

Total No. of Questions : 4]

SEAT No. :

P5117

[Total No. of Pages : 2

[5060]-1

M.E. (Construction Management) (Semester - II)

THRUST AREAS IN PROJECT MANAGEMENT

(2008 Pattern) (Open Elective - IV)

Time : 4 Hours]

[Max. Marks : 50

Instructions to the candidates:

- 1) *Answer 3 questions from Section - I and 3 questions from Section - II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Black figures to the right indicate full marks.*
- 5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

Q1) Conduct a 'SWOT Analysis' for the present status/conditions w.r.t. the 'BRTS system' in India and document the results in the format of SWOT matrix. Also, recommend various measures in order to convert each weakness into strength and threat into opportunity. **[10 + 8 = 18]**

Q2) What is Project Pre-planning? State the advantages of project Pre-planning. Explain various subphases - involved in Project Pre-planning. **[2 + 6 + 8 = 16]**

Q3) Explain the following :

- a) SCM applications in construction industry. **[8]**
- b) 'Fast Track' methods in construction. **[8]**

Q4) Explain how the following 'Covey Habits' are helpful in construction industry with examples.

- a) Begin with the end in Mind **[4]**
- b) Win-Win situation **[4]**
- c) Be Proactive **[4]**
- d) Sharpen the Saw **[4]**

P.T.O.

SECTION - II

Q1) With respect to the ISO : 9000 series explain the following concepts with flow diagram for each :

- a) Quality and its management [6]
- b) Process Based Approach [6]
- c) Conformities and Non conformities [6]

Q2) Explain

- a) Project leadership styles with proper examples of the construction industry. [8]
- b) Competency Mapping with examples. [8]

Q3) What is Pre-Engineered construction? What are the challenges and merits of these construction. Explain with a case study. [6 + 10 = 16]

Q4) Explain the following :

- a) Six Sigma application in construction [4]
- b) Motivation Types and Effects [4]
- c) GMP contracts [4]
- d) Training Needs Assessment (TNA) [4]



Total No. of Questions : 12]

SEAT No :

P4601

[5060]-10

[Total No. of Pages : 2

M.E.(Civil - Environmental Engineering)

ENVIRONMENTAL SANITATION

(2010 Course) (Semester - II) (Open Elective-IV)

Time :3Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any 3 question each section.*
- 2) *Each question carries equal marks.*
- 3) *Figures to the right indicate full marks.*
- 4) *Your answer will be valued as a whole.*
- 5) *Assume Suitable data if necessary.*
- 6) *Use of electronic pocket calculator and steam table is allowed.*

SECTION - I

Q1) Discuss about Communicable diseases and role of Micro - organisms.

[9+9=18]

OR

Q2) Explain in details about Diseases communicated by discharges of intestines.

[10+8=18]

Q3) Discuss the Fly control methods and its applications.

[8+8=16]

OR

Q4) Explain in details about Rodents and public health.

[8+8=16]

Q5) Explain about Study of factors like Light, Heat and its role in general.

[10+6=16]

OR

Q6) Explain about sanitation of Public Buildings.

[8+8=16]

SECTION - II

Q7) Discuss Occupational Hazards and its assessment in details.

[9+9=18]

OR

Q8) Discuss in details about Industrial plant sanitation and how it is differ from other.

[10+8=18]

P.T.O.

Q9) Discuss in detail about Rural Sanitation. Give suitable example. **[8+8=16]**

OR

Q10) Discuss the low cost excreta disposal systems. Give suitable example.

[8+8=16]

Q11) Discuss Rural sanitation improvement schemes in detail. Give suitable example.

[10+6=16]

OR

Q12) Give any one Case study on sanitation.

[8+8=16]

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Total No. of Questions : 8]

SEAT No. :

P5044

[5060]-103

[Total No. of Pages : 2

**M.E.(Mechanical) (Energy Engineering)
NON -CONVENTIONAL ENERGY SOURCES
(2008 Course)(Semester-I)(Elective-II)(502505C)**

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 diagram must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of Logarithmic table, slide rule, mollier charts, electronic pocket calculator and steam table is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) What is insolation? Intensity of solar energy received on earth surface is much less than the intensity with which it is beamed from surface of sun. Discuss various factors responsible for the same. [8]
- b) Discuss the various types of solar radiation measurement instruments.[8]
- Q2)** a) Derive the collection efficiency for a cylindrical parabolic concentrator system. [8]
- b) Calculate the angle made by the beam radiation with the normal to a flat plate collectors, pointing due south located in New Delhi ($28^{\circ} 38' N$, $77^{\circ} 17' E$) at 9:00 hour, solar time on December 1. The collector is tilted at an angle of 36° with the horizontal. [8]
- Q3)** a) What are the main advantages and disadvantages of sensible heat storage with water as storage media? Compare them with that of solid media storage. [8]
- b) Explain Heat extraction method from solar pond. [8]
- Q4)** Write short notes on following. [18]
- a) Solid media storage
 - b) Components of flat collectors
 - c) Principle of conversion of solar energy into heat

P.T.O.

SECTION-II

- Q5)** a) Describe the factors that affect the size of Biogas plant. Also describe the materials used for bio-gas generation. [8]
- b) What are the main problems in straw fermentation? How they are minimized? [8]
- Q6)** a) Derive the expression for maximum power developed due to wind. [8]
- b) What are the basic requirements for locating a wind power plant? [8]
- Q7)** a) What are the different sources of geothermal energy? Discuss different systems used for generating the power using geothermal energy in brief.[8]
- b) Describe the characteristics of materials used for different components of power plant utilizing the geothermal energy. [8]
- Q8)** Write short notes on following: [18]
- a) Sources of biomass.
- b) Integrated energy systems.
- c) Types of wind power conversion systems.



Total No. of Questions : 8]

SEAT No. :

P4656

[5060]-105

[Total No. of Pages : 2

**M.E. (Mechanical) (Energy Engineering)
RADIATION SAFETY AND SHIELDING**

(2012 Course) (Elective - III) (502511A) (Semester - II)

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

SECTION - I

- Q1)** a) Write note on radiation shielding materials? [8]
b) Explain ALARA and BAT principle. [8]
- Q2)** a) What is Photon Attenuation list different techniques to obtain the required x-ray. [8]
b) Write a note on natural and man-made radiation sources. [8]
- Q3)** a) Write note on how radiation hazard situation should be handled? [8]
b) Explain control methods for ionizing and non-ionizing radiation. [8]
- Q4)** Write short note on (Any Three): [18]
a) Bragg curve
b) Equivalent dose and effective dose
c) Any Nuclear Disaster in past
d) Need of radioactive shielding.

P.T.O.

SECTION - II

- Q5)** a) What do you mean by radiological or nuclear emergency? Explain in brief its classification. [8]
b) Write note on 'Surface Contamination'. [8]
- Q6)** a) What are the different ways to protect against radiation exposure? [8]
b) What are Principal technical requirements for radiation safety design. [8]
- Q7)** a) Write note on protect against radiation exposure? [8]
b) Write note on Standards of Radiation Protection. [8]
- Q8)** Write short note on (Any Three): [18]
a) Kerma (K)
b) Quality factor
c) IAEA standards for safety design
d) Safety principles.



Total No. of Questions : 6]

SEAT No. :

P5149

[Total No. of Pages : 2

[5060]-107

First Year B.Pharmacy

1.7 : COMPUTER APPLICATION AND BIO-STATISTICS

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates :

- 1) *All questions are compulsory.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Figures to the right indicate full marks.*

SECTION - I

Q1) Explain various methods of representation of a statistical data with example. **[10]**

OR

In a class of 60 students following are the marks obtained in class test out of 20. a Find the mean standard deviation from mean.

Class limit (X)	0-4	4-8	8-12	12-16	16-20
Frequency (f)	04	13	25	15	03

Q2) A) In a series of 8 matches played abroad every year by an Indian team; What is the probability of an Indian captain to win the tosses more than 7 times in next five years? **[5]**

B) Using following data related to tablet formulation, prove that the concentration of a binder has significant correlation with batch-wise average hardness of tablets. **[5]**

%conc. of a Binder	3	2	7	6	8	4	6
Average Hardness	7	5	13	12	17	7	11

C) Using regression analysis show that there is significant linear relation between number of defective punches used and number of defective tablets produced in each minute by a tablet machine. **[5]**

No. of defective punches used	5	8	3	4	9	6	4	3
No. of defective tablets per minute	11	15	7	9	17	12	8	5

P.T.O.

Q3) Answer any five out of seven

[15]

- a) Write formula for chi square test and explain it.
- b) Explain the confidence interval in Gaussian probability distribution.
- c) Explain advantages of crossover against parallel experimental design in clinical trials.
- d) Discuss advantages of non-parametric analysis over parametric.
- e) Null hypothesis and alternative hypothesis in research.
- f) Write a short note on quality control charts.
- g) Define common parameters used in parametric testing.

SECTION - II

- Q4)**
- a) Explain in detail scanner. **[5]**
 - b) Note on PROM. **[2]**
 - c) Elaborate types of data processing-batch in multimedia. **[3]**

OR

- a) Explain functions of operating system. **[5]**
- b) Explain data representation. **[5]**

- Q5)**
- a) Note on EBCDIC. **[6]**
 - b) Short note on EPROM (Erasable Programmable Read Only Memory) **[4]**
 - c) Detail about expanded memory. **[5]**

- Q6)**
- a) Convert $(0110100110)_2$ to decimal and $(87654)_{10}$ to binary form. **[5]**
 - b) Attempt following. **[10]**
 - i) Note on GUI
 - ii) Explain use of computers in pharmacy.



Total No. of Questions : 8]

SEAT No. :

P5032

[5060]-11

[Total No. of Pages :2

M.E. (Civil-Hydraulics)

**COMPUTATIONAL METHODS IN HYDRAULIC ENGINEERING
(2008 Course) (Semester-I)**

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

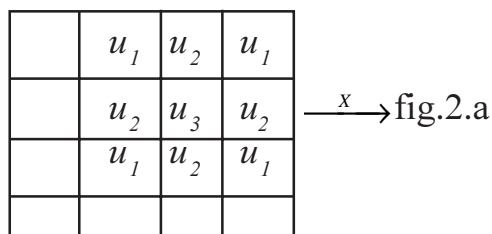
- 1) *Answer any 3 questions from each section.*
- 2) *Answer 3 questions from section-I and 3 questions from section-II.*
- 3) *Answers to the two sections should be written in separate books.*
- 4) *Neat diagrams must be drawn wherever necessary.*
- 5) *Figures to the right side indicate full marks.*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

SECTION-I

Q1) a) Solve $\nabla^2 u = 0$ under the conditions ($h=1, k=1$) $u(0, y) = 0, u(4, y) = 12 + y$
for $0 \leq y \leq 4; u(x, 0) = 3x, u(x, 4) = x^2$ for $0 \leq x \leq 4$. **[9]**

b) Explain in brief how the finite difference method is used in Hydraulic Engineering. **[8]**

Q2) a) Solve the Poisson equation $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 v}{\partial y^2} = 8x^2 y^2$ for the square mesh in
fig.2.a with $u(x, y) = 0$ on the boundary and mesh length 1.
[X and Y axes pass through center of Mesh] **[12]**



b) What is the classification of the equation $\frac{\partial^2 f}{\partial x^2} + 2 \frac{\partial^2 f}{\partial x \partial y} + \frac{\partial^2 f}{\partial y^2} = 0$. **[5]**

P.T.O.

Q3) a) Solve the boundary value problem for $x=0.5$: $\frac{\partial^2 y}{\partial x^2} + y + 1 = 0$, $y(0) = y(1) = 0$.
(Take $n=4$). [8]

b) What do you mean by 'Markov Chain'? What is the importance and significance of Markov Chain in Computational Methods in Hydraulic Engineering? [8]

Q4) Write short notes on any four of the following. [16]

- a) Chi-square test.
- b) Coefficient of Correlation.
- c) Pearson type I, II and III distribution.
- d) Initial boundary value problem.
- e) Normal distribution.

SECTION-II

Q5) a) Discuss in detail Gauss-Quadrature method of Numerical integration. [8]

b) Evaluate $\int_4^{5.2} \log x dx$ by [8]

- i) Trapezoidal rule
- ii) Simpson's 1/3 rule.

Q6) a) Discuss the transformation $w = z + 1/z$. Is it conformal at the origin. [5]

b) Explain Schwarz-Christoffel Transformation. Find the transformation which maps the semi-infinite strip of width π bounded by the lines $v=0$, $v=\pi$ and $u=0$ into upper half of z -plane. [12]

Q7) a) Use the Cauchy's integral formula to evaluate $\int_C \frac{z}{z^2 - 3z + 2} dz$,
where C is $|z-2| = 1/2$. [8]

b) Solve the system of simultaneous equations by relaxation method.
 $10x - 2y - 3z = 6$; $-x + 10y - 2z = 7$; $-x - y + 10z = 8$. [8]

Q8) a) Expand $f(z) = \cos z$ in a Taylor series about the point $z = \pi / 2$. [5]

b) Use the Gauss Quadrature three point formula to evaluate

$$I = \int_0^1 \frac{1}{x} \sin\left(\frac{1}{x}\right) dx. \quad [6]$$

c) Under the transformation $w=1/z$, find the image of $|z-2i| = 2$. [6]

Total No. of Questions : 8]

SEAT No. :

P5045

[5060]-110

[Total No. of Pages : 2

M.E. (Mechanical) (Energy Engg.)

PROCESS STORAGE AND DISPOSAL OF NUCLEAR WASTE

(2012 Pattern) (Semester - II) (Elective - IV) (502512)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer any three questions from each section.*
- 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 types of Radioactive Waste in detail. [8]
b) Explain Radioactivity and Radio Nuclides. [8]
- Q2)** a) What is Photon Attenuation list different techniques to obtain the required x. [8]
b) Explain Long-term behavior of waste and containers. [8]
- Q3)** a) Write a note on Indian scenario of nuclear waste management. [8]
b) Characterize the radioactive waste approaches to nuclear waste management. [8]
- Q4)** Write short note on (Any Three) [18]
a) Long-Lived Waste Radio Nuclides
b) Short-Lived Waste Radio Nuclides.
c) ALARA and BAT principle.
d) Process of High Level waste Handling.

P.T.O.

SECTION - II

- Q5)** a) Explain the following waste treatment techniques: [8]
i) Vitrification.
ii) Ion-Exchange.
- b) Write note on 'Surface Contamination'. [8]
- Q6)** a) Write a note on 'Nuclear Waste Regulations'. [8]
b) What are principal technical requirements for radiation safety design. [8]
- Q7)** a) Which are the challenges in nuclear waste management? [8]
b) Explain various liquid waste treatment techniques. [8]
- Q8)** Write note on (Any Three) [18]
a) Long term nuclear waste disposal.
b) Effect of nuclear waste on environment.
c) Protect against radiation exposure before disposal.
d) Pre-Treatment of Radioactive wastes.

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Total No. of Questions :10]

SEAT No. :

[Total No. of Pages :2

P4657

[5060] - 114

M.E. (Mechanical - Mechatronics)

COMPUTERAIDED DESIGN

(2008 Course) (Semester - II) (New) (Elective - III) (502811 A)

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 electronic pocket calculator is allowed.*
- 6) Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) What is CAD? Write in detail design methodology? [8]
b) Discuss in details Quality Function Deployment function, (QFD)? [8]
- Q2)** a) Define computer graphics? Write concept of Transformation, Scaling, Rotation? [8]
b) Write note on Product life cycle? [8]
- Q3)** a) Discuss in brief the CAD/CAM data exchange? [8]
b) Explain in detail Data base requirement? [10]
- Q4)** a) Write difference between surface and Solid modeling? [8]
b) Write in detail about spline curves and Benzir curve. [8]

P.T.O.

- Q5)** a) Write short note on: [8]
i) B rep.
ii) Hybrid modeling.
b) Discuss in detail design Feature based modeling? [8]

SECTION - II

- Q6)** a) What is FEA? What are steps in FEA? [8]
b) Explain in detail Variational method? [8]

- Q7)** a) Explain in detail Rayleigh - Ritz method. [8]
b) Write in detail about RP techniques? [8]

- Q8)** a) Explain in detail Selective Laser Sintering (SLS)? [8]
b) What is concept of Fused Decomposition modeling (FDM)? [10]

- Q9)** a) Explain with examples the Design for manufacturing? [8]
b) Explain in detail about Design for assembly? [8]

- Q10)**a) Write short notes on: [8]
i) Need for simulation.
ii) Model & its purpose.
b) Explain steps in simulation study and its Advantages, Disadvantages. [8]



Total No. of Questions : 8]

SEAT No. :

P5113

[Total No. of Pages : 2

[5060] - 116

M.E. (Mechanical) Mechatronics (Elective - IV) (Semester - I)

AUTOMOTIVE ELECTRONICS

(2008 Course)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Explain Throttle position sensor with respect to construction, sample specifications and its advantages. [9]
b) Discuss in brief three types in parking assistance systems used in cars on Indian roads. [9]
- Q2)** a) Explain in brief the batteries used in automobiles along with tests of batteries and protections used in batteries. [8]
b) Discuss in brief Electric Power Steering as driver assistance system along with electronics involved in it. [8]
- Q3)** a) Discuss "Lane assistance system" used in modern luxury cars [8]
b) Explain in brief "Electronic Stability Program" in luxury cars. [8]
- Q4)** a) Explain in brief need of "Balancing" and "Alignment" and sensors and equipment used for them. [8]
b) Discuss in brief Electrical Locking System. [8]

P.T.O

SECTION - II

- Q5)** a) Explain Head light dazzling preventive methods in modern cars [9]
b) Explain Engine RPM sensors with principle of working, resolution and repeatability [9]
- Q6)** a) Write a short note on "Distributor less ignition" [8]
b) Explain Lambda sensor used in Exhaust Gas Analysis. [8]
- Q7)** a) Explain the sensors employed in Air conditioning systems in modern cars [8]
b) Write a short note on "Anti fog provisions in Modern automobiles" [8]
- Q8)** a) Explain two important safety provisions and sensors incorporated in power windows [8]
b) Explain in brief "Modern trends in Spark Ignition Systems" [8]



Total No. of Questions :8]

SEAT No. :

P4602

[5060]-12

[Total No. of Pages :2

M.E. (Civil) (Hydraulics)
WATER RESOURCE PLANNING AND MANAGEMENT
(2008 Course) (501302) (Semester- I)

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 logarithmic tables, slide rule, Mollier Charts, electronic pocket calculator and steam tables is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) Explain the data required for planning of water resource project. [12]
- b) Discuss in detail the procedure involved in planning of a water resources project. [6]
- Q2)** a) Explain the process of process of multi-objective planning model with respect to following points: [8]
- i) Objective quantification
 - ii) Plan formulation
- b) Explain in brief the following terms: [8]
- i) Direct Benefits
 - ii) Indirect Benefits
- Q3)** a) Explain the role of water users' co-operative societies in water distribution. [8]
- b) What are the various objectives for formation of water users' co-operative society? [8]

P.T.O.

Q4) a) An irrigation project is to be analyzed at discount rate of 9% and its economic life is 65 years. The cash flows are to be accounted at the end of each year and as shown below: **[10]**

- Capital investment = Rs. 22 Crore during the first year and Rs. 40 Crore during the second year.
- O and M costs = Rs. 2.11 Crore per year for the first 5 years and Rs. 2.8 Crore per year for the remaining period.
- Benefits = Rs. 3.2 Crore per year for the first 5 years and Rs. 13 Crore per year for the remaining period.

Draw the cash flow diagram calculate: B/C Ratio and Present Worth of the project.

- b) Write short note on the following: **[6]**
- i) National Water Policy.
 - ii) Social aspects involved in water resources planning.

SECTION-II

Q5) a) State and explain briefly various discounting technique. **[12]**

b) Discuss in detail “Global water partnership”. **[6]**

Q6) a) What do you mean by integrated approach to manage Water Resource? List out its salient features. **[8]**

b) Discuss in detail “interlinking of rivers - a future need”. **[8]**

Q7) a) Explain the functions of different bodies in water resource planning. **[8]**

b) Explain in brief “Preparation of feasibility report”. **[8]**

Q8) a) Explain the salient features of ICOLD and ICID. **[8]**

b) Write short note on the following: **[8]**

- i) Long term and Short term benefits of Planning of water resources.
- ii) Single and Multipurpose projects.



Total No. of Questions :12]

SEAT No. :

P4658

[5060]-121

[Total No. of Pages :3

M.E. (Electrical Control System)
ADVANCED TOPICS IN CONTROL SYSTEM
(2008 Pattern) (Semester-I) (Elective - II)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Solve any three questions from each section.*
- 2) *Figures to the right indicates full marks.*
- 3) *Assume suitable data, if necessary.*

SECTION-I

Q1) a) Explain sliding mode and variable mode control. **[10]**

b) State and explain the uncertainties in system matrix and input matrix. **[8]**

OR

Q2) a) Consider state variable model **[10]**

$$\dot{x} = Ax + Bu$$

$$Y=Cx$$

Where matrices A, B & C are given by

$$A = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 0 & -5 & -6 \end{bmatrix}, B = \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix}, C = [1 \ 0 \ 0]$$

Determine state feedback gain matrix $k=[k_1, k_2, k_3]$ such that closed loop poles are located at $s= -2+j4$; $s= -2-j4$ & $s= 10$.

b) Explain: **[8]**

- i) Reaching mode
- ii) Chattering

P.T.O.

Q3) a) Given a linear time-invariant control system in state space form [8]

$$\dot{x}(t) = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 5 & -1 & -3 \end{bmatrix} x(t) + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} u(t)$$

Design a linear state variable feedback to place the poles at desired location: $S = -2, (-3+j3)$ and $(-3-j3)$.

b) Draw the block diagram of adaptive system and explain working of each block. [8]

OR

Q4) a) Draw block diagram of adaptive system and explain working of each block. [8]

b) What are the conditions for arbitrary pole placement in closed loop control system? Explain with the help of block diagram the method of pole placement using linear state variable feedback. [8]

Q5) a) Discuss various methods of obtaining state feedback gain matrix $K = [k_1, k_2, \dots, k_n]$. [8]

b) Explain “adaptive schemes” with the help of a neat diagram. [8]

OR

Q6) Write detailed notes on any one of the following: [16]

a) MIT rule,

b) Model Reference Adaptive System (MRAS)

SECTION-II

Q7) a) What is neural network? State the benefits of neural network. [8]

b) With a neat structure explain biological neuron. [8]

OR

Q8) a) With a neat diagram explain the deterministic model of artificial neuron. Also explain the activation functions. [8]

b) Sketch the multiple input neuron model. [8]

Q9) a) Explain the following: [9]

i) supervised learning

ii) unsupervised learning

b) Discuss fast output sampling feedback control (FOSF). [9]

OR

Q10) a) Explain the concept of pattern recognition by a suitable example. [9]

b) Discuss briefly periodic output feedback (POF). [9]

Q11) a) Define and explain generalization of neural network. [8]

b) Explain recurrent network. [8]

OR

Q12) a) Explain Delta learning method. [8]

b) Multirate output feedback control. [8]

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Total No. of Questions : 6]

SEAT No. :

P4659

[5060]-125

[Total No. of Pages : 2

M.E. (Electrical) (Power Electronics and Drives)

FACTS AND HVDC (Elective - II)

(2008 Course) (Semester - I) (503305)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any two questions from each section.*
- 2) *Answer two questions from Section I and two questions from Section II.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*

SECTION - I

- Q1)** a) With the help of neat diagram explain the working of static VAR compensation. [12]
- b) Explain the need of reactive power compensation in power system. [13]
- Q2)** a) What is the difference between Series compensation and Shunt Compensation? Explain any one method for series compensation in detail along with diagram. [15]
- b) Explain the principle of operation of Thyristor Controlled Switched Capacitors (TCSC). [10]
- Q3)** a) What is Unified Power flow? Explain the working of Unified Power Flow Control (UPFC) with the help of neat diagram. [12]
- b) What are the different types of FACTS controller used for power system stability? Explain the basics of STATCOM along with its block diagram and applications. [13]

P.T.O.

SECTION - II

- Q4)** a) Compare AC and DC Transmission system on the basis of economy, technical performance and reliability. Also discuss the merits and demerits of HVDC system over AC Transmission system. **[15]**
- b) Draw a schematic diagram of a typical HVDC converter station and explain the working of each part of it in detail. **[10]**
- Q5)** a) With the help of neat diagram and necessary waveforms explain the working of 6 pulse bridge converter. **[15]**
- b) What are the different faults occurred in converter circuit? Discuss the protection provided against it. **[10]**
- Q6)** a) From fundamentals explain basic principle of power flow control DC link? Draw basic converter control characteristics. **[12]**
- b) Discuss firing angle control and explain the basic requirement for firing angle generation. Explain any one type of firing angle control in detail. **[13]**

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Total No. of Questions : 6]

SEAT No. :

P4660

[5060]-126

[Total No. of Pages : 2

**M.E. (Electrical) (Power Electronics and Drives)
HARMONICS AND THEIR MITIGATION (Elective - II)
(2008 Course) (Semester - I) (503305(B))**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Solve any two questions from section I and two questions from section II.*
- 2) Use separate answer book for both the sections.*
- 3) Figures to the right indicate full marks.*

SECTION - I

- Q1)** a) Discuss different power quality regulations. [15]
b) Discuss in detail about voltage disturbances. [10]
- Q2)** a) Enlist harmonic suppression methodologies. [15]
b) Explain the waveform distortion categories in detail. [10]
- Q3)** a) Explain harmonics distortion in power system with relevant waveforms. [15]
b) Enlist passive Harmonic filter design steps. [10]

SECTION - II

- Q4)** a) Enlist power quality monitoring equipments. [15]
b) Discuss wavelet transformation technique used in Power Quality monitoring? [10]

P.T.O.

- Q5)** a) Explain shunt compensation techniques used in PQ improvement. [10]
b) Explain principal and operation of STATCOM. [15]
- Q6)** a) Explain operating characteristics of phase shifter. [15]
b) Explain operating principal of SPS. [10]

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Total No. of Questions :6]

SEAT No. :

P4661

[Total No. of Pages :2

[5060] - 128

M.E. Electrical (Power Electronics & Drives)

MICROCONTROLLER AND ITS APPLICATIONS (Elective - III)

(2008 Course) (Semester - II) (503311)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Solve any two questions from section I and two questions from Section II.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Use of Calculator is allowed.*
- 5) *Assume Suitable data, if necessary.*

SECTION - I

- Q1)** a) Explain overview of 8051 family of microcontrollers and the difference between microprocessor and microcontroller. **[15]**
- b) Write note on reset circuitry and watchdog timer. **[10]**
- Q2)** a) Explain register structure and addressing modes of 8051. **[15]**
- b) Interface 8-bit ADC with microcontroller 8051. Write a program to sample and hold an input signal using ADC. **[10]**
- Q3)** a) What is a Timer? Write a short note on Timer modes of operation. **[15]**
- b) Explain different jump and call instructions of 8051. **[10]**

SECTION - II

- Q4)** a) Explain a BLDC motor operation. Write a program to interface BLDC motor using 8051. **[15]**
- b) Explain 8051 based DC motor control. **[10]**

P.T.O.

- Q5)** a) Enlist any five sensors/actuators and their interface with 8051. [15]
b) With the help of neat circuit diagram explain how 16* 1 LCD is interfaced with 8051 microcontroller. [10]
- Q6)** a) Discuss 8051 based electronic speed governor. [15]
b) Write a note intelligent switchgear unit. [10]



Total No. of Questions : 6]

SEAT No. :

P4662

[5060]-129

[Total No. of Pages : 2

M.E. (Electrical) (Power Electronics and Drives)
SPECIAL TOPICS IN POWER ELECTRONICS AND DRIVES
(Semester - II) (2008 Course) (503312B) (Elective -IV)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any two questions from section I and any two questions from section II.*
- 2) *Answers to the two sections should be written in separates answer sheet.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use to electronic Calculator is allowed.*
- 5) *Assume Suitable data, if necessary.*

SECTION - I

- Q1) a)** Explain operation of three phase inverter in 120 degree conduction mode with output voltage and pulses waveform. What are different PWM control techniques explain PWM, SPWM inverter. **[15]**
- b) How voltage variation is achieved within inverter. Explain different methods. **[10]**
- Q2) a)** What are the advantages and disadvantages of CSI? Explain current regulated PWM CSI. Draw circuit diagram and output voltage, current waveform. **[15]**
- b) What are basic types of switching mode regulators? Explain any two in detail. **[10]**
- Q3) a)** Explain buck converter with output voltage and current waveform. What are advantages and disadvantages of buck regulator? **[15]**
- b) What are different methods of power factor control explain any two methods in detail. **[10]**

P.T.O.

SECTION - II

- Q4)** a) What are IEEE standards for power quality? [10]
- b) Show in detail implementation of single phase active filter and associated output. [15]
- Q5)** a) Explain vector control operation of three phase induction motor with block diagram and function of each block. [15]
- b) What is sensor less control of Induction Motor and explain any one control method for control of IM. [10]
- Q6)** a) What is sensor less control of Synchronous Motor? [10]
- b) Describe the design of 1-phase APF with PWM inverter as voltage source controller. [15]



Total No. of Questions : 6]

SEAT No. :

P5046

[5060]-131

[Total No. of Pages :2

**M.E. (Electrical-Power Systems)
HIGH VOLTAGE POWER TRANSMISSION
(2008 Course) (Semester-II) (503210)**

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answer any 2 questions from each sections.*
- 2) *Answer to the two section 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) What is the significance of clearance in case of high voltage power transmission? What will happen in case of less clearance? **[15]**

Explain the required clearance in following.

- i) Clearances in a tower, phase to phase, phase to ground, phase to tower,
 - ii) Factors to be considered while deciding clearance.
- b) Explain the reasons for Switching over voltage. With graph, give the specifications of switching over voltage. **[10]**

Q2) a) What is travelling wave? With mathematical equation, give specification of travelling wave. Also explain the effect of travelling waves on transmission line and other equipments. Also explain the reflection and refraction of waves. **[15]**

b) What is radio interference? Explain the origin of radio interference. What are the ill-effects of the radio interference? What points are needed to be considered while designing the line? **[10]**

Q3) a) State the reasons for line-voltage deviation. Explain with diagram, the working of shunt reactor and shunt capacitor to control voltage? **[10]**

b) Explain the Biological effects of electric field on live being. What are the various safety measures to avoid accidents under high voltage power transmission lines? **[15]**

P.T.O.

SECTION-II

- Q4)** Explain the commutation, phase control in HVDC systems along with their control characteristics, configurations. **[25]**
- Q5)** a) Explain the Bipolar HVDC terminal and switching arrangements in bipolar HVDC terminal. **[15]**
b) With schematic diagram, the working of Converter transformer connections. **[10]**
- Q6)** a) Compare Synchronous HVDC link and Asynchronous HVDC Link. **[10]**
b) Explain various faults and abnormal condition in bipolar, two terminal HVDC system. **[15]**



Total No. of Questions : 6]

SEAT No. :

P4663

[5060]-132

[Total No. of Pages : 2

M.E. (Electrical) (Power Systems)

POWER ELECTRONICS APPLICATIONS IN POWER SYSTEMS

(2008 Pattern) (Semester - II) (503211) (Elective - III)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Answer two questions from section I and two questions from sections II.*
- 2) Answer to both the sections should be written in separate answer books.*
- 3) Neat diagram wherever necessary be drawn by pencil of black pen.*
- 4) Figures to the right indicate full marks.*

SECTION - I

- Q1) a)** From fundamentals explain basic principles of DC link control. Draw and explain basic converter control characteristics. **[13]**
- b) Stating their merits and demerits, enlist different types of semiconductor controllers with their block diagram, used in power system control. **[12]**
- Q2) a)** Giving classification of SVC, with neat diagram explain functioning of FC+TCR Controller. State its merits and demerits. **[10]**
- b) With neat block diagram and waveform; explain the operation and control of six pulses VSC based STATCOM. **[15]**
- Q3) a)** From fundamentals obtain mathematical modeling of a SSSC to be used for steady state analysis. **[10]**
- b) With help of a single line diagram explain the different modes of operation of TCSC. State its merits and demerits. **[15]**

P.T.O.

SECTION - II

- Q4)** a) Define UPFC. State its merits and demerits. With neat block diagram and necessary waveforms explain the principle of operation of VSC based UPFC. [13]
- b) Enlist constraints in control of UPFC. With neat diagram explain control functions of UPFC. [12]
- Q5)** a) Define Dynamic Voltage Regulator. With neat diagram explain the operating features of DVR. [10]
- b) Explain the need for FACT controller in AC power flow. Discuss on capabilities of different FACTS controller. [15]
- Q6)** a) With neat diagram explain briefly control of STATCOM using artificial neural network. [15]
- b) With suitable block diagram explain the switching signal generation using hysteresis controller in a controlled converter operation. State its merits and demerits. [10]

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Total No. of Questions :8]

SEAT No. :

P4603

[5060]-14

[Total No. of Pages :3

M.E. (Civil - Structures)

STRUCTURAL MATHEMATICS

(2008 Course) (501401) (Semester - I)

Time : 4 Hours]

[Max. Marks :100

Instructions to candidates:

- 1) *Attempt three questions from section I and three questions from section II.*
- 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 non programmable electronic calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) What is the relation between flexibility and stiffness matrix? Explain with proper illustration. **[4]**
- b) Analyse a fixed beam of span 6m subjected to uniformly distributed load of 6kN/m along with a central point load of 20 kN. Use Flexibility method for analysis. **[13]**
- Q2)** a) What is bandwidth. Explain how the band width and half band width of stiffness matrix of a three storey double bay portal frame can be minimized? **[5]**
- b) Using Flexibility or Stiffness method, analyze the truss shown in the Fig. 2. b. Find the joint displacements, support reactions, bar forces and bar elongations. Take $AE = 4000 \text{ kN}$ for vertical members and 5000 kN for remaining members. **[12]**

P.T.O.

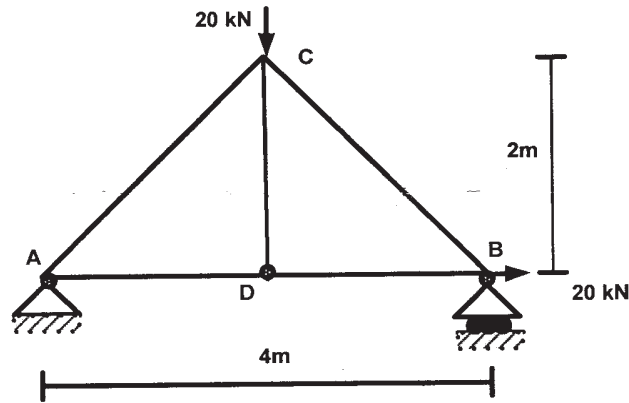


Fig . 2.a

- Q3)** a) Derive the transformation matrix for the portal frame member. [8]
- b) Given $dy/dx = x^2 - y + 2$. At $x = 0, y = 1$. Calculate the value of y at $x = 0.1$ and 0.2 using an interval of 0.1 . Use Euler method. [8]
- Q4)** a) Find an approximate value of y when $x = 0.2$, given that $dy/dx = 3xy$ and $y = 0.5$ when $x = 0$. Take $h = 0.1$. Adopt Rangakutta method. [8]
- b) Derive the stiffness matrix of a space frame member. [8]

SECTION-II

- Q5)** a) For the fixed beam shown in Fig. 5.a, apply central difference formula dividing the beam in four equal parts and find the deflection at nodal points, and moment at fixed ends. [8]



Fig. 5.a

- b) A simply supported uniform plate of side length 'a x a' supports a uniformly distributed load over entire plate. Estimate the deflection at the various nodal points, using a grid interval of $h = a/4$ using finite difference method. Comment in the changes to be employed if the plate is fixed at all edges instead of simply supported. [8]

Q6) a) What are different interpolation techniques? Explain cubic spline interpolation? What are cubic splines? State the conditions for a spline to be cubic. [7]

b) Find the cubic splines for the following table of values. [9]

x:	1	2	3	4
y:	1	4	12	6

Hence evaluate $y(1.5)$ and $y'(3)$.

Q7) a) Values of y are given at values of x as shown below. [9]

X	1.0	1.5	3.6	5.2
Y	15.0	20.0	38.6	34.2

Calculate the value of y at $x = 4.6$ using Interpolation Technique.

b) Find a quadratic polynomial that fits the following data. [8]

x	-4	-2	0	2	4
$y=f(x)$	2	1	1	1	2

Q8) a) When the values of y at values of x at uniform interval are known, state how the area under the curve is to be calculated using Simpson's rule and Gauss Quadrature. [7]

b) A beam simply supported at its ends supports uniformly distributed load of 6 kN/m over the entire length of 5 m. Find a Fourier expression for the load. Calculate the deflection and bending moment at its centre. [10]

EEE

Total No. of Questions :8]

SEAT No. :

P4664

[5060]-141

[Total No. of Pages :2

**M.E. (E&TC / Electronics) (Microwave / VLSI Embedded Systems /
Communication Network / Signal Processing / Digital Systems)
PRINCIPLES AND PRACTICES FOR IT MANAGEMENT
(2008 Course) (Semester- I) (504182)**

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) Answers 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) Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) Explain planning and controlling function of management in detail. [8]
b) Discuss the various skills required for the manager. [8]
- Q2)** a) Explain the role & importance of business policy. [8]
b) Write short notes on tracking project progress and financial obligations. [8]
- Q3)** a) Discuss in detail the steps in revising the project plan. [8]
b) Enlist various types of conflicts. Identify the techniques used for conflict management. [8]
- Q4)** Write short note on any three: [18]
a) Work breakdown Structure
b) Business ethics
c) Team management
d) Theories of group formation

P.T.O.

SECTION-II

- Q5)** a) Discuss in detail coping with project delays. [8]
b) State and explain various project quality standards. [8]
- Q6)** a) Explain the application of IT in agriculture sector. [8]
b) Explain the concept of knowledge management. [8]
- Q7)** a) Enlist various project constraints. Explain any one of them in detail. [8]
b) Explain in detail IPR and Cyber law. [8]
- Q8)** Write short note on any three: [18]
- a) Six sigma.
 - b) Supply chain management.
 - c) Process of creating budget.
 - d) Application of IT in customer relationship and Marketing.

EEE

Total No. of Questions : 8]

SEAT No. :

P5109

[Total No. of Pages : 2

[5060]-142

**M.E. (E & TC) (Communication Networks)
CODING AND MODULATION TECHNIQUES
(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 answer-books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Black figures to the right indicate full marks.*
- 5) *Use of electronic pocket calculator and steam tables is allowed.*
- 6) *Assume suitable data if necessary.*

SECTION - I

Q1) a) Explain need of compression in detail? Explain in detail video compression? **[8]**

b) Consider five source symbols of a discrete memory less source and their probabilities as shown below. Follow Huffman's algorithm to find the code word each message. Also, find code-word length and average information per message. **[8]**

$$m_1 = 0.4, m_2 = 0.2, m_3 = 0.2, m_4 = 0.1, m_5 = 0.1$$

Q2) a) Explain the following with reference to OFDM. Principles of operation, Advantages, Disadvantage, Applications. Support your answer with suitable block diagram and frequency spectrum. **[10]**

b) What are the properties of PN sequence? Hence demonstrate all these properties with a PN code generator of three shift register stages. **[8]**

P.T.O.

- Q3)** a) Define MPEG? & Explain in detail different MPEG standards? [8]
b) Discuss the following parameters of Small-Scale Propagation Models.[8]
i) Doppler Shift
ii) Excess Delay
iii) Power Delay Profile
iv) Delay Spread

- Q4)** Write short notes (any two) : [16]
a) CDMA 2000
b) Video compression
c) IS-95

SECTION-II

- Q5)** a) Explain the coherent detection technique and Cost as loop receiver model. [8]
b) Explain need of Transmit Diversity. Hence discuss various techniques to achieve it. [8]
- Q6)** a) Compare and contrast Flat Fading and frequency selective fading channels. Explain Doppler frequency. [10]
b) Explain the Rician multipath fading phenomenon and its statistical properties. [8]
- Q7)** a) Discuss the two techniques of decoding Huffman Code. [8]
b) Explain in detail quantization process in image compression. [8]
- Q8)** Write short notes (any two) [16]
a) DCT in image compression
b) RAKE Receiver
c) JPEG standard



Total No. of Questions :8]

SEAT No. :

P4665

[Total No. of Pages :2

[5060] - 143

**M.E. (E & TC) (Communication Networks)
SIGNAL DETECTION AND ESTIMATION
(2008 Course) (Elective - I) (Semester - I)**

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) Q.1 and Q.5 are compulsory solve any two 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) Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Derive equation for Wiener Filter? Explain the relation between Wiener and Kalman Filter. [10]
b) Explain Gauss-Markov probabilistic model and its properties. [8]
- Q2)** a) Give the significance and limitation of linear mean square estimation. [8]
b) Explain the procedure for the maximum likely hood estimation of parameter of linear system and discuss the merits and demerits. [8]
- Q3)** a) Explain significance of gauss markov model with suitable example. [8]
b) Compare the performance of ARMA and MA models in the presence if Gaussian noise. [8]
- Q4)** a) Discusses the significance of estimation techniques in radar signal processing. [8]
b) Distinguish between estimation and detection. [2]
i) What is an estimator? List important properties of estimators. [3]
ii) What do you understand by “linear model” in estimation. [3]

P.T.O.

SECTION - II

- Q5)** a) Explain Forward and backward linear prediction with example. [12]
b) Derive relationship between autocorrelation and model parameters. [6]
- Q6)** a) Explain the procedure for the maximum likelihood estimation of parameter of linear system and discuss its merits and demerits. [8]
b) Distinguish the terms prediction Filtering and Smoothing with reference to estimation. [8]
- Q7)** a) What is meant by “Innovation” w.r.t. the Kalman filter. What is the Extended Kalman Filter (EKF)? [8]
b) Explain any four Probability distribution function and its properties. [8]
- Q8)** a) Write a short notes on: [8]
i) ML estimator.
ii) Maximum likelihood estimate of parameters.
b) Explain how speech processing and image processing find application in estimation and detection. [8]



Total No. of Questions :8]

SEAT No. :

P4666

[Total No. of Pages :2

[5060] - 144

M.E. (E & TC) (Communication Network)

ADHOC NETWORKS

(2008 Course) (Semester - I) (Elective - I)

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) *Neat diagrams must be drawn wherever necessary.*
- 4) *Assume suitable data, if necessary.*
- 5) *Figure to the right indicates full marks.*

SECTION - I

- Q1)** a) Explain any two applications of Ad hoc wireless network in brief. [9]
b) Draw the schematic diagram for ad hoc wireless Internet. What are the considerations for successful ad hoc wireless Internet. [9]
- Q2)** Explain the following Routing Protocols. [16]
a) Temporally ordered on demand routing protocol (TORA).
b) Core extraction distributed adhoc routing protocol.
- Q3)** a) What are the design goals of multicast routing protocol for ad hoc wireless network? [8]
b) Explain the architecture of multicast routing protocol with the help of reference model. [8]
- Q4)** a) What are the design goals of transport layer protocol for adhoc wireless network? [8]
b) Compare the application controlled transport protocol (ACTP) and split TCP. [8]

P.T.O.

SECTION - II

- Q5)** a) What are the different energy conservation techniques? [9]
b) Enlist the different battery scheduling techniques in ad hoc wireless network and explain them briefly. [9]
- Q6)** a) Explain network security requirements for different applications in ad hoc wireless network. [8]
b) Explain the major routing attacks in Ad hoc wireless Network? [8]
- Q7)** a) Explain various QoS reservation mechanisms in ad hoc wireless network. [8]
b) Explain the QoS enabled on demand distance vector Routing Protocol (AODV). [8]
- Q8)** a) What are the challenges in providing QoS support in ad hoc wireless network. [8]
b) Explain the INORA QoS framework. [8]



Total No. of Questions : 8]

SEAT No. :

P5047

[5060]-145

[Total No. of Pages : 2

**M.E. (E & TC) (Communication Networks)
NETWORK ARCHITECTURE & DESIGN
(2008 Course) (Semester-I) (Elective-II) (504604)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer to the two sections should be written in separate answer books.*
- 2) *Answer any three questions from each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) Explain Network's architecture and design using an analogy of home's architecture and design. **[8]**
- b) Design network architecture for a university. **[8]**
- Q2)** a) Justify how system components play vital part in network analysis, architecture and design. **[9]**
- b) Consider a network project where you can talk to users. What resources can you use to gather user, application, device and network requirements? Briefly outline a method for gathering and deriving requirements in the absence of user involvement. **[9]**
- Q3)** a) Which flow models apply to each set of flows described below? **[8]**
- i) Users on internet accessing the same web server.
 - ii) 25 workstations processing batch jobs overnight, managed by the central mainframe.
 - iii) Email use across the internet.
 - iv) A transaction-processing application, authorizing credit card transaction between a company's retail stores and its headquarters.

P.T.O.

- b) Devices can act as both data sources and sinks, depending on the application and flow. Which of the following devices (for the application given) are data sinks and data sources? [8]
- i) A storage device receiving streaming video from a camera.
 - ii) A video editing unit, using video from the storage device in (i).
 - iii) A web server and its clients.
 - iv) A storage disk farm.

- Q4)** a) Give examples of external relationships between each of the following component architectures: addressing/routing, network management, performance and security. [8]
- b) A network's architecture differs from its design, in terms of its scope, level of detail, description and location information. Describe how an architecture and design differ in each characteristic. [8]

SECTION-II

- Q5)** a) Develop two sets of initial conditions (each containing either type of network project, scope of network project and architecture/design goals) and give an example regarding network project for each set. [8]
- b) Explain any two flow models in detail. [8]
- Q6)** a) How are routing protocols chosen and applied? [8]
- b) Define critical flow. Where this flow analysis is used? [8]
- Q7)** a) Write short notes: [8]
- i) Prioritization
 - ii) Traffic Management
 - iii) Scheduling
 - iv) Queuing
- b) Explain threat analysis with example. [8]
- Q8)** a) Explain various terms of state. [10]
- b) How is security of network maintained? [8]



Total No. of Questions :8]

SEAT No. :

[Total No. of Pages :2

P4667

[5060] - 146

**M.E. (E & TC) Communication Network
WIRED AND WIRELESS NETWORKS
(2008 Course) (Semester - II) (504607)**

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 answer 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) State and explain four basic network topologies and write advantages of each type. [8]
b) Compare and contrast a circuit - switched and packet - switched network. [8]
- Q2)** a) Explain Go Back-N ARQ protocol and selective repeat ARQ protocol. [8]
b) Explain the MAC layer mechanism of IEEE 802.11. [8]
- Q3)** a) How can we distinguish a multicast address in IPv4? How can we do so in IPv6? [8]
b) What is a socket? What are types of socket? Explain socket and bind primitives used in TCP client server communication. [8]
- Q4)** a) Explain SONET architecture. [6]
b) Explain unicast, multicast and broadcast routing. [6]
c) Explain difference between pure ALOHA and slotted ALOHA. [6]

P.T.O.

