESERVOIR ENGINEERING

(2013 Pattern) (Semester - II)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any five questions.***
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) Derive the diffusivity equation in Cartesian coordinates. **[5]**

b) Draw and define the five types of reservoir fluids, along with their reservoir and separator conditions. **[3]**

c) The oil and gas rates, measured at a particular time during the producing life of a reservoir are, x stb oil/day and y scf gas/day. What is the corresponding underground withdrawal rate in reservoir barrels/day? **[2]**

Q2) a) How would you compute the GOC and OWC using capillary pressure curves? Explain in detail. **[5]**

b) Explain the difference between black oil and volatile oil from the fluid properties perspective. **[3]**

c) Calculate the mass of methane gas contained at 1000 psi and 68 deg. F, in a cylinder with volume of 3.20 cu.ft. Assume that methane is an ideal gas. **[2]**

Q3) a) Draw the graph of viscosity, formation volume factor of oil, water and gas with respect to pressure. Explain the trends and give reasons for the particular trends observed in the graphs. **[5]**

b) Calculate the density of methane at standard conditions. **[3]**

c) Write a short note on ASP flooding. **[2]**

P.T.O.

Q4) a) How does the Pc. Vs. water saturation curve change with permeability? Explain. **[5]**

b) Explain in detail 5 fluid properties for oil, and how they vary with pressure. **[3]**

c) Compute the apparent molecular weight of air, given its approximate composition, in the table below: **[2]**

Component	Mole fraction, y_f
Nitrogen	0.78
Oxygen	0.21
Argon	0.01
	1.00

Q5) a) Draw the relative permeability curves for a oil-wet rock and a water-wet rock. Explain how they are different from each other? **[5]**

b) Explain, with the help of a diagram, the various phases in an in-situ combustion process. **[3]**

c) What are the screening criteria for implementing a particular EOR method? Write in detail. **[2]**

Q6) a) Write the fractional flow equation and explain its significance. **[5]**

b) What is the significance of Buckley-Leverett equation? Explain in detail. **[5]**

Q7) Write short notes on :

a) Importance of mobility ratio in water-flooding **[5]**

b) Thermal EOR, with its screening criteria. **[5]**

Q8) Explain in detail, what do you mean by :

a) Areal and vertical sweep efficiency **[5]**

b) CO_2 Flooding **[5]**

Total No. of Questions : 8]

SEAT No. :

P3798

[Total No. of Pages : 2

[5462]-158

M.E. (Petroleum Engineering)

ENVIRONMENTAL TECHNOLOGY IN PETROLEUM ENGINEERING

(2013 Pattern) (Semester - II)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Attempt Any Five questions.***
2) ***Figures to the right side indicate full marks.***
3) ***Illustrate your answers with suitable examples and diagrams, wherever necessary.***
4) ***Write relevant question number before writing the answer.***

Q1) a) Explain in brief drilling wastes generation and management approach in Petroleum industry. **[4]**

b) Write a note on: Clean Development Mechanism and Kyoto Protocols. **[3]**

c) Explain in brief environmental impacts of the oil industry. **[3]**

Q2) a) Explain in brief hazardous waste handling and its storage. **[4]**

b) Write a notes on : Safety Measures in Oil and gas industry. **[4]**

c) Explain in brief operational practices and procedures for oilfield waste management. **[2]**

Q3) Write notes on : (Any Two) **[10]**

a) Various technologies for oil and gas produced water treatment.

b) Production operation wastes generation and management.

c) Accidents in Oil and gas Industry.

Q4) a) Discuss about environmental best practices in petroleum industry. **[4]**

b) Write a note on: Environmental Impact Assessment. **[4]**

c) State waste water treatment technologies used in oil industry. **[2]**

P.T.O.

Q5) Write notes on : (Any Two) **[10]**

a) Disaster Management

b) HAZOP and HAZAN

c) PTW (Permit to Work)

Q6) a) Explain in brief responsibilities of team members in typical HAZOP study. **[4]**

b) Write a note on : Risk Analysis and Management. **[4]**

c) Explain the principle of ALARP. **[2]**

Q7) a) Write brief note on : **[5]**

i) JSA

ii) ATR

b) Explain the various causes and preventive measures in petroleum industry for fire and explosion hazards. **[5]**

Q8) Write notes on: (Any Two) **[10]**

a) Oil Spill Control in Marine Environment.

b) Health and Safety laws applicable in Oil and Gas Industries.

c) Qualitative and Quantitative Risk Management.

Total No. of Questions : 8]

SEAT No. :

P3799

[Total No. of Pages : 2

[5462]-160

M.E. (Petroleum Engineering)

ADVANCED WELL TESTING

(2013 Pattern) (Semester - III)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any five questions.***
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) Derive the diffusivity equation for fluid flow in radial direction. **[5]**

b) What are the various flow regions that are encountered in a derivative curve? **[3]**

c) Define and explain the various pressure regimes encountered in well testing. **[2]**

Q2) a) What do you mean by the continuity equation? What are the assumptions that are used to derive the same? **[5]**

b) Explain Horner time ratio, and describe its significance. **[3]**

c) What is the importance of the line source solution of the diffusivity equation? **[2]**

Q3) a) What are the objectives of a well test? Explain in detail. **[5]**

b) What do you mean by DST? Explain with its different time phases. **[3]**

c) What is the significance of the multiple buildups and drawdowns in a DST? **[2]**

Q4) a) Explain the two main types of gas well tests conducted for tight gas reservoirs. **[5]**

b) Explain the concept of superposition in space, with appropriate diagrams. **[3]**

c) Explain what is meant by pseudo pressure. **[2]**

P.T.O.

Q5) a) What do you mean by method of images? Explain in detail. **[5]**

b) Plot the line source solution and explain how it varies. **[3]**

c) Plot pseudo-pressure function vs. pressure, with the help of a graph. Explain. **[2]**

Q6) a) Explain the three types of empirical decline curves. **[4]**

b) Explain the difference between an IPR and a VLP? **[4]**

c) What happens when you change the node position in Nodal Analysis? Explain with graphs. **[2]**

Q7) Write short notes on :

a) Empirical decline curves. **[5]**

b) Various solutions to the diffusivity equation. **[5]**

Q8) Explain in detail, what do you mean by :

a) Fetkowich and Blasingame decline curves. **[5]**

b) Bourdet derivative and its impact on pressure transient analysis. **[5]**

Total No. of Questions : 8]

SEAT No. :

P3800

[Total No. of Pages : 3

[5462]-162

M.E. (Polymer Engineering)

MATHEMATICAL AND STATISTICAL METHODS

(2013 Pattern)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Attempt any five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Solve the following system of equations using Gauss-Seidel method. **[5]**

$$23x_1 + 13x_2 + 3x_3 = 29$$

$$5x_1 + 23x_2 + 7x_3 = 37$$

$$11x_1 + x_2 + 23x_3 = 43$$

b) Determine numerically largest eigenvalue of the following matrix A. Also find corresponding eigenvector of A. **[5]**

$$A = \begin{bmatrix} 4 & 1 & 0 \\ 1 & 2 & 1 \\ 0 & 1 & 1 \end{bmatrix}$$

Q2) a) Find Z-transform of the following (any two) : **[6]**

i) $6^k + 9^k$, $k \geq 0$.

ii) $\cos(2k+3)$, $k \geq 0$.

iii) $k5^k$, $k \geq 0$

P.T.O.

b) Find inverse z-transform of the following (any one) : **[4]**

i) $\frac{z}{(z-1)(z-2)}$ if $|z| \geq 2$

ii) $\frac{10z}{(z-1)(z-2)}$ using inversion integral method.

Q3) a) Solve the difference equation **[5]**

$12\ f(k+2) - 7\ f(k+1) + f(k) = 0,\ k \geq 0,\ f(0) = 0.$

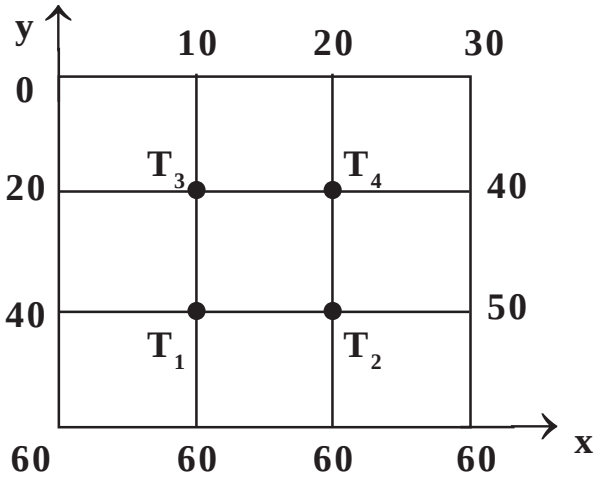
b) Use Gauss Quadrature two point formula to evaluate $\int_0^1 e^{-x^2} dx$. **[5]**