SECTION - II

- Q5)** a) Explain Distance vector routing algorithm. [8]
b) With help of diagram explain functions of ATM layers and also explain cell format of ATM. [8]
- Q6)** a) Show the format of typical IP datagram header and explain. [8]
b) What is routing? State different types of routing? Write properties of routing algorithm. [8]
- Q7)** a) Explain the network connecting devices. [8]
b) Define subnetting and supernetting. How do the subnet mask differ from a default mask in Classful addressing? [8]
- Q8)** a) What is NAT? How can NAT help in address depletion? [6]
b) What is VPN and why it is needed? [6]
c) Draw suitable diagram and explain virtual LAN. [6]



Total No. of Questions : 8]

SEAT No. :

P4668

[5060]-147

[Total No. of Pages : 2

**M.E. (E &TC) (Communication Network)
NETWORK TRAFFIC ANALYSIS AND QoS
(2008 Course) (504608) (Semester - II)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Explain Statistical analysis in detail? [8]
b) Justify importance of traffic engineering models for Real time traffic? [8]
- Q2)** a) Write short note on Bandwidth Allocation along with its reallocation parameters. [8]
b) Describe Bases and conception of traffic management planning? [8]
- Q3)** a) What are the various congestion control schemes? Explain any one congestion control scheme in detail? [8]
b) What is Congestion? [2]
Explain concept of congestion with suitable diagram? [6]
- Q4)** Write short note on: [18]
a) Traffic shaping.
b) Differentiated Services (DiffServ)
c) Measuring Tools

P.T.O.

SECTION - II

- Q5)** a) Explain Standard Deviation in detail. [8]
b) What are the basic performance metrics of network traffic? [8]
- Q6)** Explain traffic management planning and its methodologies also explain Quality of perception (QoP). [16]
- Q7)** a) Describe Network attacks in detail. [8]
b) Explain Management of Multimedia on the Internet? [8]
- Q8)** Write short note on: [18]
a) Network security
b) Traffic Engineering



Total No. of Questions : 8]

SEAT No. :

P4669

[5060]-148

[Total No. of Pages :2

**M.E. (E & TC) (Communication Network)
WIRELESS SYSTEM DESIGN
(2008 Course) (Semester-II) (504609)**

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

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

SECTION-I

- Q1)** a) What do you mean by fixed frequency oscillators how to reduce attenuation in basic LC oscillator. [8]
b) Give in detail quartz crystal oscillator. [8]
- Q2)** a) What is constant gain circle in RF amplifier? Write normalized equation. [8]
b) Explain in brief Roulette stability factor. [8]
- Q3)** a) Derive equation of power produced by source, under perfect matched condition in RF amplifier. [8]
b) Derive phase velocity expression in terms of L& C. Also describe relation between bandwidth and phase velocity. [8]
- Q4)** Write short notes on: [18]
a) Gunn element oscillators.
b) Single balanced mixers.
c) High power and multistage amplifiers.

P.T.O.

SECTION-II

- Q5)** a) Explain in detail. YIG tuned oscillator. [8]
b) Give in brief 'isolation in mixer'. [8]
- Q6)** a) With circuit dia. Explain common gate RF transconductance mixer. [8]
b) Enlist limitations of quartz crystal at high frequency? How to overcome it? [8]
- Q7)** a) Explain in detail performance degradation due to RF components. [8]
b) Explain fundamental of multiplication in mixer. [8]
- Q8)** Write short notes on: [18]
a) Single balanced mixer.
b) Performance of different RF system architectures.
c) High frequency oscillators.



Total No. of Questions : 8]

SEAT No. :

P4670

[5060]-149

[Total No. of Pages : 2

M.E. (E & TC) (Communication Network)

WIRELESS SENSOR NETWORKS

(2008 Course) (Semester - III) (Elective - III) (504610 A)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Explain in detail different applications of Wireless Sensor Network. [8]
b) What are the Hardware and Software components of Wireless Networks. [8]
- Q2)** a) Enlist the various wireless data networks. Explain any three in detail. [8]
b) Explain the early wireless networks. [8]
- Q3)** a) Explain in detail different Medium access control techniques. [8]
b) Describe the design Constraints for WSNs and WNs. [8]
- Q4)** Write a short note on (any three): [18]
a) The Physical Layer.
b) System Analysis & Simulation.
c) Partitioning Decision.
d) Transducer Interfaces.

P.T.O.

SECTION - II

- Q5)** a) Elaborate the concept of Energy Scavenging. [8]
b) What are the different types of voltage converters? Explain the voltage conversion strategy. [8]
- Q6)** a) Describe the antenna in terms of: [8]
i) Characteristics.
ii) Efficiency & antenna placement.
iii) Bandwidth.
iv) Antenna Design choice.
b) Explain coupling mechanism in detail. What are the different methods used to avoid coupling problems? [8]
- Q7)** a) Explain in detail the Victim circuits in receivers. [8]
b) Elaborate the Physical Properties related of the Electrostatic Discharge? [8]
- Q8)** Write short notes on (any three): [18]
a) Self-Interference.
b) Detective/Corrective Techniques.
c) IEEE 802.15.4 low rate WPAN standard.
d) The ZigBee Alliance.

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Total No. of Questions : 10]

SEAT No. :

P5048

[Total No. of Pages : 2

[5060]-150

M.E. (E & TC) (Communication Network)

SOFTWARE RADIO

(2008 Course) (Elective - IV) (Semester - II)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) What is Software defined radio? Explain the difference between SDR and conventional radio. [8]
- b) Write typical characteristics and explain benefits of SDR. [8]
- Q2)** a) Explain hardware architecture of SDR. [8]
- b) Explain what are Worldwide frequency band plans. [8]
- Q3)** a) Explain design principles of SDR. [8]
- b) Explain different types of transmitters used for SDR? [8]
- Q4)** a) Explain the networking overview of JTRS Software Communications Architecture. [8]
- b) State and explain various RF front ends used in SDR. [8]

P.T.O.

Q5) Write a short notes on (any three): **[18]**

- a) Cognitive Radio Forum.
- b) SDR hardware development issues (FPGA/CPLD/ASIC).
- c) SCA and JTRS compliance.
- d) Core Framework.

SECTION - II

Q6) a) What is smart antenna? Explain any one smart antenna architecture. **[8]**
b) State what are different adaptation algorithms used in smart antenna? Explain any one in brief. **[8]**

Q7) a) Why is it important for the RF components in an antenna array to have uniform Characteristics across the channels? **[8]**
b) Explain system propagation loss with neat block diagram. **[8]**

Q8) a) Describe a typical low cost set up of SDR. **[8]**
b) What is selection criterion for selecting SDR. **[8]**

Q9) a) What factors should be considered while selecting RTOS? **[8]**
b) Explain any one RTOS : **[8]**
i) Vx Works
ii) RTLinux

Q10) Write a short notes on (Any three): **[18]**

- a) CORBA
- b) Joint Tactical Radio System.
- c) Future of SDR.
- d) Military application in SDR.



Total No. of Questions : 6]

SEAT No. :

P4671

[5060]-151

[Total No. of Pages : 2

M.E. (E & TC) (Communication Network)

HARDWARE PLAT FORMS FOR NETWORKING APPLICATIONS

(2008 Course) (504611) (Elective - IV) (Semester - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer all 3 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) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Explain distributed computing advantages to support networking applications. **[8]**
- b) With neat architecture explain in detail NET ASIC's for network applications. **[8]**
- Q2)** a) With neat diagram, explain in detail IBM network processor. **[8]**
- b) Describe the architecture of Intel network processor with neat diagram. **[8]**
- Q3)** Write short notes on (any two): **[18]**
- a) Convergence of network.
 - b) Network processor justification.
 - c) System engineering Issues.

P.T.O.

SECTION - II

- Q4)** a) Explain the architecture of ARM-7 processor to support ethernet based applications. [8]
- b) List out and compare AMCC family of network processors. [8]
- Q5)** a) List out Various important features of ARM-7 processor for networking applications. [8]
- b) Describe and explain the architecture of storage processor. [8]
- Q6)** Write short notes on:- [18]
- a) Packet processing.
- b) IP Cores.
- c) Evolution of network technology.

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Total No. of Questions :6]

SEAT No. :

P4672

[Total No. of Pages :2

[5060] - 152

M.E. E & TC (Microwave)

MICROWAVE INTEGRATED CIRCUITS

(2008 Course) (Semester - II) (504228)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) Answer any two questions from each section.*
- 2) Figures to the right side indicate full marks.*
- 3) Assume Suitable data if necessary.*

SECTION - I

- Q1) a)** What are the methods of MIC synthesis. Discuss any one of them. **[15]**
- b) Design a circular microstrip antenna using a substrate (RT/Duriod 5880) with a dielectric constant of 2.2, $h = 0.1588\text{cm}$ (0.0625in) so as to resonate at 10 GHz. **[10]**
- Q2) a)** Write a short note on: **[8]**
- i) Microstrip line.
 - ii) Coplanar line.
- b) Explain, discuss and compare hybrid & monolithic microwave integrated circuits. **[17]**
- Q3) a)** How the calibration of network analyzer is achieved? **[13]**
- b) Discuss the impedance and admittance parameters. **[12]**

P.T.O.

SECTION - II

Q4) a) A two port network has the scattering matrix shown below: **[16]**

$$\begin{bmatrix} 0.15\angle 0^\circ & 0.85\angle -45^\circ \\ 0.85\angle -45^\circ & 0.2\angle 0^\circ \end{bmatrix}$$

- i) Is this network lossless?
 - ii) Is this network reciprocal?
 - iii) What is the return loss at port 1 when all ports are terminated with matched load?
 - iv) What is the return loss at port 2 when all ports are terminated with matched load?
- b) Explain matrix network decomposition of n port microwave network. **[9]**

Q5) a) Explain in detail the techniques involved in the measurement of noise in MIC circuits. **[13]**

- b) Write short notes on: **[12]**
- i) GaAs FET switches.
 - ii) Power splitter.

Q6) Write a notes on applications of MICs to **[25]**

- a) Radio System.
- b) Satellite Communication.
- c) Broadcast System.
- d) Future trends' in MICs.



Total No. of Questions : 6]

SEAT No. :

P5049

[5060]-153

[Total No. of Pages : 3

M.E. (E & TC) (Microwave)

MOBILE COMMUNICATIONS - GSM AND CDMA

(2008 Revised Course) (Semester - II) (504230)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answer any two question 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 Calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

- Q1) a)** In a proposed TDMA cellular system, the one-way bandwidth of the system is 40 MHz The channel spacing is 30 kHz and total voice channels in the system are 1333. The frame duration is 40 ms divided equally between six time slots. The system has an individual user data rate of 16.2 kbps in which the speech with error protection has a rate of 13 kbps. Calculate the efficiency of the TDMA system. What is the efficiency of the system with 20,60,80 and 100 MHz? **[15]**
- b) What are the various multiple schemes in wireless communication system? Explain each with emphasizing on advantages, disadvantages applications and their limitations. **[10]**
- Q2) a)** Discuss the evolution of wireless communications from 1G to 4G with reference to data rate, technology and applications. **[10]**
- b) Define the following terms related to traffic engineering **[5]**
- i) Erlangs.
 - ii) CCS.
 - iii) Blocking probability.
 - iv) Grade of Service.
 - v) Spectral Efficiency.

P.T.O.

- c) In a switching office an equipment component with an average holding time of 5 seconds has a peg count of 450 for a one-hour-period. Assuming there was no overflow, how much usage in call =-seconds, CCS, and Erlangs has accumulated on the piece of the equipment. [10]
- Q3)** a) If the carried load for a component is 3000CCS at 5% blocking, what is the offered load? [5]
- b) Explain the following traffic models with relevant mathematical expressions and applications. [10]
- i) Poisson's Distribution.
- ii) Erlang's Distribution.
- c) Explain the signal to interference ratio for the worst case scenario of channel interference with relevant diagrams and expressions. [10]

SECTION - II

- Q4)** a) Consider a cellular system in which total available voice channels to handle the traffic are 960. The area of each cell is 6km^2 and the total coverage area of the system is 2000km^2 . Calculate [15]
- i) the capacity if the cluster size, N is 4 and
- ii) the system capacity if the cluster size is 7. How many times would a cluster of size 4 to be replicated to cover the entire cellular area? Does decreasing the reuse factor N increase the system capacity? Explain.
- b) Define the following terms and explain their effect and relevance in Wireless Communication with illustrative diagrams and mathematical expressions [10]
- i) Multipath
- ii) Shadow fading
- iii) Doppler shift,
- iv) Time dispersion or delay spread : ISI
- v) Frequency Dispersion: Coherence Bandwidth

- Q5)** a) Explain the Okumara/Hata Model with mathematical support and enlist the assumption and applications. [10]
- b) Draw the CDMA transmitter and receiver block schematics and explain the functions of each subsystem. [10]
- c) Draw the GSM architecture diagram and explain the function of each system with relevant illustration. [5]
- Q6)** a) What are the various logical channels in GSM and explain the functions and their relevance. [10]
- b) Draw the functional block diagram of DSS-CDMA and explain. [10]
- c) Explain the modulation scheme MSK with relevant wave forms. [5]



Total No. of Questions : 8]

SEAT No. :

P5107

[Total No. of Pages : 2

[5060]-154

M.E (E& TC) Microwave Fiber Optic Communication)

(2008 Pattern) (Elective - III)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Q.1 and Q.5 are compulsory solve any two 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) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Write short notes on OTDR and its application. **[10]**
b) What is meant by material dispersion? Derive an expression for material dispersion. **[8]**
- Q2)** a) Discuss the operational principles of WDM? Describe the key features of WDM. **[8]**
b) Discuss the propagation modes in single - mode fiber and Discuss the structure of graded index fiber. **[8]**
- Q3)** a) Draw the structures of edge - emitting LED and surface emitting LED and explain the operation. **[8]**
b) Explain nonlinear effects in fiber optic links. **[4]**
c) Explain Multichannel Amplitude Modulation. **[4]**
- Q4)** a) Explain the rise - time budget of a fiber - optic point - to - point link. **[8]**
b) List the advantages of optical fiber communication? Draw the elements of an optical fiber transmission link and explain. **[8]**

P.T.O.

SECTION - II

- Q5)** a) Draw and explain three possible configuration of an Erbium Doped Fiber Amplifier EDFA. [12]
- b) What is the fundamental parameter of a single mode fiber? A step index fiber has a normalized frequency $V = 26.6$ at 1300 nm wavelength. If the core radius is 25 μm , find the numerical aperture. [6]
- Q6)** a) Draw a setup for a typical Raman amplifier system and explain. [8]
- b) Derive an expression for the bit error rate of an optical digital receiver. [8]
- Q7)** a) Write short notes on wavelength stabilization. [4]
- b) Write short notes on Optical performance monitoring. [4]
- c) What is meant by population inversion? A photodiode is constructed of GaAs, which has band gap energy of 1.43 eV at 300K. What is meant by long wavelength cutoff? [8]
- Q8)** a) What is known as quantum limit? A digital fiber optic link operating at 850 nm requires a maximum BER of 10^{-9} . Find the minimum incident optical power P_o to achieve this BER at a data rate of 10 Mb/s for a simple binary level signaling scheme. (ry.1), $[1/r : B/2]$. [8]
- b) Signal degradation on optical fiber due to dispersion. [8]



Total No. of Questions :12]

SEAT No. :

[Total No. of Pages :2

P4673

[5060] - 155

M.E. (E & TC) (Microwave)

SYSTEM DESIGN

(Semester - II) (2008 Course) (Elective - III)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Solve Q.1 or 2; Q.3 or 4 and Q.5 or 6 from section I.
Solve Q.7 or 8; Q.9 or 10 and Q.11 or 12 from section II.*
- 2) *Figures to the right indicate full marks.*

SECTION - I

Q1) a) Explain with example synchronous & asynchronous design methodology. **[8]**

b) Differentiate between top-down & bottom - up methodologies in system design. **[8]**

OR

Q2) a) Explain the finite state machines with suitable example. **[8]**

b) Write a short note on Approaches to avoid meta-stability. **[8]**

Q3) a) What do you mean by system partitioning. Explain anyone partitioning technique in detail. **[8]**

b) Explain in detail the interfacing in linear & digital systems. **[8]**

OR

Q4) Write a short note on: **[16]**

a) Critical path analysis.

b) Data flow graphs.

P.T.O.

Q5) Explain the principle of operation of pipelining. Also explain design & optimization of pipelined stages. [18]

OR

Q6) a) Explain problems associated with interfacing of synchronous & asynchronous system blocks. [10]

b) Write a short note on :Resource sharing in system design. [8]

SECTION - II

Q7) a) Compare various techniques for improving power efficiency. [8]

b) Explain strategies for local & global signals in IC and board level system design. [8]

OR

Q8) a) What is the role of boundary scan logic & BIST in system design. [8]

b) Write a short note on: RF & wireless standards. [8]

Q9) a) Explain in detail operation of BJT at RF frequency. [8]

b) Write a note on: Linearization techniques for power amplifier design.[8]

OR

Q10)a) Explain in detail coherent & non - coherent - detection. [8]

b) Explain the modeling of transistor using SPICE. [8]

Q11)Write a short note on: [18]

a) MOSFET at RF frequency.

b) Phase locked loop.

OR

Q12)a) Explain the design of low noise amplifier. [9]

b) Explain in detail resonatorless VCO design. [9]



Total No. of Questions : 6]

SEAT No. :

P4674

[5060]-156

[Total No. of Pages :2

**M.E. (E & TC) (Microwave)
SOFTWARE PROJECT MANAGEMENT (Open Elective-IV)
(2008 Course) (Semester-II) (504232)**

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Attempt any two questions form each section I and any two from section II.*
- 2) *Figures to right indicate full marks.*
- 3) *Use separate answer sheet for both section.*
- 4) *Neat diagrams must be drawn wherever necessary.*
- 5) *Assume suitable data wherever necessary.*

SECTION-I

- Q1)** a) Draw an Activity Network using either Activity on node or Activity - on - Arrow network conventions for each of the following projects. **[8]**
- i) Construction of apartment
 - ii) Planning of tour
- b) What is Project Management? Write five goals of project. What is role of Project Manager in project Management ? **[9]**
- c) Explain following: **[8]**
- i) Cost Estimation
 - ii) Quality planning
- Q2)** a) Explain brain storming technique for problem solving, team building and creative process. **[13]**
- b) What is critical path in project? Explain with suitable example how to find critical path. **[12]**
- Q3)** Write short notes on. **[25]**
- a) Software project plan
 - b) Work Breakdown Structure
 - c) Budgeting of IT projects
 - d) Types of Risks in software project

P.T.O.

SECTION-II

- Q4)** a) Explain how project performance can be improved using qualitative analysis. [12]
- b) Briefly explain the purpose of project phase review. What are preparations required for project phase reviews? What are the outcomes of project reviews? [13]
- Q5)** a) What is difference between Customers and Stake holders? How to manage stakeholders in software development projects? [8]
- b) What are the benefits of function points? Explain function point analysis method. [9]
- c) Define transaction function. Explain two components of transaction function that decides its complexity. [8]
- Q6)** Explain following. [25]
- a) General system Characteristics
 - b) Project Procurement management
 - c) Managing stakeholders
 - d) Return on investment



Total No. of Questions : 8]

SEAT No. :

P4675

[5060]-157

[Total No. of Pages :2

**M.E. (E & TC) (Microwave)
DIGITAL SIGNAL COMPRESSION
(2008 Revised Course) (Semester-II) (Elective-IV) (Open)**

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answer any three questions from each section.*
- 2) *Answers to the two sections must be written in separate answer books.*
- 3) *Use of scientific calculator is allowed.*
- 4) *Assume suitable data wherever required.*
- 5) *Figures to the right indicate full marks.*

SECTION-I

- Q1)** a) What is a lossless compression? Why compression is required? What are the applications for lossless compression? [8]
- b) What is entropy coding? Write an algorithm for Huffman coding technique. [8]
- Q2)** a) What is prediction? What are the properties of the signal required for good predictive coding? Why? [8]
- b) What is a quantizer? Define quantization noise. How will you decide the step size? [8]
- Q3)** a) Explain forward adaptive quantizer. How the signal variance is used for predictive coding? [8]
- b) What are companded quantizers. Why is it used for speech signals? [10]
- Q4)** a) Explain RZ and NRZ formats used for PCM coding. Why the differential coding is preferred? [8]
- b) What is the advantage of adaptive modulation? Explain any one adaptive waveform modulator. [8]

P.T.O.

SECTION-II

- Q5)** a) Explain the compression techniques used for music. [8]
b) What is MIDI? Explain frame format for MIDI and its use for music coding. [8]
- Q6)** a) Explain rate distortion criterion. How is it used for coding? [8]
b) Explain Shanon Fano Procedure. What is the advantage of this method? [8]
- Q7)** a) Explain two stage WT decomposition of image signal. Explain properties of Haar transform. [8]
b) How will you code speech signal using sub band coding? How will you assign the number of bits for coding of each band? [10]
- Q8)** a) Explain compression of image using DCT. How will you decide a step size? [8]
b) What is Zig-zag scanning technique? Explain with one simple example. [8]



Total No. of Questions : 8]

SEAT No. :

P4676

[5060]-158

[Total No. of Pages : 2

M.E. (E & TC) (Signal Processing)
LINEAR ALGEBRA AND RANDOM PROCESSES
(2008 Course) (Semester - I) (504501)

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) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) If A is any non-singular matrix and B is a matrix such that product AB exists, then show that AB and B have the same rank. **[6]**

b) Find a unit vector u orthogonal to $v=[1,3,4]$ and $w=[2,-6,-5]$. **[10]**

Q2) a) Solve using determinants the system **[10]**

$$3y + 2x = z + 1$$

$$3x + 2z = 8 - 5y$$

$$3z - 1 = x - 2y$$

b) Prove that orthogonal set of non-zero vectors is linearly independent. **[6]**

Q3) a) If A is nonsingular matrix and k is eigen value of A, then show that $1/k$ is eigen value of A^{-1} . **[6]**

b) Find the inverse of the matrix $A = \begin{bmatrix} 1 & 0 & 2 \\ 2 & -1 & 3 \\ 4 & 1 & 8 \end{bmatrix}$. **[10]**

Q4) a) Let $u=[1,1,0]$, $v=[1,3,2]$, $w=[4,9,5]$. Then prove that u, v, w are linearly independent. **[8]**

P.T.O.

- b) Evaluate the determinant of each of the following matrices [10]

$$A = \begin{bmatrix} 2 & 3 & 4 \\ 5 & 4 & 3 \\ 1 & 2 & 1 \end{bmatrix} \quad B = \begin{bmatrix} 1 & -2 & 3 \\ 2 & 4 & -1 \\ 1 & 5 & -2 \end{bmatrix}$$

SECTION - II

- Q5)** a) A box contains 3 Red, 4 white and 5 black balls. One ball is drawn at random. Find the probability that it is [8]

- i) Red ball.
- ii) Not black ball.
- iii) Black or white ball.

- b) Define probability. List its properties. What is conditional probability? [8]

- Q6)** a) In an experiment, three coins are tossed simultaneously. If the number of heads is the random variable, find the probability density function for this random variable and plot it. [8]

- b) Define and list the properties of CDF and PDF. [8]

- Q7)** a) PDF is given by $f(x) = 12x^3 - 21x^2 + 10x$ for $0 \leq x \leq 1$ [8]
 $= 0$ otherwise.

Determine the following:

- i) $P(X \leq 1/2)$ and $P(X > 1/2)$.
- ii) Obtain a number k such that $P(X \leq k) = 1/2$.
- iii) The probability that the outcome lies between 1 and 2.

- b) Write a short note on Binominal and Poissions distribution function. [8]

- Q8)** a) Derive the formula for calculation of mean and variance of a random variable X having uniform distribution function between the interval a, b . [8]

- b) What is a random process. Write a short note on different types of random processes. [10]

Total No. of Questions :10]

SEAT No. :

P4677

[Total No. of Pages :2

[5060] - 159

M.E. (E & TC) (Signal Processing)

AUTOMOTIVE ELECTRONICS

(2008 Pattern) (Semester - I) (504503B) (Elective - I)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answer Any three questions from section I and Any three questions from section II.*
- 2) *Write answers of section I and section II in separate answer sheets.*
- 3) *Figures to the right indicates full marks.*

SECTION - I

- Q1)** a) Explain spark Ignition engine and their electronic control. [8]
b) Describe open loop and close loop system in automobile system with example. [8]
- Q2)** a) With the help of schematic diagram explain battery charging and its application in automotive system. [8]
b) Explain emission control in automobiles. [8]
- Q3)** a) Explain controls used in automotive heating system. [8]
b) What types of sensors are used in measurement of pressure in automotive? Explain any one in detail. [8]
- Q4)** a) Explain various sensors used for stability control. [8]
b) Describe various controls used in automotive air conditioning. [8]
- Q5)** a) Describe components in engine management system. [9]
b) Write a note on sensors, controls and display used in automobiles. [9]

P.T.O.

SECTION - II

- Q6)** a) Explain adaptive cruise control system. [8]
b) Describe in detail steering control system. [8]
- Q7)** a) Explain term automatic transmission control. [8]
b) Explain two techniques used for crank shaft angular position sensor.[8]
- Q8)** a) Give the significance of collision detection in modern automobile systems also explain important components associated with the system. [8]
b) Describe the components in antitheft system in modern automotives.[8]
- Q9)** a) Explain hybrid design in automotives. [8]
b) Explain the operation of engine coolant temperature sensor. [8]
- Q10)** Give notes on: [18]
a) Electronic speedometer.
b) Automatic rain sensitive wiper control.
c) Intelligent breaking.



Total No. of Questions :8]

SEAT No. :

P4678

[Total No. of Pages :2

[5060] - 160

M.E. E & TC (Signal Processing)

ADVANCED DIGITAL SIGNAL PROCESSING

(2008 Course) (Semester - II) (504508)

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) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right 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 multirate filtering by I/D factor. How it is obtained? **[8]**

b) Design a two stage decimator that down samples an audio signal by a factor of 30 & satisfies specifications given as **[10]**

Input sampling frequency $F_s = 240$ KHz

Highest frequency of interest = 3.4 KHz.

Pass band ripple $\delta_p = 0.05$

Stop band ripple $\delta_s = 0.01$

Give suitable pair of decimation factor & design corresponding filter. Specify sampling frequency at the input and output of each stage & also values of above parameters at each stage.

Q2) a) With the help of mathematical expression prove the aliasing occurs when down sampling is performed. **[8]**

b) Explain the concept of polyphase filter Draw & explain polyphase Decimator filter structure with $D = 3$. **[8]**

P.T.O.

- Q3)** a) Draw the block schematic of LMS algorithm & explain it. [8]
b) Compare forward and backward linear prediction. [8]
- Q4)** a) Compare the features of TMS 32.054 XX and ADSP 21XX. [8]
b) Explain the use of adaptive filter in Echo cancellation in data transmission over telephone line. [8]

SECTION - II

- Q5)** a) Discuss how adaptive beam former can be used in radar & sonar application. [8]
b) Explain Levinson & Durbin algorithm to determine auto-regressive parameters of linear predictive filter. [8]
- Q6)** a) Draw the direct form FIR filter realization. What are applications of FIR filter. [8]
b) What is deconvolution? How will you use predictive deconvolution for data processing. [8]
- Q7)** a) Draw a super Harvard Architecture & explain how it is useful for execution of MAC instruction. What is use of program cache.? [8]
b) Explain following units of DSP processor in detail. [8]
i) Barrel shifter.
ii) ALU
iii) Circular Addressing.
- Q8)** Write short notes on (any three): [18]
a) AR Lattice structure.
b) Multirate application in compact hi-fi system.
c) Pipelining in DSP processors.
d) Sub band coding.



Total No. of Questions : 8]

SEAT No. :

P4679

[5060]-161

[Total No. of Pages : 2

**M.E. (E & TC) (Signal Processing)
VLSI IN SIGNAL PROCESSING
(2008 Course) (Semester - II)**

Time : 3 Hours]

[Max. Marks : 100

Instructions:

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

SECTION - I

- Q1)** a) Explain need of vector quantization. Also explain encoding & decoding process with tree structured vector quantization. [8]
- b) Explain DSP application demands & scaled CMOS Technologies. [8]
- Q2)** a) Explain Minimum Cycle Mean algorithm. [8]
- b) Explain with the help of an example, the algorithm to retime a DGF for clock minimization. [10]
- Q3)** a) Explain the properties of Unfolding. [8]
- b) Explain carry free radix-2 addition and subtraction. [8]
- Q4)** a) Design B2 for FIR systolic arrays. [8]
- b) Explain properties of retiming. [8]

P.T.O.

SECTION - II

- Q5)** a) Explain with neat schematic 4*4 Baugh Wooley multiplier. [8]
b) Explain bit serial multiplier using systolic mapping. [8]
- Q6)** a) Describe various clock distribution strategies. Explain in brief the merits and demerits of each. [8]
b) Explain how floating point arithmetic is implemented on FPGA. [8]
- Q7)** a) With the help of neat diagram explain 10 block, CLB slice and interconnection matrix of FPGA. [8]
b) Explain the Parallel Carry Save and Carry Ripple Array multipliers with sign bit extensions. Draw Dependence Graph for each. [8]
- Q8)** Write short note following: [18]
a) FIR filters implementation on FPGA.
b) Carry free radix - 2 addition and subtraction.
c) Digital Clock managers.



Total No. of Questions :8]

SEAT No. :

P4680

[5060]-162

[Total No. of Pages :2

**M.E. (E & TC) (Signal Processing)
DIGITAL SIGNAL COMPRESSION
(2008 Course) (Elective - III) (Semester- II)**

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answer any 3 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 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) Design a Huffman code for a source that puts out letters from an alphabet $A = \{ a_1, a_2, a_3, a_4, a_5 \}$ [9]

$$P(a_1) = P(a_3) = 0.2$$

$$P(a_2) = 0.4$$

$$P(a_4) = P(a_5) = 0.1$$

Find out the average length of the code & entropy.

b) What is companding? Why it is required in speech compression? Explain A - law & μ - law companding. How to realize these companding curves in practice. [9]

Q2) a) Explain with suitable term lossy & lossless compression. Hence explain lossy predictive coder & decoder with the help of block diagram. [8]

b) Explain forward & backward adaptive quantization with the help of block diagram. [8]

P.T.O.

- Q3)** a) What is PCM? What are the advantages of using differential coding. Explain ADPCM coding of I - D signal with the help of block diagram. [8]
- b) What is drawback of Fourier transform. How Wavelet overcomes it. Explain how wavelet is useful for signal compression. [8]
- Q4)** a) Explain motion estimation & motion compensation in video. How it is useful in compression. [8]
- b) Explain rate distortion theory. How it is utilized for coding. [8]

SECTION-II

- Q5)** a) With the help of block diagram explain JPEG compression standard in detail. [8]
- b) What is Vector Quantization (VQ)? How image or signal is compressed using VQ. What are the advantages & disadvantages of VQ? [8]
- Q6)** a) Explain what do you mean by sub-band coding of signals. How it is done for speech signal. [8]
- b) Explain the basic video coder/decoder with the help of neat block diagram. [8]
- Q7)** a) Explain data structures used in EZW coder. Explain the method of scanning wavelet transform coefficients for encoding using EZW algorithm. [8]
- b) Explain the difference between Fourier transform & DCT. How these transforms are orthogonal. Why DCT is preferred over Fourier for compression. [8]
- Q8)** Write short notes on (any three): [18]
- a) LPC of speech.
 - b) GOP in MPEG -I
 - c) Fractal coding of images.
 - d) Ziv-Lempel coding.

EEE

Total No. of Questions :8]

SEAT No. :

P4681

[5060]-163

[Total No. of Pages :2

**M.E. (E&TC) (Signal Processing)
MULTIMEDIA TECHNIQUES
(2008 Course) (Semester- II) (Elective - III)**

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

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

SECTION-I

- Q1)** a) Explain different text compression methods. [8]
b) Explain different Audio file formats. [8]
- Q2)** a) What are the hardware & software components of a multimedia platform? Using block diagram explain the functions of multimedia development system. [8]
b) Draw a neat block diagram of PAL encoder & explain function of each block. [8]
- Q3)** a) Explain different types of scanners. [8]
b) Explain the salient features of a typical scanning software. [8]
- Q4)** Write short notes on any three: [18]
a) JPEG compression standard for video.
b) MIDI Audio file making.
c) Line-drawing algorithm and circle-drawing algorithm.
d) Working of Digital camera.

P.T.O.

SECTION-II

- Q5)** a) Explain the steps in creating 3D animation. [8]
b) Explain with an example the Animation principles of presentation. [8]
- Q6)** a) With the help of generic block diagram of video compression explain how the compression is carried out? Discuss briefly the different compression techniques. [8]
b) Explain the graphics editing techniques with example. [8]
- Q7)** a) What are MIDI messages? [8]
b) With help of neat block diagram explain JPEG encoder and decoder.[8]
- Q8)** Write short notes on any three: [18]
a) Salient features of a typical audio editing.
b) Virtual reality.
c) Motion Estimation and Compensation.
d) Software Steps in creating 3D animation.

EEE

Total No. of Questions : 8]

SEAT No. :

P4682

[5060]-164

[Total No. of Pages : 2

M.E. (E & TC) (Signal Processing)
OPERATING SYSTEM AND OPEN SOURCE SYSTEM
(2008 Course) (Elective - IV)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer any three questions form each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Use of calculator is allowed.*
- 5) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Explain the functions of OS. List different types of OS with examples. [8]
- b) Compare process and Threads. Explain types of threads. [8]
- Q2)** a) Draw and explain Process Control Block. [8]
- b) Explain concepts virtual memory, physical memory, paging and segmentation. [8]
- Q3)** a) List and explain the system calls with examples. [8]
- b) What is difference between starvation and deadlock. Explain the reasons for deadlock. What do you mean by deadlock prevention and avoidance. [8]
- Q4)** a) Explain in brief any three process scheduling algorithms with examples.[12]
- b) Write short notes on: [6]
- i) Process states.
 - ii) Producer Consumer Problem.

P.T.O.

SECTION - II

- Q5)** a) Explain the information stored in file descriptor. Explain the access rights for a file. [8]
b) Explain need and the ways of Interprocess communication. [8]
- Q6)** a) Explain system calls and library functions. [8]
b) Explain I node and superblock in Linux. [8]
- Q7)** a) Explain Ext2 and Ext3 Linux file system. [8]
b) Explain the advantages and limitation of open source systems with the licensed systems w.r.t. Ubuntu OS and Windows OS respectively. [8]
- Q8)** a) Explain different file types and the ways to access them. [6]
b) Write short notes on: [12]
i) Critical section, semaphores and Mutex.
ii) File and directory operations.
iii) Operating system security.

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Total No. of Questions : 8]

SEAT No. :

P4683

[5060]-165

[Total No. of Pages : 2

M.E. (E & TC) (Signal Processing)
COMPUTER VISION
(2008 Pattern) (Elective - IV) (Semester - II)

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 answer books.*
- 3) *Figures to the right indicate full marks.*
- 4) *Neat diagrams must be drawn wherever necessary.*
- 5) *Assume suitable data, if required.*

SECTION - I

- Q1)** a) Explain the terms world coordinates, camera coordinates and image coordinates. Give relation between them. **[8]**
- b) Assume that first the camera center is at the origin of the world coordinates. Next the camera is translated by (1,1,1) units in x , y & z direction respectively and then rotated by 45 degrees around x axis in the clockwise directions. Assume that focal length of the camera is 0.030 Find the image coordinates of the point which has world coordinates (1,1,1). **[8]**
- Q2)** a) Explain internal camera calibration parameters. **[8]**
- b) An ideal pinhole camera has a focal length 5mm. Each pixel is 0.02mm* 0.02mm and the image principal point is at pixel (500,500). Pixel coordinates start at (0,0) in the upper-left corner of the image. What is the 3×3 camera calibration matrix, K , for this camera configuration?**[8]**
- Q3)** a) With block diagram explain the principle of tomography. **[8]**
- b) State & explain properties of perspective projection. **[8]**

P.T.O.

- Q4)** Explain following camera specifications. **[18]**
- a) Resolution.
 - b) Depth of field.
 - c) Field of view.

SECTION - II

- Q5)** a) What is disparity? How we can find disparity in the image? What information we get from disparity. **[8]**
- b) Explain epipolar geometry, epipolar line and epipoles. **[8]**
- Q6)** a) Explain procedure of epipolar rectification. Why it is required? **[8]**
- b) What is fundamental matrix? How it can be estimated. **[8]**
- Q7)** a) What is optical flow. What is the application of optical flow estimation? Explain aperture problem in optical flow estimation. **[8]**
- b) Explain Lucas-Kanade Optical flow estimation technique. **[8]**
- Q8)** Write short notes:
- a) Applications of Infrared Imaging. **[9]**
 - b) Harris corner detector. **[9]**

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Total No. of Questions : 8]

SEAT No. :

P4684

[5060]-166

[Total No. of Pages : 2

**M.E. (E & T/C) (VLSI & Embedded Systems)
ANALOG AND DIGITAL CMOS IC DESIGN
(2008 Course) (Semester - I) (504181)**

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) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Explain MOSFET as a switch and as a diode. **[8]**
b) With the help of necessary schematic explain current sink & source with Rout offered. **[8]**
- Q2)** Design CMOS differential amplifier for CMMR = 40dB. The power dissipation should not exceed 2.5 mW at supply of 2.5V. **[16]**
- Q3)** a) Explain with necessary expressions design technique for low noise op-amp? **[8]**
b) Explain in detail the concept of BGR with its necessity. **[8]**
- Q4)** Write short notes on any three: **[18]**
a) Active Load Invertors & its parameters.
b) Techniques used in Micro Power op-amp.
c) Current amplifiers.
d) Buffered op-amps using MOSFETs.

P.T.O.

SECTION - II

- Q5)** a) Explain hazards and its elimination techniques with suitable example. [8]
b) With the help of suitable expressions explain total power dissipation in CMOS. [8]
- Q6)** a) Design 2:1 MUX using transmission gate. [8]
b) Explain NORA logic in detail. [8]
- Q7)** a) Compare:
i) Synchronous and asynchronous machines. [4]
ii) Moore and Melay machines. [4]
b) Draw state diagram, write a VHDL code for 1111 Melay sequence Detector. [8]
- Q8)** Write short notes on any three: [18]
a) Transmission Gate: Merits, Demerits and Use.
b) Trends in ultrafast technology.
c) Dynamic Logic.
d) Low power design techniques.

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Total No. of Questions :8]

SEAT No. :

P4685

[Total No. of Pages :2

[5060] - 167

M.E. (E & TC) (VLSI & Embedded Systems)

NANOTECHNOLOGY

(2008 Pattern) (Semester - I) (Elective - I)

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 answer books.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Use of electronic pocket calculator is allowed.*
- 5) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Elaborate the role of Molecular Recognition in nanotechnology. [8]
b) Justify how nanotechnology can change the world scenario in coming years. [8]
- Q2)** a) What are the tools used in nanotechnology? How these are different than conventional tools? [8]
b) List and elaborate the electrical and mechanical properties of CNT. [8]
- Q3)** a) Explain with suitable example, application of nano crystal in medical diagnosis. [8]
b) What is quantum dot, elaborate with example. [8]
- Q4)** Write short notes on any three:
- a) Electronic nose. [6]
 - b) Nano sensors. [6]
 - c) Optical properties at nano scale. [6]
 - d) Nano composites. [6]

P.T.O.

SECTION - II

- Q5)** a) Explain the fabrication techniques used for MEMS/NEMS. [8]
b) Give classification of carbon nano tubes. [8]
- Q6)** a) Elaborate the different structures of carbon nano tubes. [8]
b) Explain how nanotechnology can help in drug and drug delivery system. [8]
- Q7)** a) Explain atomic beam lithography. [8]
b) How nano materials can be used to cure cancer cells. [8]
- Q8)** Write short note on any three:
- a) Lithography using photons. [6]
b) Nano machines. [6]
c) Electro chemistry. [6]
d) Magnetic force microscopy. [6]



Total No. of Questions : 10]

SEAT No. :

P4686

[5060]-168

[Total No. of Pages :2

M.E. (E & TC)

MEMORY TECHNOLOGIES

(2008 Course) (Semester-I) (Elective-II) (504185) (Theory)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

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

SECTION-I

- Q1)** a) Draw and explain various DRAM circuit elements. Explain the following application specific SRAMS. [10]
- i) Line Buffers
 - ii) CAM
- b) Draw the functional block diagram of typical application specific DRAM. [6]
- Q2)** a) Enlist the advantages and disadvantages of trench capacitor based cells compare SPT and TTC trench capacitors. [8]
- b) Explain high speed DRAM in detail with the help of functional block diagram. [8]
- Q3)** a) Explain with functional block diagram EEPROM. Compare Bipolar PROM and CMOS PROM. [8]
- b) Explain with a diagram floating gate EPROM cell. [8]
- Q4)** a) What is pattern sensitive fault? What are the categories of neighborhood pattern sensitive faults (NPSF). [8]
- b) Explain in detail nonvolatile SRAM [8]

P.T.O.

Q5) Write short notes (Any three): **[18]**

- a) Reliability issues
- b) Pattern sensitive fault
- c) Significance of testing of semiconductor memory
- d) Explain single stuck fault model (SSF).

SECTION-II

Q6) a) Explain in detail the general design for testability techniques? **[8]**

- b) What are the various types of radiation and corresponding transistor / circuit level parameter degradation and failures. **[8]**

Q7) a) Explain Analog memory and enumerate applications of Analog memory. **[8]**

- b) Explain in detail assembly and packaging related failures. **[8]**

Q8) a) Explain in detail issues related to DRAM reliability. **[8]**

- b) Packages for SMT (Surface Mounting Technology). **[8]**

Q9) a) Compare MRAM, SRAM, DRAM, EEPROM and FRAM. **[8]**

- b) Explain in detail memory failure mechanisms with the help of bathtub curve . **[8]**

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

- a) Single Electron memory.
- b) FRAM's reliability issues and radiation effects.
- c) Different types of high density memory packaging techniques.



Total No. of Questions : 8]

SEAT No. :

P4687

[5060]-169

[Total No. of Pages :2

M.E. (E & TC) (VLSI) Embedded System

VLSI EDA TOOLS

(2008 Course) (Semester-I) (Elective-II) (504185)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answers 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) *Use of electronic pocket calculator is allowed.*
- 5) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) What is IP core and its advantage? Give examples of any two IP cores. [8]
b) What is need of verification? At what stage of design cycle is it done? Explore in detail. [8]
- Q2)** a) Write short note on CMOS software tools. [8]
b) Explain with the help of example of stick diagram. [8]
- Q3)** a) List various simulation tools and explain any one in detail. [8]
b) List different design rule checks involved in chip design. Explain any one in detail. [8]
- Q4)** Write short notes on (Any three): [18]
a) Clock domain.
b) Place and route.
c) LVS.
d) GDS files.

P.T.O.

SECTION-II

- Q5)** a) Explain ASIC design flow in detail. What different simulations are carried out at various stages? [8]
b) What is SPICE? Explain various parameters in detail. [8]
- Q6)** a) What is synthesis? Compare the different vendors synthesis tool. [8]
b) Explore any two layout editor tools in brief. What are their capabilities. [8]
- Q7)** a) Explain different types of timing analysis. [8]
b) What are the different types of design entry in VLSI flow diagram. [8]
- Q8)** Write short notes on (Any three): [18]
a) Power budget & estimation.
b) VLSI Design flow.
c) Floorplanning.
d) Cross compliers.



Total No. of Questions : 6]

SEAT No. :

P4604

[5060]-17

[Total No. of Pages :2

M.E. (Civil-Structure Engg.)
DESIGN OF COMPOSITE CONSTRUCTION
(2008 Course) (Semester-I) (501404) (Elective-I)

Time : 4 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) *Use of calculator is allowed.*
- 6) *Assume suitable data if necessary.*

SECTION-I

- Q1)** a) Explain provisions in India, and any other country code with reference to flexural behavior of composite used in Construction. [9]
- b) Explain Elastic behavior of Composite beam made up of two materials. [8]
- c) State steps in design of composite construction. [8]
- Q2)** a) Classify sheeting used for composite construction; Explain utility of each type, applications, its material properties. [9]
- b) Explain structural behavior of composite sheets for longitudinal shear, vertical shear. [8]
- c) Explain structural failure patterns and its possible reasons, in composite beam. [8]
- Q3)** a) Explain behavior of concrete filled column under axial load with circular section. [8]
- b) What is profiled decking system, write steps in design of Profiled decking. [8]
- c) Write steps in design of composite slab. [9]

P.T.O.

SECTION-II

- Q4)** a) List dos and Don't's during composite construction. [8]
b) Explain design of composite truss with shear connectors. [9]
c) Draw structural arrangement in composite truss with details of connectors. [8]
- Q5)** a) How the fire protection is taken care of in composite construction. [8]
b) Explain geometric imperfections, give suitable structural examples. [8]
c) Sketch typical composite foundation showing important connection details. [9]
- Q6)** a) Sketch typical composite bridge deck slab and detail it. [8]
b) Write design steps of composite beam with all necessary checks as per codal provisions . [8]
c) Write in details the checks to be applied to design of composite flexural member as per standard code of practice. [9]



Total No. of Questions : 8]

SEAT No. :

P5050

[5060]-170

[Total No. of Pages : 2

M.E.(E&TC) (VLSI & Embedded Systems)
REAL TIME OPERATING SYSTEM
(2008 Course)(Semester-II)

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

SECTION-I

- Q1)** a) Explain various software architecture in detail. State their merits & demerits. [12]
- b) Explain different characteristics of RTOS. [6]
- Q2)** a) Explain semaphore, mutex, mailbox, message queue, pipe related with RTOS. [10]
- b) Define context switching. What are the steps involved in context switching? [6]
- Q3)** a) Describe priority inversion & priority inheritance related with RTOS. [8]
- b) Describe kernel structure used in RTOS. [8]
- Q4)** a) List different software development process life cycle model. Explain any one in detail. [8]
- b) Explain the operation of preemptive type scheduling. [8]

P.T.O.