Q4) a) Obtain the solution of differential equation $\frac{dy}{dx} = \sqrt{x+y}$ for y at $x = 0.2$ using Runge-Kutta fourth order method. Given $y(0) = 1$ with $h = 0.1$. **[5]**

b) The steady state two dimensional heat flow in a metal plate is given by

$$\frac{\partial^2 T}{\partial x^2} + \frac{\partial^2 T}{\partial y^2} = 0.$$

Given the boundary conditions in the following grid, Find the temperatures T_1, T_2, T_3 and T_4. **[5]**



Q5) a) Using finite difference scheme, Solve the boundary value problem.

$$\frac{d^2y}{dx^2} + x\frac{dy}{dx} - 1 = 0, \quad y(0) = 0, \quad y(1) = 10, \quad h = 0.2.$$ **[5]**

b) Explain Explicit - Finite difference method to solve one dimensional heat flow problem. **[5]**

Q6) a) Show that the necessary condition for

$$I = \int_{x_1}^{x_2} f(x, y, y')\, dx \text{ is } \frac{\partial f}{\partial y} - \frac{d}{dx}\left(\frac{\partial f}{\partial y'}\right) = 0.$$ **[5]**

b) Solve the boundary value problem. **[5]**

$y'' + y + x = 0 (0 \le x \le 1), \quad y(0) = 0 \ , y(1) = 0.$

by using Galerkin's method.

Q7) a) Reduce the following matrix into tridiagonal form using Householder's method. **[5]**

$$A = \begin{bmatrix} 1 & 3 & 4 \\ 3 & 1 & 2 \\ 4 & 2 & 1 \end{bmatrix}$$

b) Use L-U decomposition method to solve following system of equations. **[5]**

$2x_1 + 2x_2 + 3x_3 = 4$

$4x_1 - 2x_2 + x_3 = 9$

$x_1 + 5x_2 + 4x_3 = 3$

Q8) a) Among 64 offsprings of a certain cross between guinea pigs 34 were red, 10 were black and 20 were white. According to a genetic model, these numbers should be in the ratio 9 : 3 : 4.
Are the data consistent with the model at 5% level?

Given $\chi^2_{2:0.05} = 5.991$. **[5]**

b) The nine items of a sample have the following values 45, 47, 50, 52, 48, 47, 49, 53, 51. Does the mean of these differ significantly from the assumed mean of 47.5?
Value of t for 8 degrees of freedom is 2.31 **[5]**

Total No. of Questions : 8]

SEAT No. :

P3801

[Total No. of Pages : 2

[5462]-163

M.E. (Polymer Engineering)

PRINCIPLES OF MANAGEMENT

(2013 Pattern) (Semester - I)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Attempt Any Five questions.***
2) ***Figures to the right side indicate full marks.***
3) ***Illustrate your answers with suitable examples and diagrams, wherever necessary.***
4) ***Write relevant question number before writing the answer***

Q1) a) Define functional organization. State its merits and demerits. **[4]**

b) Discuss different types of organizational structures. **[3]**

c) Describe principles of management. Describe different approaches to management. **[3]**

Q2) a) Explain time study and motion economy. **[4]**

b) Define manpower planning. Discuss its importance. **[4]**

c) Explain Line and Staff authority. **[2]**

Q3) a) What is plant location? Explain factors affecting plant location. **[4]**

b) Explain the requirements of an effective control system. **[4]**

c) Explain selection process and techniques. **[2]**

Q4) a) What is the role of R&D department in polymer industry? **[4]**

b) Define planning and explain the steps involved in Planning? **[4]**

c) Explain methods of Performance Appraisal. **[2]**

P.T.O.

Q5) a) What is technology forecasting? **[4]**

b) Explain the Strategic policies & planning. **[4]**

c) Give the importance of product labeling and packing. **[2]**

Q6) a) Explain the tools and techniques for improving productivity. **[4]**

b) Explain the modern concept of marketing and distinguish it from selling. **[4]**

c) What is industrial fatigue? **[2]**

Q7) a) Describe communication? Explain the role of effective communication in the organization. **[5]**

b) Explain Decentralization and Centralization. What are the factors influencing decentralization? **[5]**

Q8) a) Write notes on : (Any Two) **[5]**

i) Role of Budgeting as a Control Technique

ii) Product Life cycle

iii) Objectives of technological forecasting.

b) How can decentralization improve the decision making in an organization? **[5]**

Total No. of Questions : 8]

SEAT No. :

P3802

[Total No. of Pages : 2

[5462]-164

M.E. (Polymer Engineering)

ADVANCE POLYMER TECHNOLOGY

(2013 Pattern) (Semester - I)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any five questions.***
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 nematic phase with suitable diagram. **[5]**

b) Write a note on gel electrolysis. **[5]**

Q2) a) Explain the importance of polymer electrolytes through its applications. **[5]**

b) Write a note on F-H equation and its use. **[5]**

Q3) Write a note on polythiazyl. **[10]**

Q4) a) Discuss piezoelectric polymers and their applications. **[5]**

b) Explain the importance of self-assembly polymers. **[5]**

Q5) a) Explain the use of ion exchange resins and their preparation. **[5]**

b) What is RAFT? Explain the mechanism. **[5]**

Q6) a) Differentiate between thermotropic and lyotropic LCPs. **[5]**

b) Write a note on ring forming polymers. **[5]**

P.T.O.

Q7) a) Write a note on dendritic polymers. **[5]**

b) What is surface functionalization of polymers? How is it achieved? **[5]**

Q8) a) Write a note on inorganic polymers. **[5]**

b) Differentiate the observations at molecular level between crystalline melting temperature and glass transition temperature. **[5]**

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Total No. of Questions : 8]

SEAT No. :

P3803

[Total No. of Pages : 2

[5462]-165

M.E. (Polymer Engineering)

RESEARCH METHODOLOGY

(2013 Pattern) (Semester - I)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any five questions from the following.***
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.***
6) ***Students are permitted to use standard statistical tables having normal distribution area, F-test data, χ^2 test data etc.***

Q1) a) Explain in detail with diagram different steps in "Research Methodology." **[6]**

b) What are different types of research? Explain various objectives of research. **[4]**

Q2) a) Write a note on "Types and Importance of Research Design." **[4]**

b) Discuss the criteria for choice of topic of research. **[3]**

c) Explain the importance of review of literature, different sources of literature. **[3]**

Q3) a) How to collect data and represent it in different forms? Which is best suited for engineering research? **[4]**

b) Write a note on "Methods of Correlation Analysis". **[3]**

c) Discuss the factors which should be considered while deciding the Sample size and explain how to determine Sample size? **[3]**

Q4) a) Explain how to carry out linear regression analysis using computer program? What is the significance of R^2 value? **[5]**

b) Explain the procedure of Testing Hypothesis. **[5]**

P.T.O.

Q5) a) Define ANOVA and one way and two way methods. Where do you use two way ANOVA. **[3]**

b) Discuss the process of a discrete frequency distribution with one example. **[4]**

c) Explain different graphical ways of frequency distributions with examples. **[3]**

Q6) a) Explain the different sections / formats in a project proposal. **[4]**

b) What are the agencies for submitting the project proposal? **[3]**

c) How do you estimate the budget for the proposed project? **[3]**

Q7) a) Write a note on different forms of reporting the research results. **[4]**

b) Explain the difference in journal publications, conference paper and short communication. **[4]**

c) Explain Impact Factor of a journal. **[2]**

Q8) a) Explain the term IPR. Which are different categories of IPR? **[4]**

b) Explain the different steps involved in obtaining patent. **[4]**

c) Explain the difference between Product patent and Process patent. **[2]**

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Total No. of Questions : 8]

SEAT No. :

P3804

[Total No. of Pages : 2

[5462]-166

M.E. (Polymer Engineering)

POLYMER PROCESSING AND TESTING

(2013 Pattern) (Semester - II)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Solve any 5 questions from total 8 questions.***
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 with neat figure, the caterpillar haul-off system used for pipes. **[5]**

b) Discuss flood feeding in extrusion. State its advantages and disadvantages. **[3]**

c) List the types of products made by the process of injection stretch blow molding. **[2]**

Q2) a) What is drag flow in extruders? Analyze drag flow. **[5]**

b) Discuss the test method used for determination of heat distortion temperature. **[3]**

c) Explain the significance of studying weathering properties of plastics. **[2]**

Q3) a) Discuss in details tests used to determine tensile strength at yield, at break and Young's modulus. Discuss the role of an extensometer in the tensile test. **[5]**

b) Describe matched die thermoforming method in details. **[3]**

c) List the various products made by extrusion blow molding. **[2]**

P.T.O.