SECTION-II

- Q5)** a) What are the strength & weakness of μ COS-II O.S.? [8]
b) Describe the Rate monotonic scheduling algorithm. [8]
- Q6)** a) Which are the commands used in Linux/RT Linux to handle file manipulation? [8]
b) Explain the interrupt handling functions supported in μ COS-II. [8]
- Q7)** a) What is meant by dynamic priority? How it is useful in solving priority inversion problem? [8]
b) What do you mean by 'Porting the RTOS'? What are the requirements for porting the μ COS-II. [8]
- Q8)** Write short notes on the following(any three) [18]
- a) Role of IDE in software development.
 - b) Functions used to handle mailbox in μ COS-II.
 - c) Features of Vx works.
 - d) Inter Task Communication.



Total No. of Questions : 8]

SEAT No. :

P5051

[5060]-171

[Total No. of Pages : 2

M.E. (E&TC) (VLSI & Embedded Systems)

RF IC DESIGN

(2008 Course) (Semester - II) (504190)

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) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) What is EMC? What are the techniques to achieve EMC for ASIC? Explain in brief. [8]
- b) With the help of suitable schematics, explain crosstalk mitigation techniques in brief. [8]
- Q2)** a) List Characteristics of LNA. Compare Single ended & differential LNA. [8]
- b) What do you mean by neutralization? How we implement it in the amplifier design? [8]
- Q3)** a) Explain ASIC design flow. At what stage will you care for Cross talk?[8]
- b) Discuss EMI of RFI mitigation techniques. [8]
- Q4)** a) With suitable example explain back gate bias effect. [6]
- b) Write short note on S Parameters. [6]
- c) How AM - PM conversion destroys the Orthogonality? [6]

P.T.O.

SECTION-II

- Q5)** a) Comment on Effects of technology scaling on RF amplifiers. [8]
b) What is substrates bias effects? Explain it with equivalent circuit model. Give the typical component values for those models. [8]
- Q6)** a) Using the method of open circuit time constant and incremental model Derive the expression for input resistance, output resistance & voltage gain of CS amplifier. [8]
b) Design cascade amplifier for voltage gain of 50. Assume suitable data Comment Ro & BW. [8]
- Q7)** a) Explain BW enhancement technique of HF amplifier. [8]
b) Discuss Role of Poles in amplifier. [8]
- Q8)** Write short notes on (any three). [18]
a) MOSFET capacitance and their comparisons
b) Cascaded Amplifier
c) Short Channel Effect
d) SPURS



Total No. of Questions : 10]

SEAT No. :

P4688

[5060]-172

[Total No. of Pages :2

**M.E. (E & TC) (VLSI & Embedded System)
BIOMEDICAL SIGNALS AND SYSTEMS
(2008 Pattern) (Semester-II) (Elective-III) (504191)**

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Attempt any three questions from each section.*
- 2) *Answer to the two sections should be written in separate answer-books.*
- 3) *Draw neat diagrams wherever necessary.*
- 4) *Figures to right indicates full marks.*

SECTION-I

- Q1)** a) Explain action potential and the Na⁺ – K- pumping action. [8]
b) Explain the objectives of Biomedical Signal Analysis with neat block diagram and the difficulties in Biomedical Signal Analysis. [8]
- Q2)** a) Analyze the various types of artifacts in biomedical signals & explore filtering techniques to remove them. [12]
b) Draw typical ECG waveform over one cardiac cycle indicating the important components with their typical values. [6]
- Q3)** a) Explain 10-20 electrode system for acquiring EEG signal. [10]
b) Explain the following terms with reference to cardio-vascular system:[6]
i) Heart-rate Variability
ii) Arrhythmia
iii) Myocardial Infraction
- Q4)** a) Explain the terms: [8]
i) ECG
ii) EMG
iii) VAG
iv) PCG
b) Explain Pan- Tompkins Algorithm for QRS Detection with block diagram.[8]

P.T.O.

- Q5)** a) How could we improve the performance of basic 1st order diff operator as a filter to remove low frequency noise or base line wander without disturbing QRS complex? [10]
- b) Explain how the Adaptive Filters are used for Removal of Interference. [6]

SECTION-II

- Q6)** a) Show how the ECG and carotid pulse signals may be used to break a PCG signal into its systolic and diastolic parts. [8]
- b) State and explain four measures to characterize QRS complex according to its morphology. [8]

- Q7)** a) Explain the operations involved in Homomorphic Filter and state its applications for any bio-medical signals. [9]
- b) State and explain the signal flow diagram of AR model with an appropriate application example. [9]

- Q8)** a) Explain any one technique for envelop extraction and analysis of any appropriate bio-signal activity. [8]
- b) Enlist and Explain the various short time statistical measures used to characterize a non-stationary signal. [8]

- Q9)** a) Explain any one technique for analysis of ST segment variations in clinical applications. [8]
- b) Explain the use of adaptive filter for segmentation. [8]

Q10) Write short notes on. [16]

- a) Multilayer perceptron for pattern classification
- b) Logistic regression Analysis



Total No. of Questions : 8]

SEAT No. :

P4689

[5060]-173

[Total No. of Pages :2

M.E. (E & TC) (VLSI & Embedded System Design)
ADVANCED DIGITAL SYSTEM DESIGN
(2008 Course) (Elective-III) (Semester-II) (504191)

Time : 3 Hours]

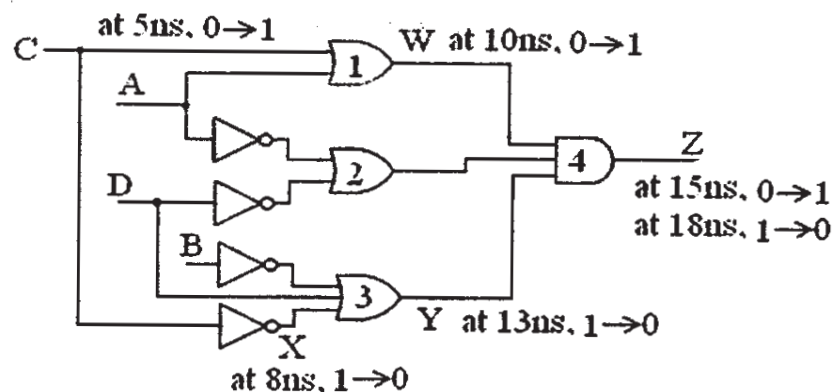
[Max. Marks :100

Instructions to the candidates:

- 1) Answers any three questions from each section.
- 2) Answers 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.
- 5) Assume suitable data if necessary.

SECTION-I

- Q1)** a) Draw and explain the interfacing diagram of 480 bus with microprocessor. [10]
b) Describe the design issues of CISC and RISC processor. [8]
- Q2)** a) Explain boundary scan testing with the help of block schematic. [6]
b) Draw address and data path architecture of CPU, indicate names of various blocks. Which unit of CPU sequences the data path operation? How are they implemented? [10]
- Q3)** a) Consider the following logic function. $F(A, B, C, D) = \sum m(0, 4, 5, 10, 11, 13, 14, 15)$ Find the two different minimum circuits which implement F using AND and OR gates. Identify two hazards in each circuit. [8]
b) For the given circuit draw timing diagram, identify the hazard and modify the circuit to eliminate the hazard. [8]



P.T.O.

- Q4)** a) Design a sequence detector in which output is '1' only if the input sequence of 1001 occurs at consecutive clock pulses. [8]
- b) What do you mean by clock skew? Explain the methods to minimize the clock skew. [8]

SECTION-II

- Q5)** a) Model 1K × 8 Dual port RAM using VHDL. [8]
- b) Draw $2^m \times n$ array of SRAM cells and explain operation in detail. [8]
- Q6)** a) What are the major steps to design ATM packet generator? Explain in detail. [8]
- b) Explain ATM switch architecture using block diagram. Discuss important steps for design of ATM switch. [8]
- Q7)** a) What is PRBS generator? Draw and explain a scheme to generate PRBS. [8]
- b) With neat flowchart, explain steps in floating point multiplication. [8]

- Q8)** Write notes on: [3×6=18]
- a) IEEE 486 BUS.
- b) BIST.
- c) Scan path techniques.



Total No. of Questions : 8]

SEAT No. :

P5052

[5060]-174

[Total No. of Pages : 2

M.E. (E&TC) (VLSI & Embedded Systems)

EMBEDDED AUTOMOTIVE SYSTEMS

(2008 Course) (Elective - IV(A)) (Semester - II) (504192)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) State advantages of closed loop system. Explain sensor based motion control system used in automobile. [8]
- b) Explain the role of dashboard electronic instruments? Discuss on board diagnostic system. [8]
- Q2)** a) Describe with suitable block diagram and design methodology of sensors and actuator interfacing with electronics control unit. [8]
- b) Define electromagnetic compatibility. Explain significance of Electro magnetic interference suppression unit. [8]
- Q3)** Describe in details following sensors: [18]
- a) Vehicle speed sensors.
- b) Flow sensors.
- c) Position sensors.
- Q4)** a) Explain role and principle of working of Electronic management of chassis system. [8]
- b) What are the different safety measures taken using embedded systems in modern vehicles? [8]

P.T.O.

SECTION - II

- Q5)** a) Which are different types of fuel injection systems? Explain each type in detail. [8]
- b) Why communication is important in electronic automotive systems? How different sensors plays important role in vehicle communication. [8]
- Q6)** a) Briefly explain the technique of exhaust emission control technique. [8]
- b) Explain the principle of working of solid state ignition systems. What is role of ignition system in a vehicle? [8]
- Q7)** Write short note on : [18]
- a) Open loop and closed loop control system in automotive application.
- b) CAN protocol based communication.
- c) Role of Artificial Intelligence in modern vehicles.
- Q8)** a) What is the role of Engine cranking and warm up control in automotive systems? State different techniques of engine cranking. [8]
- b) Explain principle of cruise car control system with design limitations. [8]



Total No. of Questions :8]

P5053

SEAT No. :

[5060]- 175

[Total No. of Pages : 2

M.E. (Information Technology)
HIGH PERFORMANCE COMPUTER NETWORKS
(2008 Course) (Semester-II) (Elective-IV(c))

Time : 3 Hours]

[Max. Marks : 100

Instructions to candidates:

- 1) *Answer any 3 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) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) Explain with example the various factors contributing to Quality of Service in High Performance Computer Networks. **[8]**
- b) Explain the need and requirement of High-speed LANs. **[8]**
- Q2)** a) Write comparative points for A/ H/ S/ V DSL. **[8]**
- b) Explain in brief objectives of ISDN. **[8]**
- Q3)** a) Explain architecture of Frame relay. **[8]**
- b) Discuss importance of control signaling in ATM networks. **[8]**
- Q4)** Write short notes on (Any 3): **[18]**
- a) Packet Switching using virtual circuit.
 - b) Advantages of frame relay over X.25.
 - c) ATM cell.
 - d) Comparison of S/T/F/CDMA.

P.T.O.

SECTION-II

- Q5)** a) State the advantages and disadvantages of wireless LAN. [8]
b) Explain protocol architecture of Fibre channel. State its application. [8]
- Q6)** a) Explain in short transmission structure of ISDN. [8]
b) Explain the architecture and various standards of Gigabit Ethernet. [8]
- Q7)** a) Explain the protocol architecture of GSM for signaling. [8]
b) Explain in detail the SDH standard with example. [8]
- Q8)** Write short notes on (Any 3): [18]
a) IEEE 802.11 system architecture.
b) ATM QoS parameters.
c) CDMA.
d) UMTS system architecture.



Total No. of Questions : 6]

SEAT No. :

P4605

[5060]-18

[Total No. of Pages :2

M.E. (Civil) (Structures)

DESIGN OF FOUNDATIONS

(2008 Course) (Semester-I) (Elective-I) (501404 D)

Time : 4 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answers any two 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) *Your answers will be valued as a whole.*
- 5) *Use of electronic pocket calculator is allowed & its codes are not allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION-I

Q1) a) Explain: [15]

- i) Importioning of footing
 - ii) Teng's correlations,
 - iii) USCS
 - iv) Soil structure interaction
 - v) Is-1892-1979, provisions for soil exploration
- b) Explain the steps for determination of consolidation settlement at the middle of clay clayer, by giving sample calculations. [10]

Q2) Explain:

- a) Different types of raft & its need. [9]
- b) Design of 'Flat slab raft'. [8]
- c) Design of ' Beam & raft (slab) foundation. [8]

Q3) a) Differentiate clearly between the design of foundations for Rotary M/C & Impact M/C, in the light of, IS - 2974 - pt - II -1966. [15]

- b) How will you determine Cu & Amplitude for resonance condition. [10]

P.T.O.

SECTION-II

- Q4)** Explain: **[25]**
- a) NSF & PSF
 - b) Design steps for precast & cast in-situ piles
 - c) Steps for computation of settlement of pilegroup, with sample example.
- Q5)** a) Explain the steps for design of RCC precast pile. **[17]**
- b) Explain 'Rees & Matlock' method for LLP. **[8]**
- Q6)** a) Explain the steps for 'Design of pile cap'. **[9]**
- b) Discuss, 'IS code recommendations' for 'shell foundations. **[8]**
- c) Compare 'Hyperbolic & conical RC shell foundations' with & without edge beams. **[8]**



Total No. of Questions : 8]

SEAT No. :

P4690

[5060]-181

[Total No. of Pages :2

M.E. (Electronics) (Digital Systems)
ADVANCED DIGITAL SYSTEM DESIGN (Elective-I)
(2008 Course) (Semester-I) (504197B)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

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

SECTION-I

- Q1)** a) Design a sequential circuit that computes the product of two four bit numbers. **[10]**
- b) Draw and explain address and data path architecture of CPU. **[8]**
- Q2)** a) Design a sequence generator in which output 'Y' is '1' only if input sequence of 0011 occurs at consecutive clock pulses, otherwise 'Y' is '0'. **[10]**
- b) Describe the design issues of RISC and CISC processor. **[6]**
- Q3)** a) What is digital signature? What is the use of signature analysis? Explain with suitable example. **[8]**
- b) How to design a circuit to eliminate the de-bouncing of a switch. **[8]**
- Q4)** Writes short notes on (Any four): **[16]**
- a) System integrity.
 - b) ATM pack generator.
 - c) Hazard analysis.
 - d) Fault tree analysis
 - e) ASM and FSM.

P.T.O.

SECTION-II

- Q5)** a) Explain the following term in context to large digital system design. [10]
- i) Reliability estimation.
 - ii) Reliability function.
 - iii) Failure rate
 - iv) Bathtub curve
 - v) MTBF
- b) Explain interfacing of 4K byte RAM memory to microprocessor. [8]
-
- Q6)** a) Draw and explain architecture design of ATM switch. [8]
- b) Explain BIST scheme with the help of block schematic. [8]
-
- Q7)** a) Draw and explain IEEE 486 bus interface. [8]
- b) What is PRBS generator? Draw and explain a scheme to generate PRBS. [8]
-
- Q8)** Writes short notes on (Any four): [16]
- a) Floating point multiplication.
 - b) Network design tool.
 - c) Scan testing.
 - d) Asynchronous serial data transfer.
 - e) Methods of elimination of cross talk.



Total No. of Questions : 10]

SEAT No. :

P5054

[5060]-182

[Total No. of Pages : 2

M.E. (Electronics) (Digital Systems)
ADVANCED COMPUTING ARCHITECTURES
(2008 Course) (Semester - I) (504198) (Elective-II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any three questions from each section.*
- 2) *Figures to the right indicate full marks.*
- 3) *Assume suitable data,if necessary.*

SECTION-I

- Q1)** a) Explain the following issues in multiprocessor systems: [8]
i) Interprocessor communication.
ii) Synchronization software mechanism.
- b) Explain desirable architectural features of processor to be effective in a multiprocessing environment. [8]
- Q2)** a) Explain various static and dynamic network topologies with suitable example in each case. [8]
b) Explain SIMD computer architecture. [8]
- Q3)** a) Explain software techniques for increasing speed of uniprocessor system. [8]
b) Explain different techniques to balance the subsystem bandwidth of a uniprocessor. [8]
- Q4)** a) Explain data flow architecture principles. [8]
b) What are the different shared memory multiprocessor models? [8]
- Q5)** a) Explain Grain Sizes and Latency. [6]
b) Explain Linear Pipeline Processors? [6]
c) Explain Arithmetic Pipeline design? [6]

P.T.O.

SECTION-II

- Q6)** a) What is Super Scalar Processors? [8]
b) What is Virtual memory? In how many classes virtual memory system is categorized? [8]
- Q7)** a) Explain Vector super computers? [8]
b) Explain techniques for exploitation of instruction level parallelism. [8]
- Q8)** a) What is the use of speculative execution in superscalar architecture? [8]
b) Explain any one case study of VLIW architecture. [8]
- Q9)** a) Explain classification of vector computers. [8]
b) Explain the performance parameters of pipelined vector processors. [8]
- Q10)** a) Explain speed up performance Laws.(any three). [12]
b) Define Speed up,efficiency, and CPI. What is their significance. [6]



Total No. of Questions :10]

SEAT No. :

P4691

[Total No. of Pages : 2

[5060] - 183
M.E. (Electronics)
MEMORY TECHNOLOGIES (Theory)
Digital Systems
(2008 Pattern)(Elective-II)

Time : 3Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Answers any three questions from each section.*
- 2) Answers to the 2 section should be written in separate book.*
- 3) Neat diagram must be drawn wherever necessary.*
- 4) Figures to right indicate full marks.*

SECTION - I

- Q1)** a) Draw and explain various DRAM circuit elements. **[4]**
b) Draw and explain in detail the BiCMOS Technology. **[6]**
c) Draw the functional block diagram of typical application specific DRAM. **[6]**
- Q2)** a) Explain with a diagram a simple trench cell and stacked capacitor cell structure DRAM. **[8]**
b) Explain high speed DRAM in detail with the help of functional block diagram. **[8]**
- Q3)** a) Explain with functional block diagram EEPROM. **[10]**
b) Explain with a diagram floating gate EPROM cell. **[6]**
- Q4)** a) Explain in detail OTP EPROMs. **[8]**
b) Explain in detail nonvolatile SRAM **[8]**
- Q5)** Write Short Notes (Any Three) **[18]**
a) Reliability Issues.
b) Pattern Sensitive fault.
c) Radiation hardened memory.
d) IDDQ Fault modeling and Testing.

P.T.O.

SECTION-II

- Q6)** a) Explain in detail RAM fault modeling. [8]
b) What are the various types of radiation and corresponding transistor / circuit level parameter degradation and failures. [8]
- Q7)** a) Explain in detail radiation hardening techniques and design issues in a semiconductor memory. [8]
b) Explain in detail assembly and packaging related failures. [8]
- Q8)** a) Explain in detail issues related to DRAM reliability. [8]
b) Explain in detail the design considerations for reliability [8]
- Q9)** a) Compare MRAM, SRAM, DRAM, EEPROM and FRAM. [8]
b) List most commonly used memory packages for both insertion and surface mounting technologies. [8]
- Q10)** Write Short Notes (ANY THREE) [18]
a) Memory Card.
b) FRAM's reliability issues and radiation effects.
c) DVD Palyer.
d) Different types of high density memory packaging techniques.



Total No. of Questions : 8]

SEAT No. :

P5112

[Total No. of Pages : 2

[5060] - 184

M.E (Electronics) (Digital System) (Semester - II)

DIGITAL SYSTEMS USING PLDS

(2008 Course)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Attempt any SIX questions; Question No. 8 is 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) Compare between CPLD and FPGA. [8]
b) Explain in detail Behavioural, Data flow and structural VHDL modeling techniques. [8]
- Q2)** a) For a Spartan Xilinx FPGA explain [8]
i) Block RAM
ii) DLL
b) Write a short note on JTAG boundary scan. [8]
- Q3)** a) Explain importance and necessity of FPGA? Enlist its specification. [8]
b) Draw the architecture of FPGA and explain. [8]
- Q4)** a) What is the significance of cool runner CPLD over other CPLDs. Explain its architecture? [8]
b) Explain ACTEL ACT series FPGA. Basic ACTEL FPGA architecture. [8]
- Q5)** a) Draw the architecture of Xilinx XC 9500 CPLD explain. [8]
b) Explain in detail PLD architectures for embedding soft cores. [8]

P.T.O

- Q6)** a) Write a test bench of 8 : 1 MUX. [8]
b) Explain features and design flow of Mentor Graphics EDA tool. [8]
- Q7)** a) Compare FPGA of Xilinx, Actel and Altera on various parameters like. [8]
i) Architecture ii) Memory
iii) Density and iv) Any other specifications.
b) Discuss the switch matrix/boxes design and related issues. [8]
- Q8)** Draw the digital design and write VHDL code for [20]
a) PIPO Shift register
b) SISO shift register
c) SIPO shift register
d) PISO shift register



Total No. of Questions : 8]

SEAT No. :

P5055

[5060]-185

[Total No. of Pages : 2

M.E. (Electronics) (Digital Systems)
BIOMEDICAL SIGNAL AND SYSTEMS
(2008 Course) (Elective - III) (Semester - II) (504204 B)

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) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) What is Biomedical signal? Explain in brief with examples and neat diagrams, any four Biomedical signals. [10]
b) Explain the objectives of Biomedical instrumentation and signal analysis. [8]
- Q2)** a) Distinguish between the ECG and EEG rhythms. [8]
b) Explain briefly the method of segmentation of PCG signal to separate systolic and Diastolic parts. [8]
- Q3)** a) Enlist different artifacts involved in Biomedical signal instrumentation. [8]
b) Explain effect of motion artifact on ECG. Explain briefly the removal of motion artifact on ECG. [8]
- Q4)** a) What are time domain filters? Explain various time domain filters used in removing artifacts. [8]
b) Compare time domain and frequency domain filtering techniques. [8]

P.T.O.

SECTION - II

- Q5)** a) What is event detection? Explain with examples, how event detection is useful in Biomedical signal analysis. [8]
b) Explain the derivative based method for QRS detection in ECG signal. [8]
- Q6)** a) Explain the use of PSD function to detect EMG rhythms with appropriate illustrations. [8]
b) Explain with example the significance of pole-zero modeling of biomedical signals. [8]
- Q7)** a) Explain Pattern Classification. Explain the use of pattern classification in diagnostic decision making. [10]
b) Compare supervised and unsupervised pattern classification process. [8]
- Q8)** a) State the use of Neural networks in Biomedical signal analysis. [8]
b) Explore the applicability of Fourier spectral analysis methods to study heart rate data. [8]



Total No. of Questions : 8]

SEAT No. :

P4692

[Total No. of Pages : 2

[5060] - 186

**M.E. (Electronics- Digital Systems)
EMBEDDED VIDEO PROCESSING
(Elective-III) (2008 pattern)**

Time : 3Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) With the help of neat block diagram explain the method of objective video quality measurement. **[8]**
- b) What is need of video compression? Explain any two lossy video compression techniques in detail. **[8]**
- Q2)** a) What is transform coding? State the advantages of transform coding & explain any one transform coding in detail. **[10]**
- b) Explain the different types of pictures defined in MPEG-1 standard. **[8]**
- Q3)** a) Explain the various types of data structures used for entropy based coding of pixels in JPEG. **[8]**
- b) Compare JPEG with motion JPEG & JPEG 2000. **[4]**
- c) Enlist important features of MPEG - 4. **[4]**

P.T.O.

- Q4)** a) State the rate - distortion function & compare the performance of motion compensation based & intra - frame based video coding techniques. **[8]**
- b) Write short notes on :- (any two) **[8]**
- i) HVS model
 - ii) MPEG - 2
 - iii) Huffman coding

SECTION-II

- Q5)** a) Explain the concept of audio / video objects and their spatio - temporal relationships to generate encoded bit streams in case of MPEG - 4 system. **[8]**
- b) Draw a neat block diagram of video codec with prediction & explain function of each block. **[8]**
- Q6)** a) Explain the motion estimation & compensation technique using neat block diagram. **[8]**
- b) Explain the process of video codec testing. **[4]**
- c) Explain the use of pre - filtering process. **[4]**
- Q7)** a) Discuss the following parameters with respect to optimum Qos requirements- **[8]**
- i) Bit rate
 - ii) Error resilience
 - iii) delay.
- b) State the important features of ITU - R BT 500 - 10. **[4]**
- c) State the important specifications of DSP used for video processing. **[4]**
- Q8)** a) Explain the following terms - **[18]**
- i) De - blocking & De - ringing filters.
 - ii) Interfacing of video codec.
 - iii) Arithmetic coding.
 - iv) Multiple sample based compression.



Total No. of Questions : 8]

SEAT No. :

P5091

[5060]-187

[Total No. of Pages : 2

**M.E. (Electronics Engineering) (Digital Systems)
EMBEDDED AUTOMOTIVE SYSTEMS (Elective-IV)
(2008 Course) (Semester-II) (504205)**

Time :3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Answers to the two sections should be written in separate answer books.*
- 2) Neat diagrams must be drawn wherever necessary.*
- 3) Figures to the right indicate full marks.*
- 4) Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) Which are the components for Electronic engine management systems? Explain. [8]
- b) How auto breaking system contributes to vehicle motion control. [8]
- Q2)** a) What are types of solid state ignition systems? Explain their principle of operation. [8]
- b) What are different types of interferences? How they can be overcome. [8]
- Q3)** a) Explain the role of embedded systems in Automotive systems. [8]
- b) Explain different dashboard instruments and their use. [8]
- Q4)** Write short note on any three: [18]
- i) Current trends in automotive systems
 - ii) Air mass flow sensors & Flow sensors
 - iii) Security and Warming system
 - iv) Digital engine control systems

P.T.O.

SECTION-II

- Q5)** a) Describe the details of head light and sidelight, Horn, wiper system and traffic indicator. [8]
- b) What do you understand by Vehicle Safety? What are the objectives of it? List out various provisions of safety aspects incorporated in modern car? [8]
- Q6)** a) Draw and explain following fields of standard format of CAN protocol. [8]
- i) Arbitration
 - ii) Control
 - iii) Data
 - iv) CRC
- b) How vehicle tracking system is achieved using GPS. [8]
- Q7)** a) How Artificial intelligence plays role in modern vehicles. [8]
- b) Which are the rating efficiency of battery? What are the various tests on batteries and how charging is done. [8]
- Q8)** Write short notes on any three. [18]
- a) Cruise control car
 - b) Fuel metering and its different techniques
 - c) Open loop and closed loop control systems
 - d) Deceleration learning and ideal speed control



Total No. of Questions : 8]

SEAT No. :

P4693

[Total No. of Pages : 2

[5060] - 188

M.E. (Electronics) Digital System

Elective - IV: DIGITAL SIGNAL COMPRESSION

(2008 pattern) (Revised)

Time : 3Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any three questions from each section.*
- 2) *Answers to the 2 sections must be written in separate answer books.*
- 3) *Use of scientific calculator is allowed.*
- 4) *Assume suitable data wherever required.*
- 5) *Figures to the right indicate full marks.*

SECTION - I

- Q1)** a) What is lossless compression? Explain the algorithm for arithmetic coding with numerical example. **[8]**
- b) Execute Shannon Fano coding for the following source emitting 4 symbols a,b,c, and d with probability 0.3, 0.2, 0.3 and 0.2 respectively. **[8]**
- Q2)** a) What is LPC? Explain the lossy compression using adaptive predictive coding. **[8]**
- b) What are uniform quantizers? Do you need to consider the variance of the signal for deciding a step size for a quantizer? Give one example for uniform quantizer. **[8]**
- Q3)** a) Explain delta modulation technique. **[8]**
- b) Draw a companding curve and explain its nature related to speech signal. Explain companded quantizer. **[10]**

P.T.O.

- Q4)** a) Explain backward adaptive quantizer? How will you adapt the step size? [8]
- b) Explain PCM and differential PCM coding. How will you select the number of bits using for coding? [8]

SECTION-II

- Q5)** a) What are features of music signal? Explain ADSR envelope. [8]
- b) What are the symbols used in coding music? Explain the streaming of music. [8]
- Q6)** a) What is a phase distortion? How will you use rate distortion coding? [8]
- b) What is entropy? Write a formula for information and coding efficiency. Explain any one entropy coding. [8]
- Q7)** a) Explain the meaning of detail function and a low resolution function. Decompose the signal points {2,5,3,7} using Haar wavelet. What are the characteristics of a mother wavelet? [8]
- b) Explain sub band coding for speech. [10]
- Q8)** a) Explain compression of image using Haar wavelet. What are wavelet packets? [8]
- b) Explain the algorithm for EZW coding. [8]



Total No. of Questions : 6]

SEAT No. :

P4606

[5060]-19

[Total No. of Pages : 2

M.E. (Civil-Structures)

ADVANCED DESIGN OF METAL STRUCTURES

(2008Course) (Semester - I)

Time : 4 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) *Use of Calculator and relevant IS codes is allowed.*
- 6) *Assume Suitable data if necessary.*

SECTION - I

Q1) 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. **[15]**

b) Explain behavior of castellated beam in flexure and shear with suitable free body diagram. **[10]**

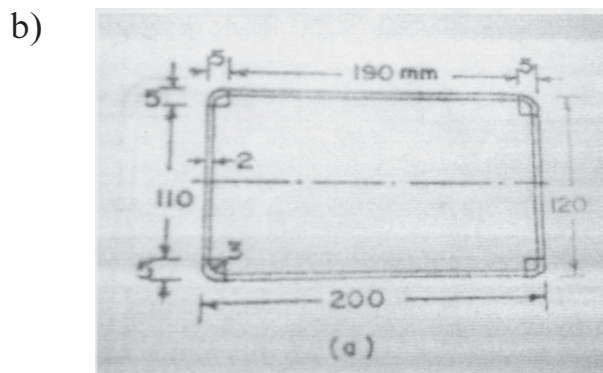
Q3) a) Compare steel and aluminum structural sections. And its applications, advantages, disadvantages. **[12]**

b) Find flexural and shear stresses in IS ALB 150 at 12.1 kg/m when loaded with UDL of 25 KN/m on span of 4 m. **[13]**

P.T.O.

SECTION - II

- Q4)** a) Sketch structural geometry of Microwave tower and a transmission tower carrying high tension electric wire. Indicate all important structural components. [13]
- b) Design the foundation bolt for transmission tower, for one of the four legs, consisting of angle section, which has to transfer tensile reaction of 500 KN to foundation block. The cross-section of tower leg is ISA 125.125.10. Draw design details of connection. [12]
- Q5)** a) State advantages and disadvantages of tubular structural sections used in steel structures. [6]
- b) What are the design considerations of tubular scaffolding structure. [6]
- c) Design scaffolding support structure for RCC slab 210 mm thick, span between beams is 4.5 m. [13]
- Q6)** a) Explain manufacturing of light gauge structural members. Enlist its advantages over conventional sections. [10]



Find the allowable axial load for the rectangular tubular strut section made of light gauge section as show in fig. The effective length of column is 3.3 m. Take $f_y = 235 \text{ N/mm}^2$. [15]



Total No. of Questions : 8]

SEAT No. :

P4694

[Total No. of Pages : 2

[5060] - 192

M.E. (Instrumentation and Control)(Process and Biomedical)

ORGANIZATIONAL BEHAVIOUR AND MANAGEMENT

(Semester - II)

(2008 Pattern)

Time : 3Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers any three questions from each section.*
- 2) *Answers to the 2 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) Define Management. State and explain its functions. Explain the role of effective managerial activities as compared to successful managerial activities in a changing global business environment. **[16]**

Q2) Define organizational behavior. Describe various organizational behavior models. Also, evaluate the challenges and opportunities for organizational behavior. **[16]**

Q3) Explain how perception is a key element in individual decision making. Also, compare personality, emotions and perception. **[16]**

Q4) Write short notes on :

- a) Concepts of motive, motivating and motivation **[9]**
- b) Theory of motivation **[9]**

SECTION-II

Q5) a) What is Conflict management? How conflict resolution takes place in business? Explain contingency approach to conflict management. **[16]**

P.T.O.

Q6) Write short notes on :

- a) Components of organisational systems [9]
- b) Group decision techniques [9]

Q7) Explain the concept of leadership. Also, explain contingency theory of leadership and how it is helpful to an organization. [16]

Q8) Describe the role of Group Dynamics in effective group decision making process. [16]



Total No. of Questions : 8]

SEAT No. :

P4695

[Total No. of Pages : 2

[5060] - 193

M.E. (Bio medical Instrumentation)

BIO-IMAGING MODALITY

(2008 pattern) (Elective - III (a)) (Semester - II)

Time : 3Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers 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) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) What is radiation? Differentiate the two types of radiation? [8]
b) Explain why we use different methods of imaging for diagnosis. Explain the typical use of different types of imaging. [8]
- Q2)** a) Explain the block diagram of X-ray machine in detail. [8]
b) Explain the operation and the application of X-ray fluroscopic system that is used for real imaging. [8]
- Q3)** a) What is the difference between diagnostic mammography and screening mammography? What is magnification mammography? [8]
b) Explain the method that overcomes the drawbacks of X-ray imaging system. Explain atleast three image reconstruction methods in the same. [10]
- Q4)** a) What do you mean by CT Number in CT scanning? [8]
b) List the factors affecting the spacial resolution of the image in CT scan. Explain atleast two factors in detail. [8]

P.T.O.

SECTION-II

- Q5)** a) Explain the different modes in ultrasound imaging system. [10]
b) Explain the relationship of resolution, depth of penetration and frequency in connection with ultrasound image. Explain the advantages and biological effects of ultrasound imaging. [8]
- Q6)** a) Enlist clinical applications of SPECT and give the reason why SPECT is accepted instead of conventional nuclear medical imaging. [8]
b) Discuss various magnets used in MRI to produce appropriate magnetic field. [8]
- Q7)** a) Explain the principle of PET imaging system. Why NaI crystal is popular in nuclear imaging. Which component of PET system makes it costlier system? [8]
b) Draw and explain block diagram of infrared imaging. [8]
- Q8)** a) Explain the basic principle of MR imaging. Enlist advantages of MRI techniques. [8]
b) Explain Medical thermography and the benefits of thermal imaging. [8]



Total No. of Questions : 6]

SEAT No. :

P4696

[Total No. of Pages : 2

[5060] - 195

M.E. (Instrumentation & Control) (Process)

Industrial Automation

(Elective - I) (Semester - I)

(2008 pattern)

Time : 3Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

Q1) What is OPC? Explain with an example, How OPC is actually used in the field? **[25]**

Q2) Discuss the various selection criteria that must be considered for selection of a suitable PLC for a specific process control.
Develop programmable ladder diagram for two lights are to flash on and off at different intervals. One is on 4 seconds and off 4 seconds. The other is on for 7 seconds and off 7 seconds. Two lights are to flash alternately, one for 4 seconds, one for 7 seconds. After five cycles both lights must go off . **[25]**

Q3) Write notes on : **[25]**

- a) Model predictive control
- b) Hybrid DCS/PLC

P.T.O.

SECTION-II

Q4) Describe in brief SCADA systems in terms of their architecture, interface to process hardware and the functionality. **[25]**

Q5) Describe in brief power plant process. Develop DCS based automation strategy for the power plant control. **[25]**

Q6) Write notes on: **[25]**

- a) Sequential Function Chart
- b) Statistical process control



Total No. of Questions :6]

SEAT No. :

P4595

[5060]-2

[Total No. of Pages :4

M.E. (Civil) (Environmental Engg.)
NUMERICAL METHODS AND APPLIED STATISTICS
(2010 Course) (Semester- I)

Time : 3 Hours]

[Max. Marks :100

Instructions to candidates:

- 1) *Answer any two 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) *All questions carry equal marks.*
- 6) *Use of logarithmic tables, slide rule, Mollier Charts, electronic pocket calculator and steam tables is allowed.*

SECTION-I

Q1) a) Find the inverse of matrix $\begin{bmatrix} 1 & 1 & 1 \\ 4 & 3 & -1 \\ 3 & 4 & 3 \end{bmatrix}$ using Gauss Jordan method, and hence solve the system **[9]**

$$x_1 + x_2 + x_3 = 4$$

$$4x_1 + 3x_2 - x_3 = 10$$

$$3x_1 + 4x_2 + 3x_3 = 12$$

- b) Determine the roots of equation $x^2 + y^2 = 5$ and $x^2 - y^2 = 1$ by using Newton - Raphson method. **[8]**
- c) Find $\log 2.5$ using second order Newton's Interpolation polynomial. **[8]**

i:	0	1	2	3
x_i :	1	2	3	4
$\log x_i$:	0	0.3010	0.4771	0.6021

P.T.O.

Q2) a) Using Simplex method find optimal solution to the following LPP. [15]

$$\text{Maximize } Z = 4x_1 + 3x_2 + 6x_3$$

$$\text{Subject to } 2x_1 + 3x_2 + 2x_3 \leq 440$$

$$4x_1 + 3x_3 \leq 470$$

$$2x_1 + 5x_2 \leq 430$$

$$\text{and } x_1, x_2, x_3 \geq 0.$$

b) A Company manufactures two types of cloth, using three different colours of wool. One yard length of type A cloth requires 4 oz of red wool, 5 oz of green wool and 3 oz of yellow wool, one yard length of cloth B requires 5 oz of red wool, 2 oz of green wool and 8 oz of yellow wool. The wool available for manufacturer is 1000 oz of red wool, 1000 of green wool and 1200 oz of yellow wool. He can make profit of Rs. 5 on one yard of cloth A and Rs. 3 on one yard of cloth B. Formulate LPP and solve it graphically. (oz is unit of wool) [10]

Q3) a) State and prove compound probability theorem. [7]

b) For the following distribution find first four moments about mean, coefficient of skewness and Kurtosis. [9]

x:	2	2.5	3.00	3.5	4.00	4.5	5.00
f:	5	38	65	92	70	40	10

c) In a quality control department of rubber tube manufacturing factory, 10 rubber tube are randomly selected from each day's production for inspection. If not more than 1 of 10 tube is found to be defective, the production lot is approved, otherwise it is rejected. Find the probability of the rejection of a day's production lot if the true proportion of defective in the lot is 0.3. [9]

SECTION-II

Q4) a) A random variable x has the following probability function. **[8]**

$x:$	-2	-1	0	1	2	3
$p(x):$	0.1	k	0.2	$2k$	0.3	k

Find the value of k and calculate the mean and variance of the distribution.

b) Fit a binomial distribution to the following frequency distribution. **[8]**

$x:$	0	1	2	3	4	5	6
$f:$	13	25	52	58	32	16	4

c) In a test on 2000 electric bulbs was found that the life of a particular make, was normally distributed with an average life is 2040 hours and S.D of 60 hours. Estimate the number of bulbs likely to burn for, **[9]**

- i) more than 2150 hours
- ii) less than 1950 hours
- iii) more than 1920 hours and less than 2160 hours.

Q5) a) Write short notes on (any two): **[10]**

- i) Sampling theory.
- ii) Testing of Hypothesis.
- iii) Chi-square Test.

b) The means of simple samples of sizes 1000 and 2000 are 67.5 and 68.00 cm respectively. Can the samples be regarded as drawn from the same population of S.D 2.5 cm. [Tabulated value of $z = 3$] **[7]**

c) 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 47.5? **[8]**

- Q6) a)** Find the correlation coefficient between Industrial production and export using the following data and comment on the result. [8]

Production: 55 56 58 59 60 60 62
(In cores tons)

Exports : 35 38 38 39 44 43 45
(in cores tons)

- b)** The following data shows the test scores made by salesman on an intelligence test and their weekly sales. [8]

Test score : 40 70 50 60 80 50 90 40 60 60

Sales : 2.5 6.0 4.5 5.0 4.5 2.0 5.5 3.0 4.5 3.0

Calculate regression lines of sales on test score and estimate the most likely sales if a salesman make score of 75.

- c)** The following data give the yield on 12 plots of land in three different samples, each of 4 plots under three varieties of fertilizers A, B, C. [9]

A: 25 22 24 21

B: 20 17 16 19

C: 24 26 30 20

Is there any significant difference in the average yields of land under three fertilizers? (Given F for $\gamma_1 = 2$ & $\gamma_2 = 9$ at 5% level is 4.26).

EEE

Total No. of Questions : 6]

SEAT No. :

P5147

[Total No. of Pages : 2

[5060]-20
M.E. (Civil - Structures)
STRUCTURAL DESIGN OF STEEL BRIDGES
(2008 Pattern)

Time : 4 Hours]

[Maximum Marks : 100

Instructions to the candidates:

- 1) Attempt any two questions from section I and section II.*
- 2) Answers to the two sections should be written in separate answer books.*
- 3) Neat diagrams must be drawn wherever necessary.*
- 4) Figure to the right indicate full marks.*
- 5) Assume suitable data, if necessary and clearly state.*
- 6) Use of electronic pocket calculator, steel table and IS 800 are allowed.*
- 7) Use of cell phone is prohibited in the examination hall.*

SECTION - I

- Q1)** a) Explain in brief method of erection for the steel bridges with suitable sketches. **[10]**
- b) Explain the historical development of bridges in details. **[8]**
- c) Explain in brief classification of steel bridges based on load carrying element and structural layout of load carrying member. **[7]**
-
- Q2)** a) Explain design criterion of horizontal truss bracings and end cross frames deck type plate girder bridge. **[10]**
- b) A deck type plate girder railway bridge of span 20 m is provided for a double broad gauge track. The self weight of stock rails and check rails are 0.8 and 0.4 kN/m respectively. The self weight of sleepers is 3.6 kN/m. Design a economical cross section of plate girder. Draw the design sketches for the bridge structures. The EUDL for B M is 2000 kN, for S F is 2400 kN and impact factor is 0.5. **[15]**

P.T.O

- Q3) a)** Explain design of bracing systems for through type truss girder railway bridges. [10]
- b) Determine the maximum forces in top and bottom chord members of the pratt truss girder through bridge for single broad gauge track of span 40m. The spacing of main girder, cross girder and stringer are 7, 5 and 2m respectively. [15]

SECTION - II

Q4) The effective span of through type truss girder highway two lane bridge is 40. The reinforced concrete slab is 300 mm thick inclusive of the wearing coat. The foot paths are provided on either side of the carriage way. The spacing between centre to centre of truss girder is 15 m. The highway bridge is to carry IRC class A standard loading. Suggest a suitable truss girder for the bridge. Design the top chord members of the central panel. [25]

Q5) The effective span of a deck type plate girder two lane highway bridge is 25m. The reinforced concrete slab is 300 mm thick inclusive of the wearing coat, the foot paths are provided on either side of the carriage way. Design the maximum section of plate girder, if the bridge is to carry IRC class A loading. [25]

- Q6) a)** Explain in details application of bearing in steel bridges. [10]
- b) The effective span of truss girder through type bridge for a single broad gauge track is 25 m. Reaction due to dead load, live load and impact load is 1200 kN. Vertical reaction due to wind is 250 kN. Tractive force is 1200 kN and breaking force is 450 kN. Design the rocker bearing and draw design sketch. [15]



Total No. of Questions : 8]

SEAT No. :

P4697

[Total No. of Pages : 2

[5060] - 201

**M.E. (Computer Engg.) (Computer Networks)
EMERGING TRENDS IN COMPUTER ARCHITECTURE
(2008 Pattern) (Semester -I)**

Time : 3Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Answers any three 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 indicate full marks.*
- 5) Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Draw typical architecture of following parallel computer models and list their features. **[16]**
- i) Symmetric multiprocessor (SMP).
 - ii) Massively parallel processor (MPP).
- Q2)** a) What do you mean by software multithreading? Explain various low - level synchronization primitives. **[8]**
- b) Draw a typical architecture of a cluster and explain their architectural concepts. **[8]**
- Q3)** a) Draw Log P communication model and explain it in detail. **[8]**
- b) Draw and explain four layered ATM network architecture. **[10]**
- Q4)** Write short notes on : **[16]**
- a) TCP/IP protocol suite.
 - b) IBM SP2 System architecture.
 - c) Myrinet switches.
 - d) ATM cell format.

P.T.O.

SECTION-II

- Q5)** a) Explain following parallel programming models in detail. **[16]**
- a) Message - passing model
 - b) Shared - variable model
- Q6)** a) Draw and Explain ARC model of grid computing. **[8]**
- b) Give differences between SAN and NAS. **[8]**
- Q7)** a) Explain process management mechanism in PVM. **[8]**
- b) Compare PVM and MPI message passing libraries. Explain briefly various communication functions implemented as a part of MPI. **[10]**
- Q8)** Write short notes on : **[16]**
- a) Direct Attached Storage (DAS).
 - b) Topology used in Storage Area Network (NAS).
 - c) Grid architecture.
 - d) IA-64 architecture.



Total No. of Questions : 10]

SEAT No. :

P4698

[Total No. of Pages : 2

[5060] - 202

**M.E. COMPUTER NETWORK
Principles & Practices For IT Management
(2008 pattern)**

Time : 3Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Answers any three questions from each section.*
- 2) Answers to the 2 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) Explain the project Management process in detail . [8]
b) What are the various tools & techniques used in strategic management with suitable examples? [8]
- Q2)** a) How project priorities are decided in project management? Explain with example. [8]
b) What are the roles of business ethics in project management? [8]
- Q3)** a) Explain work - break down structure in project management. [8]
b) How project team is build for IT projects? Explain with example? [8]
- Q4)** a) What is change control in IT project? How changes are implemented in project? [8]
b) Discuss the importance of project network diagram. Explain the process to prepare project network diagram. [8]

P.T.O.

- Q5)** Write short notes (any three) [18]
- a) Risk management
 - b) Resource procurement
 - c) Estimation of IT project
 - d) Reasons for delays in project management.

SECTION-II

- Q6)** a) What is formal and informal groups? How communication occurs in formal and informal group. [8]
- b) Explain strategies used in resolving conflict in teams [8]
- Q7)** a) What is energy management and energy audit? State its importance. [8]
- b) How stress management is carried out in IT project? Explain with example. [8]
- Q8)** a) Explain knowledge management in detail. [8]
- b) What is the role of cyber laws in IT projects? Explain with examples. [8]
- Q9)** a) State the application of IT in product design and development with example. [8]
- b) What is quality management system? Explain its impact with suitable example. [8]
- Q10)** Write short notes (any three) [18]
- a) Six sigma
 - b) Employee welfare
 - c) Intellectual Property Right (IPR)
 - d) Technology management.



Total No. of Questions : 8]

SEAT No. :

P4699

[Total No. of Pages : 2

[5060] - 203

M.E. (Computer Engineering)

ADVANCED SOFTWARE ENGINEERING

(2008 pattern) (Elective - I) (Semester -I)

Time : 3Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers 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) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Explain the importance of software engineering with general software process activities. [8]
b) Explain the types of requirements. [8]
- Q2)** a) Explain the object oriented design method with an example. [8]
b) Explain the client server model. [8]
- Q3)** a) What do you mean by incremental development? Explain with a process model. [8]
b) Explain the reliability specification for critical systems development. [8]
- Q4)** Explain the following (Any three) [18]
a) System engineering
b) Algebraic notation
c) Component based software development
d) UI design rules

P.T.O.

SECTION-II

- Q5)** a) Explain the unit testing strategy. [8]
b) Give the significance of estimation with an estimation technique. [8]
- Q6)** a) Explain Extreme programming. [8]
b) Give the advantages of formal methods development. Explain the z specification method. [8]
- Q7)** a) Explain the Risk identification process. [8]
b) State and explain the quality factors of software. [8]
- Q8)** Explain the following (Any three) [18]
a) Clean room software engineering
b) Fault recovery
c) Integration testing
d) Scheduling techniques



Total No. of Questions : 8]

SEAT No. :

P4700

[Total No. of Pages : 2

[5060] - 204

M.E. (Computer Engineering)
INTERNET ROUTING DESIGN
(semester - I) (2008 pattern)
(Elective-I (c))

Time : 3Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Explain in detail classful addressing and CIDR. **[8]**
b) Write and explain the algorithm for shortest path computation when candidate paths are known. **[8]**
- Q2)** a) Explain Dijkstra's shortest path first algorithm for centralized approach. **[8]**
b) Explain distance vector routing protocol with example. **[8]**
- Q3)** a) Write and explain path vector protocol with path caching. **[8]**
b) What are the sub - protocols of a link state protocol? compare distance vector protocol and link state protocol. **[8]**
- Q4)** a) Explain with diagram OSPF packet header. Why are different types of LSAs defined in OSPF? **[9]**
b) Explain packet format of RIPV1 compare RIPV1 with RIPV2. **[9]**

P.T.O.

SECTION-II

- Q5)** a) Explain with neat diagram components of a router. [8]
b) Explain Route reflection approach in BGP. [8]

- Q6)** a) Explain with example ternary CAM based lookup State advantages and disadvantages of TCAM. [8]
b) Explain why longest prefix match is important and define longest prefix matching problem. Also explain why prefix expansion is required. [8]

- Q7)** a) Construct a grid - of - trie using the rules given below Describe the steps involved in classifying the packet with F1= 0011 and F 2 =0011 [8]

Prefix label	F1	F2
p1	0*	10*
p2	0*	01*
p3	0*	1*
p4	00*	1*
p5	00*	11*
p6	10*	1*
p7	11*	00*
p8	*	00*

- b) Explain with example Hicuts decision tree. [8]

Q8) Write short note on

- a) Source based Qos routing with path caching [6]
b) Routing for voice over MPLS. [6]
c) VPN traffic engineering. [6]



Total No. of Questions : 8]

SEAT No. :

P4701

[Total No. of Pages : 2

[5060] - 205
M.E. (Computer)
MOBILE COMPUTING
(2008 Pattern) (Semester - II) (Elective - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :-

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

SECTION - I

Q1) Explain each of the following with neat GSM N/W diagram. **[18]**

- a) MSC/VLR
- b) HLR
- c) AVC
- d) EIR
- e) GMSL
- f) BSC
- g) BTS
- h) MS
- i) OSS

Q2) a) Explain FDMA, TDMA & CDMA in brief. **[12]**

b) Write a short note on mobile application security. **[4]**

Q3) a) List the major parameters need to consider for calculating performance of cellular networks & explain them in brief. **[8]**

b) Explain SCCP protocol with its message format. **[8]**

P.T.O.

Q4) Write a short note on security in mobile networks with types of security threats & measures that can be taken to safeguard the system against those threats. **[16]**

SECTION - II

Q5) a) Explain the following in brief : **[8]**

i) MSC

ii) HLR

iii) VLR

iv) EIR

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

Q6) a) Discuss in brief SIM with its desired characteristics. **[8]**

b) Write a short note on WEP & WPA. **[8]**

Q7) a) Write short note on SS7 network with neat diagram. **[8]**

b) Explain the MTP of SS7 in brief. **[8]**

Q8) a) Write a short note on MAP protocol for basic service support. **[8]**

b) Write a short note on mobility management. **[10]**



Total No. of Questions : 8]

SEAT No. :

P4702

[Total No. of Pages : 2

[5060] - 206

M.E. (Computer Engineering) (Semester - I)
INFORMATION AND NETWORK SECURITY
(2008 Pattern) (Elective - 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) *Use of logarithmic tables, slide rule, mollier charts, electronic pocket calculator and steam table is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Enlist various security mechanisms and Explain how these different security Mechanisms are related to security services? [7]
- b) Enlist and explain various principles of data security architecture. [7]
- c) What is service interruption-based attack? [4]
- Q2)** a) Explain RSA algorithm with suitable example. [8]
- b) What is the difference between Authentication and Authorization? Explain authentication protocol based on symmetric and asymmetric cryptosystems. [8]
- Q3)** a) Explain difference between an SSL connection and an SSL session? What are the basic protections provided by secure socket layer? [8]
- b) Explain what is Firewall and describe the screened-subnet firewall system with a Demilitarized Zone (DMZ). [8]

P.T.O.

Q4) Write Short Notes on (Any Three) [16]

- a) IPv4/IPv6 encapsulation header.
- b) Issues in multi-level secure systems.
- c) ICMP redirect hazard.
- d) Link encryption.

SECTION - II

Q5) a) What is secure binding of multimedia streams? Explain with example. [7]

- b) Describe key localization in SNMP. How localized key is generated?[7]
- c) What is route aggregation? [4]

Q6) a) Explain what is partitioning models and methods with respect to firewalls? [8]

- b) Explain how firewall differs from intrusion detection system? List the issues to be addressed when installing firewall. [8]

Q7) a) Describe security of the Diffie-Hellman algorithm. Discuss advantages and limitations of the Diffie-Hellman algorithm. [8]

- b) What is key agreement? Explain any one Key agreement protocol with suitable example? [8]

Q8) Write Short Notes on (Any Three) [16]

- a) Shared secret data authentication.
- b) PKI components and applications.
- c) Secure routing interoperability.
- d) Privacy enhanced mail.



Total No. of Questions : 8]

SEAT No. :

P4703

[Total No. of Pages : 2

[5060] - 207

M.E. (Computer Engineering)

ADVANCED COMPILERS

(2008 Pattern) (Elective - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :-

- 1) *Answer any three questions from each section.*
- 2) *Question 4 and 8 are compulsory.*
- 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) What are the different phases of compiler Design? Explain all phases in detail. [8]
- b) Explain the design and Implementation of YACC Tool. [8]
- Q2)** a) Explain Register Allocation Techniques. [8]
- b) Explain the three address Code generation with suitable example. [8]
- Q3)** a) Explain SSA form in detail with example. [8]
- b) Explain the data-flow analysis with different schemas. [8]
- Q4)** Write Short Note on : [18]
- a) Code generation for Pipelined machine.
 - b) Role of Symbol Table in compiler.
 - c) LEX Parser.

P.T.O.

SECTION - II

- Q5)** a) Explain structure of parallelizing compiler in detail. [8]
b) Why parallel compiler is required give the justification. [8]
- Q6)** a) Explain dynamic compilation in detail for distribution machine. [8]
b) Explain the three flavors of Data dependency in detail. [8]
- Q7)** a) Explain Just in Time Compiler. [8]
b) Explain the concept of Auto scheduling compilers with example. [8]
- Q8)** Write Short Note on : [18]
a) Direction Vector
b) Instruction scheduling
c) Data partitioning



Total No. of Questions : 8]

SEAT No. :

P4704

[Total No. of Pages : 2

[5060] - 208

M.E. (Computer)

WEB SERVICES AND SOA

(2008 Pattern) (Elective) (Theory)

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) *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 what you understand by registry, UDDI. [4]
b) What is SOAP & WSDL? Explain its importance in Web Service Communication. [8]
c) Give WSDL description of any service of your choice. [4]
- Q2)** a) Describe Service layer abstraction in SOA in detail. [8]
b) Explain in detail : [8]
i) Evolution of SOA
ii) SOA characteristics
- Q3)** a) Explain with any example of your choice the following three steps in SOA lifecycle, Service Oriented analysis, Service Design, mapping to technology like J2EE or .NET [8]
b) How to determine non-functional requirements like technical constraints, business constraints, runtime qualities, non runtime qualities in SOA analysis Phase. Explain with suitable example. [8]

P.T.O.

- Q4)** Write Short note on : **[18]**
- a) Enterprise Solution Assets
 - b) Enterprise Service Bus
 - c) WS-Reliable Messaging

SECTION - II

- Q5)** a) Explain in detail Service Oriented design Process. **[6]**
b) Explain how to choose appropriate design standards for SOA implementation. **[6]**
c) Describe in brief features of any tool available for SOA design. **[4]**
- Q6)** a) What is SOA Governance? What challenges are faced while using SOA Governance. **[6]**
b) What is role of ESB in SOA governance? Explain impact of changes to services in the SOA lifecycle. **[10]**
- Q7)** a) How can RSS be used for your website. **[4]**
b) Describe Web 2.0 user participation in detail. **[6]**
c) Ajax is not a single technology, but a collection of technologies. Justify the statement. **[6]**
- Q8)** Write short note on following : **[18]**
- a) JavaScript
 - b) Quality Assurance in SOA
 - c) Business Centric SOA



Total No. of Questions : 8]

SEAT No. :

P4705

[Total No. of Pages : 2

[5060] - 209

M.E. (Computer Engineering)
EMBEDDED SYSTEM DESIGN
(2008 Pattern) (Elective - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :-

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Attempt any three questions from each section.*
- 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 with the help of suitable example tightly constrained characteristics of an embedded system. [8]
- b) Explain the following technologies which are used in embedded system and compare them. [8]
- i) ASICs.
 - ii) FPGA.
- Q2)** a) Why ARM processors are mostly used in Embedded system design? Explain with block diagram the five stage pipeline of ARM9 processor. [10]
- b) Explain 12C bus protocol with its timing diagram and list out its features. [6]
- Q3)** a) What is the need for communication interface in Embedded system? Explain IEEE 802.11 Protocol with its data transfer mechanism. [8]
- b) Name and explain low power management modes of Bluetooth. [8]

P.T.O.

- Q4)** Write short notes on any three : **[18]**
- a) CAN BUS protocol.
 - b) IDE tools used in Embedded Systems.
 - c) ARM processor modes.
 - d) Hardware architecture of Embedded System.

SECTION - II

- Q5)** a) Differentiate between embedded operating system and real time operating system. **[8]**
- b) Explain the objects of an operating system kernel. **[8]**
- Q6)** a) Explain memory management functions of RTOS. **[8]**
- b) Explain Task and thread with a suitable example. **[8]**
- Q7)** a) What are cross compilers? When do you use them? How they are different than other compilers? **[8]**
- b) What are the different real time features of VxWorks? **[8]**
- Q8)** a) C++ / Java programming is widely used in embedded system programming. Why? **[8]**
- b) Explain Software Engineering Practices in the Embedded Software Development Process. **[10]**



Total No. of Questions :6]

SEAT No. :

P4607

[Total No. of Pages :2

[5060] - 21

M.E. (Civil - Structures)

**PLASTIC METHOD FOR ANALYSIS AND DESIGN OF STEEL
STRUCTURES**

(2008 Course) (Elective - II) (Semester - I) (501405 (c))

Time : 4 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 sketches must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of non-programmable calculator, IS: 800 - 2007 and steel table is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Explain concept of plastic hinge. **[3]**
- b) A simply supported beam of T section is subjected to sagging bending moment. Find the shape factor if permissible yield stress in compression and tension is 250 MPa and 300 MPa respectively. The section has following dimensions: **[12]**
- Top flange = 150 mm × 15 mm
Web = 15 mm × 175 mm (excluding top flange)
- c) Determine the shape factor for an I-section of 10 mm thick web and 14 mm thick flange. The depth of web excluding flanges is 280 mm. the width of flange is 130 mm. **[10]**
- Q2)** a) A continuous beam ABCD is simply supported at A, B, C & D. Spans AB = 5m, BC = 6m and CD = 5m. M_p is uniform. It is subjected to factored load as under: **[12]**
- i) Total udl value on AB and CD = 2W
ii) Concentrated load W at center of BC.
- Find collapse load W and statically admissible bending moment diagram. What is the type of collapse?

P.T.O.

- b) A rectangular portal frame ABCD has fixed base A & D, 5 m apart. Height of column AB and CD is 6 m. A vertical downward load $2W$ is acting at the center BC and horizontal point load W is acting at B in the direction of BC. Plastic moment of resistance for beam is 2 times that of column. Determine collapse load. [13]

Q3) A symmetrical gable portal frame ABCDE has bases A & E fixed 16 m apart. Vertical column AB & ED each equal to 8 m and apex C is 10 m above the base. It is subjected to horizontal load 45 kN at B and a concentrated load 90 kN each at center of each gable beam. M_p is uniform. [25]

- a) Draw all basic mechanism and obtain M_p in each case.
b) Draw (Sway + Gable) mechanism and obtain M_p .

SECTION - II

Q4) a) Explain in brief, philosophy of Limit State Design. [5]

- b) A simply supported beam of 10m effective span carrying a total factor load of 50 kN/m. The depth of beam should not exceed 500 mm. the compression flange of the beam is laterally supported. Design the section as per IS: 800-2007 and check for shear and deflection. [15]

- c) How the cross sections are classified in limit state theory? What is its significance? [5]

Q5) A column between floors of a multi storey building frame is subjected to load and moment as mentioned below.

Ultimate axial compression = 1400 kN

Ultimate moments about major axis

At top = 200 kNm

At bottom = 120 kNm

The effective length of column is 6.0 m

It is braced at its mid-height to provide local lateral restraint for buckling about yy axis. Design the section and use specification for interaction between moment and axial compression. [25]

Q6) a) Draw various knee and haunch details for rectangular and gable portal frames.

- b) Design the section for gable portal frame members as mentioned in Q.3. [25]



Total No. of Questions : 8]

SEAT No. :

P4706

[Total No. of Pages : 2

[5060] - 210
M.E. (Computer Engineering)
DISTRIBUTED SYSTEMS
(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 answer book.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Explain the “interaction model” of distributed systems. [8]
b) Explain the layered architectural pattern for distributed system. [8]
- Q2)** a) Explain the TCP Stream Communication as an API for Internet Protocol. [8]
b) Elaborate “Massively multiplayer online games (MMOGs)” as an example of distributed system. [8]
- Q3)** a) Explain the implementation issues for group communication services. [8]
b) Explain : [8]
i) Totally ordered logical clocks
ii) Vector clocks
- Q4)** Write short notes on ANY THREE : [18]
a) “Java’s Object Serialization” as an approach for external data representation and marshaling
b) Java RMI
c) Resource sharing
d) Global State

P.T.O.

SECTION - II

- Q5)** a) Explain the functional and non-functional requirements for the peer-to-peer middleware. [8]
b) Explain the X.500 Directory service as a case study of Name Service.[8]
- Q6)** a) Explain the “Synchronization Model” as a design and implementation issue in distributed shared memory. [8]
b) Explain in detail sequential consistency model. [8]
- Q7)** a) Define a Java interface for the Election service suitable for use as a web service. State why you think the interface you defined is suitable. Explain how a WSDL document for the service is generated and how it is made available to clients. [8]
b) Explain how web services are used in supporting the Grid. [8]
- Q8)** Write short notes on ANY THREE [18]
a) Andrew File System
b) SOAP
c) Name Spaces
d) Combination of Web Services



Total No. of Questions : 8]

SEAT No. :

P4707

[Total No. of Pages : 2

[5060] - 211

M.E. (Computer Engineering / Computer Networking)

HIGH PERFORMANCE DATABASE SYSTEMS

(2008 Pattern) (Semester - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :-

- 1) *Solve any three questions from each section.*
- 2) *Answer to each section should be written on different answer sheets.*
- 3) *Assume suitable data, if necessary.*
- 4) *Draw neat diagram wherever required.*

SECTION - I

- Q1)** a) List and explain atleast four features of TPC benchmarks that help make them realistic and dependable measures. [4]
b) Explain in detail how Database can be Tuned using different parameters. [6]
c) Explain TP-monitor Architecture. [6]
- Q2)** a) Discuss heuristics in Optimization. [6]
b) Explain hash join algorithm with example. [6]
c) Explain immediate and deffered view maintenance. [4]
- Q3)** a) Explain how shadow paging and write-ahead logging helps in recovery. [6]
b) Explain 2 phase locking protocol with example. [6]
c) Explain the difference between hash index and B+ Tree index with example. [4]
- Q4)** a) Explain data warehouse Architecture. [6]
b) Explain various data warehouse schemas with examples. [6]
c) Explain OLAP operation with example. [6]

P.T.O.

SECTION - II

- Q5)** a) Explain Aggregations in SQL. [6]
b) How XML integration is achieved with SQL servers. [6]
c) Discuss about SQL 3 standards, Objected oriented and security features. [4]
- Q6)** a) What is supervised and unsupervised learning. [6]
b) Discuss how to find candidate and frequent itemsets using APRIORI algorithm with example. [6]
c) What are the issues faced in Data mining. [4]
- Q7)** a) Explain Active and Deductive databases. [6]
b) Whats is main memory database. Discuss relative merits of loading entire database back into main memory before resuming transaction processing. [6]
c) Brief about Object Relational database. [4]
- Q8)** Write a short note on (any 3) : [18]
a) Webservice
b) Materialized views
c) BI
d) LDAP



Total No. of Questions : 8]

SEAT No. :

P5056

[5060]-212

[Total No. of Pages : 2

M.E. (Computer Engineering)
NETWORK DESIGN, MODELLING AND ANALYSIS
(2008 Course) (Semester - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *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) *Assume Suitable data if necessary.*

SECTION - I

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

b) Discuss in detail Failure probability in establishing network connection? **[8]**

Q2) Describe following with respect to network applications (Any Two): **[16]**

- a) Latency.
- b) Little's Theorem.
- c) Cumulative Distribution Function.

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

- a) Jackson's Theorem.
- b) Non-Preemptive Service.
- c) Analysis of M/M/2 queue on vacation.

Q4) a) Analyze M/M/m queuing system using state transition diagram. **[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 duties and responsibilities of Network Administrator. [6]
b) Solve Terminal Assignment problem for given data. [10]

Weight of node = 01

Max. capacity of concentrator = 03

	G	H	I	K
a	16	25	8	21
b	4	2	12	12
c	5	5	6	24
d	15	8	15	22
e	12	9	21	23
f	24	25	15	14

- Q6)** a) Describe different BW management tools. Explain importance of it. [8]
b) Explain ESAU William's algorithm with example. [8]

- Q7)** a) Explain with neat diagram architecture of network node. [8]
b) Describe locality of Network Layer and Transport Layer in actual network setup. Explain how ACCEPT and RECEIVE are different at receiver node. [8]

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

- a) PSN Network.
- b) Subnetting.
- c) Quality of Service.
- d) Network Implementation.

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Total No. of Questions : 8]

SEAT No. :

P4708

[Total No. of Pages : 2

[5060] - 213

M.E. (Computer Engineering)

PATTERN RECOGNITION AND MACHINE VISION

(2008 Pattern) (Semester - II) (Elective - III)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :-

- 1) *Answer any three questions from each section.*
- 2) *Neat Diagram must be drawn, wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume suitable data if required.*

SECTION - I

- Q1)** a) Write a note on non-linear modeling and fitting. [8]
b) Explain cross validation techniques in detail. [8]
- Q2)** a) What is the role of distance function in classification. State different distance measure. Explain k-NN method with example. [10]
b) Explain Levenberg-Marquardt algorithm. [6]
- Q3)** a) Explain active shape model with its applications. [8]
b) What is the need of dimension reduction in Image formation? Discuss PCA for dimension reduction. [8]
- Q4)** Write a short notes on any three : [18]
a) Non-linear kernel methods
b) Estimation theory
c) Fisher's discriminant Classification
d) Linear discriminant analysis

P.T.O.

SECTION - II

- Q5)** a) Define tracking and state its applications? Discuss any suitable corner tracking algorithm. [8]
b) Discuss the Optical flow estimation using suitable algorithm. [8]
- Q6)** a) write a note on stereo data fusion. [8]
b) Explain the Projective transformation for Image formation. [8]
- Q7)** a) Explain graph matching and interpretation tree with suitable example. [8]
b) What are the intrinsic and extrinsic parameters of a stereo system. [8]
- Q8)** Write a note on any three : [18]
a) PCA applications
b) Object recognition applications
c) F-Matrix
d) Geometric hashing



Total No. of Questions : 8]

SEAT No. :

P4709

[Total No. of Pages : 2

[5060] - 214

**M.E. (Computer Engineering)
NETWORK PROGRAMMING
(2008 Pattern) (Semester - II) (Elective - III)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :-

- 1) *Answer of any three questions from each section.*
- 2) *Answer to the two sections should be written in separate books.*
- 3) *Neat Diagram must be drawn whenever necessary.*

SECTION - I

- Q1)** a) Define and explain the term Buffer Sizes with its limitations? [8]
b) Compare TCP Output Vs UDP Output with suitable diagram. [8]
- Q2)** a) What are the steps take place in Crashing and Rebooting of Server Host? [8]
b) Explain the connect Function with User datagram Protocol. [8]
- Q3)** a) Explain Data exchanged with kernel across routing socket for RTM_GET command with Suitable diagram. [6]
b) Justify the statement “DNS is used primarily to map between hostnames and IP addresses” and Explain Resourcereords terms in DNS. [10]
- Q4)** Explain following terms : [18]
a) Gethostbyname Function
b) Gethostbyaddr Function
c) Getaddrinfo Function

P.T.O.

SECTION - II

- Q5)** a) Write down twelve macros to test an IPv6 address for certain properties? [8]
b) Explain Multicasting versus Broadcasting on a local area network? [8]
- Q6)** a) Describe the all Command in Multicast group membership socket options? [10]
b) Explain the term Source-Specific Multicast? [6]
- Q7)** a) How Information maintained by the system about each Thread with suitable example? [8]
b) Explain the term Multicasting on a WAN and which steps taken for multicast packets go from the sender to all the receivers? [8]
- Q8)** Explain the term : [18]
a) SNTP protocol
b) TCP Multicast Address
c) IP fragmentation in Unicast and broadcast



Total No. of Questions : 6]

SEAT No. :

P4710

[Total No. of Pages : 2

[5060] - 215

**M.E. (Computer Engineering)
ADVANCED INTERNET PROGRAMMING
(2008 Pattern) (Elective - III) (Semester - II)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :-

- 1) *Attempt ANY FIVE Questions out of 6 Questions.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*

Q1) a) Draw & Explain TCP/IP internetworking model? [8]

b) Draw & Explain UDP Header structure? [7]

c) Enlist the different tags used in HTML & Explain it with suitable example? [5]

Q2) a) What is MVC? Explain in brief about MVC design pattern? [5]

b) Explain J2EE architecture. [7]

c) Write short note on : [8]

i) J2EE components& containers.

ii) J2EE specification.

Q3) a) Give the definition of Java applets and explain with suitable example?[6]

b) Write short note on: [8]

i) JS variables.

ii) JS operators

iii) JS functions.

iv) JS events.

c) How to create JS object? How to access object properties and object method? [6]

P.T.O.

- Q4)** a) What is JSP? Explain the life cycle of JSP? [6]
b) Give the advantage of JSP over servlet? [6]
c) Write short note on GET & POST method? [8]
- Q5)** a) What is servlet? Explain servlet life cycle? [6]
b) Write short note on Java Beans. [6]
c) Write a sample program for database connectivity using JDBC? [8]
- Q6)** a) Explain the following concepts in terms of Evolution of Portal. [8]
i) Information Searching
ii) Information Dissemination
iii) collaboration
iv) Business service integration
b) Define Internationalization and localization? Explain its goal in detail?[6]
c) What are the steps to send email using Java Mail API? Explain it? [6]



Total No. of Questions : 8]

SEAT No. :

P4711

[Total No. of Pages : 3

[5060] - 216

M.E. (Computer Engineering)
SOFTWARE PROJECT MANAGEMENT
(2008 Pattern) (Semester - II) (Elective - IV)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :-

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *From section-I, Answer(Q1 or Q2) and (Q3 or Q4).*
- 3) *From section-II, Answer (Q5 or Q6) and (Q7 or Q8).*
- 4) *Neat diagram must be drawn whenever necessary.*
- 5) *Figures to the right indicate full marks.*
- 6) *Assume suitable data ,if necessary.*

SECTION - I

- Q1) a)** Explain Project Management? Explain five goals of project? Explain the role of Project Manager in Project Management. **[12]**
- b) Illustrate the main mechanism for regularly communicating the state of the project to senior management and customer? What are the typical contents of a status report? **[8]**
- c) “Balancing Development Needs with Organizational Expectations”. What can organization do to help? **[5]**

OR

- Q2) a)** Difference between software process model & software processes. Suggest two ways in which a software process model might be helpful identifying possible process improvements. **[12]**
- b) Describe are the main challenges while implementing the Software Project? How to overcome these challenges? **[8]**
- c) Describe the difference Between Corporate Strategy & Project Management. **[5]**
- Q3) a)** Describe Risk? Explain different categories of Risk with Risk management Model. Tools and techniques for Risk identification, Risk analysis & Risk response planning. **[12]**

P.T.O.

- b) Determine the project planning and scheduling recording, storage, distribution and tracking methods. [8]
- c) Identify tasks which are critical to the success and timely completion of the project. [5]

OR

- Q4)** a) Explain the following : [12]
- i) Cost Estimation
 - ii) PERT Chart
 - iii) Quality Planning
- b) Why Quality Planning is important in Project Management? Describe the Quality Management System Goals & Objectives. [8]
 - c) Describe the best practices for successful Project Management. [5]

SECTION - II

- Q5)** a) Write short notes on the following : [18]
- i) Project risk management
 - ii) Configuration Management
 - iii) Client Management issues
- b) Explain the concept of Project Complexity and its influence upon the Project Management process. [7]

OR

- Q6)** a) i) Explain peer reviews.
- ii) List the advantages of peer reviews
 - iii) Explain the process of peer reviews
 - iv) Describe the roles and responsibilities of various participants of peer reviews.
- [18]
- b) Explain Project Management Organization? Differentiate Project Based & Non-Project Based Organizations? [7]

- Q7)** a) Explain Function Point Analysis along with their components. Describe the objectives and benefits of FPA. To what extent Function Point Analysis is being used in the Object Oriented Technology environment. [18]
- b) Explain the various reasons for measuring the Software Development Process and Product. [7]

OR

- Q8)** a) Explain Software Size. What are the important factors of the size measures are? Why software sizing is one of the most challenging, and critical activities in software project management? [12]
- b) Describe the different types of Function Point count. How is the process of function point counting method. [7]
- c) Describe Counting GUI environments and what is the objective of the count? [6]



Total No. of Questions : 8]

SEAT No. :

P4712

[Total No. of Pages : 2

[5060] - 217

M.E. (Computer Engineering)
INFRASTRUCTURE MANAGEMENT
(2008 Pattern) (Semester - II) (Elective - IV)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :-

- 1) *Write Each Section on Separate Answer sheet.*
- 2) *Write any three questions from each Section.*
- 3) *Assume suitable data if necessary.*

SECTION - I

- Q1)** a) Explain the value of system management for Business. [8]
b) What are the benefits and potential problems of using IT service management? [8]
- Q2)** a) Explain in detail how an IT company structure evolves from a basic organization to an Organization in which applications are aligned with business units. [12]
b) Explain with neat diagram Information Technology Infrastructure Library. [6]
- Q3)** a) What are the important factors that should be managed in Service support process? [8]
b) What is Service Level Management? Explain Service Level Management with Diagram. [8]
- Q4)** a) Explain Capacity Management Activities. [4]
b) Explain purpose, objectives and scope of IT Service Continuity Management. [8]
c) Enlist the order of preference of ten things users want most when they call the help desk. [4]

P.T.O.

SECTION - II

- Q5)** a) Explain various steps in incident management process. [8]
b) Explain configuration management in detail? [8]
- Q6)** a) What are the differences between incident management and problem management? [6]
b) Explain objectives of availability Management. [2]
c) Enlist and explain challenges, critical success factors and risk in release process. [8]
- Q7)** a) Explain Organizational structure of a service desk. [8]
b) What is Access management? Explain components and benefits of Access management? [8]
- Q8)** a) What are the components of NAS? What are the mechanisms for implementation of NAS. Explain in detail how connectivity is established for the different mechanisms. [12]
b) Explain in detail Content Address Storage (CAS) Architecture Explain the Storage and Retrieval Operation in detail. [6]



Total No. of Questions : 10]

SEAT No. :

P5057

[Total No. of Pages : 2

[5060]-218

M.E. (Computer Engineering)

DATA WAREHOUSING AND DATA MINING

(2008 Course) (510112) (Elective - IV) (Semester - II)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Q.1 and Q.6 are compulsory.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Assume suitable data, if necessary.*
- 4) *Solve any two questions from Q.2 , Q.3, Q.4 , Q.5.*
- 5) *Solve any two questions from Q.7, Q.8, Q.9 , Q.10.*
- 6) *Answers to the two sections should be written in separate books.*

SECTION - I

- Q1)** a) What is conceptual model? Explain conceptual models in data warehouse. **[8]**
b) Explain any two techniques for data reductions in large database. **[8]**
- Q2)** a) Explain different indexing techniques used in data warehouse. **[8]**
b) In real-world data, tuples with missing values for some attributes are a common occurrence. Describe various methods for handling this problem. **[9]**
- Q3)** a) What is concept description? Explain Data Generalization based characterization. **[8]**
b) What is association mining? Explain Apriori algorithm. **[9]**
- Q4)** a) Explain different data reduction strategies for Numerosity reduction. **[8]**
b) Explain data mining primitives. **[9]**

P.T.O.

Q5) Write a short note on: **[17]**

- a) Load Manager in Data Warehouse.
- b) Correlation Analysis.
- c) Materialized view.

SECTION - II

Q6) a) Explain k-nearest neighbor classifiers with suitable example. **[8]**

- b) What is boosting? State why it may improve the accuracy of decision tree induction. **[8]**

Q7) a) What is outlier analysis? Explain Distance and Deviation-based Outlier detection. **[8]**

- b) Explain hierarchical clustering with suitable example. **[9]**

Q8) a) Explain spatial data cube with suitable example. **[8]**

- b) Explain keyword based association text mining. **[9]**

Q9) a) What is model based clustering. Explain with suitable example. **[8]**

- b) Explain web usage mining with suitable example. **[9]**

Q10) Write a short note on: **[17]**

- a) Case based reasoning.
- b) Linear and non linear regression.
- c) Mining Web's link structure.



Total No. of Questions : 6]

SEAT No. :

P5148

[Total No. of Pages : 2

[5060] - 22
M.E. (Civil - Structures)
DESIGN OF INDUSTRIAL STRUCTURES
(2008 Pattern)

Time : 4 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Attempt any two questions from Section I and section II.*
- 2) *Answers to the two Sections should be written in separate answer books.*
- 3) *Neat diagram must be drawn wherever necessary.*
- 4) *Figure to the right side indicates full marks.*
- 5) *Assume suitable data, if necessary and clearly state.*
- 6) *Use of electronic pocket calculator, steel table and IS 800 are allowed.*
- 7) *Use of cell phone is prohibited in the examination hall.*

SECTION - I

Q1) The span of a knee roof trusses used over an industrial building 20 m long is 15 m. The pitch of roof truss is 1 in 3. The A C Sheets are used for roof covering. The basic wind pressure is 1.5 kN/m². The height of eaves above ground level is 7.5 m. Propose a suitable type of roof truss. Determine the loads at various panel points due to dead load, live load and wind load. Also determine the reaction. **[25]**

Q2) Design of gable portal frame without gantry loads for the data given in Q. 1 and draw the design sketches. **[25]**

Q3) a) Analysis the industrial building bents for columns **[15]**
i) Hinged at base and fixed at base.

b) Explain design consideration of roof column with cases. **[10]**

P.T.O.

SECTION - II

- Q4)** a) State and explain application of open web portal frame for industrial shade. [13]
b) State the application of truss purlin and explain in brief design consideration using tubular section. [12]
- Q5)** a) State and explain advantage and disadvantage of mobile gantry structure. [15]
b) State and explain design codal provision for machine foundation. [10]
- Q6)** Design knee bracing systems for industrial structure of Q. 2. [25]



Total No. of Questions : 8]

SEAT No. :

P4713

[Total No. of Pages : 3

[5060] - 220

M.E. (Computer Engineering & Computer Networks)

APPLIED ALGORITHMS

(2008 Pattern) (Semester - I)

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) *Neat diagrams must be drawn whenever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Explain the proof by contradiction. Why do we need these proof technique? With the help of proof by contradiction “prove that there exist 2 irrational numbers X and Y such that X^Y is rational. [8]

b) Prove the following by Mathematical induction [8]

i) $C(n, 0) + C(n, 1) + C(n, 2) + \dots + C(n, n) = 2^n$

ii) $C(n, 0) - C(n, 1) + \dots + (-1)^i C(n, i) + \dots + (-1)^n C(n, n) = 0$

Q2) a) Explain the following algorithms with example: [10]

i) Recursive Algorithm.

ii) Deterministic Algorithm.

iii) Approximation Algorithm.

iv) Serial Algorithm

b) Compare the sorting methods Merge sort and quick sort, devise data sets which compare the average and worst case complexities for these two algorithms. [6]

P.T.O.

- Q3)** a) What is time complexity and space complexity of an algorithm? How do we measure these complexities of an algorithm? Discuss the recursive and non-recursive version of the merge sort and compare the time space complexity requirement in the same. [8]
- b) What is worst case, average case and best case time complexity of an algorithm.
- i) Which sorting algorithm have a different worst case complexity than their average case?
- ii) Which sorting algorithms have a different best case complexity than their average case? [8]
- Q4)** a) Assume you have functions f and g such that $f(n)$ is $O(g(n))$. For each of the following statement, decide whether you think it is true or false. And give a proof or counter example. [10]
- i) $\log_2 f(n)$ is $O(\log_2 g(n))$.
- ii) $2^{f(n)}$ is $O(2^{g(n)})$
- iii) $f(n)^2$ is $O(g(n)^2)$
- b) Show that if all internal nodes in a tree have degree K then the number of external nodes n is such that $n \bmod (K-1) = 1$. [8]

SECTION - II

- Q5)** a) What is an NP-hard and approximation algorithm? What is the relation between these two? Give suitable example. [8]
- b) Explain the following with respect to approximation algorithm [8]
- i) Approximate scheme
- ii) Polynomial time approximation scheme
- iii) Fully polynomial time approximation scheme
- Q6)** a) What is dynamic programming approach to solve the problem? Explain with suitable example. [6]
- b) $N = 3$ and $\{a_1, a_2, a_3\} = \{\text{do, if, while}\}$ Let $p(1:3) = (0.5, 0.1, 0.05)$ $q(0:3) = (0.15, 0.1, 0.05, 0.05)$ Compute and construct OBST for above values using Dynamic approach. [12]

- Q7)** a) What is parallel algorithms? How it is different than its counterpart i.e. serial algorithm? Give suitable example. And Discuss various parallel computational model and how do they achieve the parallelism in the algorithmic design. [8]
- b) Let there be n numbers (n is power of 2) and there sum needs to be found out using multiple processor. Design the algorithm using parallel computation. [8]
- Q8)** a) What are the advantages of Greedy algorithmic strategy? Analyze a single source shortest path algorithm with time and space complexity using greedy approach. [10]
- b) Write short note on “prefix computation”. [6]



Total No. of Questions : 8]

SEAT No. :

P4714

[Total No. of Pages : 2

[5060] - 221
M.E. (Computer Networks)
WIRELESS TECHNOLOGY
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :-

- 1) Neat diagrams must be drawn wherever necessary.*
- 2) Figures to the right side indicate full marks.*
- 3) Assume suitable data, if necessary.*
- 4) Attempt any three questions from each section.*

SECTION - I

- Q1)** a) Explain DSSS spreading with Barker code as a chipping sequence, also explain DSSS transmitter and receiver with block diagram.
- b) Discuss different types of communication media being used today. Give comparative analysis of various transmission media.

[18]

- Q2)** a) Explain how tunneling works for mobile IP using various methods. Discuss the advantages and disadvantages of these methods.
- b) With the help of suitable diagram show various function block and their interconnection in a GSM architecture. What are the major interfaces and protocols used?

[16]

- Q3)** a) With reference to 802.11 explain the terms:
- i) Independent Base service rate
 - ii) Infrastructure BSS
- b) Explain the different techniques of improving coverage and capacity in cellular system.

[16]

P.T.O.

- Q4)** Write short note any two of the following : **[16]**
- a) FTP over Bluetooth
 - b) Enterprise Authentication Protocol
 - c) Tunneling and reverse tunneling in mobile node

SECTION - II

- Q5)** a) Draw a diagram showing WEP operations which handles confidentiality and integrity simultaneously. Explain WEP data transmission.
- b) Explain in detail 802.11 frame format. Explain the frame control field along with its subfields.

[18]

- Q6)** Write short note any two of the following: **[16]**

- a) Frequency translation
- b) CSMA/CA
- c) Wi-Max

- Q7)** a) Explain the errors in wireless network with degrade TCP performance. Briefly explain how TCP snooping can improve the situation ?
- b) State and explain basic location update procedure in a GSM network.

[16]

- Q8)** a) Write advantages and disadvantages of Snoop-TCP and Mobile-TCP
- b) Compare the following:
- i) Wi-Fi and Wi-Max
 - ii) Cryptographic and non cryptographic methods

[16]



Total No. of Questions : 8]

SEAT No. :

P5058

[5060]-222

[Total No. of Pages : 2

M.E.(Computer Engg.) (Computer Networking)

OPERATING SYSTEM DESIGN

(2008 Course)(Semester-II)(510308)

Time :3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Solve any three questions from each section.*
- 2) *Answer to each section should be written on different answer sheets.*
- 3) *Assume suitable data, if necessary.*
- 4) *Draw neat diagram wherever required.*
- 5) *Figures to the right indicate full marks.*

SECTION-I

- Q1)** a) What are the five major activities of an operating system with respect to file management? Briefly describe why each is needed. [6]
- b) To a programmer, a system call looks like any other call to a library procedure. Is it important that a programmer know which library procedures result in system calls? Under what circumstances and why?[6]
- c) There are several design goals in building an operating system, for example, resource utilization, timeliness robustness and so on. Give an example of two design goals that may contradict one another. [4]
- Q2)** a) Consider three periodic tasks, [4]
- Task P_1 : $C_1 = 20, T_1 = 100$
- Task P_2 : $C_2 = 40, T_2 = 150$
- Task P_3 : $C_3 = 100, T_3 = 350$
- (where C is execution time and T is period of task)
- Can these tasks be scheduled using rate monotonic scheduling?
- b) What operations on processes the operating system must provide? [8]
- c) List and briefly define four techniques for thread scheduling? [4]

P.T.O.

- Q3)** a) What do you mean by cooperating processes? Explain how processes on different computer systems communicate with each other. [8]
- b) Explain in details the shared memory approach for inter-process communication. [8]
- Q4)** a) Demonstrate the use of monitors in producer-consumer problem to achieve mutual exclusion. [8]
- b) Explain Dekker's algorithm for mutual exclusion of two processes. [10]

SECTION-II

- Q5)** a) Model deadlocks using resource allocation graphs. [8]
- b) Explain the deadlock handling mechanism in details. [8]
- Q6)** a) Explain in detail the concepts of replication and migration in multiprocessor systems with respect to file management. [8]
- b) Compare stateless and stateful file servers. [6]
- c) Discuss any file system that you have used recently. [4]
- Q7)** a) Enlist and explain the user authentication mechanisms to provide protection. [8]
- b) How to revoke rights in case of access control lists and capabilities? [8]
- Q8)** Write short note on any two of the following: [16]
- a) User Authentication Mechanisms in Unix.
- b) File Management in Unix.
- c) Unix kernel support for shared memory.



Total No. of Questions : 8]

SEAT No. :

P5059

[5060]-223

[Total No. of Pages : 2

M.E.(Computer Networking)
ADVANCED SOFTWARE ENGINEERING
(2008 Pattern)(Semester-II)(510310)

Time :3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers any three questions from each section.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) How the other systems within a system's environment can have unanticipated effects on the functioning of a system? Explain with suitable example. **[8]**
- b) Explain the need of generic software process activities. **[8]**
- Q2)** a) Explain suitable approach of software development for real-time systems with proper justification. **[8]**
- b) Explain user interface design process in detail. **[8]**
- Q3)** a) Why are patterns an effective form of design reuse? Explain with suitable example. **[8]**
- b) Explain reusability to be achieved with component based development. **[8]**
- Q4)** Explain any three: **[18]**
- a) Formal specification
 - b) Layered model of an architecture
 - c) System engineering
 - d) Object oriented design

P.T.O.

SECTION-II

- Q5)** a) What is control structure testing? Give methods for testing a module. [8]
b) Explain need of high-quality software process for high-quality software products with proper justification. [8]
- Q6)** a) What is agile process? Explain with process model. [8]
b) What is extreme programming? How it is different from clean room software engineering approach? [8]
- Q7)** a) Explain risk analysis and management in detail [8]
b) What is software quality? Explain with suitable example measure, measurement, metrics and indicator. [8]
- Q8)** Write short notes on: [18]
- a) Capability Maturity Model.
 - b) Critical systems.
 - c) Corrective Maintenance.



Total No. of Questions : 6]

SEAT No. :

P5142

[Total No. of Pages : 2

[5060] - 23

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) *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) *Assume suitable data if necessary.*

SECTION - I

- Q1)** a) Explain resources in building construction and its role in planning. [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) Explain structural health monitoring. [5]
b) What are the factors affecting structural health monitoring? Explain any two. [12]
c) Explain the concept of T.Q.M. [8]
- Q3)** a) Explain assessment of health of structure. [7]
b) Explain evaluation and reporting procedure of structural audit. [6]
c) Explain the carbonation depth measurement test. [6]
d) State and explain different methods of NDT. [6]

P.T.O.

SECTION - II

- Q4)** a) Explain retrofitting of structures with parameters for assessment for restoration strategies. [10]
- b) Explain with sketches [8]
- i) Base isolation techniques
- ii) Jacketing to the structural members
- c) Write a note on construction chemicals for restoration. [7]
-
- Q5)** a) Write a note on safety during construction in all aspects. [7]
- b) Explain the design of formwork with following points. [10]
- i) Load on formwork
- ii) Design criteria
- iii) Design procedure
- c) Differentiate structural aspects for formwork in buildings and bridges.[8]
-
- 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 : 12]

SEAT No. :

P4715

[Total No. of Pages : 3

[5060] - 231

M.E. (Information Technology)

BIOINFORMATICS

(2008 Pattern) (Elective - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :-

- 1) *Answer Question 1 or 2, 3 or 4, 5 or 6 from Section-I and question 7 or 8, 9 or 10, 11 or 12 from Section-II.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn whenever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Define Bioinformatics. Classify major protein structure prediction databases in Bioinformatics. [8]
- b) Explain the various tools for Web search and Data Retrieval in Bioinformatics. [8]

OR

- Q2)** a) What is Molecular Biology? Discuss Data Management in Bioinformatics. [8]
- b) How is data mining achieved in Biological databases? [8]

- Q3)** a) Explain the significance of Triplet Coding Protein Sequences in Bioinformatics. [8]
- b) Explain the secondary and tertiary protein structure. What is Protein Purification and characterization? [8]

OR

- Q4)** a) Explain Protein Genome Sequences and Genome rearrangement in Bioinformatics. [8]
- b) Discuss how Multiplicity of Data and Redundancy is handled in Bioinformatics. [8]

P.T.O.

- Q5)** a) Write a note on Hidden Markov Model. What is Gene Mapping? [8]
b) Discuss how Database Similarity Searching is achieved in BLAST with neat stepwise diagram. [10]

OR

- Q6)** a) Describe the Multiple sequence Alignment in detail. [8]
b) Write short notes on : [10]
- FASTA
 - Pairwise Sequence Alignment (PSA)

SECTION - II

- Q7)** a) Explain the method by which Gene expression is analyzed using Microarray Technique. [8]
b) How is Data Analysis done in Microarrays? Explain how Data Redundancy and Error handling is achieved in Microarrays. [10]

OR

- Q8)** a) Explain the concept of Gene Expression in Bioinformatics. [8]
b) What are the various gene structure prediction methods? Explain any two in detail with appropriate examples. [10]

- Q9)** a) Explain Protein Classification and Protein Structure Prediction in Bioinformatics. [8]
b) What is Proteomics? Explain its role in Protein Structure Visualization. [8]

OR

- Q10)** a) Discuss Structure Visualization in brief. [8]
b) Explain Protein Folding. Which databases in Bioinformatics support protein Folding visualization? [8]

Q11)a) What is drug target? Explain the role of drug receptors in Drug Discovery. [8]

b) Discuss how Protein Coupled Receptors behave as Drug Target for Drug Discovery. [8]

OR

Q12)a) Explain how drug discovery helps in targeting drugs for disease diagnosis? [8]

b) Explain cell cycle in detail for Bioinformatics. [8]



Total No. of Questions : 10]

SEAT No. :

P4716

[Total No. of Pages : 3

[5060] - 232

M.E. (Information Technology)

MANAGEMENT TRENDS IN INFORMATION TECHNOLOGY

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :-

- 1) Solve any *THREE* questions from each section.
- 2) Answers to the two sections should be written in separate books.
- 3) Neat diagrams must be drawn whenever necessary.
- 4) Assume suitable data, if necessary.