Q4) a) Discuss in details the process of compression molding. **[4]**

b) Explain with neat figure, the complete line for extrusion of cast films. **[3]**

c) Explain Charpy and Izod test methods to determine impact properties. **[3]**

Q5) a) Write a detailed note on grooved barrel. **[4]**

b) Explain the complete line used in extrusion of pipes. **[3]**

c) With a neat figure, explain the internal calibrator used for calibration of pipes. **[3]**

Q6) a) Discuss ultrasonic testing and acoustic emission. **[5]**

b) Discuss the process of rotational molding. **[3]**

c) List the various components made by the process of calendaring. **[2]**

Q7) a) Explain the process of plug assist thermoforming in details. **[5]**

b) Explain the process of calendaring details with neat figures. **[5]**

Q8) a) Explain the terms power factor, permittivity, tracking resistance and arc resistance. **[5]**

b) List at least five faults in injection molded products. State the causes and remedies. **[5]**

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Total No. of Questions : 8]

SEAT No. :

P3805

[Total No. of Pages : 2

[5462]-167

M.E. (Polymer Engineering)

Polymer Physics and Characterization

(2013 Pattern) (Semester - II)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Solve any 5 questions from total 8 questions.***
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) Comment on the importance of multiple frequency runs in DMA. **[5]**

b) Discuss about the solid state mechanical properties of polymers. **[5]**

Q2) a) Write a note on structure of polymer networks. **[5]**

b) Discuss about Hilderbrand and Scott equation. Explain terms in it. **[5]**

Q3) a) Write a short note on Thermo-mechanical Analysis characterization technique. **[4]**

b) Explain the terms Storage modulus and Loss modulus, and comment on their importance in polymers. **[4]**

c) Explain the working principle of Scanning Electron Microscope. **[2]**

Q4) a) With suitable examples explain the concept of conformation and configuration. **[4]**

b) Explain in brief X-ray diffraction technique used for analyzing polymers. **[6]**

Q5) a) Comment on the scratch resistance of LDPE, HDPE and PP. **[4]**

b) Explain how thermal stability of polymeric materials can be determined by TGA. Draw appropriate sketches. **[6]**

P.T.O.

Q6) a) Explain the light scattering technique used for studying polymer properties. **[4]**

b) Estimate composition of the HDPE/PP blend using following DSC data. **[6]**

Peak Area (mJ)	Transition temperature (°C)	Enthalpy of fusion, ΔH(J/g)
562	170	100 for PP
173	130	18 for HDPE

Q7) a) With appropriate diagrams explain how XRD can be used to estimate morphology of polymers. **[5]**

b) Explain the concept of surface tension. Discuss in brief the method used to determine surface tension. **[5]**

Q8) a) Briefly discuss about use of universal calibration curve in GPC. Explain how molecular weight and its distribution are obtained using GPC technique. **[5]**

b) Explain any one viscometric technique used to determine molecular weight of polymer. **[5]**

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Total No. of Questions : 8]

SEAT No. :

P3806

[Total No. of Pages : 2

[5462]-168

M.E. (Polymer Engineering)

POLYMER STRUCTURE AND PROPERTIES

(2013 Pattern) (Semester - II)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Solve any 5 questions from total 8 questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***

Q1) a) Briefly comment on difference between amorphous and crystalline structure. **[3]**

b) Explain in brief the effect of molecular flexibility on mechanical and thermal properties of polymers. Give suitable examples. **[5]**

c) Isotactic PP has better properties than syndiotactic PP. Do you agree with the statement? Justify. **[2]**

Q2) a) Discuss about factor affecting growth of spherulites. **[4]**

b) With reference to thermoplastics, elastomers and thermosets, comment on effect of cross-linking on properties. **[6]**

Q3) a) Comment on the requirement of molecular weight and molecular Weight distribution for following polymer processing techniques. Justify your answer. **[6]**

i) Injection moulding

ii) Extrusion

iii) Blow moulding

b) In case of PP, why biaxially oriented film has more strength than monoaxially film than unoriented film? **[4]**

P.T.O.