SECTION - I

- Q1)** a) Explain five distinct aspects which the Project Manager should consider when preparing a project communications plan. [8]
- b) What is corporate social responsibility? Explain social accounting and auditing with respect to corporate social responsibility. [8]
- Q2)** a) Describe the method for the cost estimation and cost budgeting for a project. [8]
- b) Explain applications of Information Technology in defence organization. Give suitable example. [8]
- Q3)** a) Who are the stake holders of an IT project? Elaborate various aspects to be considered for them while project management? [9]
- b) Elaborate on the need of a work breakdown structure for a project undertaken for health information system by listing the functionalities of the system. List down the WBS for the same. [9]
- Q4)** a) What are the problems faced in managing teams of professionals? How does this differ from managing teams of blue color workers?[8]
- b) Discus on the efforts measures in software estimation process. State their significance and purpose. [8]

P.T.O.

- Q5) a)** Explain the risks that regularly occur in software projects and the controls in reducing the risks identified. Also consider that a recently established Software Industry wants to computerize its Research and Development Department by using various software applications. You as a Software Expert need to find out risk involved in implementation and administration of the project. [8]
- b) What is the need of auditing? Explain methods for Auditing IT/IS systems. [8]

SECTION - II

- Q6) a)** Discuss the role of Quality Assurance and Testing during Software Development. [8]
- b) Explain the theory of Group Formation. Also write formal and informal groups and their Interaction. [8]
- Q7) a)** What is Conflict Management? Discuss the importance of communication in conflict management. [8]
- b) What are ethics? Explain the importance of ethics and corporate social responsibility? [8]
- Q8) a)** Explain the reasons for project delays? How to cope with project delays? [8]
- b) How can the information technology help in imbining the social responsibility in the country? Give your suggestions. [8]
- Q9) a)** What is Intellectual Property Rights (IPR)? Explain its need in IT industry. [8]
- b) What is learning organization? Explain its importance in IT project management. [8]

Q10) Write short note on any THREE of the following:

[18]

- a) Energy Audit
- b) Revising the Project Plan
- c) The Consumer Protection Act
- d) PCMM



Total No. of Questions : 8]

SEAT No. :

P5060

[5060]-233

[Total No. of Pages :2

M.E. (Information Technology)

ADVANCED TOPICS IN OPERATING SYSTEMS

(2008 Course) (Elective - III (b)) (514411) (Semester - II)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) With a neat diagram, explain Solaris OS architecture in detail. [10]
b) Differentiate between Windows and Linux with respect to their features. [8]

- Q2)** a) How is a process created in Windows? Explain. [12]
b) Also explain Create Thread function in windows. [4]

- Q3)** With respect to Linux explain the following:
a) Process control system calls. [8]
b) Light weight process. [3]
c) task_struct structure. [5]

- Q4)** a) Explain the virtual memory mechanism in Linux. [8]
b) Explain the Windows OS PnP manager in detail. [8]

SECTION - II

- Q5)** a) Why is NTFS good over FAT32 file system in Windows OS? Also state the features of FAT 32 file system. [8]
b) Explain the FS driver architecture in Windows. [8]

P.T.O.

- Q6)** a) Explain with a neat diagram the data block allocation for a typical disk file in Linux. Also give an example demonstrating the maximum file size that can be supported by Linux. [10]
- b) Explain the inode structure in Linux. [6]
- Q7)** a) What is a buffer? What is the location of buffer in the computer system? Why do we need buffer? Explain the Buffer Head structure in Linux. [8]
- b) Explain I/O system components in Windows OS. [8]
- Q8)** Write short notes on the following (Any three) [18]
- a) VFS in Linux.
- b) Anatomy of a block device in Linux.
- c) Features of Solaris OS.
- d) Creating device driver in Windows.



Total No. of Questions : 8]

SEAT No. :

P4717

[Total No. of Pages : 2

[5060] - 234

M.E. (Information Technology)
ADVANCE NETWORK PROGRAMMING
(2008 Pattern) (Elective - IV)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :-

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

SECTION - I

- Q1)** a) Draw and explain the allocation of port number schemes. [8]
- b) Explain TCP State Transition Diagram for Opening & Closing a connection. [8]
- Q2)** a) Write a program to issue RTM_GET Command on routing Socket. [8]
- b) Define following resource records(RR). [8]
- i) AAAA
 - ii) PTR
 - iii) MX
 - iv) CNAME
- Q3)** a) List types of operations are supported on a routing socket and explain types of messages exchanged across a routing socket. [8]
- b) State & Explain Pseudo code name and Index functions. [8]

P.T.O.

Q4) Write Short Notes on: **[18]**

- a) Port Number Schemes
- b) Buffer Sizes & Limitations
- c) Resource Records(RR).

SECTION - II

Q5) a) Define Resolver and Name Servers? Explain following functions with examples: **[8]**

- i) `getserverbyname()`
- ii) `getserverbyport()`

b) Explain `getaddrinfo` Function with actions and results. **[8]**

Q6) a) Explain with a pseudo code to receive and print SAP/SDP announcements. **[8]**

b) Write a program for TCP based echo server using Threads. **[8]**

Q7) a) Explain with a example Unicast of a UDP datagram. **[8]**

b) State & Explain Pseudo code name and Index functions. **[8]**

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

- a) SNTP
- b) Buffer Sizes & Limitations
- c) Signals and thread



Total No. of Questions :6]

SEAT No. :

P4608

[Total No. of Pages :2

[5060] - 24

M.E. (Civil - Structure)

EARTHQUAKE RESISTANT DESIGN OF STRUCTURES

(2008 Course) (Semester - II) (Elective - III)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

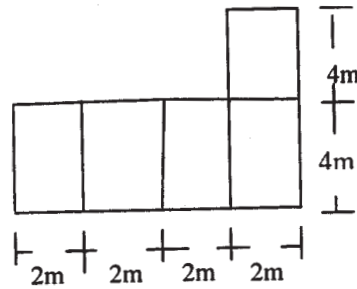
- 1) *Attempt any two questions from each section.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of non programmable electronic calculator is allowed.*
- 5) *Assume suitable data, if necessary.*
- 6) *Use of IS 1893 (2002) Part - I is permitted.*

SECTION - I

- Q1)** a) What are the causes of earthquake? Explain with neat sketches the Elastic Rebound Theory? [7]
- b) Classify and describe with suitable sketches, different types of waves generated by an earthquake? [8]
- c) Describe the difference between magnitude and intensity of an earthquake? [10]
- Q2)** a) What are the lessons learnt from past earthquakes? Explain philosophy behind earthquake resistant design of structures? [10]
- b) Explain the interior of the earth with neat sketches? Classify the earthquakes based on different parameters? [15]

P.T.O.

- Q3)** Determine the design eccentricity in Y-direction for a three storey building as shown in Figure 3.1 The total seismic weight /floor = 550kN. The column size = 400 mm × 500 mm. Assume grade of concrete = M25. [25]



Figures 3.1

SECTION - II

- Q4)** a) Explain the causes of instability of steel building? Describe the P- Δ effect? [7]
- b) Explain the procedure to carry dynamic analysis of multistory structure to obtain seismic forces and distribution along the height? [8]
- c) Give reasons for poor performance of masonry buildings? How to improve the seismic performance of masonry building? [10]
- Q5)** a) Design a RC rectangular beam of span 6m supported on RC columns to carry a point load of 150kN in addition to its self weight 3kN/m. The moment due to seismic load is 6kN. m and shear force 30kN. Use M20 grade concrete and Fe250 grade steel. [15]
- b) Define shear wall and their classification? Describe behavior of long shear wall? [10]
- Q6)** a) What is necessity of ductile detailing? Explain with sketches ductile detailing of flexural member? [7]
- b) Explain concept of base isolation? Describe different techniques of base isolations? [8]
- c) How would you carry the assessment of RC building to ascertain the requirement of level of retrofitting? [10]



Total No. of Questions : 8]

SEAT No. :

P5061

[5060]-241

[Total No. of Pages :2

M.E. (Chemical Engineering)

CATALYSIS AND SURFACE PHENOMENA

(2008 Course) (Semester-II) (Open Elective-Elective-IV) (509112)

Time : 3 Hours]

[Max. Marks :100

Instructions to candidates:

- 1) *Answer to the two sections should be written in separate answer books.*
- 2) *Answer any three questions from each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side 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) Explain with example dual functional catalyst. [6]
b) Write about supporting material in a catalyst. [6]
c) Differentiate between homogeneous and heterogeneous catalyst. [6]
- Q2)** a) Explain surface acidity and thermal stability in a catalyst. [8]
b) Explain Elovich equation. [8]
- Q3)** a) Explain mercury porosimetry. [8]
b) Explain Langmuir Hinshelwood model. [8]
- Q4)** a) Describe NMR an XRD methods in brief. [8]
b) Describe any one method of catalyst preparation. [8]

P.T.O.

SECTION-II

- Q5)** a) Give the physical significance of effectiveness factor of a catalyst and derive an expression for the same for a flat plate. [10]
b) What is internal and external transport in heterogeneous catalysis? [8]
- Q6)** a) What is catalyst poisoning? How can it be prevented? [8]
b) What is the importance of catalyst regeneration? [8]
- Q7)** a) What are zeolites ? Write about their catalytic activity in detail. [8]
b) Explain the methanol synthesis process in detail. [8]
- Q8)** a) Write about the kinetics of deactivation. [8]
b) Explain the phenomenon of catalyst sintering. [8]



Total No. of Questions : 8]

SEAT No. :

P5116

[Total No. of Pages : 2

[5060]-242

M.E. (Chemical)

PROCESS OPTIMIZATION

(2008 Pattern) (Theory Elective - IV)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer total 3 questions from each section.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume suitable data, if necessary.*

SECTION - I

Q1) Minimize $f(x) = 3x^3 - 2x^2$ in the interval $[-1, 1]$. Use (a) Newton Raphson Method, (b) Golden Search Method. Write complete algorithm for these methods and demonstrate at least 3 steps towards finding optimized solution for the above function. **[17]**

Q2) Minimize $f(x) = 8x^3 - 2x^2 + 5x + 4$. Use internal halving method. Write complete algorithm for this method and demonstrate at least 3 steps towards finding optimized solution for the above function. **[17]**

Q3) A typical material balance envelope around a reactor/mass transfer unit is an example of a steady state set of linear equations. The typical constraints on such a problem are of physical type based on dimensions of units, of system type based on physicochemical considerations which can also be linear in nature. Considering above, construct a problem around any one of reactor/mass transfer unit (like distillation column, absorption column etc.) and identify objective function. Constraints. Also discuss the strategy to get optimized solution out of it. **[16]**

P.T.O.

Q4) Write short notes (any three) : **[16]**

- a) Secant method
- b) Weighted parameters
- c) Types of constraints
- d) Global Optima

SECTION - II

Q5) Minimize $f(x) = (x_1 - 2)^2 + x_2^2$

subject to linear constraints

$$x_1 \geq 0, x_2 \geq (-10), 7 - 2x_1 - x_2 \geq 0, 24 - 3x_1 - 2x_2 \leq 0 \quad [17]$$

Q6) Explain the Simplex Search Method and demonstrate for minimization of

$f(x) = x_1^2 + x_2^2 + 3$ starting at $(x^0)^T = [21]$ in the direction $s^0 = [-2 - 2]^T$
perform 4 steps. **[17]**

Q7) State various conditions of definiteness of a function using Hessian matrix.
Find whether the following function is strictly convex / strictly concave.

$$f(x) = 4x_1^2 + 7x_1x_2 + 9x_1 - 7x_2 - 8x_2^2 + 9 \quad [16]$$

Q8) Write short note (any three) : **[16]**

- a) Multivariable optimization
- b) Optimization parameters
- c) Non Linear Programming
- d) Genetic Algorithms



Total No. of Questions : 8]

SEAT No. :

P4718

[Total No. of Pages : 2

[5060] - 243
M.E. (Chemical Engineering)
FUEL CELL TECHNOLOGY
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :-

- 1) Solve any three questions from each section.*
- 2) Figures to the right indicate full marks.*

SECTION - I

Q1) Explain different types of overpotentials and their effect on cell potential.

How are they estimated? **[18]**

Q2) Differentiate among PEM, phosphoric acid, molten carbonate and solid oxide fuel cells, based on their operating conditions and materials of construction of different components. **[16]**

Q3) Describe the salient features of SOFC with a neat schematic and reaction mechanism involved. **[16]**

Q4) Typical fuel gas contains methane – 15.1%, carbon monoxide – 1.4%, carbon dioxide – 10.6%, hydrogen – 72.9% on volumetric basis at NTP condition. Calculate its molecular weight, density, lower and higher heating value of the fuel gas. Comment on the effect of gas composition on the performance of fuel cell. **[16]**

SECTION - II

Q5) Describe the general electrode reactions and derive the correlation for estimating emf generation in PEMFC. **[16]**

P.T.O.

Q6) Power density for tubular type SOFC is 3.2 kW/m^2 . Single tube has a diameter of 18 mm and active length of 1.75 m. In order to obtain 250 kW power, calculate : **[16]**

- a) Total anode surface area required and
- b) Total number of tubes required.

Also comment on the other design features of the cell.

Q7) Explain the working of hybrid cycle combining biomass gasification with solid oxide fuel cell. **[16]**

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

- a) Advancements in anodic material of PEMFC
- b) Anodic reactions in AFC
- c) Limiting reforming factor



Total No. of Questions : 8]

SEAT No. :

P4719

[Total No. of Pages : 4

[5060] - 244

M.E. (Chemical) (Environmental)

**GROUND WATER CONTAMINATION AND POLLUTION
TRANSPORT
(2008 Pattern)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :-

- 1) *Answer any three question from each section.*
- 2) *Answer to the two section should be written in separate books.*
- 3) *Neat diagram should be drawn wherever necessary.*
- 4) *Figure to right indicate full marks.*
- 5) *Use of logarithmic table, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

- Q1) a) Explain the need to study groundwater pollution and what are the geological factors that aid the movement of contaminants into groundwater. [6]
- b) What are water bearing formation and explain the different forms of water bearing strata? [6]
- c) Explain the different point and non point source of groundwater pollution. Explain the mechanism of surface and groundwater contamination. [6]
- Q2) a) Derive an equation for discharge through isotropic aquifer and explain the changes in equation to account for non isotropic nature of aquifer. [6]
- b) Explain groundwater subsystem and water profiling. [4]
- c) Explain Recharge and discharge of ground water and explain their affect on movement of contaminants. [6]

P.T.O.

- Q3)** a) Derive the condition for steady flow into an unconfined aquifer. [6]
- b) Observation on fluctuation of lake surface showed that the water surface had an elevation of 95.40 m with respect to another lake with elevation of 93.40m. The permeability of the formation between 2 lakes is 30.5m/day & lies on an imperious horizontal layer having an elevation of 90.00m. Determine the flow between lakes, if separating distance is 2.5km. Also find the seepage discharge if the aquifer on bottom 4.5m has permeability of 12m/day. [6]
- c) Discuss the effect of [4]
- i) Hydraulic conductivity,
 - ii) Transmissivity &
 - iii) Storativity on performance of an aquifer

- Q4)** a) An aquifer had the following data : [6]
- i) Effective size of a available for an aquifer = 0.10mm.
 - ii) Hydraulic gradient 1in 75
 - iii) Viscosity coefficient at 10°C = 1.0, Assuming slitcher constant = 400 & Hazen constant =1000, Find
 - 1) Velocity of flow through aquifer
 - 2) Discharge through aquifer, using Slichter formula, if aquifer is 200m wide &10m deep.
- b) What is the use of flow net in the study of groundwater flow? Flow net analysis on an aquifer pumped for 8 hours gave following results. No of flow channel =10, No of potential drop = 25 Head drop between successive equipotential line is 10m. Find the discharge/mm, find also the transmissibility .Take permeability of aquifer medium = 5×10^{-6} m/s. [4]
- c) Explain : [6]
- i) Specific yield,
 - ii) Permeability
 - iii) Transmissivity

SECTION - II

- Q5)** a) What is leaching and leaching requirement? Explain the underground travel of groundwater contaminants. [6]
- b) What are the different trace materials that contribute to groundwater contamination? Explain the transport of trace material in groundwater. [6]
- c) Explain the secular and seasonal variation of groundwater. [6]
-
- Q6)** a) Explain with necessary sketch different groundwater plume. Explain Gaussian plume model in detail. [6]
- b) What are the various methods of treatment of organic matter in groundwater? Explain any one method with its applications & cost economics. [6]
- c) Briefly explain [4]
- i) Mining yield, and
 - ii) Perennial yield
-
- Q7)** a) What are utility of model study in groundwater pollution study ? Explain RC network analog model. [6]
- b) What are the different methods of disposal of solid waste and explain any land disposal of solid waste. [4]
- c) What are the different methods of groundwater pollutant migration? Explain the mass transport and finite difference method in context to pollution migration. [6]

Q8) Explain briefly the following :

[16]

- a) Dual permeability approach for ground water contamination flow.
- b) Artificial Recharge methods.
- c) Salt water Intrusion and methods to control salt water intrusion.
- d) Pollution cycle between land and water.



Total No. of Questions : 6]

SEAT No :

P4609

[5060]-25

[Total No. of Pages : 2

M.E.(Civil Structure)

STRUCTURAL STABILITY

(2008 Pattern) (Elective - III) (501411B)

Time :4 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) *Use of Calculator is allowed.*
- 6) *Assume Suitable data if necessary.*

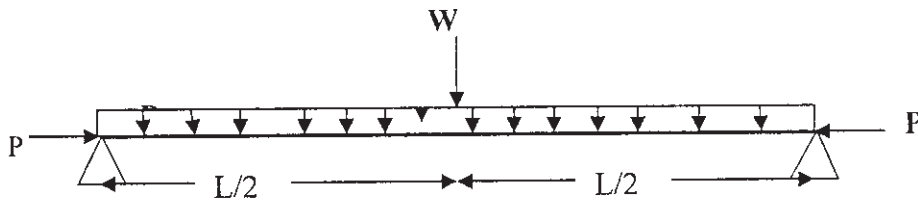
SECTION - I

- Q1)** a) Explain the concept of stability of structure with reference to the equilibrium Conditions. **[10]**
- b) Explain Euler's theory of columns stability, write assumptions and limitations. **[10]**
- c) Differentiate with suitable theory stable and unstable equilibrium. **[5]**
- Q2)** a) Describe the dynamic approach for column buckling with suitable example. **[10]**
- b) Derive the higher order governing equation for stability of columns. Hence analyse the column with one end clamped and other hinged boundary condition. **[15]**
- Q3)** a) Explain how Eigen value concept is applicable to stability problem. **[10]**
- b) Explain behavior of column in elastic buckling and Inelastic buckling. **[15]**

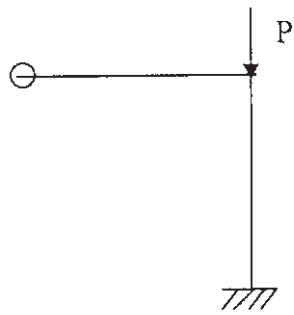
P.T.O.

SECTION - II

- Q4) a)** A beam column subjected to a uniformly distributed W KN/m over entire span and an axial load P as shown in figure 1. Obtain the expression for maximum deflection and maximum moment. **[12]**



- b)** Compute the critical load of the frame shown in figure 2 by the energy method. All the members have the same EI and L . **[13]**



- Q5) a)** Explain the equilibrium approach for the buckling analysis of beam columns with example. **[10]**

- b)** With suitable sketches discuss the different modes of buckling of portal frames. **[5]**

- c)** Derive the general formula for stiffness matrix $[K_{cr}]$. **[10]**

- Q6) a)** Explain the role of finite element method in structural stability analysis. What is stress stiffness matrix? **[10]**

- b)** Derive the governing moment equilibrium equation for the buckling of a thin plate. **[15]**

☆ ☆ ☆

Total No. of Questions : 6]

SEAT No. :

P5115

[Total No. of Pages : 2

[5060]-251

M.E. (Petroleum Engineering)

GIS AND COMPUTER APPLICATIONS IN PETROLEUM INDUSTRY
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate books.*
- 2) *Write answer to any two questions from each section.*
- 3) *Figures to the right indicate marks*
- 4) *Assume additional data if necessary*

SECTION - I

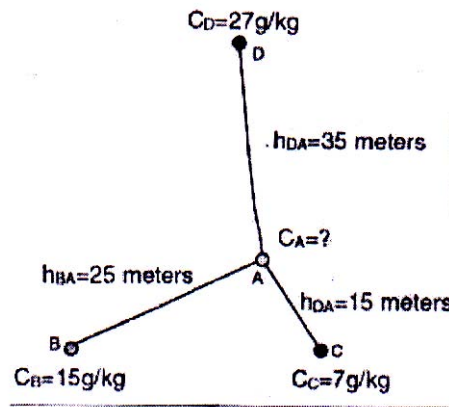
- Q1)** a) Classify natural and artificial spatial objects giving suitable examples of each. [15]
b) What is an expanded raster structure? Draw sketches. [10]
- Q2)** a) What are buffers/ Dilation? Explain in brief basic methods of determining buffer distances with suitable examples. [15]
b) How multivariate maps are created using query based operations? [10]
- Q3)** a) Describe the vector data structure. Give its advantages. How does it deal with the space between objects? [15]
b) How are spatial resolution and image interpretability characterization in important temporal analysis? [10]

SECTION - II

- Q4)** a) Explain the difference between static maps and dynamic maps with supporting examples. How is anisotropy taken into consideration? [15]
b) How fractals are useful in GIS operations? [10]

P.T.O.

- Q5) a)** What is the difference between deterministic and probabilistic approach in the mapping of oil spill hazard and contingency planning using GIS and Remote Sensing techniques? [15]
- b)** Figure shown below gives contamination concentration values at B, C and D along with distance between them. [10]



Calculate the contaminant concentration at point A using inverse distance weighted (IDW) interpolation method.

How is autocorrelation attempted in such cases?

- Q6) a)** Answer any two of the following : [16]
- What are the five basic steps required in the design of any GIS project to avoid unnecessary work and duplication of database.
 - Site selection using different Boolean operations.
 - Utility of GIS in integrating the information in the life span of typical oil and gas field development project.
 - Multivariate maps
- b)** The vector-line subsurface marker horizon map below is overlain with a raster grid of columns and rows. Determine the value for each intersecting point in the grid marked at the centre. Prepare a table to create a raster-based, grid DEM data set, [9]



Total No. of Questions : 8]

SEAT No. :

P5033

[5060]-26

[Total No. of Pages : 3

M.E. (Civil) (Structural Engineering)
STRUCTURAL RELIABILITY
(2008 Pattern) (Semester-II) (Elective-III)

Time :4 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION-I

Q1) a) State and review critically the principle advantages of probability based Limit State Design Method over the deterministic methods of design of Civil Engineering Structures. **[6]**

b) Samples of soil are collected from various depths below ground level and tested in the laboratory to determine their shear strength. The collected field data are given below: **[6]**

Depth(m)	2	3	4	5	6	7
Shear strength(KN/m ²)	14.8	20.3	32.2	39.0	42.0	56.4

Determine the sample covariance and correlation coefficient between the depth of the soil and its shear strength. What do you infer?

c) Define the term 'Structural Reliability' with explanation of each significant element in that definition. **[5]**

Q2) a) Enlist common probability distributions used in reliability analysis and explain any one of them in detail. **[6]**

b) From the statistical analysis of live load survey, it is found that live load follows the lognormal distribution with parameters _____. **[5]**

P.T.O.

Median of live load=1217 N/m²

Standard deviation of live load=0.368

Determine the characteristic load for the probability of live load exceeding lifetime maximum live load being 0.05, if there is no change in tenancy during the lifetime of the building.

- c) Compare critically the conventional methods of structural design with respect to evaluation of safety. [5]

Q3) a) Explain the Significance of “Chi-Square Test” in Structural Reliability Engineering. [6]

- b) It is given that the ratio of the mean value of the cube strength of M15 Concrete (design mix) to its characteristic strength is 1.4 and the coefficient of variation of the strength of concrete is 0.18. Determine the allowable stress for the probability of failure of concrete equal to 0.001 and coefficient K value equal to (-3.091) for the given probability. [6]

- c) Derive the expression for “Reliability Index” for the case of load (s) and resistance (R) following normal distribution. [5]

Q4) a) Derive the expressions for the reliability of a series system and a parallel redundant system. [6]

- b) What is meant by the Lifetime Maximum sustained Load? Enumerate the assumptions used in the stochastic analysis of it. [5]

- c) Explain the formulation of probability model for wind load along with the various variables involved. [5]

SECTION-II

Q5) a) What is the Inverse transformation Technique and derive expression for generating random deviates of y having uniform Distribution. [6]

- b) Write note on Applications of Monte Carlo Method. [6]

- c) Explain how the system reliability concept can be extended for decision making with design risk. [5]

- Q6)** a) Explain Monte Carlo Method with respect to its objective and procedural steps? [6]
- b) Explain the Safety Checking Formats used in design code? [5]
- c) Explain the procedure stepwise to generate normal variates from the distribution of Y following the normal distribution with mean μ and variance σ^2 . [5]
- Q7)** a) Write short note on Reliability based design Analysis Techniques. [6]
- b) Explain the steps to formulate Reliability Based Decision Model for Designed Risk. [6]
- c) Write short note on Decision Tree Analysis based on concept of Reliability Engineering. [5]
- Q8)** a) Explain stepwise procedure to determine partial safety factors for the given reliability index. [6]
- b) Comment on the Reliability Based Managerial decision Tree Technique as an efficient managerial tool. [5]
- c) Write short note on Reliability based design criteria for RCC beams in limit state of collapse calibrated in IS code. Comment on the observations and conclusion on safety factors. [5]



Total No. of Questions : 8]

SEAT No. :

P4720

[Total No. of Pages : 3

[5060] - 261

M.E. (Polymer Engineering)
PROCESSING & MECHANICS OF COMPOSITES
(2008 Pattern) (Semester - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :-

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Q. No 1 and 5 are compulsory. Answer any other two questions from section I and any other two questions from section II.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of Calculator is allowed.*
- 6) *Assume Suitable data if necessary.*

SECTION - I

Q1) Answer any four :

[20]

- a) Explain the process of hand lay-up and spray lay-up techniques in details.
- b) List the various types of glass fibres used as reinforcements. Discuss their properties in details.
- c) Draw stress envelop of Tsai- Hill theory and explain why the stress envelop is not continuous space. What is the significance of this?
- d) List the process parameters affecting autoclave molding process. Explain their role in autoclave molding.
- e) Prove the condition of symmetry for stiffness matrix for orthotropic material $C_{ij} = C_{ji}$

Q2) a) Explain the process of filament winding with a neat sketch. State advantages and limitations of the process. **[8]**

b) Write a detailed note on tsai-Hill failure theory stating its limitations.[7]

P.T.O.

Q3) a) Discuss the thermochemical sub-model and stress sub-model with reference to filament winding. [8]

b) Prove the conditions of symmetry for Poisson's ratio in case of specially orthotropic material. $\frac{\nu_{12}}{E_{11}} = \frac{\nu_{21}}{E_{22}}$. [7]

Q4) a) Give tensor notation system for stresses and Strains and also give transformation equations for stresses and strains for orthotropic lamina under plane stress condition. [8]

b) Explain how one can find out 4th order strength tensor defined in Tsai-Wu biaxial failure theory. [7]

SECTION - II

Q5) Answer any two : [20]

a) Give an example of cross ply laminate with stacking sequence. Analyze the [A][B] [D] matrices.

b) Prove the rule of mixtures for ν_{12} in terms of Poisson's ratio for fiber and Poisson's ratio for matrix using mechanics of materials approach.

c) Define and explain force and moment resultant equations for the following types of laminates. Comment on the elements of [A], [B], & [D] matrix

i) Regular symmetric cross ply laminate

ii) Ant symmetric laminate

Q6) a) Write a detailed note on invariant properties of orthotropic lamina. [9]

b) Discuss merits and demerits of Hoffman's failure criteria for orthotropic materials. [6]

Q7) Obtain governing equations for laminated beams. Using governing equations obtain deflection of beam having symmetric lay up and carrying uniformly distributed load and is simply supported at both ends. **[15]**

Q8) a) Discuss failure modes of pin bearing test. Discuss also effect of stacking sequence on test results. **[7]**

b) Explain 10° off-axis test to determine in-plane shear properties. Explain how stress, strain and modulus is calculated. **[8]**



Total No. of Questions : 8]

SEAT No. :

P4721

[Total No. of Pages : 2

[5060] - 262

**M.E. (Polymer Engineering)
PAINTS AND ADHESIVES
(2008 Pattern)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :-

- 1) *Attempt any three questions from section I and any three questions from section II.*
- 2) *Answer to the two sections should be written in separate books.*
- 3) *Figures to the right indicate full marks.*

SECTION - I

- Q1)** a) Write a note on types of paints and their areas of applications. [8]
b) Differentiate lacquers and varnishes. [8]
- Q2)** a) Differentiate between automotive and industrial coatings. [8]
b) Explain various ways of surface preparation for painting and its importance. [8]
- Q3)** a) How will you check stability of paint in different environments? [8]
b) What is gloss? Discuss the method to determine the same. [9]
- Q4)** a) Explain a typical paint manufacturing process. [8]
b) Discuss the health issues related with various paint ingredients. [9]

SECTION - II

- Q5)** a) Explain hot melt adhesives manufacture with examples. [8]
b) Write a note adhesives cure time. Explain the test method. [8]

P.T.O.

- Q6)** a) Write a note on various solvents used in adhesive industry with the health issues associated with them. [8]
b) Explain pressure sensitive adhesives. [8]
- Q7)** a) Explain the importance of tack and drying test for adhesives. [8]
b) Write a note on manufacturing process of acrylic adhesives. [9]
- Q8)** a) Discuss chemistry of epoxy adhesives. [8]
b) Give the manufacturing process of PU adhesives. [9]



Total No. of Questions : 12]

SEAT No. :

P5136

[Total No. of Pages : 3

[5060] - 264

M.E. (Polymer Engineering) (Semester - II)
ELASTOMER TECHNOLOGY (Elective - IV)
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :-

- 1) *Answers to Section - I and Section - II should be written separate answer book.*
- 2) *Solve 3 questions from Section - I and 3 questions from Section - II.*
- 3) *Neat diagrams should be drawn wherever necessary.*
- 4) *Figures to right indicate full marks.*
- 5) *Assume suitable data, if necessary.*
- 6) *Use of electronic pocket calculator is allowed.*

SECTION - I

- Q1)** a) With respect to elastic behaviour of single molecule strand and elasticity of molecular network explain molecular theory of rubber elasticity. [8]
- b) Rubbers have crystalline morphology. Do you agree? Justify. [4]
- c) With schematic diagram explain curing curve of rubbers. [4]

OR

- Q2)** a) Explain the terms compression set, rebound resilience and fatigue resistance. [6]
- b) Elaborate an instrumental technique used to study cure rate of rubbers. [6]
- c) Glass transition temperature of rubber is below room temperature while that of plastics is above room temperature. True or False? Why? [4]

- Q3)** a) What are tackifiers? Comment on their relevance in the rubber field. Give at least three examples of tackifiers. [6]
- b) What do understand by cross-link density? How does it affect rubber properties? [4]
- c) Elaborate various factors affecting cure rate of rubbers. [6]

OR

P.T.O.

Q4) a) Enlist various types of carbon blacks used in rubbers. Discuss in detail effect of carbon black on rubber properties. [8]

b) Explain in detail vulcanization of rubbers via sulphur and sulphur donors. Give at least two examples of sulphur donors. [8]

Q5) a) Briefly discuss about the role of silane coupling agents in rubber processing. [4]

b) Explain in detail physical and chemical peptizers. Give suitable examples of each. [8]

e) Enlist at least three applications each of SBR and Neoprene rubbers. [6]

OR

Q6) a) Write short note on Crepe rubber. [5]

b) Elaborate the concept of reclaim rubber, Briefly discuss about various methods to carry reclamation of rubber. [8]

c) Explain SBR synthesis by emulsion polymerization technique. [5]

SECTION - II

Q7) a) Discuss in detail ribbed smoked sheet and air-dried sheet types of natural rubber. [6]

b) Explain rubber processing by compression and transfer moulding technique. [10]

OR

Q8) a) Write short note on thermoplastic elastomers in automotive applications. [6]

b) Explain injection moulding and extrusion techniques used for rubber processing. [10]

Q9) a) Explain the terms vulcanization and scorch. [4]

b) What are activators and accelerators? Elaborate their working mechanism. [6]

c) Elaborate cure characteristics of Chloroprene and butyl rubbers. [6]

OR

Q10)a) Discuss in detail peroxide vulcanization process. Give examples where it is used. [8]

b) Write a short note on Mooney Viscometer. Explain its importance in rubber field. [8]

Q11)a) Along with formulation, explain in detail the manufacturing process for V-belt. [9]

b) Explain in detail compounding of rubber using roll mill. [9]

OR

Q12)a) Explain in detail the manufacturing process for conveyor belt. [9]

b) Elaborate the rubber compounding by internal mixer. [9]



Total No. of Questions : 6]

SEAT No :

P4610

[5060]-27

[Total No. of Pages : 2

M.E.(Civil Structures)

NON-LINEAR ANALYSIS OF STRUCTURES

(2008 Pattern) (Semester - II) (Elective - III) (501411D)

Time :4 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any two questions from each section.*
- 2) *Answer to the two section should be written in separate books.*
- 3) *Figures to the right indicate full marks.*
- 4) *Neat diagrams must be drawn wherever necessary.*
- 5) *Use of non programmable Calculator is allowed.*
- 6) *Assume Suitable data if necessary.*

SECTION - I

Q1) a) State and Explain types of nonlinearities, with examples, in case of beams. **[10]**

b) Find the solution for a moment curvature by non linear analysis of a simply supported beam subjected to concentrated load at midspan.**[15]**

Q2) a) Derive Material Nonlinearity of plates using Ramberg-Osgood relation.**[8]**

b) Write the strain energies due to stretching, bending and kinetic energy of an orthotropic plate. Use Hamilton's principle and stress function approach to derive governing equations. **[17]**

Q3) a) Derive the equation for maximum deflection of rectangular plate by nonlinear analysis. **[17]**

b) State a system of four equations governing the large amplitude flexural vibrations of anisotropic plates. **[8]**

P.T.O.

SECTION - II

- Q4)** Obtain approximate solutions for the tip deflection components of cantilever column at post- buckling stage due non linear behaviour considering moment curvature relationship. **[25]**
- Q5) a)** Explain with diagrams and derivation, the deformation of square pinned -fixed frame for tensile loading. **[15]**
- b) Explain Incremental procedure of analysis of material nonlinear problems. **[10]**
- Q6) a)** Obtain the displacement transformation matrix for a member with a hinge. **[12]**
- b) Write procedure for elastic plastic analysis of **[13]**
- i) Frames.
- ii) Propped cantilever.



Total No. of Questions : 6]

SEAT No. :

P4722

[Total No. of Pages : 1

[5060] - 271

M.E. (Printing Engg. 2 Graphics Communication)

TOTAL PRODUCTIVE MAINTENANCE

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :-

Answer any 2 questions from each section.

SECTION - I

Q1) Explain 8 Pillars of TPM in detail for offset printing process. [25]

Q2) Explain types of maintenance & in detail the total productive maintenance.[25]

Q3) Explain OEE in detail. [25]

SECTION - II

Q4) Explain periodical & preventive maintenance in detail. [25]

Q5) Explain in brief press optimization and press standardization. [25]

Q6) Explain in detail office TPM w.r.t. Health & Environment. [25]



Total No. of Questions :6]

SEAT No. :

P4611

[5060]-28

[Total No. of Pages :2

M.E. (Civil Structures)
BIO MECHANICS AND BIO MATERIALS
(2008 Course) (Semester- II) (Open Elective - IV)

Time : 4 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) *Use of calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) Explain classification of tissues from Engineering aspect. Give suitable example. [8]
- b) Explain various elastic models applicable biological tissue. Draw suitable diagram to illustrate, illustrate its suitability to type of tissue. [9]
- c) Explain importance of study of Biomechanics. [8]
- Q2)** a) Explain Bio compatibility of material and List bio compatible materials used as replacement material to biological organ. Illustrate your answer with suitable application. [8]
- b) List various metallic and non-metallic materials used as bio compatible materials and its biological application. [9]
- c) Explain with suitable sketch & FBD's structural stability of Hip joint. [8]
- Q3)** a) Explain bone cement, PMMA. Explain its advantage as biomaterial. [8]
- b) Explain silicon rubber, UHMWPE, ultra-high molecular weight poly ethylene as biocompatible material. [9]
- c) Explain properties of stainless steel, cobalt base alloys, and Titanium base alloys when used as prosthesis material. [8]

P.T.O.

SECTION-II

- Q4)** a) Explain and sketch structure of bone tissue. [9]
- b) Sketch geometry of the articulating joint for Knee joint, with possible contact areas Show joint forces acting on it. [9]
- c) Explain experimental measurement of wear of cartilage on cartilage material. [7]
- Q5)** a) Explain with sketch, the term 'Gait analysis'. [8]
- b) Explain various measurement techniques for body motion. [9]
- c) How gait analysis helps in various applications of Biomechanics study. [8]
- Q6)** a) Explain engineering design concepts of dental prosthesis. [8]
- b) Explain steps in structural design of a fixation device hip or knee joint. [9]
- c) What is the classification of prosthetics devices? Enlist prosthetics useful for human use. [8]

EEE

Total No. of Questions :6]

SEAT No. :

P4612

[5060]-29

[Total No. of Pages :2

M.E. (Civil - Structures)

MECHANICS OF MODERN MATERIALS

(2008 Course) (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 indicate full marks.*
- 5) *Use of nonprogrammable pocket calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) Explain FRPC (Fiber Reinforced Polymer Composite) and its constituent structure and materials. [8]
- b) Explain Piezoelectric material? And its applications in civil construction. [8]
- c) Explain classification of materials used in FRC and situations where these class of materials are advantageous. [9]
- Q2)** a) Explain orthotropic, anisotropy of composite material. [12]
- b) Write compliance and stiffness matrices for plane stress condition, for cross ply laminate material. [13]
- Q3)** a) Explain at least four theories of failure applicable for FRC. [20]
- b) Explain stress strain behavior of FRC. [5]

P.T.O.

SECTION-II

Q4) a) Obtain Naviers equation for orthotropic laminate with two opposite 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]

$$E_1 = 65 \text{ GPa}, \quad E_2 = 18 \text{ GPa}, \quad E_3 = 18 \text{ GPa}$$

$$\mu_{12} = 0.29 = \mu_{21}$$

$$\alpha_1 = 0.9 \times 10^{-6} / \text{c}^0, \quad \alpha_2 = 27 \times 10^{-6} / \text{c}^0$$

Q6) a) Explain manufacturing of composite sketch important details. [8]

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

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

EEE

Total No. of Questions : 8]

SEAT No. :

P5111

[Total No. of Pages : 2

[5060]-3

M.E. (Civil Environmental Engg.)
AIR AND WATER QUALITY MODELING
(2010 Course)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer ANY THREE questions from EACH section.*
- 2) *Use of non programmable calculators are allowed.*
- 3) *Neat sketches to be drawn wherever necessary.*
- 4) *Make suitable assumptions if necessary.*
- 5) *Figures to the right indicate full marks.*

SECTION - I

- Q1)** a) Discuss the importance of model development and write the steps in the model development. [8]
- b) Explain the casual and statistical model characteristics. [10]
- Q2)** a) Explain Streeter - Phelps equation to determine the D.O. concentration at the downstream. [8]
- b) Discuss the lake water quality models. [8]
- Q3)** a) Explain with neat sketch Oxygen Sag curve. [8]
- b) Discuss the transport of air pollutants in the ambient air. [8]
- Q4)** a) Explain the role of Atmospheric stability in air quality modeling. [8]
- b) Discuss Nitrogen modeling in a lake. [8]

P.T.O.

SECTION-II

- Q5)** a) Explain the stack plume characteristics. [8]
b) Discuss the transport and diffusion of stack emissions. [8]
- Q6)** a) Explain the types of modeling techniques. [8]
b) Discuss the features of multiple cell models. [8]
- Q7)** a) Discuss the categories of water quality index. [8]
b) Explain the industrial and municipal effluent index. [8]
- Q8)** Write a short notes on following : [18]
a) Modeling for non-reactive pollutants
b) Calibration and verification of model
c) NAAQS, 2009



Total No. of Questions :6]

SEAT No. :

P4613

[5060]-30

[Total No. of Pages :2

M.E. (Civil - Structures)

THEORY OF PLASTICITY

(2008 Course) (Open 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 indicate full marks.*
- 5) *Use of electronic pocket calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) Show that $\phi = \frac{q}{8c^3} \left[x^2 (y^3 - 3c^2 y + 2c^3) - \frac{1}{5} y^3 (y^2 - 2c^2) \right]$ is a stress function, and find what problem it solves when applied to the region included is $y = \pm c, x = 0$, on the side x positive. **[15]**
- b) Explain in constitutive relations for plane stress, plane strain and axisymmetric elasticity problems. **[10]**
- Q2)** a) Explain strain hardening phenomenon. What is the effect of strain hardening on plastic deformation. **[10]**
- b) Explain in brief Drucker's stability postulates. **[8]**
- c) Write short note on convexity of yield surface? **[7]**
- Q3)** a) Explain plastic deformation of metal by slip and twinning. **[15]**
- b) Explain in brief Tresca's and Von-Mises-Hencky's yield criteria. **[10]**

P.T.O.

SECTION-II

- Q4)** a) Determine the plastic deformation of the bar if the whole elongation $\Delta l = 0.04m$, the original length of the bar was $l = 4.0 m$, assumption is elasto-plastic behaviour of material. $E = 200 \text{ GPa}$ and $f_y = 275 \text{ MPa}$. [15]
- b) Derive the equations of radial (σ_r) and transverse (σ_θ) stresses for the section of wide plate subjected moments at the ends. [10]
- Q5)** a) Explain isoparametric, sub-parametric and super-parametric elements with suitable example. [15]
- b) State and explain uniqueness theorems. [10]
- Q6)** a) What is Mises flow rule for isotropic hardening? [10]
- b) Explain initial and subsequent yield surface in tension. [15]

EEE

Total No. of Questions :6]

SEAT No. :

P4614

[5060]-31

[Total No. of Pages :3

M.E. (Civil) (Structures)

OPTIMIZATION TECHNIQUES

(2008 Course) (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 indicate full marks.*
- 5) *Use of electronic pocket calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION-I

Q1) a) Elaborate Optimization Problem with Example for Minimum Weight and Optimum Cost Consideration. [13]

b) State six structural engineering applications of optimization. [12]

Q2) a) Solve the following LP problems by the revised simplex method. [13]

$$\text{Max } Z = x_1 + 2x_2$$

Subject to

$$x_1 + x_2 \leq 3$$

$$x_1 + 2x_2 \leq 5$$

$$3x_1 + x_2 \leq 6$$

$$\text{and } x_1, x_2 \geq 0.$$

b) Explain Decomposition principle, and Post-optimality analysis in Linear Programming. [12]

P.T.O.

- Q3) a)** Draw the flowchart and algorithm of any two **[12]**
- i) Fibonacci Method
 - ii) Golden Section Method
 - iii) Quadratic Interpolation Method
 - iv) Cubic Interpolation Method
- b) Find the minimum of the function $f(x) = x^2 - \sin(x)$ on the interval $[0, 1]$ using the Fibonacci search method. Use a tolerance of $= 10^{-4}$ and the distinguishability constant $e=0.01$. **[13]**

SECTION-II

- Q4) a)** Analyze the function $f(x) = -x_1^2 - x_2^2 - x_3^2 + 2x_1x_2 + 2x_1x_3 + 4x_1 - 5x_3 + 2$ and classify the stationary points as maxima, minima and points of inflection. **[8]**
- b) Explain with neat sketches any two: **[10]**
- i) Indirect search method and Direct search method,
 - ii) Random search method and Steepest Descent (Cauchy) method.
 - iii) Univariate and pattern search method.
- c) What is unconstrained optimization and what are the engineering applications. **[7]**
- Q5) a)** What is constrained optimization and what are the engineering applications. **[7]**
- b) Explain with neat sketches any two: **[10]**
- i) Interior Penalty function method.
 - ii) Convex Programming.
 - iii) Reduced Gradient method.
- c) Derive the analysis of Truss using constrained optimization. **[8]**

- Q6)** a) Develop the Artificial Neural Network Model for Civil Engineering Application. [6]
- b) Explain with suitable sketch and examples Selection Operator, Crossover Operator and Mutation Operator in Genetic Algorithms. [6]
- c) Develop the Genetic Algorithm based Model for Civil Engineering Application. [6]
- d) What are the activation functions in artificial neural networks? [7]

EEE

Total No. of Questions :8]

SEAT No. :

[Total No. of Pages :2

P4615

[5060]-32

M.E. (Civil)

Water resources and Environmental Engineering

ENVIRONMENTAL MANAGEMENT

(2008 Course) (501602) (Semester- I)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Question No.1 and 5 are compulsory and answer any two from remaining 3 questions of 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 logarithmic tables, slide rule, Mollier Charts, electronic pocket calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) Explain the mitigation measure to be taken up for reducing the impact on soils by industrial - activity. **[9]**
- b) Give the general methodologies for the assessment of impacts on surface water environment. **[9]**
- Q2)** a) How do you consider socio- economic factors in an impact prediction study? **[8]**
- b) Explain the following terms: **[8]**
- i) Resettlement.
 - ii) Rehabilitation.
- Q3)** Discuss in brief any one case study related to environment impact assessment of mining industries. **[16]**
- Q4)** a) Explain the Meaning of Carbon Credit? Discuss the global scenario of Carbon Credit in context of India. **[8]**
- b) Write note on: **[8]**
- i) Clean development mechanism.
 - ii) WHO agreements on environment.

P.T.O.

SECTION-II

- Q5)** a) Describe the adoption of provisions in India for protection of the environment made by NEPA? [10]
- b) Write a note on: [8]
- i) Earth Summit 1992
- ii) Air Act 1981 (India)
- Q6)** a) Enlist the Environmental safety policies in ISO/NABET certified Construction Consultancy. [4]
- b) Describe Environmental management system in line with ISO 14000?[12]
- Q7)** a) What are the rights to know laws related to occupational safety and health? Explain? [8]
- b) Describe the role of CPCB & State Pollution Control Board in India?[8]
- Q8)** Write note on: [16]
- a) Ecological Succession? How it helps to keep the environment in development state.
- b) ISO 14000 & it's significance.
- c) Sustainable Environmental Technologies.
- d) Women empowerment in environment field.

EEE

Total No. of Questions :8]

SEAT No. :

P4616

[5060]-33

[Total No. of Pages : 2

**M.E. (Civil-Water Resources and Environmental Engineering)
GROUND WATER CONTAMINATION AND POLLUTION
TRANSPORT**

(2012 Course) (Semester-I) (501604 A)(Elective-I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to candidates:

- 1) Answer any 3 questions from each section.*
- 2) Figures to the right indicate full marks.*
- 3) Assume suitable data if necessary clearly mentioning the same.*
- 4) Use of non-programmable scientific calculator is allowed.*

SECTION-I

- Q1)** a) Explain with neat: yield of water from rock. **[8]**
- b) Explain in detail: zones of aeration. **[8]**
- Q2)** a) Explain in detail various properties of water wrt flow. **[8]**
- b) How dispersion studies are helpful in understanding the GW flow. **[8]**
- Q3)** a) Explain in detail: flow net analysis. **[8]**
- b) The ground surface elevation of a 20 m deep piezometer is 60 m. Above MSL. The depth of water level in the piezometer is 8 m. Calculate: **[10]**
- i) The elevation head,
 - ii) pressure head &
 - iii) Hydraulic head, taking the bottom of the piezometer as the reference point. The density of water in the piezometer is 1.02

P.T.O.

- Q4)** a) Explain in detail any one method of evaluation of aquifer boundaries. [8]
- b) An organic waste with very high BOD has contaminated a GW aquifer. Explain in detail the method to be adopted for recovering this aquifer. [8]

SECTION-II

- Q5)** a) Explain in detail how water quality analysis is used for mineral prospecting. [8]
- b) Outline the essential features of geochemistry of GW in. [8]
- i) Quartzite
 - ii) Limestone
 - iii) Basalt &
 - iv) Granite
- Q6)** a) What is sea water intrusion? Explain in detail: prevention & control of saline water intrusion. [8]
- b) Enlist various methods of discharge measurement from well. Explain any one in detail. [8]
- Q7)** a) Explain in detail: GW provinces of India. [8]
- b) Explain quality requirements for water for: [8]
- i) Agricultural Use.
 - ii) Industrial Use.
- Q8)** a) Explain Tri-linear diagram for representing analysis of GW Quality. [10]
- b) Explain in detail: Electric Analog Models. [8]

Total No. of Questions : 12]

SEAT No. :

P4617

[5060]-34

[Total No. of Pages : 2

M.E. (Civil -Water Resources & Environmental Engg.)

AIR POLLUTION ENGINEERING

(2008 Course) (Semester-I) (Elective-I) (501604 C)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answer Que 1 or Que2, Que 3 or Que 4, Que 5 or Que 6 from section I.*
- 2) *Answer Que 7 or Que 8, Que 9 or Que 10, Que 11 or Que 12 from section II.*
- 3) *Figures to the right indicate full marks.*
- 4) *Your answers will be valued as a whole.*
- 5) *Assume suitable data, if necessary.*
- 6) *Use of electronic pocket calculator and steam table is allowed.*

SECTION-I

Q1) Discuss the following:

- a) Pasquil stability model. [9]
- b) Rain drop formation. [8]

OR

- Q2)** a) What do you understand by maximum mixing depth? Explain the with typical example. [8]
- b) What is Plume behavior? Discuss the behavior suitable with sketches. [8]

- Q3)** a) What is dispersion of pollutants in atmosphere? Explain. [8]
- b) Explain Eddy diffusion model in details. [8]

OR

- Q4)** a) Give note on following:
- i) Ground level concentration [4]
 - ii) Gaussian model of dispersion [6]
- b) Discuss in Inversion Trap. [7]

- Q5)** a) What are the sources of indoor pollution? Discuss. [9]
- b) Discuss about odour pollution. How you will control the same. [8]

OR

- Q6)** a) Discuss in detail about Air pollution survey. [8]
- b) Explain in detail Iso-kinetic sampling. [9]

P.T.O.

SECTION-II

Q7) a) What is the minimum size of the particulates removed through the following control equipments. [8]

- i) Settling chambers
- ii) Cyclones
- iii) Fabric filters
- iv) ESP's

b) Discuss distribution and source of Suspended Particulate Matter. [9]

OR

Q8) a) Discuss following: [8]

- i) Inertial Separator
- ii) Venturi Scrubbers

b) Discuss the factors to be considered while selecting particulate collector. [8]

Q9) Give note on the following and explain. [16]

- a) Absorption and solution used
- b) Adsorption and Solution used

OR

Q10)a) Discuss about closed circuit and Recovery system. [9]

b) Discuss and explain the control of sulphuric dioxide. [8]

Q11)a) Discuss the following. [12]

- i) Exhaust Emission
- ii) Crank-Case Emission
- iii) Evaporative Emission

b) Give note on the alternatives to reduce air pollution due to automobile sources. [5]

OR

Q12)a) What you understand from Nitrogen Oxides in Exhaust Gas. [8]

b) Discuss Strategy for effective control of air pollution in India. [9]



Total No. of Questions : 6]

SEAT No. :

P4618

[5060]-35

[Total No. of Pages : 2

M.E.(Civil) (WR & EE)

**SOLID WASTE & HAZARDOUS WASTE MANAGEMENT
(2010 Course) (Semester-I)(501604 D) (Elective-I)**

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answer 3 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) *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) *All questions are compulsory.*

SECTION-I

- Q1)** a) Discuss various provisions made under solid waste management rules by Govt. of India. **[8]**
- b) Discuss public health aspects of solid waste management. **[8]**
- Q2)** a) Enlist types of solid waste. Discuss in detail the sources of municipal solid waste. Also is there any Impact of life style on solid waste generation? **[8]**
- b) Discuss various physical properties of MSW. **[8]**
- Q3)** Write note on any three. **[18]**
- a) Storage and transportation of solid waste.
 - b) Biological methods of municipal solid waste management.
 - c) Bio degradable and Non biodegradable solid waste.
 - d) Composition of MSW.

P.T.O.

SECTION-II

- Q4)** a) What is Leachate in land fills. Explain Water balance in land fills. [8]
b) Explain waste heat recovery and co-generation from the solid waste treatment. [8]
- Q5)** a) Discuss rules for handling and management of Biomedical waste. [8]
b) Draw neat sketch and explain a double liner hazardous waste land fill.[8]
- Q6)** Write short notes on any three of following. [18]
- a) Manifest system for disposal of hazardous waste.
 - b) Waste heat boilers.
 - c) Concept of Zero-risk hazardous waste.
 - d) Disposal and treatment of Nuclear waste.



Total No. of Questions : 8]

SEAT No. :

P4619

[5060]-36

[Total No. of Pages : 2

M.E. (Civil) (WREE)

UNIT OPERATIONS IN ENVIRONMENTAL ENGINEERING

(2012 Course) (Semester - I) (Elective - II) (501605A)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Attempt any three question from each sections.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of calculator is allowed.*
- 6) *Assume Suitable data if necessary.*
- 7) *Use data sheet.*

SECTION - I

- Q1)** a) Explain working of reciprocating pump with figure. **[8]**
b) Classify the compressor and explain centrifugal compressor in details. **[8]**
- Q2)** a) Write short note actuator. **[8]**
b) What are different application of hydraulic and pneumatic valve in waste water treatment plant. **[8]**
- Q3)** a) Derive equation for frequency spring-mass-damper system for single degree of freedom. **[10]**
b) Find natural frequency of system having mass of 3 kg, spring stiffness of 5N/m. Two spring attach in series and parallel position. **[8]**
- Q4)** a) Write short note on gear pump with applications. **[8]**
b) Draw any four symbol used in hydraulic and pneumatic circuits. **[8]**

P.T.O.

SECTION - II

- Q5)** Explain working of parallel and counter current flow heat exchanger with figure. **[16]**
- Q6)** a) Explain Herry's Law, Raoult's Law and Gibbs phase rule. **[8]**
b) Write short note on distillation column. **[8]**
- Q7)** What are application of hydraulic filter press. Explain design procedure for hydraulic filter press in details. **[18]**
- Q8)** Write short note on drying and filtration operations. **[16]**



Total No. of Questions : 8]

SEAT No. :

P4620

[5060]-37

[Total No. of Pages : 2

M.E. (Civil) (WREE)

**ADVANCED WATER TREATMENT & WATER SUPPLY
ENGINEERING**

(2008 Course) (Semester - I) (Elective - II) (501605B)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any three questions from Section-I and Section-II.*
- 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.*

SECTION - I

- Q1)** Explain in detail the principle and working of electro dialysis and micro filtration for water treatment. **[16]**
- Q2)** Discuss the principle, concept and necessity of aeration. Explain various methods of aeration with neat sketches. **[16]**
- Q3)** Explain in detail the objectives, working and types of floatation systems. State the design considerations for the floatation systems. **[16]**
- Q4)** Design an aerated grit chamber for the treatment of municipal wastewater. The average flow rate is $0.5 \text{ m}^3/\text{s}$. Take peak factor as 2.75. **[18]**

SECTION - II

- Q5)** Differentiate between slow sand & rapid sand gravity filters. Explain backwashing of rapid sand filters. **[16]**
- Q6)** Discuss Adsorption processes, types of adsorption, factors influencing adsorption & activated carbon adsorption kinetics. **[16]**

P.T.O.

- Q7)** a) What is the theory of disinfection? State the factors affecting disinfection. Discuss the chemistry of chlorination. [8]
- b) Briefly discuss ion exchange method, ion exchange chemistry and its applications for hardness and TDS removal. [8]
- Q8)** Design RSGF unit for treating 4 MLD of supply, with underdrainage system and washwater troughs. [18]



Total No. of Questions : 8]

SEAT No. :

P4621

[5060]-38

[Total No. of Pages : 2

M.E. (Civil) (WREE)

**R.S. & G.I.S. SYSTEM FOR WATER RESOURCE MANAGEMENT
(2012 Course) (Semester - I) (501605)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer books.*
- 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.*
- 6) *All questions are compulsory.*

SECTION - I

- Q1)** a) Discuss the principles of photogrammetry and its applications in water resources. [5]
- b) Write an essay on Fundamentals of Remote Sensing System. [5]
- c) Write a note on Electromagnetic Spectrum. [3]
- Q2)** a) State and Explain the Displacement Law. [4]
- b) Discuss in detail the interaction of EMR with 'Atmosphere'. [4]
- c) Describe the stages of Remote Sensing with neat sketch. [3]
- Q3)** a) Discuss the important advantages of vertical and oblique aerial photographs. [3]
- b) State the elements of image interpretation in short. [5]
- c) What are FCC images? Write its advantages. [5]

P.T.O.

- Q4)** a) Discuss various characters of IR images. [3]
b) Discuss the ORTHO rectification method. [5]
c) Write a note on Concept of Analog and Digital System. [5]

SECTION - II

- Q5)** a) Describe in brief Geographical Information System (GIS). [5]
b) Write in brief the Components of GIS. [5]
c) Discuss in short buffering. [3]

- Q6)** a) What are Map Projections? [4]
b) Write a note on Raster Data Structure. [4]
c) Describe Supervised and unsupervised classification. [3]

- Q7)** a) Describe Spatial and Attribute Database. [3]
b) Discuss Errors in GIS. [5]
c) Write an essay on Data collection and input processing in G.I.S. [5]

- Q8)** a) Explain RS application in Open Canal Conduit with flow chart. [3]
b) Write in short the software's used in GIS for Water Resources. [5]
c) Explain in brief 'DEM'. [5]



Total No. of Questions : 12]

SEAT No. :

P5034

[5060]-39

[Total No. of Pages : 5

M.E. (Civil) (WREE)

OPTIMIZATION TECHNIQUES

(2012 Course) (501608) (Semester - II)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

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

SECTION - I

Q1) a) Write the applications of system approach in civil engineering? Explain the 'need' implementation of system approach in civil engineering field? Explain with suitable example. **[8]**

b) Solve by Big M method. **[8]**

$$\text{Maximize } Z = 6x_1 - 3x_2 + 2x_3,$$

$$\text{Subject to, } 2x_1 + x_2 + x_3 \leq 16,$$

$$3x_1 + 2x_2 + x_3 \leq 18,$$

$$x_2 - 2x_3 \geq 8,$$

$$x_1, x_2, x_3 \geq 0.$$

OR

Q2) a) Explain the meaning and significance of following terms with examples.

- i) Slack variables,
- ii) Surplus variables,
- iii) Artificial variables
- iv) Infeasibility

[8]

P.T.O.

- b) Solve the problem by Two Phase method [8]

$$\text{Maximize } Z = 5x - 2y + 3z,$$

$$\text{Subject to, } 2x + 2y - z \geq 2,$$

$$3x - 4y \leq 3,$$

$$y + 3z \leq 5$$

$$x, y, z \geq 0.$$

- Q3)** a) Solve the problem by Two Phase method [10]

$$\text{Max } Z = 3X_1 - 6X_2 - 8X_3$$

$$\text{Subject to } -3X_1 + 5X_2 + X_3 = 4$$

$$3X_1 - 4X_2 + 5X_3 \geq 6; \text{ and } X_1, X_2, X_3 \geq 0$$

- b) What is dual problem? When and how it should be solved with primal?[8]

OR

- Q4)** a) Explain the difference between Big M method and Two phase method. Write down the conditions in which both these methods should be used. [8]

- b) Use Big M technique to Maximize $Z = 2X_1 + 4X_2$, [10]

$$\text{Subject to } 2X_1 + X_2 \leq 18$$

$$3X_1 + 2X_2 \geq 30$$

$$X_1 + 2X_2 = 26$$

$$X_1, X_2 \geq 0.$$

- Q5)** a) Use the steepest descent to Minimize $Z = 2(x_1 - 1)^2 + (x_2 - x_1)^2$ taking starting point as $(-1, 2)$. Carry out only two iterations. [10]

- b) Maximize $Z = 80x - x^2$ in the interval $(0, 100)$ with an accuracy of 0.1% by using Dichotomous method. [8]

OR

- Q6) a)** Use the steepest gradient technique to Maximize $f(x) = 3x_1 + x_1x_2 - x_1^2 - x_2^2$ Take initial point as (0, 0) and Carry out first two iterations. [8]
- b) Use Fibonacci method to minimize the function, $Z = x^3 - 12x$ within a range of 0 to 5 and an accuracy of 0.1%. Carry out first four iterations only. [10]

SECTION - II

- Q7) a)** What is 'principal of optimality' in dynamic programming? What is recursive equation? How it should be solved? [8]
- b) Six units of power (1 unit = 100 MW) are to be distributed among three regions designated as 1,2 and 3. The return functions are given below. Where P is the power supplied in units, $R_i(p)$ is the return function from the region I where $i = 1,2$ and 3. Using dynamic programming allocate the power optimally. [8]

P	0	1	2	3	4	5	6
$R_i(p)$							
R_1	0	8	11	30	70	82	90
R_2	0	6	12	40	50	69	75
R_3	0	9	25	43	53	60	68

OR

- Q8) a)** It is proposed to develop the hydropower by building dams on 3 possible river sites. The total Financial resource available is 3 units. This is to be allocated optimally to these possible developments. The return functions of this investment are given below. Use dynamic programming and determine the maximum return and the allocation to various sites. [10]

Resource allocated	Return Form		
	Site 1	Site 2	Site 3
0	0	0	0
1	3	2	4
2	5	6	6
3	7	7	8

- b) What are the applications of dynamic programming in Water resource and environmental engineering? [6]

- Q9) a)** Explain the operating characteristics of queuing models. [8]
- b) Construction equipment is to be transported from place 1 to place 11. The equipment can be transported along different routes. The travel distance along different routes from place 'i' to place 'j' are given below. Use dynamic programming to determine the shortest route between place 1 to place 11. Write the recursive equation for each stage. [8]

Place 'i-j'	Dist. in Km	Place 'i-j'	Dist. in Km
1-2	30	5-8	21
1-3	34	5-9	33
1-4	36	5-10	33
2-5	29	6-8	22
2-6	27	6-9	24
2-7	30	6-10	29
3-5	31	7-8	33
3-6	25	7-9	32
3-7	23	7-10	34
4-5	28	8-11	37
4-6	27	9-11	28
4-7	26	10-11	36

OR

- Q10)a)** Vehicles arrive at service station in a Poisson fashion at an average rate of 45 minutes. The average time taken for service is 30 min. with exponential distribution. Determine [8]
- The chance that a vehicle will be serviced straight away.
 - The proportion of time the service station is busy.
 - The average no. of vehicles in the queue and the system.
 - The average time spent by vehicle waiting in the queue and the system.
 - The probability that there are two vehicles in the queue.
- b) Customers arrive at service facility to get the required service. The inter arrival and service times are constant and are 1.8 min and 4 min respectively. Simulate the system for 14 min. Determine average waiting time of a customer and idle time of service facility. [8]

Q11)a) Explain the following: **[8]**

- i) Minimax and maxmin principles.
- ii) Pure and mixed strategies
- iii) Two-person zero sum game.

b) Solve the following game. **[10]**

		Player B			
Player		I	II	III	IV
A	1	6	4	8	0
	2	6	8	4	8
	3	8	4	8	0
	4	0	8	0	16

OR

Q12)a) Solve the following 2×5 game by graphical method. **[8]**

		Player B				
Player		-5	5	0	-1	8
A		8	-4	-1	6	-5

b) Solve the following game by dominance method **[10]**

		Player B		
Player		I	II	III
A	I	7	1	7
	II	9	-1	1
	III	5	7	6



Total No. of Questions :8]

SEAT No. :

P4596

[Total No. of Pages :2

[5060] - 4

**M.E. (Civil) (Environmental Engg.)
OCCUPATIONAL SAFETY & HEALTH
(2010 Course) (Semester - I) (Elective - 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) *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) Explain the important provisions made in Occupational Safety and Health Act. [8]
b) What are the OSHAS 18001 Health & Safety Standards? [8]
- Q2)** a) What is heat stress? What are the effects of heat stress on human body? [8]
b) What is a need of ergonomics program? Explain. [8]
- Q3)** a) Explain hazard analysis with example of any one type of an industry. [8]
b) How to control hazards in Chemical industry? [8]
- Q4)** Write short notes on following: [18]
a) Task Analysis in Ergonomics.
b) Hazards in Sugar Industry.
c) Human error and fault tree analysis.

P.T.O.

SECTION - II

- Q5)** a) What measures are required for the prevention and protections of the fire? Explain. [8]
b) What are the product safety measures in an industry? Explain. [8]
- Q6)** a) Enlist personal safety equipments and explain uses of any four. [8]
b) Explain different methods to control accidents at working place. [8]
- Q7)** a) What are the health problems in steel plant? Explain. [8]
b) How to tackle health problems in food processing industry? Explain. [8]
- Q8)** Write short notes on following: [18]
a) Types of fires.
b) Occupational health.
c) Hazard control in construction of buildings.



Total No. of Questions : 8]

SEAT No. :

P5035

[5060]-40

[Total No. of Pages : 2

**M.E. (Civil) (Water Resources and Environmental Engg.)
COMPUTATIONAL METHODS IN WATER RESOURCES
(2012 Course) (Semester-II) (501611) (Elective-III)**

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) *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) Using Gauss elimination method, solve the equations: [6]
 $x+2y+3z-u=10, 2x+3y-3z-u=1, 2x-y+2z+3u=7, 3x+2y-4z+3u=2.$
- b) Solve the following equations by Gauss-Jordan method. [12]
 $10x-7y+3z+5u=6, -6x+8y-z-4u=5, 3x+y+4y+11u=2, 5x-9y-2z+4u=7.$
- Q2)** a) Apply the Gauss-Jordan method to solve the following equations: [8]
 $x+y+z=9; 2x-3y+4z=13; 3x+4y+5z=40.$
- b) Find the real root of the following equations using Newton-Raphson Method. [8]
 $y^2 - 5y + 4 = 0$ and $3yx^2 - 10x + 7 = 0$
- Q3)** a) Using Picard method, find approximate values of y and x corresponding to $x=0.1$, given that $y(0) = 2, z(0) = 1$ and $\frac{dy}{dx} = x + z, \frac{dz}{dx} = x - y^2$. [8]
- b) Find the missing term in the following table using lagrange's interpolation:

x	0	1	2	3	4
y	1	3	9	...	81

[8]

P.T.O.

Q4) a) Given $\frac{dy}{dx} = 1 + y^2$, where $y = 0$ when $x = 0$, find $y(0.2)$, $y(0.4)$ and $y(0.6)$.
Use Runge-Kutta fourth order method. **[10]**

b) Given $\frac{dy}{dx} = \frac{(y-x)}{(y+x)}$ with initial condition $y=1$ at $x=0$; find y for $x=0.1$ by Euler's Method. **[6]**

SECTION-II

Q5) a) Using the finite difference method, find $y(0.25)$, $y(0.5)$ and $y(0.75)$ satisfying the differential equation $\frac{d^2y}{dx^2} + y = x$, subject to the boundary condition $y(0)=0$, and $y(1)=2$. **[12]**

b) Classify the following equations: **[6]**

i)
$$\frac{\partial^2 u}{\partial x^2} + 4 \frac{\partial^2 u}{\partial x \partial y} + 4 \frac{\partial^2 u}{\partial y^2} - \frac{\partial u}{\partial x} + 2 \frac{\partial u}{\partial y} = 0$$

ii)
$$x^2 \frac{\partial^2 u}{\partial x^2} + (1 - y^2) \frac{\partial^2 u}{\partial y^2} = 0, -\infty < x < \infty, -1 < y < 1.$$

iii)
$$(1 + x^2) \frac{\partial^2 u}{\partial x^2} + (5 + 2x^2) \frac{\partial^2 u}{\partial x \partial t} + (4 + x^2) \frac{\partial^2 u}{\partial t^2} = 0.$$

Q6) a) What do you mean by Hyperbolic equation? Explain any one method to solve the Hyperbolic equation. **[8]**

b) Explain in detail the method of characteristics. **[8]**

Q7) a) Explain in brief the following: **[8]**

i) Explicit Finite Difference Scheme

ii) Implicit Finite Difference Scheme

b) Explain the Convergence and Stability of Difference Schemes. **[8]**

Q8) a) Explain in detail Cascade Correlation Algorithm. **[8]**

b) Explain the Applications of Artificial Neural Network in Water Resource Engineering. **[8]**



Total No. of Questions : 6]

SEAT No :

P4622

[5060]-41

[Total No. of Pages : 2

M.E. (Civil) (WR & EE)

NOISE POLLUTION AND CONTROL TECHNIQUE

(2010 Course) (Elective - III) (Semester - II)

Time :3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer 3 questions from Section I and 3 questions from Section II.*
- 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) *Your answers will be valued as a whole.*
- 6) *Assume suitable data, if necessary.*
- 7) *All questions are compulsory.*

SECTION - I

- Q1)** a) Discuss Absorption of sound in air. [8]
- b) Draw a sketch of human ear and explain hearing mechanism. [8]
- Q2)** a) Describe in detail measurement of sound pressure level. [8]
- b) Explain Noise characterisation with neat sketch. [8]
- Q3)** Write note on: [18]
- a) Sources of Noise.
 - b) Audiometer.
 - c) Characterization of Acoustical materials.

SECTION - II

- Q4)** a) Explain Annoyance & sleep disturbance due to Noise pollution. [8]
- b) Discuss effect of Noise pollution on Task performance and cardiovascular system. [8]

P.T.O.

Q5) a) What is traffic Noise survey. How it is carried out? [8]

b) Discuss legal provisions enacted to avoid Noise pollution in India. [8]

Q6) Write note on: [18]

a) Noise Impact assessment study.

b) Noise control methods.

c) Various stages to environmental noise management.



Total No. of Questions : 8]

SEAT No. :

P4623

[5060]-42

[Total No. of Pages : 2

M.E. (Civil)

WATER RESOURCE & ENVIRONMENTAL ENGINEERING

Ground Water Modelling

(2012 Pattern) (Elective - III) (501611)

Time : 3 Hours]

[Max. Marks : 100

Instructions:

- 1) *Answer all questions from Section I and all questions from Section II.*
- 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) *Assume suitable data, if necessary.*
- 6) *All questions are compulsory.*

SECTION - I

- Q1)** a) Write in brief unit hydrograph. [10]
b) Discuss types of aquifers. [5]
- Q2)** a) Discuss in detail ground water movement sub-surficial. [10]
b) Short note on aquifer System. [5]
- Q3)** a) Essay on seepage from surface water recharge. [5]
b) Note on vertical sub surface water distribution. [5]
- Q4)** a) Describe in brief how budgetting is made for water. [5]
b) Write a note on water Logging. [5]

P.T.O.

SECTION - II

- Q5)** a) Note on parameters for groundwater development. [10]
b) Limitations of ground water modelling by FEM. [5]
- Q6)** a) Discuss in detail ground water modelling. [10]
b) Sources of Error in modelling. [5]
- Q7)** a) Discuss the Misuse of models for ground water. [5]
b) Limitations in ground water flow modelling. [5]
- Q8)** a) Details of mathematical modelling for ground water. [5]
b) Note on data requirement for ground water modelling. [5]



Total No. of Questions : 8]

SEAT No. :

P4624

[5060]-43

[Total No. of Pages : 2

M.E. (Civil)

WATER RESOURCES & ENVIRONMENTAL ENGINEERING

Industrial waste Management

(2012 Course) (Elective - III) (Semester - II) (501611D)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate Answer books.*
- 2) *Attempt any three question from each sections.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of calculator is allowed.*
- 6) *Assume Suitable data if necessary.*
- 7) *Use data sheet.*

SECTION - I

- Q1)** a) Explain preliminary, primary and secondary treatment of industrial waste water. [8]
- b) Explain oxygen sag curve. [8]
- Q2)** a) Explain adsorption process for removal of chromium from industrial waste water. [8]
- b) Explain method for removal of Nickel from waste water. [8]
- Q3)** a) What are different technique for waste minimization. [8]
- b) What are different biological process for treatment of waste water. [8]
- Q4)** a) Design ETP for industrial waste water having capacity of 500 m³/d, BOD of I/F water is 300 mg/L, COD =10,000 mg/L, Y=0.5, Kd=0.02/day, MLSS=8,000 mg/L, Return sludge Concentration = 15,000 mg/L. [10]
- b) Write short note on digester. [8]

P.T.O.

SECTION - II

- Q5)** Draw flow diagram for treatment of waste water for dairy industry and explain how the waste Generated from each units. **[16]**
- Q6)** Explain characteristics of steel industries and state different method for disposal of Waste. **[16]**
- Q7)** Explain necessity of CETP. Enlist function of each unit in CETP. **[18]**
- Q8)** a) Explain membrane process and its applications. **[8]**
- b) What is role of MPCB in controlling pollution from industrial waste water. **[8]**



Total No. of Questions :8]

SEAT No. :

P4625

[5060]-44

[Total No. of Pages :2

M.E. (Civil -Water Resources and Environmental Engineering)
ENERGY AND ENVIRONMENT
(2008 Course) (Semester - II) (501612) (Elective- IV)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) Answer any 3 questions from each section.*
- 2) Figures to the right indicate full marks.*
- 3) Assume suitable data if necessary clearly mentioning the same.*
- 4) Use of non-programmable scientific calculator is allowed.*

SECTION - I

- Q1)** a) Discuss the pollution potential of conventional energy sources. Explain in detail the means of overcoming these ill effects of conventional energy sources. **[8]**
- b) Explain in detail: the development of a country is assessed by its energy availability. Justify your answer with comparing developed and developing countries. **[8]**
- Q2)** a) Explain in detail tidal energy and hydrogen as sustainable energy sources. Comment on tidal power potential in India. **[8]**
- b) Compare conventional & non conventional energy sources from techno-economic & sustainability point of view. **[8]**
- Q3)** a) Explain in detail the status of solar energy in India. Support your answer with current status in India, its advantages, disadvantages. **[8]**
- b) Explain current R&D activities in non conventional energy sector in India. **[8]**
- Q4)** a) Explain in detail the importance of public participation in sustainable energy management. **[9]**
- b) Explain what you understand by socio-environmental impact assessment with an example of solar pumps in tribal areas for GW withdrawal. **[9]**

P.T.O.

SECTION-II

- Q5)** a) Explain in detail why biogas should be considered as one of the better options for overcoming energy crisis in India. [8]
- b) Explain in detail: environmental impacts of biomass. What are the challenges in the same. [8]
- Q6)** a) Explain various methods of storage of energy produced from non conventional sources. What are the limitations of these methods? [8]
- b) Explain in detail: principles of heat transfer. [8]
- Q7)** a) Explain in detail various energy recovery systems used in industries. [8]
- b) Explain importance of cogeneration plants in sugar industry. [8]
- Q8)** a) Write notes on (any two): [10]
- i) Gas to Liquid Heat Transfer.
 - ii) Non conventional liquid fuels.
 - iii) Recovery of waste heat in coil coating.
- b) Enlist various types of digesters. Explain their peculiarities in detail. [8]

EEE

Total No. of Questions : 8]

SEAT No. :

P5036

[5060]-45

[Total No. of Pages : 3

M.E. (Civil - WREE)

CLOSED CONDUIT FLOW

(2012 Pattern) (Elective - IV) (Semester - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to 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 logarithmic tables slide rule, and non-programmable electronic pocket calculator is allowed.
- 6) Assume suitable data, if necessary and state it.

SECTION - I

- Q1)** a) What are the main and operating characteristics of a centrifugal pump? Outline the laboratory procedure of developing the operating characteristics of the centrifugal pump. [6]
- b) Three reservoirs A,B and C are connected by a pipeline system with a junction at point D.

The relevant data of the system are as follows:

Pipe	Length(m)	Diameter(mm)	Friction Factor	Water surface Elevation (m)
AD	500	600	0.024	$Z_A=155$ m
BD	400	500	0.020	$Z_B=140$ m
DC	300	500	0.025	$Z_C=120$ m

Compute the rate of flow in each of the pipes by taking at least two trials. [12]

P.T.O.

Q2) a) Describe one complete cycle of pressure variation due to water hammer when a valve at the downstream end of the pipe starting from the reservoir is closed completely & rapidly. [6]

b) A 400 mm diameter 6 km long mild steel pipe having wall thickness of 8 mm carries water at the rate of 400 lit/sec. What will be pressure rise in the pipe if the valve at the downstream end is closed instantaneously. Compare the results assuming the pipe to be rigid as well as elastic. Take the modulus of elasticity for steel as $2.47 \times 10^{11} \text{N/m}^2$ and bulk modulus for water as $2.075 \times 10^9 \text{N/m}^2$. What would be the maximum closing time for the computed results to be valid? [10]

Q3) a) Derive the formula for the maximum rise of water level in case of a simple surge tank and the time required to attain this maximum surge. Also obtain the total time required for one complete cycle of surge oscillations. Neglect friction. [8]

b) A simple surge tank of 24 m diameter is connected to a reservoir by means of a pipe 3 m in diameter and 5 km in length. If the turbine flow is suddenly closed when the pipe was carrying a discharge of $60 \text{ m}^3/\text{sec}$, determine the maximum rise of water level in the surge tank and its period of oscillation. [8]

Q4) Explain the following in brief: [16]

- a) Iso-efficiency curves for centrifugal pump.
- b) Method of characteristics solution to water hammer problem.
- c) Differential surge tank.
- d) Thoma's criterion for stability of surge tank.

SECTION - II

- Q5) a)** Explain the use of PIPE 2000 (KY PIPE) program for the solution of pipe network problem. [6]
- b) For the pipe network shown in Fig Q5(b), estimate the flow in each of the pipes. Assume the formula for the loss of head as $h_f = rQ^2$. Take at least three trials. [12]

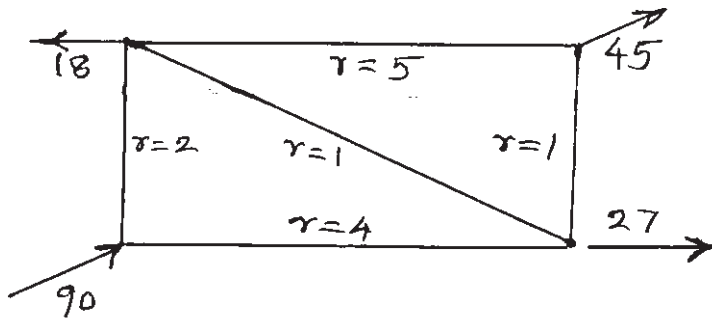


Fig Q.5(b)

- Q6) a)** Derive the basic differential equation of steady gradually varied flow in open channel. [8]
- b) Explain with sketches the characteristics of M_2 , S_2 , H_2 and A_2 GVF profiles of open channel flow. [8]

Q7) A rectangular channel 10 m wide carries a discharge of 50 m³/sec. If at a certain section due to the construction of weir the depth of flow becomes 3:2 m, how far upstream of this section, would the depth of flow be within 90% of the normal depth of flow from NDL. The bed slope of the channel is 1 in 2500 and Manning's roughness co-eff. is 0.015. Use direct step method taking at least three steps. Classify and sketch the resulting profile. [16]

- Q8)** Write short notes on: [16]
- Use of HEC-RAS(HEC₂) program.
 - Transient flow in pipe systems.
 - Ven Te Chow's method.
 - Floodplain hydraulics.



Total No. of Questions : 8]

SEAT No. :

P5037

[5060]-46

[Total No. of Pages : 2

M.E. (Civil) (WREE)

**RESEARCH METHODOLOGY AND INTELLECTUAL
PROPERTY RIGHTS**

(2008 Course) (Semester - II) (Elective - IV)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Attempt any three questions from each section.*
- 2) *Figures to the right indicate full marks.*

SECTION - I

- Q1)** a) State and explain the various steps of research process. [8]
b) State and describe various decision making techniques [9]
- Q2)** a) What is a research design? Explain the objectives of research. [8]
b) What are the features of good research design? [9]
- Q3)** a) Describe various factors affecting choice of data collection methods.[8]
b) Describe in brief the four operations of data processing. [8]
- Q4)** a) What is data analysis? Explain the various methods. [8]
b) Explain various steps involved in preparing research proposal. [8]

P.T.O.

SECTION - II

- Q5)** a) Explain how the genetic algorithm is useful in decision making? [8]
b) Explain various steps involved in report writing. [9]
- Q6)** a) State and explain various techniques of interpretation. [8]
b) Describe the various steps involved in the process of obtaining patent. [9]
- Q7)** a) What is the Patent Cooperation Treaty (PCT)? [8]
b) Differentiate between geographical indication and a trademark. [8]
- Q8)** a) What conditions must be met to obtain patent protection? [8]
b) What is the procedure to obtain international patent? [8]

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Total No. of Questions :8]

SEAT No. :

P4597

[Total No. of Pages :2

[5060] - 5

M.E. (Civil - Environmental Engg.)

PRINCIPLES AND DESIGN OF BIOLOGICAL TREATMENT SYSTEM

(2008 Course) (Elective - II (B)) (Semester - I) (501505)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) Answer any 3 questions from each section.*
- 2) Figures to the right indicate full marks.*
- 3) Your answers will be valued as a whole.*
- 4) Assume suitable data, if necessary.*
- 5) Use of electronic pocket calculator and steam table is allowed.*

SECTION - I

- Q1)** a) Explain Objectives and significance of Biological treatment. [7]
b) Explain kinetic of Biological Growth. What the factors affecting to it?[10]
- Q2)** Give note on: [16]
a) Attached and Suspended growth.
b) Biodegradability Assessment.
- Q3)** a) Discuss and explain the factors affecting the choice of reactors. [10]
b) Discuss about Biological characteristics of wastewater. [7]
- Q4)** a) For a wastewater inflow of 9000 m³/day proposed to be treated in primary settling tank of not more than 2.25 hours detention time. Estimate the surface loading rate permissible for use. Assume side water depth of tank = 3m. [10]
b) Give explanatory note on Flow measurement. [7]

P.T.O.

SECTION - II

- Q5)** a) Give notes on followings **[14]**
- i) Trickling Filters.
 - ii) S.B.R.
 - iii) Stabilization pond
- b) Give the Eckenfelder's equation. **[3]**

- Q6)** a) Explain in detail with sketch Expanded Granular Sludge Bed (EGSB). **[7]**
- b) Design a gravity thickener for a wastewater treatment plant having primary and waste activated sludge with the following characteristics. **[10]**

Type of sludge	Specific Gravity	Solids in Percentage	Flow Rate (M ³ /day)
Average Design conditions			
Primary Sludge	1.03	3.3	400
Waste Activated	1.005	0.2	2250
Peak Design conditions			
Primary Sludge	1.03	3.4	420
Waste Activated	1.005	0.23	2500

- Q7)** a) Give note on Disposal of Digested sludge. **[4]**
- b) Explain about working of septic tank. **[4]**
- c) Give note on Anaerobic Filters. **[4]**
- d) Trickling filters. **[4]**
- Q8)** a) Explain with any one case study on sludge management facilities. **[9]**
- b) Explain with suitable example the trouble shooting. **[8]**



Total No. of Questions :10]

SEAT No. :

P4626

[5060]-51

[Total No. of Pages :3

**M.E. (Mechanical) (Heat Power)
TECHNOLOGY AND FINANCIAL MANAGEMENT
(2008 Course) (Semester- I) (502103)**

Time : 3 Hours]

[Max. Marks :100

Instructions to candidates:

- 1) Answer any three questions from each section.*
- 2) Answers 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)** Explain different types of following long term finance: **[10]**
- i) Preference shares.
 - ii) Debentures.
- b) Distinguish between ‘Investment decision ‘and Financing decision as functions of Finance? **[6]**
- Q2)** Describe the scope and importance of finance function in the management of a corporation. **[16]**
- Q3) a)** Explain with example, how the costs are classified based on the following: **[8]**
- i) Controllability.
 - ii) Function.
- b) Differentiate between cost control and cost reduction. Explain in brief initiation of cost reduction program. **[8]**
- Q4) a)** What are the distinctive characteristics of process costing? Explain. **[8]**
- b) Explain what is meant by Break even analysis along with the assumptions. **[8]**
- Q5)** Explain the theory of consumer’s demand with the help of indifference curve analysis. Explain in detail with suitable examples. **[18]**

P.T.O.

SECTION-II

Q6) a) Define JIT production system. Explain the pre-requisites of implementing JIT. **[8]**

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

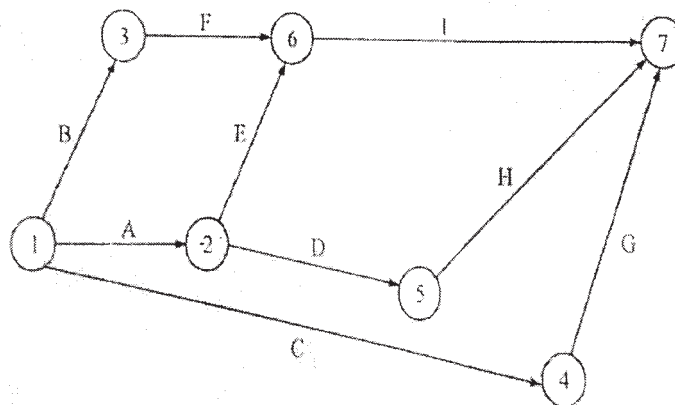
Q7) What is ISO 14000? Explain the importance and different clauses involved in it. **[16]**

Q8) a) Explain the concession package structure used in project management? **[8]**

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

Q9) The following network diagram represents activities associated with a project: **[18]**

Activities	A	B	C	D	E	F	G	H	I
Optimistic time, t_o	5	18	26	16	15	6	7	7	3
Pessimistic time, t_p	10	22	40	20	25	12	12	9	5
Most likely time, t_m	8	20	33	18	20	9	10	8	4



Determine the following:

- a) Expected completion time and variance of each activity.
- b) The earliest and latest expected completion time of each event.
- c) The critical path.
- d) The probability of expected completion time of the project if the original scheduled time of completing the project is 41.5 weeks.
- e) The duration of the project that will have 95 per cent chance of being completed.

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

b) State applications, limitation and advantages of CPM and PERT. **[8]**

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Total No. of Questions : 10]

SEAT No. :

P4627

[5060]-52

[Total No. of Pages : 2

M.E. (Mechanical) (Design Engg.)

MATERIAL HANDLING AND EQUIPMENT DESIGN

(Semester - I) (2008 Course) (Elective - II) (502205A)

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 electronic pocket calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Explain benefits of better Material handling with its Productivity improvement. [8]
- b) Classify the Material handling system? [8]
- Q2)** a) What is the interrelation between Plant layout and other organization function? [8]
- b) What are the basic analytical techniques for MH? [8]
- Q3)** a) Give Unit Load concept for MH? [8]
- b) What is Packing and storage of material handling systems? [10]
- Q4)** a) Explain hoisting gear during transient motion. [8]
- b) Explain how to decide breaking torque for hoisting gear operation? [8]

P.T.O.

- Q5)** a) Explain overhead crane with design requirements. [8]
b) Explain: [8]
i) Stability in rotary cranes.
ii) EOT.

SECTION - II

- Q6)** a) Give general design procedure for rope design? [8]
b) What are the different attachments used in MH. [8]
- Q7)** a) Explain Bucket elevator with its application. [8]
b) Explain design considerations for chain conveyor. [8]
- Q8)** a) What is rotary conveyer? Explain it in detail? [8]
b) What is the objective of automation in MH system? [8]
- Q9)** a) Discuss Safety rules and regulation for Cranes. [8]
b) What is concept of cabin conveyor? [10]
- Q10)**a) Write short notes on: [8]
i) Need of AGVs.
ii) Warehouse Automation.
b) Why storage and ware house planning is required for automotive industry. [8]

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Total No. of Questions : 10]

SEAT No. :

P4628

[5060]-53

[Total No. of Pages : 3

**M.E. (Mechanical) (Design Engg.)
PROCESS EQUIPMENT DESIGN
(2008 Pattern) (Semester - I) (Elective - II) (502205)**

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) *Your answer will be valued as a whole*
- 6) *Use of logarithmic tables, slide rules, Mollier chart, electronic steam table and electronic pocket calculator and steam table is allowed*
- 7) *Assume suitable data, if necessary giving reasons.*

SECTION - I

Q1) a) Explain significance of following preliminaries in process equipment design. **[8]**

- i) Dilation of pressure vessel.
- ii) Design stress.
- iii) Weld joint efficiency.
- iv) Corrosion allowance.

b) A storage tank 8 m in diameter and 9.5 m in height has to be provided with self supported conical roof. The slope of self supported conical roof is 1 in 5. Roof is subjected to a superimposed load of 118 kg/m². Density of plate material is 7500 kg/m³. $E = 2 \times 10^6$ kg/cm². Calculate minimum thickness required for fabrication of self supported conical roof. **[8]**

Q2) a) What is intragranular corrosion and stress corrosion? Explain the ways to avoid or reduce these types of corrosion. **[8]**

P.T.O.

- b) Explain the method for calculating thickness of torispherical head subjected to i. internal and external pressure. [8]
- Q3)** a) Explain skirt supports and design aspect related t them. [8]
b) Describe gasket factor? Explain gasket selection and classification. [8]
- Q4)** a) A pressure vessel is to be designed for an internal pressure of 0.8N/mm^2 . The vessel has nominal diameter of 1.3 m. The material used for vessel has permissible stress of 150N/mm^2 . If the weight of vessel and its content is 3000 kg and torque due to offset piping is 550 N.m. Find stresses due to combined loading. [10]
b) Explain reinforcement of nozzles. [6]
- Q5)** Write short notes on: [18]
a) Expansion joint used in process piping systems.
b) Floating roof type storage tank.
c) Protective coatings and their applications.

SECTION - II

- Q6)** a) Explain design considerations for shell and tube heat exchanger. [8]
b) Differentiate between vacuum filters and centrifugal filters. Explain either rotary disc filter or leaf filter. [8]
- Q7)** a) What are the types of baffles used in heat exchanger? [6]
b) Explain effect of wind load and seismic load on tall vessels. [6]
c) What types of loses are possible in storage of volatile liquids. [4]

- Q8)** a) Explain important features of packed or plate columns. [8]
b) With neat sketches explain construction, working and main design considerations of rotary drier. Give it's applications. [8]
- Q9)** a) Give classification of vacuum pumps or explain any one metering pump. [8]
b) What are integral, fabricated and formed nozzles. [8]
- Q10)** Write short notes on: [18]
a) Types of agitators.
b) Vacuum Crystallizer.
c) Process flow diagrams.

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Total No. of Questions :10]

SEAT No. :

P4629

[Total No. of Pages :4

[5060] - 55

M.E. (Mechanical - Design Engg.)

ADVANCED MACHINE DESIGN

(2008 Course) (Semester - II) (502209)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

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

SECTION - I

- Q1) a)** Derive an expression for maximum space efficiency of helical spring. **[6]**
- b) A semi - elliptic multi - leaf spring is used for the suspension of vehicle. It consist of two extra full length leaves & ten graduated length leaves including the master leaf. The centre - to - centre distance between the spring eyes is 1.2m. The leaves are made of steel ($S_{yt} = 1500 \text{ N/mm}^2$) and ($E = 207000 \text{ N/mm}^2$). The spring is to be designed for a maximum force of 30 KN. The leaves are prestressed so as to equalize stresses in all leaves. **[10]**

Assume factor of safety is 2.5, Determine:

- i) The cross section of leaves.
 - ii) The deflection at the end of spring.
- Q2) a)** What is the cumulative fatigue damage? How the life of component subjected to different values of fluctuating stresses in cycle is estimated. **[6]**

P.T.O.

- b) The work cycle at mechanical component subjected to completely reversed bending stress consists of following three elements: [10]
- i) $\pm 350 \text{ N/mm}^2$ for 85% time
 - ii) $\pm 400 \text{ N/mm}^2$ for 12% of time and
 - iii) $\pm 500 \text{ N/mm}^2$ for 3% of time

The material for component is SoC_4 ($S_{ut} = 660 \text{ N/mm}^2$) & the corrected endurance limit at the component is 280 N/mm^2 . Determine life at the component.