Q4) a) Explain the concept of dendrimers and hyperbranched polymers. Give suitable examples of each type. **[5]**

b) Explain any two conversion methods for converting polymeric materials from low to high molecular weight during processing. **[5]**

Q5) a) Explain how processing conditions affect structure development in case of melt processing of polymers. Give suitable examples. **[6]**

b) Discuss about kinetic factors affecting polymer properties. **[4]**

Q6) a) Discuss about the relevance of polymer-polymer miscibility in case of polymer blends. **[5]**

b) Comment on the effect of chemical groups on adhesion properties. **[5]**

Q7) a) Explain fringed micelle model & how it was used to understand the internal morphology in polymer. **[5]**

b) Write a short note on polymer-clay nano-composite. **[5]**

Q8) a) Why PE is not rubbery at room temperature even though its Tg is around -100ºC. **[3]**

b) Write a short note on barrier properties of polymers. **[5]**

c) Explain the concept of molecular weight distribution. **[2]**

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Total No. of Questions : 8]

SEAT No. :

P3807

[Total No. of Pages : 2

[5462]-169

M.E. (Polymer Engineering)

POLYMER RHEOLOGY

(2013 Pattern) (Semester - III)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Solve any 5 questions from total 8 questions.***
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 the construction and working of a concentric cylinder rheometer. Derive an expression relating shear rate to geometry of the rheometer when the gap between the cylinders is very small. **[5]**

b) Discuss in details the types of fluids with examples. **[5]**

Q2) a) What is extrudate swell? Discuss reasons for the same. **[5]**

b) Derive an expression for velocity profile and shear rate at wall for a Ellis fluid through a circular cross section. **[5]**

Q3) a) Write a detailed note on Rouse theory. **[5]**

b) A plastic test specimen is subjected to a load of 150 N for 200 seconds and is then removed. Apply Maxwell and Kelvin-Voight model to calculate strain at 100 and 230 seconds if the model constants for both models are 1.5 GN/m^2 and 90 GNs/m^2. **[5]**

Q4) a) Discuss rod climbing effect in details. **[5]**

b) Discuss in details Bagley's correction. **[5]**

Q5) a) Discuss in details experiment used to determine storage modulus, loss modulus and loss tangent. **[5]**

b) Discuss the effect of long chain branching on shear and extensional properties of polymer melts. **[5]**

P.T.O.

Q6) a) Analyze creep and stress relaxation behavior of viscoelastic materials using Standard linear model. **[5]**

b) Discuss the terms stress relaxation modulus, creep compliance and complex viscosity. **[5]**

Q7) a) Derive an expression for velocity profile and shear rate at wall for a Newtonian fluid through a circular cross section. **[5]**

b) Discuss rheological models used to study extensional viscosity. **[5]**

Q8) a) Discuss the application of isochronous, isometric and creep plots. **[5]**

b) Discuss in details Rabinowitsch correction. **[5]**

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Total No. of Questions : 8]

SEAT No. :

P3808

[Total No. of Pages : 2

[5462]-170

M.E. (Polymer Engineering)

TRANSPORT PHENOMENA IN POLYMERS

(2013 Pattern) (Semester - III)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any 5 questions from the following.***
2) ***Figures to the right side indicate full marks.***
3) ***Illustrate your answers with suitable examples and diagrams, wherever necessary.***
4) ***Write relevant question number before writing the answer.***

Q1) a) Explain the Cauchy's Principle with suitable example. **[4]**

b) Differentiate between the Newtonian and Non-Newtonian fluids. **[3]**

c) Discuss time dependent and time independent fluids with example and give proper mathematical relation. **[3]**

Q2) a) Derive the expression for momentum flux distribution for flow through circular pipe. **[5]**

b) Discuss different models to express rheological behavior of polymeric fluids. **[5]**

Q3) a) Write down the following steps to find out the number of theoretical stages for multistage distillation column. **[5]**

b) What is permeability of polymers? Discuss the factors affecting on it. **[5]**

Q4) a) Explain the steady incompressible two dimensional boundary layer flow equation. **[4]**

b) Explain single stage extraction operation. **[4]**

c) Differentiate between extraction and leaching. **[2]**

P.T.O.

Q5) a) Explain briefly the concept of diffusion coefficient and dispersion. Explain in detail Mechanism and theories of diffusion through polymers. **[6]**

b) List out the applications of solid liquid extraction. **[4]**

Q6) a) Write a short note on single stage leaching operation. **[5]**

b) Distinguish between forced convection and free convection. **[5]**

Q7) a) Write a note on Multicomponent Diffusion. **[5]**

b) Explain with neat diagram equipment used in liquid- liquid extraction. **[5]**

Q8) a) Explain in detail with neat diagram the Continuous counter current multistage extraction. **[5]**

b) Explain with example the importance of viscous dissipation in energy transport. **[5]**

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