Q3) a) Explain the following terms in context with creep: [8]

- i) Estimated time to rupture.
- ii) Stress relaxation.

- b) A cantilever beam has a rectangular cross - section 40 mm wide and 80 mm deep. The length is 2500 mm. The load acting at free end is 2000 N. The material is 0.35 carbon steel with $n = 8$ and $B = 40 \times 10^{-35} (\text{cm}^2 / \text{N})^n$ per day. Find the permanent deflection after 10 years of service. [8]

Q4) a) Write in short about composite material & increasing use of these materials in mechanical engineering with specific application. [6]

- b) A unidirectional reinforced composite of ‘Toray’ filament & ‘Nameo’ resin has the following moduli and poisson’s ratio. $E_{xx} = 181 \text{ GPa}$; $E_{yy} = 10.3 \text{ GPa}$; $\nu_{xy} = 0.0159$; $G_{xy} = 7.17 \text{ GPa}$, $(1 - \nu_{xy} U_{yx})^{-1} = 1.045$.

Estimate the components of moduli for an off. axis orientation of.

- i) $\theta = + 30^\circ$
- ii) $\theta = + 45^\circ$ [10]

Q5) Write short note on the following: [18]

- a) Vibration and surging of helical springs.
- b) Design for manufacturing and assembly.
- c) Regression analysis.

SECTION - II

- Q6)** a) How do you identify the optimum solution in the simplex method. [6]
b) The shaft has to transmit 1500 N.m at torque & have rigidity of 90 N.m/degree with factor of safety 1.5. Find optimum dimension of shaft from minimum weight consideration.

Use following data for materials.

[10]

Material	Weight Density N/m ³	σ_P N/mm ²	G N/mm ²
Chrome steel	1×10^{-4}	420	84×10^3
Stainless steel	1.5×10^{-4}	230	84×10^3
Titanium alloys	0.6×10^{-4}	910	84×10^3
Magnesium alloys	0.2×10^{-4}	224	12×10^3

- Q7)** a) What is need of profile corrections of gears. Explain how it is carried out. [6]
b) Two 10 teeth gears are to mesh without undercutting. The gears are generated using standard hob with 20° pressure angle. Module is 4 mm and clearance is 0.2 mm. Using extended centre distance method findout,
i) Hob shift
ii) Blank diameter & depth of cutter setting
iii) Actual pressure angle.

Take usual notations;

$$\theta = \text{inv } \phi$$

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

Where, $\nu = \sqrt[3]{3\theta}$, θ & ϕ are in radians.

[10]

Q8) a) Explain fault tree analysis. **[8]**

b) Prove that reliability with respect to time 't' is **[8]**

$$R(t) = \text{Exp} \left[-\int_0^t h(t) dt \right].$$

Q9) a) Why 'I' section is selected for connecting rod at high speed I.C. Engine. **[6]**

b) It is required to design cast iron piston for 4 stroke engine with following specifications: **[10]**

Cylinder bore diameter = 100 mm

Stroke length = 120 mm

Max. gas pressure = 5 N/mm²

Brake mean effective pressure = 0.65 N/mm²

Fuel consumption = 0.227 kg/KW/ hr

Speed at engine = 2200 rpm

Assume suitable data if required.

Q10) Write a short note on following: **[18]**

a) Elastic stress analysis of composite material.

b) S and S₀ spur gears.

c) Analysis of variance (ANOVA).



Total No. of Questions : 10]

SEAT No :

P4630

[5060]-56

[Total No. of Pages : 3

M.E.(Mechanical) (Design Engineering)
RELIABILITY ENGINEERING
(2008 Course) (Semester - II)

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) *Assume suitable data, if necessary.*
- 5) *Figures to the right indicate full marks.*
- 6) *Use of non-programmable electronic calculators is allowed.*

SECTION - I

- Q1) a)** Following table shows the test results of 1,000 machine components, tested simultaneously. Evaluate: Hazard rate, failure density function and reliability. **[10]**

Operating Time (Hrs.)	0	100	200	300	400	500	600	700	800	900	1000
No. of Surviving Components	1000	870	790	640	630	610	580	540	400	384	360

- b) Explain the importance of Reliability with any practical application. **[6]**
- Q2) a)** Explain the central limit theorem with practical example. **[8]**
- b) The failure time of mechanical element follows Weibull distribution with $\beta = 3$, $\eta = 2500$ and $l = 1000$. Find the reliability of the element and the failure rate for an operating time of 3000 Hours. Derive the formula used. **[8]**
- Q3) a)** What is Redundancy? Explain different types of Redundancy with examples. **[8]**
- b) Explain Cut set and Tie set method with one practical example. **[8]**

P.T.O.

- Q4)** a) Define :availability and maintainability. How “Operational availability” is different from “inherent availability”? [8]
- b) The random variations with respect to time in the output voltage of a particular system are exponentially distributed with a mean value of 100 V. What is the probability that the output voltage will be found at any time to lie in the range 90-100V? [8]

Q5) Write the short note on following (Any Three): [18]

- Reliability Engineering Tools.
- Bay’s Rule.
- Chebyshev inequality.
- MTBF and MTTF.
- Markov Analysis.

SECTION - II

Q6) a) Write a note on minimum effort method stating its advantages, limitations and applications. [8]

- b) A system consists of four subsystems A,B,C & D having failure rates 0.007, 0.005, 0.004 & 0.003 respectively per hour. If the mission time is 110 hours & the system reliability required is 0.91, find the failure rate as well as reliability of each subsystem for the entire mission using ARINC method. [8]

Q7) a) What is meant by ALT? Explain the procedure to conduct it with its advantages and limitations. [8]

- b) The block diagram given below in Figure 1 represents a system. The reliabilities of its elements A to F are also given in the block diagram. Find out the reliability of the system and construct Fault Tree Diagram. If reliabilites of A and D are changed to 0.9, what will be the new reliability of the system? Write the minimal tie sets. [8]

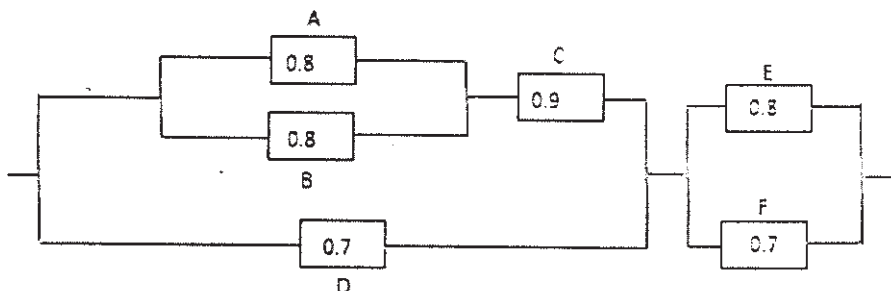


Figure 1

Q8) a) Explain importance of Monte Carlo evaluation technique and its applications. **[8]**

b) A system consists of four components connected in series with reliabilities 0.85, 0.9, 0.8, 0.95. Find the system reliability. It is desired that reliability of system should be 0.65. How this should be apportioned in four units using minimum effort method? **[8]**

Q9) a) Explain about reliability predictions from predicted unreliability with the help of an example. **[8]**

b) A beam is subjected to tensile stresses of mean stress value 276 MPa and standard deviation of 40 MPa. The beam is made up of cold rolled steel is having mean tensile yield strength of 377 MPa and standard deviation of 30 MPa. Assume normal distribution and find the reliability and the average value of factor of safety of the beam. The extract of the standard normal table is given below. **[8]**

Z	2.0	2.01	2.02	2.03	2.04	2.05	2.06	2.07
$\phi(Z)$	0.9772	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808

Q10)a) A company manufactures the crank pins of 16.46mm average outer diameter and standard deviation of 0.462mm, normally distributed. The QC department requires a report on **[10]**

- i) The percentage of pins between 16.76 mm and 16.46 mm diameter.
- ii) The percentage of pins below 16.28mm diameter.

Z	0.07	0.08	0.09	0.1	0.11	0.12	0.13	0.14	0.15	0.16
$\phi(Z)$	0.0279	0.0319	0.0359	0.0398	0.0438	0.0478	0.0517	0.0557	0.0596	0.0636

b) Explain the need of criticality analysis and procedure to do it with the help of an example of any failure. **[8]**



Total No. of Questions : 8]

SEAT No :

P4631

[5060]-57

[Total No. of Pages : 2

**M.E. (Mechanical - Design Engineering)
ENGINEERING FRACTURE MECHANICS**

(2008 Course) (Elective - III) (502211-B) (Semester - II)

Time :3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two Sections should be written in separate answer books.*
- 2) *Neat diagrams must be drawn wherever necessary. 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.*

SECTION - I

Solve any 2 Questions out of Questions 1,2 and 3. Question 4 is Compulsory.

Q1) Classify and explain modes of fracture with neat sketch. **[16]**

Q2) Explain the measures of fracture toughness. **[16]**

Q3) A wide sheet of aluminium alloy has a central crack 14 mm long. If the fracture stress for the sheet is 140 MPa and yield stress of the material is 240 MPa. Calculate the fracture toughness of the material using plastic zone correction. **[16]**

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

- a) Mechanism of crack initiation.
- b) Ductile fracture,
- c) Brittle fracture.

SECTION - II

Solve any 2 Questions out of Questions 5,6 and 7. Question 8 is Compulsory.

Q5) Explain with neat sketch the constant amplitude and variable amplitude fatigue testing. **[16]**

P.T.O.

Q6) Explain the effect of load sequencing on the fatigue life do an aluminium alloy **[16]**

Q7) Explain leak before break criteria in fracture mechanics. **[16]**

Q8) Explain experimental methods of evaluating fracture toughness. **[18]**



Total No. of Questions :10]

SEAT No. :

P4632

[5060]-59

[Total No. of Pages :2

M.E. (Mechanical) (Design Engg.)

VEHICLE DYNAMICS

(2008 Course) (Semester- II) (502212-A) (Elective - IV)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answer any three questions from each section.*
- 2) *Figures to the right indicate full marks.*
- 3) *Use of electronic calculator is allowed.*
- 4) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) Explain in brief the combined pitch and bounce motion an application to multi wheel station vehicles. [6]
- b) The sprung parts of a passenger car weigh 22 kn and the unsprung parts weigh 810 N. The combined stiffness of the suspension springs is 38.5 KN/m and that of the tires is 514 KN/m. Determine the two natural frequencies of bounce motion of the sprung and unsprung mass. [10]
- Q2)** a) Explain Kinematic behavior of vehicles with rigid wheels and with compliant tires. [8]
- b) Describe the frequency weightings for whole-body vibration with example. [8]
- Q3)** a) Explain the test carried out for determining handling characteristics of vehicle? [6]
- b) A rear engine rear wheel drive passenger car has a mass of 1100 kg. The weight distribution on the front axle is 41% and that on rear axle is 59% under static condition. If cornering stiffness each of the front tires is 33 KN/rad and that of rear tires is 38 KN/rad determine the steady state handling behavior of the vehicle. If the vehicle has wheel base of 2.4 m find critical/ characteristics speed of vehicle. [10]
- Q4)** Explain the significance of steer angle and Derive an expression for the steer angle δ_f required to negotiate a given turn with usual notations. [16]

P.T.O.

Q5) Write Short Notes on: **[18]**

- a) Effect of wheelbase in road and suspension modeling.
- b) Two degrees of freedom vehicle model for pitch and bounce.
- c) Natural frequency and damping in yaw.

SECTION-II

Q6) The sprung parts of a passenger car weigh 9.5 kN and the unsprung parts weigh 850 N. The combined stiffness of the suspension springs is 41.5 kN/m and that the tires is 551.3 kN/m. Determine the two natural frequencies of bounce motion of the sprung and unsprung mass. Derive the formula used. **[16]**

Q7) a) Explain two degree of freedom theory to include effects of traction and braking. **[8]**

b) Explain in Brief the analysis of sprocket torques and speeds, required to skid steer a tracked vehicle **[8]**

Q8) Explain with the help of labeled sketch mechanism and handling of tracked vehicle (military vehicle). **[16]**

Q9) a) Explain two degree of freedom theory to include effects of traction and braking. **[8]**

b) Explain in brief the analysis of sprocket torques and speeds, required to skid steer a tracked vehicle. **[8]**

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

- a) Frequency response of road vehicle in yaw.
- b) Frequency response function.
- c) Skid steering.

EEE

Total No. of Questions :10]

SEAT No. :

P4633

[5060]-60

[Total No. of Pages :2

M.E. (Mechanical) (Design Engineering)

INDUSTRIAL TRIBOLOGY

(2008 Course) (Semester - II) (502212 -B) (Elective - IV)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answer any three questions from each section.*
- 2) *Figures to the right indicate full marks.*
- 3) *Use of electronic calculator is allowed.*
- 4) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) What is friction? Explain the causes of friction and the laws of friction. **[8]**
b) What is wear? Explain factors affecting wear rate. **[8]**
- Q2)** a) Derive expression for flow rate through rectangular slot in Hydrostatic bearings. What are the assumptions made while deriving the equation? **[8]**
b) Differentiate between hydrostatic bearing and hydrodynamic bearing. **[8]**
- Q3)** Derive full Reynolds equation for hydrodynamic action with assumptions. **[16]**
- Q4)** a) Explain the mechanism of pressure development in hydrodynamic thrust bearing. **[8]**
b) What is lubrication? Explain the properties of lubricants. **[8]**
- Q5)** Write a note on following (Any Three): **[18]**
a) Lubrication Regimes.
b) Petroff's equation.
c) Wear prevention.
d) Tribological Properties of bearing materials.

P.T.O.

SECTION-II

Q6) a) Derive the expression for the pressure distribution, load carrying capacity and time of approach for rectangular plate near a plane under hydrostatic squeeze film lubrication. [8]

b) Give six practical examples of squeeze film lubrication. [8]

A rectangular plate having length to width ratio of 0.25 is approaching towards a fixed plane with an initial oil-film thickness between the plate and plane as 0.05 mm. Load supported by plate is 12 KN for 4 seconds. The Viscosity of oil is 35 cP. Calculate bearing length and width for final oil film thickness as 0.01 mm. Also find Velocity of approach, maximum pressure value.

Q7) a) State basic requirements of gas lubrication. State the advantages and limitations of gas lubricated bearings. [8]

b) Explain the phenomenon of Elastohydrodynamic lubrication (EHL) and state the applications where EHD lubrication is observed. [8]

Q8) a) Explain the mechanics of tyre road interactions. [8]

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

Q9) For non - Newtonian behavior of lubrication oils explain the following: [16]

- a) Bingham fluids
- b) Thixotropy
- c) Pseudo plastic flow
- d) Dilatancy
- e) Elasticity

Q10) Write a short note on (Any THREE): [18]

- a) Road grip and rolling resistance.
- b) Porous bearing.
- c) Lubrication in metal working.
- d) Piston pin lubrication.

EEE

Total No. of Questions : 8]

SEAT No. :

P4634

[5060]-62

[Total No. of Pages :2

**M.E. (Mechanical-Heat Power Engineering)
PERFORMANCE ASSESSMENT OF MECHANICAL
EQUIPMENTS
(2008 Course) (Elective-I) (502104-A) (Semester-I)**

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) Answers any three 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 and mention it clearly.*

SECTION-I

- Q1)** a) What is mean by boiler and steam system? List energy saving opportunities. **[6]**
- b) Explain various types of steam traps with neat diagrams. **[10]**
- Q2)** a) List various heat exchangers in cogeneration system. Explain any two in details. **[8]**
- b) With neat schematic, explain boiler blow down heat-recovery system. Write steps to determine the annual savings for blow down heat-recovery system. **[8]**
- Q3)** a) What are the various waste heat qualities? List the waste heat recovery devices used in thermal power plant. **[8]**
- b) Compare direct and indirect method of boiler efficiency calculation. What are the merits and demerits of these methods? **[8]**
- Q4)** Estimate the thermal efficiency of boiler using indirect method with the following data. **[18]**

Fuel consumption: 500 kg/h

Steam generation rate: 1800 kg/h

Calorific value: 41500kJ/kg

P.T.O.

Steam generation pressure: 1 MPa at saturated
Chemically correct air-fuel ratio: 15.5:1
Excess air supplied: 26%
Exhaust gas temperature & its specific heat: 300°C & 1.05kJ/kgK
Boiler surface temperature:60°C
Boiler surface area: 50 m²
Ambient temperature : 30°C
Feed water temperature: 80°C
Heat transfer coefficient from outer surface of boiler: 8 W/ m²K
Ultimate analysis of fuel: C = 84%, H = 12%, S = 3%, O₂=1%.
You may assume additional data if necessary.

SECTION-II

- Q5)** a) Describe the method to estimate free air delivery of compressor using nozzle method. [8]
b) Discuss the procedure of performance evaluation of furnace. [8]
- Q6)** a) Explain the pumping system components. Discuss the energy conservation opportunities in pumping systems. [8]
b) List and discuss the energy conservation opportunities in compressed air systems. [8]
- Q7)** a) Explain the energy conservation opportunities in compressed air systems. [8]
b) Explain the step by step procedure of energy performance assessment of DG sets. [8]
- Q8)** Explain the following: [18]
a) Heat pumps.
b) Applications of fans in HVAC.
c) Heat wheels.



Total No. of Questions : 8]

SEAT No. :

P4635

[5060]-63

[Total No. of Pages : 3

M.E. (Mechanical Engg.) (Heat Power)

REFRIGERATION TECHNOLOGY

(2008 Course) (Semester - I) (502104-B) (Elective - I)

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 answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary and mention it clearly.*
- 6) *Use of logarithmic tables, slide rule, Mollier charts, non programmable electronic pocket calculator is allowed.*

SECTION - I

Q1) a) A refrigeration system using R134a as refrigerant consist of three evaporators, E1, E2, E3 of capacities 10TR at -5°C , 20 TR at 0°C and 20TR at $+5^{\circ}\text{C}$ respectively. The vapours leaving the three evaporators are dry and saturated. The system is provided with individual compressors and individual expansion valves. The condenser temperature is 40°C and the liquid refrigerant leaving the condenser is subcooled by 10°C . Assume isentropic compression in each compressor. **[12]**

Draw the schematic for this system and show the cycle on p-h diagram.

Determine

- i) Mass of the refrigerant flowing through each evaporator.
 - ii) The power required to drive the compressors.
 - iii) COP of the system.
- b) Explain various refrigerant blends used in refrigeration systems. **[6]**

Q2) a) What is the effect of lubricant-refrigerant miscibility on the refrigerant system performance? List and explain lubricants used for compressors in refrigeration system. **[8]**

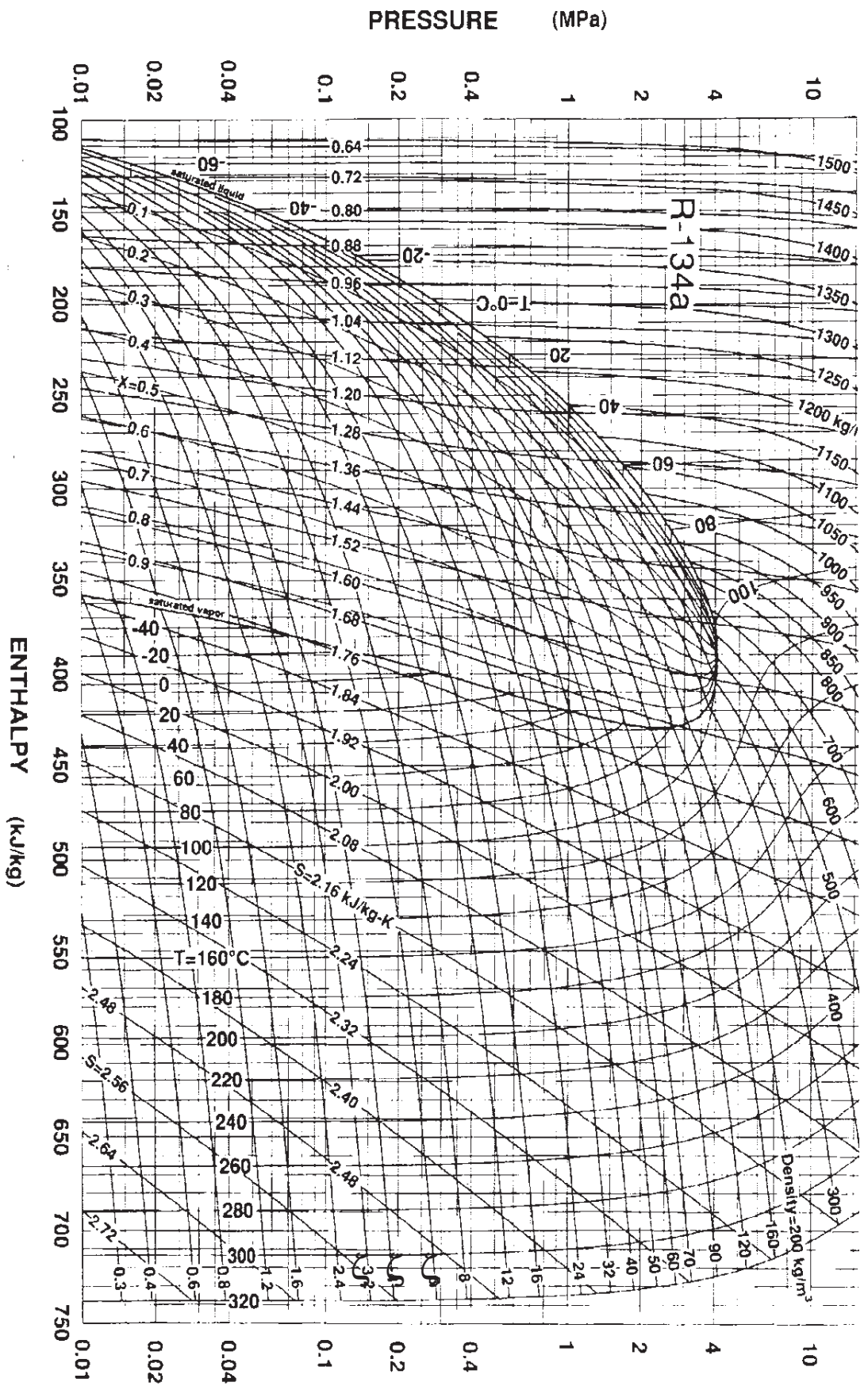
b) With neat diagram explain cascade system for manufacturing dry ice. **[8]**

P.T.O.

- Q3)** a) Explain triple effect vapour absorption refrigeration systems. [10]
b) Explain the working of thermos-acoustic refrigeration system. [6]
- Q4)** a) Illustrate the thermodynamic analysis of ammonia-water vapour absorption system. [9]
b) Explain Steam jet refrigeration system. Derive the expression for finding the mass of motive steam required per kg of water vapour produced. [7]

SECTION - II

- Q5)** Consider a refrigeration system for cold storage which require to maintain +5°C and –20°C. Select the type of refrigeration system, refrigerant, compressor, heat exchangers, expansion device, and other accessories. Justify your selection. [18]
- Q6)** a) Explain principles of refrigerant piping design. [6]
b) Explain working of scroll compressor. [6]
c) Explain different methods of starting induction motor. [4]
- Q7)** a) Give the selection criteria for TXV and capillary tube. [8]
b) Why HP/LP are used in refrigeration system? Give its working details. [8]
- Q8)** a) What are the demerits and merits of variable speed drive? [6]
b) Explain refrigerant charging procedure. [6]
c) Why filter/dryer is used in refrigeration system? [4]



Total No. of Questions : 8]

SEAT No. :

P5039

[5060]-64

[Total No. of Pages : 3

M.E.(Mechanical-Heat Power)
ENERGY CONSERVATION AND MANAGEMENT
(2008 Course)(Semester-I)(Elective-I)

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) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) Explain the principle of fluidized bed combustion and pulverized fuel combustion. **[8]**
- b) List the energy conservation measures in improving the boiler efficiency without investment **[8]**
- Q2)** a) For a diesel fired boiler operating at 100 bar the steam generation rate is 10 Tons per hour and its efficiency on GCV basis is 85%. If the quality of steam generated is dry saturated and the enthalpy of feed water is 100 kJ/kg, calculate the fuel consumed per hour assuming gross calorific value of diesel as 44MJ/kg. **[10]**
- b) Discuss various types of losses in a boiler. What is the single major heat loss in a boiler? **[8]**
- Q3)** a) What do you understand by intermittent and continuous furnace? What are the parameters to be considered in the design of an efficient furnace? **[10]**
- b) List down the adverse impacts of operating a furnace at a temperature higher than that required. **[6]**

P.T.O.

- Q4) a)** Draw the schematic of steam turbine and gas turbine based cogeneration options. Explain each of them in brief. **[10]**
- b) Explain the following terms: **[6]**
- i) Heat to power ratio
 - ii) Cogeneration system efficiency.

SECTION-II

- Q5)** Explain any three of the following **[18]**
- a) Key features of Electricity Act 2003
 - b) Energy Efficient Lamps
 - c) System Distribution losses
 - d) Cost benefits of PF improvement
 - e) Power factor improvement
- Q6) a)** Write notes on (any two) **[8]**
- i) Lighting levels in various applications.
 - ii) Efficient options in lighting system.
 - iii) Energy efficient windows.
- b) A cogeneration system installation is expected to reduce an annual company's bill by Rs. 20 Lacks. If the capital cost of the new cogeneration installation is Rs. 60 Lacks & Rs. 5 Lacks per year on an average required maintaining & operating plant. Calculate simple payback period & % return on Investment (%ROI). What is the future value of Rs.1,000/- after 3 years if the interest rate is 10%? **[8]**
- Q7) a)** List the factors affecting on energy efficiency of electric motors. Explain the speed control of electric motors. **[8]**
- b) What are different Energy Conservation Opportunities in HVAC system? **[8]**

- Q8)** a) Write short notes on: **[8]**
- i) CDM projects
 - ii) Carbon credit calculation
- b) Explain concept of cogeneration with sketch. List the advantages and limitations of cogeneration in steam power plant. **[8]**



Total No. of Questions : 8]

SEAT No. :

P4636

[5060]-65

[Total No. of Pages : 2

M.E. (Mech.) (Heat Power)

CONVECTIVE HEAT TRANSFER ANALYSIS

(2008 Course) (Semester - I) (502104D) (Elective - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Attempt any three questions from each section.*
- 2) *Answers to the two sections must 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) Discuss the convection problem in refrigerators. **[8]**
- b) For a parallel flow over a heated plate local heat transfer coefficient is expressed as; $h_x = c \cdot (x)^m$ where, $m = -0.5$ and x is the distance from leading edge and c is a constant. Find the ratio of average heat transfer coefficient to local heat transfer coefficient. **[8]**
- Q2)** a) Discuss Reynold & Colburn analogy for flow over a flat plate. **[8]**
- b) Explain: **[8]**
- i) Thermal & Hydraulic boundary layers.
 - ii) Nusselt no & Prandtl no.
- Q3)** a) Distinguish between differential & integral analysis of boundary layer flows. **[8]**
- b) Explain the concept of eddy viscosity & mixing length theory. **[8]**

P.T.O.

Q4) Write notes on: **[18]**

- a) Various models for turbulent flow.
- b) Dittus Boelter equation.
- c) Graetz number and Peclet number.

SECTION - II

Q5) Write notes on the following: **[16]**

- a) Filmwise and Dropwise condensation.
- b) Convective heat transfer through porous media.

Q6) a) Discuss the classical problem of film condensation over a vertical plate. Also derive an expression for average heat transfer coefficient. **[8]**

- b) Explain with neat sketches, three typical practical examples of condensation heat transfer. **[8]**

Q7) a) Discuss free convection caused by centrifugal forces. **[8]**

- b) Write a note on internal and external turbulent flow. **[8]**

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

- a) Combined convection.
- b) Effect of noncondensable gases on condensation.
- c) Natural convective boundary layer equations.

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Total No. of Questions :8]

SEAT No. :

P4637

[Total No. of Pages :2

[5060] - 66

M.E. (Mech.) (Heat Power)

INTERNAL COMBUSTION ENGINES

(Semester - I) (2008 Course) (502105) (Elective - II)

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 answer 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°C . Ignition is started 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 C_v 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 for SI engine and write 6 cylinder firing order. [8]

- Q4)** a) Explain the instruments for measuring the following invisible emission.[10]
i) NO
ii) HC
Write their approximate values for CI engine.
b) Explain the parameters affecting engine heat transfer. [8]

SECTION - II

- Q5)** a) Explain reasons for NO_x 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 MPFI. [8]

- Q6)** a) Explain CFD based multidimensional models for IC engine. How it can improve the performance of engine. [8]
b) What are the causes of smoke 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) NO_x and smoke.

- Q8)** Write short note on: [18]
a) Catalytic converters to control NO_x and HC.
b) Supercharging in CI engine.
c) Compare Auto cycle and diesel cycle with the help of PV and TS graphs.



Total No. of Questions :8]

SEAT No. :

P4638

[Total No. of Pages :3

[5060] - 67

M.E. (Mechanical - Heat Power)
CONVENTIONAL POWER PLANTS
(2008 Course) (502105) (Semester - I) (Elective - II)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) Answer any three questions from each section.*
- 2) Answer for the two Sections should be written in separate answer books.*
- 3) Neat diagrams should be drawn wherever necessary.*
- 4) Figures to the right indicate full marks.*
- 5) Use of pocket calculator & different gas charts as applicable is allowed.*
- 6) Assume suitable data, if necessary.*

SECTION - I

- Q1) a)** Draw the general layout of thermal power plant and explain the working of different circuits. **[10]**
- b) Steam at 10 bar and 0.95 dry is available. Find the final dryness fraction of steam for each of the following operations using steam table: **[8]**
- i) 160 kJ of heat is removed per kg of steam at constant pressure.
 - ii) It is cooled at constant volume till its temperature falls to 1400C.
 - iii) Steam expands isentropically in the steam turbine developing 200 KJ of work per kg of steam flow and pressure becomes 0.5 bar.
- Q2) a)** What are the factors to be considered while selecting a site for hydroelectric power plant? **[8]**
- b) Nozzle of impulse stage turbine receives steam at 15 bar and 300 deg. C and discharges it at 10 bar. The nozzle efficiency is 90% and the nozzle angle is 30 degrees. The blade speed is that required for maximum work and entry of the steam is without shock. The blade exit angle is 5 degrees less than the inlet blade angle. Blade friction factor is 0.9. Calculate the power and efficiency. **[8]**

P.T.O.

- Q3)** a) Write the sources of non-condensable gases in the condenser and effect of these gases on condenser vacuum. Show the arrangement to remove these gases and also derive the expression for vacuum efficiency. [8]
- b) Explain what are the different methods incorporated to ensure safety in Nuclear power plants. [8]

- Q4)** a) What are the advantages of reheat cycle over simple ranking cycle? [8]
- b) Explain significance of Co-generation and what are the different industries which can benefit from Co-generation? [8]

SECTION - II

- Q5)** a) Explain use of Load curves in Power plants. [8]
- b) Explain working of combined cycle gas power plant and derive expression for overall efficiency of plant. [8]

Q6) A steam boiler generates steam at 30bar, 3000 deg C at the rate of 2kg/s. This steam is expanded isentropically in a turbine to a consider pressure of 0.05 bar, condensed at constant pressure and pumped back to boiler. [16]

- a) Draw the schematic arrangement of the above plant and T-s diagram of Rankine Cycle.
- b) Find heat supplied in the boiler per hour.
- c) Determine the quality of steam after expansion.
- d) What is the power generated by the turbine?
- e) Estimate the Ranking efficiency considering pump work.

- Q7)** a) Explain the need of Energy storage systems. What are the different techniqeeus to store energy and explain any one method in detail. [10]
- b) What are the different methods used to control super heating of steam.[8]

Q8) Write a short note on (any 3):

[16]

- a) Devices used to control operation and safety in Power plants.
- b) Nuclear waste disposal.
- c) Projection and estimation of Power demand for future energy needs.
- d) Fuel Cells.
- e) Pollution Control techniques.



Total No. of Questions : 8]

SEAT No. :

P5108

[Total No. of Pages : 4

[5060]-68

M.E (Mechanical) (Heat Power Engineering)

ADVANCED GAS DYNAMICS

(2008 Pattern) (Elective - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers any three 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 indicate full marks.*
- 5) *Use of gas table is allowed.*
- 6) *Assume suitable data, if necessary and mention it clearly.*

SECTION - I

- Q1)** a) Write and explain in brief any four potential properties responsible for changing the state of the following fluid in one dimensional compressible flow. **[4]**
- b) Explain with neat sketches the fluid flow process that leads to the formation of a shock wave. **[6]**
- c) Classify the flow regimes based on mach number Discuss behaviour of flow around wedge with neat sketcehs. **[6]**
- Q2)** a) Explain in brief critical speed of sound (a') and Reference Mach Number (M'). Write mathematical expression for each. **[8]**
- b) For quasi one dimensional flow, derive the relation between velocity and area changes. $\frac{dA}{dV} = -\frac{A}{V}(1 - M^2)$. **[8]**
- Q3)** a) Derive an expression and show that the Mach number (M_2) downstream of a normal shock wave is function of Mach number (M_1) upstream of a normal shock wave and specific heat ration of the gas. **[8]**
- b) An aircraft engine employs a subsonic inlet diffuser of area ratio 4. Free stream air at total pressure and temperature of $1 \times 10^5 \text{N/m}^2$ and 570 K approaches the diffuser with a Mach number 2.2. A shock wave stands just outside the diffuser inlet. Determine the Mach number pressure, and temperature of the air at the exit of the diffuser. Also find the loss in stagnation pressure of air. **[8]**

P.T.O.

- Q4)** a) Explain the compression shock wave and expansion wave phenomena using concave and convex corner. [10]
- b) An oblique shock in air causes an entropy increase of 11.5 J/Kg K . If the shock angle is 25° . determine the Mach number ahead of the shock and the flow deflection angle. [8]

SECTION - II

- Q5)** a) What is Prandtl-Meyer flow? Derive Prandtl-Meyer function. [10]
- b) The underexpanded, two-dimensional nozzle exhaust into an atmosphere with $p = 105 \text{ N/m}^2$ and $M = 2.2$. Determine the Mach number and flow direction after the initial expansion. [6]
- Q6)** a) The entropy at a downstream section of an insulated duct is increased by 100 J/kg k due to friction. Assume that the air is following through the duct and it enters with a Mach number 0.16. What is the Mach number at a downstream section? [8]
- b) Write the governing equations describing the Fanno flow. Show three Fanno curves of different mass velocities on $h - v$ and $h - s$ diagram. [8]
- Q7)** a) A gaseous mixture of air and fuel enters a ramjet combustion chamber with velocity 60 m/s , temperature 50°C and pressure 35 kPa . The heat of reaction of the mixture. for the particular fuel-air ratio employed is 1160 kJ/kg . Find the condition of stream at the exit of the combustion chamber, if friction is neglected and the cross-sectional Area is assumed constant. Assume the properties of both reactants and products of combustion are the same as air. [8]
- b) Derive an expression of pressure ratio for a Rayleigh flow of a perfect gas through a duct. [8]
- Q8)** Write short note on any three of following: [18]
- Normal shock (using $h - s$ diagram)
 - Rayleigh curve.
 - Hugoniot conditions and its significance.
 - Fanno curve.

Isentropic flow table ($\gamma = 1.4$)

M	T/T_0	p/p_0	ρ/ρ_0	A/A^*	F/F^*	$(A/A^*) \cdot (p/p_0)$	M
0.00	1.00000	1.00000	1.00000	∞	∞	∞	0
0.10	0.99800	0.99303	0.99502	5.8218	4.6236	5.7812	0.10943
0.20	0.99206	0.97250	0.98027	2.9635	2.4004	2.8820	0.21822
0.30	0.98232	0.93947	0.95638	2.0351	1.6979	1.9119	0.32572
0.40	0.96899	0.89562	0.92428	1.5901	1.3749	1.4241	0.43133
0.50	0.95238	0.84302	0.88517	1.3398	1.2027	1.12951	0.53452
0.60	0.93284	0.78400	0.84045	1.1882	1.10504	0.93155	0.63480
0.70	0.91075	0.72092	0.79158	1.09437	1.04915	0.78896	0.73179
0.80	0.88652	0.65602	0.74000	1.03823	1.018253	0.68110	0.82514
0.90	0.86058	0.59126	0.68704	1.00886	1.00399	0.59650	0.91460
1.00	0.83333	0.52828	0.63394	1.00000	1.00000	0.52828	1.00000
1.40	0.71839	0.31424	0.43742	1.1149	1.03458	0.35036	1.2999
1.50	0.68965	0.27240	0.39498	1.1762	1.04870	0.32039	1.3646
1.60	0.66138	0.23257	0.35573	1.2502	1.06348	0.29414	1.4254
1.70	0.63372	0.20259	0.31969	1.3376	1.07851	0.27099	1.4825
1.80	0.60680	0.17404	0.28682	1.4390	1.09352	0.25044	1.5360
1.90	0.58072	0.14924	0.25699	1.5552	1.1083	0.23211	1.5861
2.00	0.55556	0.12780	0.23005	1.6875	1.1227	0.21567	1.6330
2.20	0.50813	0.09352	0.18405	2.0050	1.1500	0.18751	1.7179
2.40	0.46468	0.06840	0.14720	2.4031	1.1751	0.16437	1.7922
2.60	0.42517	0.05012	0.11787	2.8960	1.1978	0.14513	1.8572

Normal Shock table ($\gamma = 1.4$)

M	M_2	p_{02}/p_{01}	p_2/p_1	ρ_2/ρ_1	T_2/T_1	p_{02}/p_1	M_1
1.30	0.785957	0.979374	1.805000	1.515695	1.190873	2.7135	1.30
1.36	0.757181	0.967579	1.991200	1.620182	1.228998	2.9115	1.36
1.42	0.731436	0.953063	2.185800	1.724303	1.267643	3.1198	1.42
1.48	0.708290	0.936001	2.388800	1.827770	1.306948	3.3382	1.48
1.54	0.687388	0.916624	2.600200	1.930327	1.347026	3.5667	1.54
1.60	0.668437	0.895200	2.820000	2.031746	1.387969	3.8049	1.60
2.00	0.577350	0.720874	4.500000	2.666667	1.687500	5.6405	2.00
2.10	0.561277	0.674203	4.978333	2.811902	1.770450	6.1655	2.10
2.20	0.547056	0.628136	5.480000	2.951220	1.856860	6.7163	2.20
2.30	0.534411	0.583295	6.005000	3.084548	1.946801	7.2937	2.30
2.40	0.523118	0.540144	6.553333	3.211896	2.040332	7.8969	2.40
2.50	0.512989	0.499015	7.125000	3.333333	2.137500	8.5262	2.50
2.60	0.503871	0.460123	7.720000	3.448980	2.238343	9.1813	2.60
2.70	0.495634	0.423590	8.338333	3.558991	2.342892	9.8625	2.70

Rayleigh table ($\gamma = 1.4$)

M	T/T^*	p/p^*	T_0/T_0^*	p_0/p_0^*	M^*
0.10	0.056020	2.366864	0.046777	1.259146	0.10
0.20	0.206612	2.272727	0.173554	1.234596	0.20
0.30	0.408873	2.131439	0.346860	1.198549	0.30
0.40	0.615148	1.960784	0.529027	1.156577	0.40
0.50	0.790123	1.777778	0.691358	1.114053	0.50
0.60	0.916704	1.595745	0.818923	1.075253	0.60
0.70	0.992895	1.423488	0.908499	1.043104	0.70

Fanno table ($\gamma = 1.4$)

M	T/T^*	p/p^*	p_1/p_1^*	V/V^*	fL_{max}/D	S_{max}/R
0.20	1.19048	5.45545	2.96352	0.21822	14.53327	1.08638
0.21	1.18951	5.19355	2.82929	0.22904	12.95602	1.04003
0.22	1.18850	4.95537	2.70760	0.23984	11.59605	0.99606
0.23	1.18744	4.73781	2.59681	0.25063	10.41609	0.95428
0.24	1.18633	4.53829	2.49556	0.26141	9.38648	0.91451



Total No. of Questions :8]

SEAT No. :

P4639

[Total No. of Pages :2

[5060] - 69

M.E. (Mechanical) (Heat Power)

INTERNAL COMBUSTION ENGINES-FUELS AND COMBUSTION

(2008 Course) (Semester - II) (Elective - III) (502111)

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) Explain the effect of anti knock quality, gum deposit, sulphur content in gasoline and diesel engine respectively. [8]
b) Explain in brief octane number and cetane number. [8]
- Q2)** a) What are desirable properties of biodiesel fuel. [8]
b) Write short note on alternate fuels for IC Engines. [8]
- Q3)** Explain various stages of combustion in SI and CI engine with neat diagram. [16]
- Q4)** a) Explain potential sources of biodiesel in India. How biodiesel is produced from oils. [10]
b) Write down different principles of combustion chamber design for SI engine. [8]

SECTION - II

- Q5)** a) What do you understand by transient mixture requirements? [8]
b) Draw sketches for combustion chambers suitable for diesel engine. [8]

P.T.O.

Q6) a) Compare supercharging and turbocharging. [8]

b) Compare swirl and turbulence with reference to SI and CI engine. [8]

Q7) What is turbo charging. List various methods of turbo charging. Explain pulse method of turbo charging. State its merits and demerits. [16]

Q8) Write short note on (any three): [18]

a) CRDI

b) Catalytic Converter.

c) CRDI.

d) MPFI system.



Total No. of Questions :8]

SEAT No. :

P4598

[Total No. of Pages :2

[5060] - 7

M.E. (Civil - Environmental Engineering)

GROUND WATER CONTAMINATION AND POLLUTION TRANSPORT

(2010 Course) (Semester - II) (Elective - III)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) Answer any 3 questions from each section.*
- 2) Figures to the right indicate full marks.*
- 3) Assume suitable data if necessary clearly mentioning the same.*
- 4) Use of non – programmable scientific calculator is allowed.*

SECTION - I

- Q1)** a) Derive a general steady state continuity equation for GW flow in a homogeneous isotropic aquifer. **[8]**
- b) Explain in detail various types of aquifers. Support your answer with a neat sketch. **[8]**
- Q2)** a) Explain in detail how to determine hydraulic conductivity for an area. **[8]**
- b) Explain with suitable equation: unsteady flow in a confined aquifer. **[8]**
- Q3)** a) Explain with reference to rural area how contamination of GW can be reduced by adopting appropriate sanitation practices. **[6]**
- b) Explain with suitable sketch the following terms: **[12]**
- i) Secular variation in GW.
 - ii) Seasonal variations in GW.
 - iii) Tracer studies.

P.T.O.

- Q4)** a) An organic waste with very high BOD of 5000 mg/l has contaminated a GW aquifer. Explain in detail the method to be adopted for recovering this aquifer. [8]
- b) Explain the importance of geotechnical & geological studies for ascertaining GW potential of an area. [8]

SECTION - II

- Q5)** a) Explain Tri-linear diagram for representing analyses of GW Quality. [8]
- b) Explain with a suitable sketch: base flow recession curve. [8]
- Q6)** a) Enlist various factors that affect GW contamination. Explain each in detail. [10]
- b) Explain in detail: attenuation of GW pollution. [6]
- Q7)** a) Explain in detail the importance of physico-chemical and biological analysis of GW. [8]
- b) Enlist various types of model studies carried out for GW studies. Explain any one in detail. [8]
- Q8)** a) Draw the analogy between aquifer systems & various analog model aquifers. What laws analogous to Darcy's law are applicable? [10]
- b) Compare the GW challenges of konkan Region and Deccan Plateau of Maharashtra wrt:
- i) Geology
 - ii) Rainfall & other climatic conditions.
 - iii) Types & Sources of Pollution.
 - iv) Availability of resources.



Total No. of Questions :8]

SEAT No. :

P4640

[Total No. of Pages :2

[5060] - 70

M.E. (Mechanical - Heat Power)

CRYOGENICS ENGINEERING

(2008 Course) (Semester - II) (Elective - III) (502111)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) Answer any three questions from each section.*
- 2) Answer for the two sections should be written in separate answer book.*
- 3) Neat diagrams should be drawn wherever necessary.*
- 4) Figures to the right indicate full marks.*
- 5) Use of pocket calculator & different gas charts as applicable is allowed.*
- 6) Assume suitable data if necessary.*

SECTION - I

- Q1)** a) Define Cryogenics. What is the temperature threshold distinguishing Cryogenics from Refrigeration and Air conditioning. [6]
- b) State important landmarks achieved in the field of Cryogenics since its inception. [6]
- c) State boiling points for the gases viz. Helium, Hydrogen, Argon, Nitrogen, Oxygen, Ammonia. [6]
- Q2)** a) Discuss the phenomena of Superconductivity observed at Cryogenics temperature. State applications of Superconductivity. [10]
- b) Discuss the phenomena of Super fluidity observed in Liquid Helium. [6]
- Q3)** a) Discuss Thermodynamically ideal liquefaction system with formulas used to measure its performance. [8]
- b) Explain precooled Linde Hampson system with neat sketch. [8]

P.T.O.

- Q4)** a) Explain inversion curve with neat sketch. Discuss the significance of Joules Thompson coefficient. [8]
- b) List down the Cryogenics refrigerators used to achieve less than 1K temperature and describe any one. [8]

SECTION - II

- Q5)** a) Explain with neat sketch Stirling Refrigerator. [10]
- b) Explain the difference with neat sketch between Cryogenic Refrigerator system and a Cryogenic Liquefaction system. [8]
- Q6)** a) Explain with neat sketch Dilution refrigerator. [8]
- b) Explain the construction of Dewar vessel with neat sketch showing all the components and there function. [8]
- Q7)** a) What are the different piping arrangements possible in Dewar Vessel. Suggest the best possible arrangement. [6]
- b) Explain different insulations used in the field of Cryogenics in the increasing order of performance. [6]
- c) State different methods /instruments used to height of liquid level in Dewar vessel. Explain any one. [4]
- Q8)** State the different vacuum pumps used in the field of Cryogenics in the increasing order of vacuum achieved and there principle of operation. State the operating range of each of the vacuum pump. Explain any one Vacuum pump in detail with neat sketch. [16]



Total No. of Questions :8]

SEAT No. :

P4641

[Total No. of Pages :2

[5060] - 71

M.E. (Mechanical) (Heat Power Engineering)

NON CONVENTIONAL POWER PLANT

(2008 Course) (Semester - II) (Elective - III) (502111 C)

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) 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) What is the potential of renewable energy sources in India? Which is the most commonly used sources? [8]
- b) What are the advantages and disadvantages of Photovoltaic solar energy conversion? [8]
- Q2)** a) What do you understand by CO₂ reduction potential of renewable energy? Explain. [8]
- b) List various ways by which solar energy can be used to generate power. With sketch explain the working of any one type. [8]
- Q3)** a) List the various thermal energy storage methods and explain each one of them. [8]
- b) With neat sketch explain horizontal axis and vertical axis with machines. Write down the problems in operating large wind power generators. [8]

P.T.O.

- Q4)** Write notes on: **[18]**
- a) Distributed power supply strategy.
 - b) Energy wheeling and banking.
 - c) Economic analysis of a solar thermal system.
 - d) Renewable electricity and key elements.

SECTION - II

- Q5)** a) Explain with neat sketch Claude cycle for OTEC system. **[8]**
b) Explain details of tidal power plant components. **[8]**
- Q6)** a) List the various sources for production of biogas. Explain how to accelerate gas generation. **[8]**
b) With the help of a neat sketch explain the working of a Hydrogen-Oxygen fuel cell. Write the advantages and disadvantages of fuel cells. **[8]**
- Q7)** a) Write a short note on Micro-hydro power plant. **[8]**
b) Potential of wind, tidal and biogas energy in India. **[8]**
- Q8)** Write notes on: **[18]**
- a) Clean Development Mechanisms (CDM).
 - b) Write in brief the environmental impacts of conventional power plants.



Total No. of Questions : 10]

SEAT No :

P4642

[5060]-72

[Total No. of Pages : 2

M.E. (Mechanical) (Heat Power)
COMPUTERAIDED ENGINEERING
(Semester - II) (2008 Course) (Open Elective-IV) (502112C)
(Self Study) (Design)

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) Explain the generalized procedure in FEA. [8]
b) Define node, element, domain, continuum and meshing. [8]
- Q2)** a) What is constrained based modeling? Explain in detail. [8]
b) Describe bottom up and top down approach for assembly modeling with suitable examples. [8]
- Q3)** a) Enlist surface modeling features available in commercial modeling software and explain any one feature in detail. [8]
b) Discuss different types of elements used in meshing in detail with their applications. [8]
- Q4)** a) Explain briefly types of 2D elements used for along with their applications. [8]
b) How finite element method is better than other numerical techniques. State its advantages and disadvantages. [8]
- Q5)** Write short notes on: [18]
a) Basic fluid motions in CFD.
b) Modern developments in grid generation.
c) Comparison between tetra and brick type meshing.

P.T.O.

SECTION - II

- Q6)** a) Classify 3D meshing techniques of FEA and explain any one in detail. [8]
b) State sources of non linearities in detail. [8]
- Q7)** a) Explain p and h type of meshing refinement methods. [8]
b) Explain some quality checks used in 2D meshing in FEA. [8]
- Q8)** a) Explain the procedure for dynamic meshing. [8]
b) Explain concept of CFD in detail. [8]
- Q9)** a) Write Navier stokes equation in conservation form and explain meaning of each term. [8]
b) Explain in detail steps of thermal analysis. [8]
- Q10)** Write short notes on: [18]
a) Meshing for Thermal analysis.
b) Implicits versus explicit methods.



Total No. of Questions : 8]

SEAT No. :

P4643

[5060]-74

[Total No. of Pages :2

M.E. (Mechanical Engineering) (Automotive)
ADVANCED HEAT TRANSFER
(2010 Course) (Elective-I) (Semester-I) (502302 A)

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) *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 stem tables is allowed.*
- 6) *Assume questions data, if necessary.*

SECTION-I

- Q1) a)** Explain the effect of contact pressure on thermal contact resistance? What is thermal grease? **[8]**
- b) A thin metallic wire of thermal conductivity k , diameter d and length $2L$ is annealed by passing electrical current through the wire to induce uniform volumetric heat generation q . The ambient air around the wire is at temperature T_{∞} , while the ends of the wire at $x = \pm L$ are also maintained at T_{∞} . Heat transfer from the wire to the air is characterized by convection coefficient h . Obtain an expression for the steady-state temperature distribution $T(x)$ along the wire. **[8]**
- Q2) a)** A 6 mm diameter potato initially at a uniform temperature of 20°C is suddenly dropped into boiling water at 100°C . The heat transfer coefficient between the water and surface is $6000\text{W/m}^2\text{K}$. The thermo physical properties of potato are same as water ($\alpha = 1.6 \times 10^{-7}\text{ m}^2/\text{s}$, $K = 0.68\text{ W/mk}$). Determine the time required for the centre temperature of the potato to reach 95°C and the energy transferred to the potato during this time. **[8]**
- b) The Biot number during heat transfer process between a sphere and its surrounding is determined to be 0.02 would you use lumped system analysis or the transient temperature charts when determining the center temperature of the sphere? Why? **[8]**

P.T.O.

- Q3)** Write notes on (Any three): **[18]**
- a) Navier-stokes equation.
 - b) Reynolds and Chilton-Colburn analogies.
 - c) Prandtl's mixing length.
 - d) Von Karman's integral method.

- Q4)** a) Distinguish between differential and integral analysis of boundary layer flows. **[8]**
- b) What is energy and momentum equation for the laminar boundary layer on a flat plate? What assumptions are involved in the derivation of this equation? **[8]**

SECTION-II

- Q5)** a) Explain film wise and drop wise condensation. **[8]**
- b) Water is to be boiled at atmospheric pressure in a polished stainless steel pan placed on top of a heating unit. The inner surface of the bottom of pan is maintained at 108°C. If the diameter of bottom of the pan is 30 cm, determine: **[8]**
- i) The rate of heat transfer to the water and
 - ii) The rate of evaporation of water.

- Q6)** a) Explain Wien's Displacement Law and Stefan Boltzmann law of radiation. **[4]**
- b) Explain: Absorptivity, Reflectivity and Transmissivity. **[6]**
- c) Explain superimposition Rule and Symmetry rule. **[6]**

- Q7)** a) Why cooling of PC's is necessary? **[5]**
- b) Explain : Ablative and Transpiration Cooling. **[6]**
- c) Explain necessity of Cooling Electronic Equipments. **[5]**

- Q8)** a) Explain automobile radiator with a neat sketch. **[6]**
- b) Derive an expression for effectiveness of counter flow heat exchanger as a function of number of transfer units and heat capacity ratio. **[6]**
- c) Cold water leading to a shower enters a thin walled double pipe counter flow heat exchanger at 0.25 kg/s at 15°C and is heated to 45°C by hot water that enters at 100°C and 3 kg/s. If the overall heat transfer coefficient is 950 W/m²-K, determine the heat transfer rate and the area of the heat exchanger by Effectiveness - NTU method. Assume specific heat of water to be 4180 J/kg-K. **[6]**



M.E.(Mechanical Engg.-Automotive Engg.)

FINITE ELEMENT METHOD

(2008 Course)(Semester-I)(Elective-I)

Time :3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Answers three questions from each section.
- 2) Answer to the each section should be written in separate books.
- 3) Figures to the right indicate full marks.
- 4) Figures to the right indicate full marks.
- 5) Use of electronic pocket calculator is allowed.
- 6) Assume suitable data, if required.

SECTION-I

Q1) a) Explain different solvers used in FEA. [6]

- b) Three bars are joined as shown in Figure 1. The left and right ends are both constrained, i.e. prescribed displacement is zero at both ends. There is a force of 10 N acting on the middle node. The nodes are numbered starting with the nodes where displacements are prescribed. You may consider as the spring constant and is known K^e [10]

- i) Assemble the global stiffness and force matrix.
- ii) Partition the system and solve for the nodal displacements. 3u.
- iii) Compute the reaction forces.

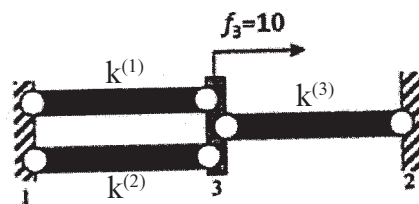


Figure 1: Three-bar problem

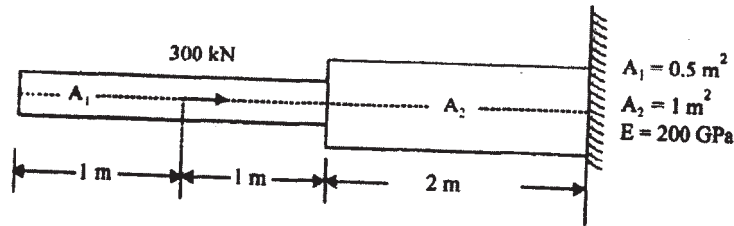
Q2) a) “Merely reduction of element size will not help us to get the accuracy of the solution” explain this statement. [6]

- b) What are advantages of Weak formulations over weighted residual method. [6]

- c) Explain advantages of FEA method over finite difference and weighted residual methods. [6]

P.T.O.

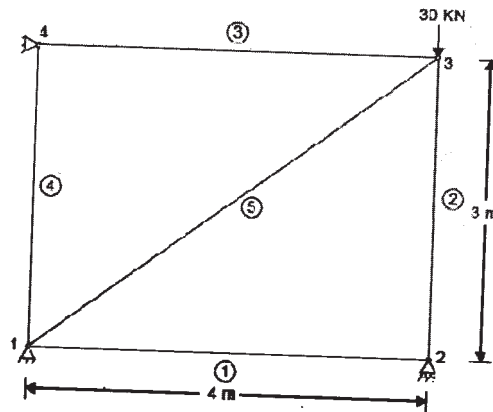
- Q3) a)** Determine the nodal displacement and element stresses by finite element formulation for the following figure. Use $P=300 \text{ kN}$; $A_1=0.5 \text{ m}^2$; $A_2=1 \text{ m}^2$; $E=200 \text{ GPa}$ [10]



- b) Write a note on Subdomain Weighted Residual Method and explain with appropriate example. [6]

- Q4) a)** Explain plane stress and plane strain. [8]

- b) Determine the forces in the members of the truss shown in Fig. Take $E=200 \text{ GPa}$, $A=2000 \text{ mm}^2$. [8]



SECTION-II

- Q5) a)** Derive a stiffness matrix for 1D quadratic bar element. [4]

- b) Explain Banded Matrix and Skyline Method. [6]

- c) Explain difference between Quadratic Bar element and Linear bar element and comment on accuracy of the solution. [6]

- Q6) a)** Explain different types of nonlinearities in the FEA and comments on different methods used to handle these nonlinearities in FEA simulation. [8]

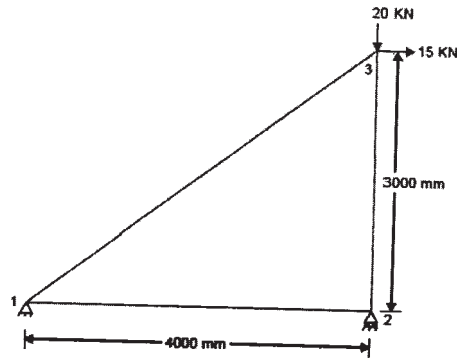
- b) Explain “P formulation and H formulation”. [8]

Q7) a) Derive the expressions for natural coordinates for a two noded bar element. In terms of ζ , when range is -1 to 1. [8]

b) What is Pascal 's Triangle and how it is useful in polynomial estimation in 2D element. [8]

Q8) a) Obtain the forces in the plane truss shown in Figure and determine the support reactions also. [10]

Use finite element method. Take $E=215$ GPa and $A=2000$ mm²



b) Explain techniques of CAD interfacing in FEA simulations write a comment on file formats used for geometric transformations. [6]

Q9) Attempt any three: [18]

- a) Isoparametric Elements.
- b) Post Processing in FEA.
- c) Element Refinement.
- d) Meshing Techniques.



Total No. of Questions : 8]

SEAT No. :

P4644

[5060]-76

[Total No. of Pages :2

M.E. (Mechanical -Automotive Engg.)
ADVANCED HYDRAULICS & PNEUMATIC SYSTEMS
(Elective-I)
(2008 Course) (Semester-I) (502302)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) Answers 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) Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) List five fields of applications where fluid power can be effectively used. Explain in detail. **[8]**
- b) Enlist type of hydraulic fluids and explain the factors affecting the performance of fluid in hydraulic system. **[8]**
- Q2)** a) Describe the factors affecting the selection of components of hydraulic power unit. **[8]**
- b) Differentiate intensifier and Accumulator. Explain one application of each in fluid power system. **[8]**
- Q3)** a) What are the specifications of a compressor. Explain compressed air generation and distribution system used in automobile industry. **[8]**
- b) What is a balanced vane pump? How do you test vane pump characteristics. **[8]**
- Q4)** Write short notes on (Any three): **[18]**
- a) Explain hydrostatic transmission
 - b) Explain theoretical torque, power and flow rate in hydraulic system.
 - c) Flow control methods
 - d) power holding devices in automobiles

P.T.O.

SECTION-II

- Q5)** a) What are the advantages of pilot operated systems? Explain any typical pilot operated pneumatic circuit. [8]
b) Explain the application of a pressure reducing valve with a circuit. [8]
- Q6)** a) Explain the hydraulic circuit for sequencing of two actuators using roller operated valve. [8]
b) What must be done to fluidic systems to insure that they will operate reliably. [8]
- Q7)** a) Explain different methods of synchronizing two cylinders giving detailed analysis. [8]
b) What components are required in designing a high pressure hydraulic system. Explain with an example. [8]
- Q8)** Answer any 03 of the following. [18]
a) FRL unit.
b) Fluid sensors in pneumatic systems.
c) Vacuum clamps in fluid power systems.
d) MPL control system.



Total No. of Questions :10]

SEAT No. :

P4645

[Total No. of Pages :3

[5060] - 77

M.E. (Mechanical) (Automotive Engineering)
TRIBOLOGY & PREVENTIVE MAINTENANCE
(2008 Course) (Semester - I) (Elective - II) (502303 A)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Solve 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) *Assume suitable data, if necessary.*
- 5) *Figures to right indicate full marks.*
- 6) *Use of non-programmable electronic calculator is allowed.*

SECTION - I

- Q1)** a) What is importance of tribology in industry? Explain tribological considerations in design of gears. [8]
b) Explain lubrication regims in Engine with the help of Stribeck Curve.[8]
- Q2)** a) Explain simple theory of friction and derive an expression for coefficient of friction using the same. [8]
b) What is wear? Explain different types of wear in brief. [8]
- Q3)** a) Derive an expression for Reynold's equation for hydrodynamic Journal bearings in two dimensional form. State different assumptions made.[10]
b) List the desirable properties of automotive lubricants. [6]
- Q4)** a) Explain the classification of the lubricants. How oils are designated? [8]
b) Explain standard methods for testing of lubricating oils. [8]

P.T.O.

Q5) Write Short notes on following (Any THREE):

[18]

- a) Factors affecting wear
- b) Modified adhesive theory.
- c) EP lubricants.
- d) Sintered Metal Bearings
- e) Ferrography.

SECTION - II

Q6) a) Explain Hertz theory in case of elastohydrodynamic lubrication in case of cylinders. **[8]**

b) A circular plate of 60 mm radius is approaching the base plane at a velocity of 150 mm/s at the instant when the oil film thickness is 0.2 mm. If the absolute viscosity of the oil is 0.025 Pa-s, calculate: **[8]**

- i) The load carrying capacity of the oil film at the given instant;
- ii) The Maximum pressure and
- iii) The average pressure.

Q7) a) What is preventive maintenance? Outline the basic steps for preventive maintenance. **[8]**

b) Differentiate regular maintenance and preventive maintenance. **[8]**

Q8) a) Explain detail process of signature analysis of bearings. **[8]**

b) Explain signature analysis of gearbox. **[8]**

Q9) a) List various types of Battery faults. What are the factors which affects battery life? [8]

b) Explain the testing procedure for starters and alternators in detail. [8]

Q10) Write short notes on following (Any THREE): [18]

a) Road Tyre Contacts.

b) Hydroplaning.

c) Wear and corrosive preventive maintenance.

d) Cooling system maintenance.

e) Maintenance of driveline system.



Total No. of Questions :8]

SEAT No. :

P4646

[Total No. of Pages :3

[5060] - 78

M.E. (Mechanical) (Automotive)
AUTOMOBILE AIR CONDITIONING
(2010 Course) (Semester - I) (Elective - II) (502303 C)

Time : 3 Hours]

[Max. Marks :100

Instruction to the candidates:

- 1) Answer three questions from section I and three questions from section II.*
- 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 indicate full marks.*
- 5) Assume suitable data, if necessary and mention it clearly.*
- 6) Use of logarithmic tables, slide rule, mollier charts, non programmable electronic pocket calculator is allowed.*

SECTION - I

- Q1)** a) Explain various processes on Bell Coleman cycle. What are the different air refrigeration system worked on Bell Coleman cycle? [8]
- b) Explain the air conditioning system for passenger car. [8]
- Q2)** a) What is the selection criteria for compressor in automotive air conditioning? Why magnetic clutch is used in automotive air conditioning? [10]
- b) Discuss the various types of evaporators used in air conditioning. With neat diagram explain DX evaporator. [8]
- Q3)** a) Discuss the effect of load variation on the performance of automobile air conditioner. [8]
- b) Explain the equal friction method for duct design. [8]

P.T.O.

Q4) 20 seater minibus is to be maintained at 24°C DBT and 50% RH. The outdoor conditions are 40°C DBT and 27°C WBT. With appropriate assumptions do the cooling load calculations for minibus and determine GTH.

If the cooling coil surface temperature is maintained at 10°C and coil BF is 0.15. Determine air supply temperature, cmm of air, and SHF of cooling coil. [16]

SECTION - II

Q5) a) With neat schematic describe the automatic temperature control system for car air conditioner. [8]

b) List various controls used in air conditioning system. Explain working of any two in detail. [8]

Q6) a) Explain the various sound control techniques in automobile air conditioning systems. [8]

b) Explain how the supply and return air outlets are selected for an air conditioning system. [8]

Q7) a) Explain fan characteristics curve. Give their selection criteria. [8]

b) With neat diagram explain the working of the following air filters. [8]

i) HEPA filter.

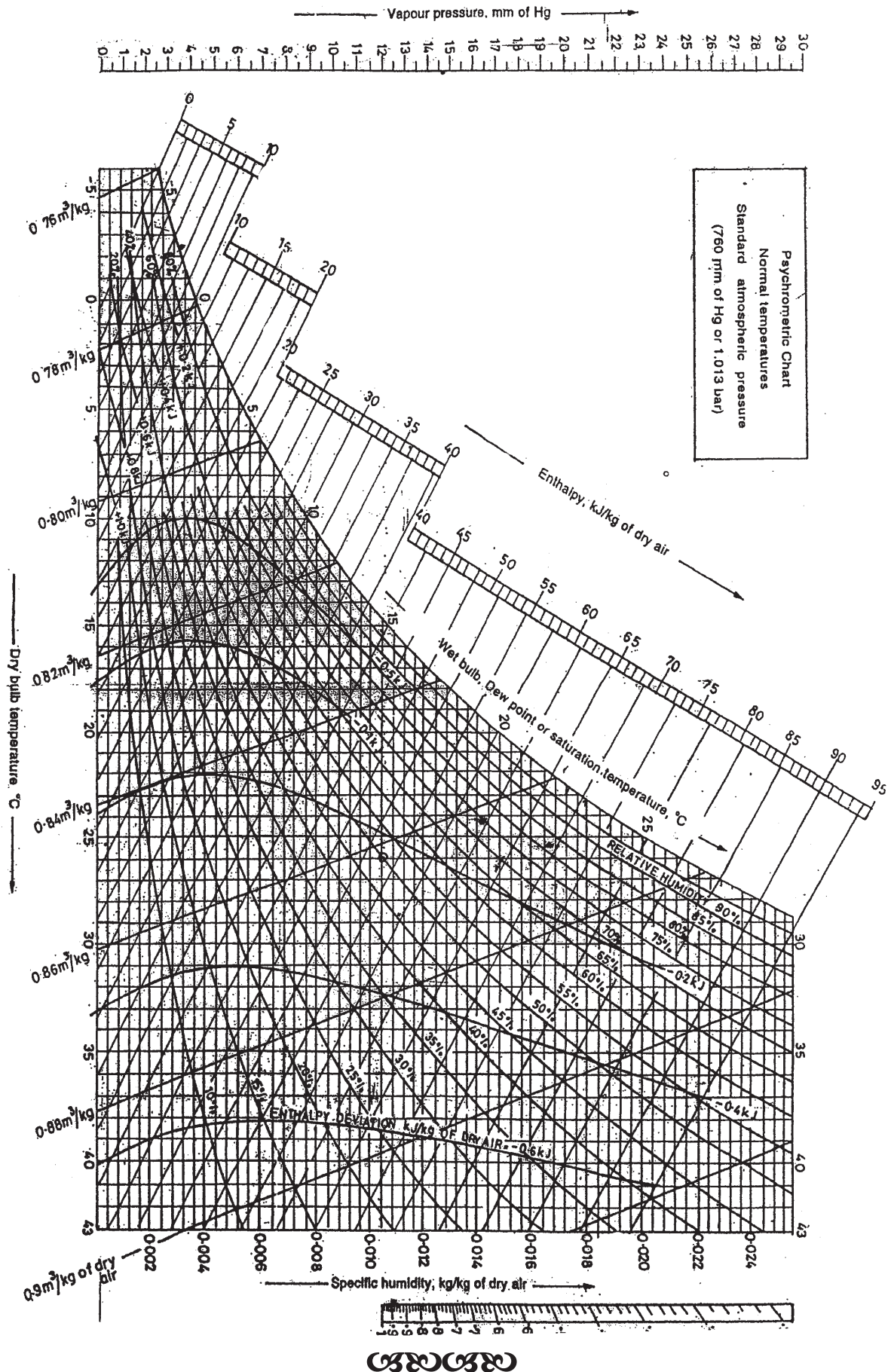
ii) Electrostatic filters.

Q8) Write short note on: [18]

a) AHU.

b) Refrigerant charging and testing.

c) Thermostat.



Total No. of Questions : 8]

SEAT No. :

P5041

[5060]-79

[Total No. of Pages : 2

**M.E.(Mechanical) (Automotive Engg.)
AUTOMOTIVE FUELS AND EMISSIONS
(2008 Course) (Semester-II) (502306)**

Time :3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers any three questions from each section.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *All questions carry equal marks.*
- 5) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) Discuss different properties of ethanol and methanol and compare them with gasoline. Why blends of either ethanol or methanol are preferred over pure alcohol fuels. **[10]**
- b) What is enthalpy of combustion? How does it differ from the enthalpy of reaction? **[6]**
- Q2)** a) Describe the changes required to be made in diesel engine to run on CNG fuel. **[8]**
- b) Discuss following terms in connection with surface ignition **[8]**
- i) Run on
 - ii) Run away
 - iii) Wild ping
 - iv) Rumble
- Q3)** a) Explain normal and abnormal combustion in SI engine. **[10]**
- b) Write the chemical equation for esterification of vegetable oil and explain the esterification process. **[6]**

P.T.O.

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

- a) Octane and Cetane rating
- b) Fugacity and Activity
- c) Chemical equilibrium

SECTION-II

Q5) a) What are the fuel modifications can reduce the emission from S.I engines? **[10]**

- b) What is meant by regulated pollution and un regulated pollution? Discuss briefly? **[6]**

Q6) a) What is a driving cycle? Discuss its significance with regard to emissions. **[8]**

- b) Which is the statutory agency monitoring and assessing the vehicular population in the cities and how the vehicular emissions are monitored and regulated by them? Explain it in detail? **[8]**

Q7) a) What is meant by a fuel cell? How it is related to automotive pollution?[10]

- b) How the transient operation of the Turbo charged diesel engines will effect the emission formation? Explain it in detail? **[6]**

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

- a) BS III and BS IV norms
- b) Charcoal Canister Control for Evaporative Emission Control
- c) Emission inventory



Total No. of Questions :10]

SEAT No. :

P4599

[Total No. of Pages :2

[5060] - 8

M.E. (Civil) (Environmental Engg.)
AGRICULTURAL POLLUTION CONTROL AND
ENVIRONMENTAL BIOTECHNOLOGY
(2010 Course) (Semester - II) (Elective - III)

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

SECTION - I

- Q1) a)** What are the water and nutrients requirement of crop? **[8]**
- b) Understanding virtual water will help to understand crop suitability in an area. Explain in detail. **[8]**
- Q2) a)** Explain various soil conservation techniques. **[8]**
- b) Enlist any four pesticides. What are the uses of these pesticides? **[8]**
- Q3) a)** What are the causes of water logging? Explain any one method of control of water logging. **[8]**
- b) What are the effects of water logging? Explain with any one example phenomenon of water logging. **[8]**

P.T.O.

- Q4)** a) What is crop rotation? What are the advantages of it? [8]
b) What are the benefits of recycling and reuse of wastewater in agriculture? [8]

- Q5)** Write short notes on the following: [18]
a) Bioremediation of soil.
b) Farming systems.
c) Agro meteorology.

SECTION - II

- Q6)** a) Understanding concepts of genetic engineering is very important for an agricultural engineer. Explain in detail. [8]
b) Explain Genetic engineering structure of DNA and RNA. [8]

- Q7)** a) Explain the operating and biological process of Up flow Anaerobic Sludge Blanket Reactor. [8]
b) Explain about microbiology in activated sludge process. [8]

- Q8)** a) What is Vermitechnology? Explain. [8]
b) Explain about microbiology in trickling filter. [8]

- Q9)** a) Draw and explain a flow diagram for treatment of wastewater of Sugar Industry. [8]
b) Explain in detail use of bioscrubbers for controlling air pollution from an agro based industry. [8]

- Q10)** Write short notes on the following: [18]
a) Rotating drums.
b) Methane production.
c) Protein Synthesis.



Total No. of Questions : 10]

SEAT No :

P4647

[5060]-80

[Total No. of Pages : 2

M.E. (Mechanical) (Automotive Engineering)
FUNDAMENTALS OF VEHICLE DYNAMICS
(2008 Pattern) (Semester- II) (502308)

Time :3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Attempt any three questions from each section.*
- 2) *Figures to the right indicate full marks.*
- 3) *All questions carry equal marks.*
- 4) *Assume Suitable data, if necessary.*

SECTION - I

- Q1)** a) Write short note with sketch on behavior of tire subjected to a side forces. **[8]**
b) Explain the Generalized block diagram of Driver- Vehicle relationship. **[8]**
- Q2)** What are test carried out for determining handling characteristics of -vehicle? Explain each test in detail. **[16]**
- Q3)** a) Find the geometry that would be necessary to achieve 100% anti-squat in the rear suspension and geometry to achieve full anti pitch for the solid axle, rear wheel drive vehicle described below. Also find the pitch rate when the geometry is set for 100% anti-squat in rear suspension. The front and rear suspension spring rates are 285 and 169 lb/in respectively. The CG height is 20 inches and wheel base is 102. **[8]**
b) Derive an expression for the steer angle δ_f required to negotiate a given turn with usual notations. **[8]**
- Q4)** A vehicle is treated as two degree freedom system in bounce and pitch mode. The mass of the vehicle is 1250kg and its radius of gyration is 1.3m. The stiffness of the front suspension is 125 kN/m and that of rear suspension is 125 kN/m. Center of gravity of the vehicle is 1.4m from front, 1.3m from rear wheel and 0.6m above ground. Find the natural frequencies and mode shapes. Derive the formula used. **[16]**

P.T.O.

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

- a) Describe controlled differential steering system.
- b) Kinematic behavior of vehicles with rigid wheels and with compliant tyres.
- c) Natural frequency and damping in yaw.

SECTION - II

Q6) a) Explain Application of theory of steering of articulated and half-track vehicles. **[8]**

b) Derive the equation for maximum tractive effort that the tire ground can support terms of coefficient of road resistance. **[8]**

Q7) A passenger car weighs 2.5kN and has a wheelbase of 3.4m. The center of gravity is 0.83 m behind the front axle and 0.54 m above ground level. The braking effort distribution on the front axle is 68%. The coefficient of rolling resistance is 0.04. Determine which set of the tires will lock first on two road surfaces : one with a coefficient of road adhesion $\mu = 0.7$, and the other with $\mu = 0.3$. **[16]**

Q8) a) Explain wheel hop, wheel wobble, wheel shimmy. **[8]**

b) Development of equations of motion of sprung mass. **[8]**

Q9) Explain with the help of labeled sketch mechanism and handling of tracked vehicle. **[16]**

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

- a) Self-aligning torque.
- b) Analysis of sprocket torques and speeds.
- c) Choice of damper characteristics.



Total No. of Questions :8]

SEAT No. :

P4648

[5060]-81

[Total No. of Pages :3

**M.E. (Mech.Automotive)
AUTOMOTIVE MATERIALS
(2008 Course) (Semester - II) (502309)**

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) Solve any three questions from each section.*
- 2) Figures to the right indicate full marks.*

SECTION-I

Q1) a) Write compositions, properties and applications of following copper alloys (any two) **[8]**

i) Cartridge Brass

ii) Tin Bronze

iii) Berilium Bronze

b) Write detailed note on classifications of steels. **[4]**

c) State effects of alloying elements on properties of steels **[4]**

i) Mn

ii) Cr

iii) Nb

iv) V

P.T.O.

- Q2)** a) Explain importance of heat treatment in design of mechanical components. [4]
- b) Explain importance of surface hardening heat treatments and explain one of such heat treatment in detail. [8]
- c) Explain significance of 'Hardenability' and how it is determined? [4]
- Q3)** a) List properties and auto applications of PP, PS and PMMA polymers. [6]
- b) Enlist CMCs and MMCs use in automotive applications and explain one of them in detail. [6]
- c) What are nanocomposites? State their applications in automotive applications. [4]
- Q4)** Write short notes on following manufacturing processes (any three): [18]
- a) Extrusion
- b) Forging
- c) Welding
- d) Powder Metallurgy

SECTION-II

- Q5)** Write short notes on following techniques (any four): [16]
- a) Compression moulding
- b) Reaction injection moulding
- c) Pulforming
- d) Filament winding
- e) Blow moulding

- Q6)** a) What is significance of protective coating in automotive applications. Explain PVD method to protect surface of component. [6]
- b) Write short note on sound insulating materials used in automotive applications. [4]
- c) State important physic - chemical properties of following: [6]
- i) Engine oil
 - ii) Brake fluids
 - iii) Antifreeze engine coolants
- Q7)** a) Explain importance of endurance limit of component and write short note on corrosion-fatigue. [6]
- b) Explain types of failures and write short note on 'Fracture mechanisms'. [6]
- c) Explain need of testing and validation of components. [4]
- Q8)** Explain requirements of mechanical properties with justification and enlist candidate materials for following applications (any three): [18]
- a) Shock absorber
 - b) Propeller shaft
 - c) Gudgeon pin
 - d) Brake liner

EEE

Total No. of Questions : 8]

SEAT No. :

P5042

[5060]-82

[Total No. of Pages : 2

M.E. (Mechanical) (Automotive Engineering)
COMPUTATIONAL FLUID DYNAMICS
(2008 Course) (502310) (Elective - IV) (Semester - II)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Question 1 and 5 are compulsory. Additionally, answer any two questions from each section from the remaining questions.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Assume Suitable data, if necessary.*

SECTION - I

- Q1)** a) For a fluid flow, write the continuity, momentum and energy equations in differential form and explain the meaning of each of the terms in them. **[15]**
- b) Explain the substantial derivative. **[3]**
- Q2)** a) Explain the general behaviour of different classes of partial differential equations. **[10]**
- b) Give physical examples of elliptic, parabolic and hyperbolic partial differential equations. **[6]**
- Q3)** a) Write the forward difference, backward difference and central difference expressions of the derivative $d\phi/dx$ for a node 'P' whose east and west neighbours are 'E' and 'W' respectively. State accuracy of each of the expressions. **[12]**
- b) Differentiate between implicit and explicit discretization methods. **[4]**
- Q4)** a) Explain the elliptic grid generation method. **[12]**
- b) Compare the structured and unstructured meshes. **[4]**

P.T.O.

SECTION - II

- Q5)** a) Explain the SIMPLE algorithm. **[15]**
b) What is the philosophy of pressure correction method? **[3]**
- Q6)** Explain the procedure for solution of purely subsonic isentropic nozzle flow. **[16]**
- Q7)** Explain the implicit Crank-Nicholson technique for the solution of incompressible Couette flow. **[16]**
- Q8)** Explain the explicit finite difference technique for solution of supersonic flow over a flat plate. **[16]**



Total No. of Questions :8]

SEAT No. :

P4649

[5060]-84

[Total No. of Pages :2

M.E.(Mechanical)(Computer Aided Design, Manufacturing & Engineering)
MATERIALS FOR ENGINEERING APPLICATIONS
(2012 Pattern) (502404-A) (Semester - I) (Elective- I)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) Attempt any three questions from each section.*
- 2) Figures to the right indicate full marks.*

SECTION-I

Q1) Explain: [16]

- a) Tensile stress strain relations.
- b) Fatigue and Abrasion.

Q2) What are material properties and applications with respect to: [16]

- a) Ball bearing steels and bearing metals.
- b) HSLA steels.

Q3) Compare Automobile alloys and aerospace alloys with respect to properties, constituents, method of manufacture and availability. [16]

Q4) Describe: [18]

- a) Inter - metallic compounds.
- b) Fracture Toughness.
- c) Micro structural characterization.

SECTION-II

Q5) Explain construction and use of phase equilibrium diagrams in study of metals and their alloys. [16]

P.T.O.

Q6) Explain composites with respect to their construction, properties, advantages and applications. **[16]**

Q7) Describe: **[16]**

- a) Zirconia and Zirconia - Toughened Aluminum.
- b) Super Alloys.
- c) Toughening Mechanisms in Composites.
- d) Thermal behavior of ceramics.

Q8) Explain the following: **[18]**

- a) Mechanics of load transfer from matrix to fiber in composites.
- b) Magnetic and optical behavior of ceramics.
- c) Metals Vs Alloys.

EEE

Total No. of Questions :8]

SEAT No. :

P4650

[5060]-85

[Total No. of Pages :2

**M.E. (Mechanical) (CADME)
ADVANCED MANUFACTURING PROCESS
(2012 Course) (502404B) (Semester- I) (Elective - I)**

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Question no.1 and 8 are compulsory.*
- 2) *Solve any two questions out of rest questions in each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of logarithmic tables, slide rules, Mollier Charts, electronic pocket calculator and steam tables is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) Discuss in detail the mechanics of metal cutting with the help of sketch. [8]
b) Classify the different types of dynamometers used in metal cutting. Explain any two of them in detail. [10]
- Q2)** a) Explain abrasive materials for making Grinding wheel? [8]
b) What is meaning of designation of grinding wheel? Explain it. [8]
- Q3)** a) State assumptions made in theory of metal cutting. [8]
b) Discuss parameters controlling Tool Life in Turning Operation: [8]
- Q4)** a) Explain the various stages involved in the Sintering Process in detail. [8]
b) Describe the various Powder injection molding techniques in detail. [8]

P.T.O.

SECTION-II

- Q5)** a) Give the classification of unconventional machining process in detail and discuss the Principle of MRR of same in brief. [8]
- b) Describe the effect of various process parameters on MRR for ECM in detail. [8]
- Q6)** a) Discuss in detail the construction, Material and Tool Design for USM process. [8]
- b) Write a detail note on parameters in high speed machining. [8]
- Q7)** a) Discuss the core issues involved in Rapid Prototype technology. [8]
- b) Explain in detail processing of particulate ceramics. [8]
- Q8)** Write a short note on any three of the following: [18]
- a) Material properties at high strain rate.
- b) Selective laser sintering.
- c) Rapid tooling.
- d) Process parameters of IBM.
- e) Significance of CAD and GMP in Rapid Prototyping.

EEE

Total No. of Questions :10]

SEAT No. :

P4651

[5060]-86

[Total No. of Pages :2

**M.E. (Mechanical) (CADME)
CUSTOMIZATION OF CAD/CAM SOFTWARE'S
(2012 Course) (Semester- I) (Elective - I)**

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 answer books.*
- 3) Neat diagrams must be drawn wherever necessary.*
- 4) Figures to the right indicate full marks.*
- 5) Assume suitable data, if necessary.*
- 6) Use of pocket non programmable electronic calculator is allowed.*

SECTION-I

- Q1)** a) Discuss OLE interface in CAE software. [8]
b) Explain general features of computer graphics programming. [8]
- Q2)** a) Explain System dependent programming interfaces with suitable example. [8]
b) Enlist the procedure to interface the simple graphic entity using Visual LISP programming. [8]
- Q3)** Enlist, Need, Benefits, and explain Concept software product development life cycle in detail. [16]
- Q4)** a) Explain, how do you test the software for its reliability. [8]
b) Explain the issues rapid development languages. [8]
- Q5)** a) Need of OLE interfaces in CAD/CAM software. [6]
b) Write notes on GRIP. [6]
c) Explain macros and scripts with suitable example. [6]

P.T.O.

SECTION-II

- Q6)** Explain the different Euler operations used during development of geometric models. **[16]**
- Q7)** Explain the core issues related to the lifecycle planning and customer oriented development. **[16]**
- Q8)** a) Design and development of user interface icons for integrating databases with CAD. **[8]**
- b) Explain basic solid modeling algorithms. **[8]**
- Q9)** Explain in brief Editing 2D, 3D and solid entities through API. **[16]**
- Q10)a)** Explain Automated Assembly modeling through customization with suitable example. **[10]**
- b) Discuss customer oriented development. **[8]**



Total No. of Questions : 10]

SEAT No. :

P4652

[5060]-88

[Total No. of Pages :3

**M.E. (Mechanical Engg.) (CADME)
FINITE ELEMENT ANALYSIS (Elective-II)
(2012 Course) (Semester-I) (502405-A)**

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answers any 3 questions form each section*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of calculator is allowed.*
- 5) *Assume suitable data if necessary.*

SECTION-I

Q1) a) Explain the following methods for finding an approximate solution of engineering problems: [8]

- i) Rayleigh Ritz Method
- ii) Galerkin Method

b) Explain Beam stiffness Matrix Based on Euler- Bernouli Beam Theory. [8]

Q2) a) Explain two dimensional Pascal's triangle. Also explain its use in FEM analysis. [6]

b) Explain Quadratic shape functions of three-noded 1-D element. [6]

c) Using the Newton cotes method with $i=2$ intervals ($n=3$ sampling points).

Evaluate $I = \int_{-1}^1 [x^2 + \cos(x/2)] dx$ [6]

Q3) a) Explain the concept of degenerated solid elements by suitable examples. [8]

b) Explain Kirchoff's and Mindlin's theory for thin plate formulations. [8]

Q4) a) Explain applications of FEM in various fields. [6]

b) What is the difference between plate element and shell element? [6]

c) Evaluate the shape functions at the internal point P (3.4, 4.8) for the triangular element defined by (1.5,2), (7,3.5) and (4, 7). [6]

P.T.O.

Q5) Write short notes on (Any 3):

[18]

- a) Elemental connectivity.
- b) Least-squares & Collocation methods.
- c) Shear locking phenomenon.
- d) Isoparametric, Subparametric and Superparametric.

SECTION-II

Q6) Calculate the response of the bar rigidly supported at both ends which is subjected to an axial load as shown in fig 6, using the modified Newton Raphson iteration. Use two equal load steps to reach the maximum load application. The stress-strain relation and the load-versus-time curve relation are given in fig 6a [16]

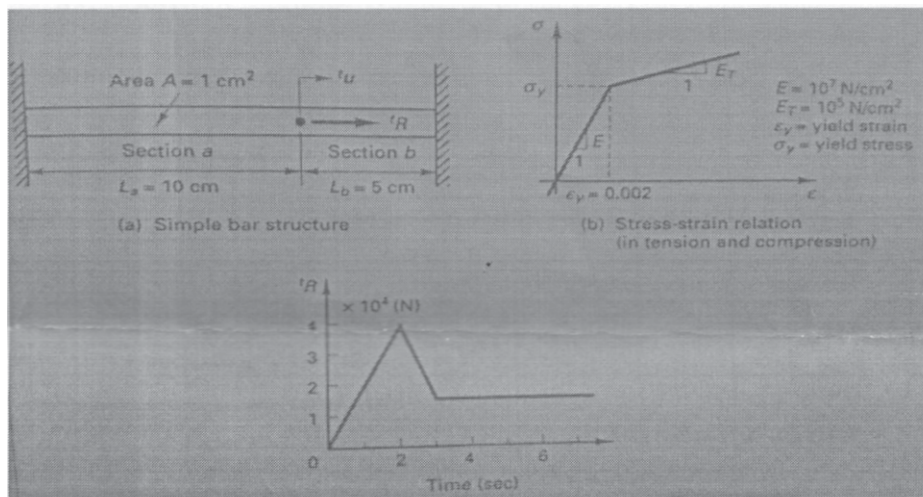


Fig. 6a simple bar structure

Q7) a) Find the natural frequencies of axial vibration of the bar using lumped mass matrix for a uniform cross-section bar as shown in fig 7a. Length of bar $L = 1$ m, $E = 200$ GPa, $A = 30$ cm², Moment of Inertia $I = 100$ mm⁴, density $\rho = 7800$ kg/m³. Model the bar using two elements. [10]



Fig 7a Uniform bar

b) Derive the consistent mass matrix for bar element.

[6]

- Q8)** a) Explain adaptive finite element technique. [8]
b) Explain the concepts submodelling and substructuring in FEM.
State its significance in structural analysis. [8]
- Q9)** a) Explain Geometric and Material non- linearity. [6]
b) Differentiate between consistent mass matrix and lumped mass matrix. [6]
c) Explain h and p refinement in FEM. [6]
- Q10)** Write short notes on following. (Any 3): [18]
a) Subspace iteration method.
b) Sources of errors in FEM.
c) Dynamic analysis
d) Modified Newton-Raphson method.



Total No. of Questions : 8]

SEAT No. :

P5110

[Total No. of Pages : 2

[5060]-89

M.E. (Mechanical) (CADME)
COMPUTATIONAL FLUID DYNAMICS
(2012 Course) (Elective - II)

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 writtern in separate answer-books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data if necessary and mention it clearly.*

SECTION - I

Q1) a) For an infinitesimally small 2D control volume of size dx, dy, show that

$$\rho \frac{Du}{Dt} = -\frac{\partial p}{\partial x} + \frac{\partial \tau_{xx}}{\partial x} + \frac{\partial \tau_{yy}}{\partial y} + \rho \bar{F}_x$$

Draw a neat diagram and show that all the x-directon body force and surface forces. Explain the terms \bar{F}_x in detail. **[12]**

b) Classify the PDE's in different forms. Write the three canonical forms of the partial differential equations. Give one practical example of each type. **[4]**

Q2) a) Which of the following, forward difference, backward difference and central difference, is most accurate and why? Derive an expression for each method. **[8]**

b) What is artificial viscosity? Explain in detail with suitable numerical scheme. **[8]**

Q3) a) What is the significance of the different grid topologies used in CFD? How coordinate transformations are used to generate the grids around complex geometries. **[8]**

b) Explain among structured and unstructured grid generation which method is preferred in industry. Justify the comment. Explain in detail algebraic grid generation method. **[8]**

P.T.O.

- Q4)** a) Explain the necessity of the coordinate transformation in CFD. Write general transformation expression for $\frac{\partial}{\partial x}$ & $\frac{\partial}{\partial y}$ for two dimensional flow. [8]
- b) Write in detail the CFD simulation process. Comment on the importance of the validation and verification process in CFD. [10]

SECTION-II

- Q5)** a) Differentiate between explicit and implicit method. Explain any one implicit method with neat sketches in detail. [8]
- b) Explain in detail any two methods of discretization commonly used in CFD. What are the merits and demerits of these methods? [8]
- Q6)** a) Explain ADI method in detail and write an algorithm, in steps, used in CFD solution process. [8]
- b) Write an algorithm for solution of initial value problems using suitable numerical scheme. Comment on the accuracy of the scheme. [8]
- Q7)** a) Convert two dimensional Laminar X-momentum equation into turbulent flow equation. Explain different terms like temporal mean velocity fluctuating component and instantaneous velocity component. [8]
- b) Write in detail complete two dimensional Navier Stokes equations in differential form, in terms of velocity components, pressure, body force and shear stress terms. Write stokes assumptions to convert shear stress term into velocity components and viscosity terms i.e. dynamics viscosity (μ) and second viscosity (λ). [8]
- Q8)** Write short notes on (any three) [18]
- a) ADI method
 - b) Relaxation techniques in CFD numerical solution
 - c) Challenges encountered in industrial CFD
 - d) Geometric modeling of complex geometry in commercial CFD tool



Total No. of Questions : 8]

SEAT No :

P4600

[5060]-9

[Total No. of Pages : 2

**M.E.(Civil - Environmental Engineering)
GROUND WATER CONTAMINATION AND POLLUTION
TRANSPORT**

(2010 Course) (Semester - II) (Open Elective - IV) (501512 A)

Time :3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any 3 questions from each section.*
- 2) *Figures to the right side indicate full marks.*
- 3) *Assume Suitable data if necessary clearly mentioning the same.*
- 4) *Use of non-programmable scientific calculator is allowed.*

SECTION - I

Q1) a) Explain in detail how to make GW as sustainable source of water. [8]

b) Derive a general steady state continuity equation for GW flow in a heterogeneous isotropic aquifer. [8]

Q2) a) Three wells A, B and C are located at the apices of an equilateral triangle, spaced 500 m apart. A is N45°E of B. The ground level elevations of A, B & C are 60, 42 and 38m resp. The depth of water table in A,B and C are 12,6 and 2 m resp. Determine the hydraulic gradient and the direction of GW flow. [10]

b) Explain GW as geotechnical problem, with special reference to: [8]

- i) Geo-hydrological investigations.
- ii) Geo-physical investigations.

Q3) a) Comment on GW contamination in detail. Explain the remedial measures for the same. [8]

b) What are flow nets? Explain the with suitable example method of constructing flow nets. [8]

P.T.O.

- Q4) a)** A well of radius 30 cm fully penetrating a water table aquifer with $K=20\text{m/day}$ and H , initial head above the impervious stratum = 40m, is pumped till a steady water level in the well is 35 m above the stratum. Assuming that R , the radius of influence is 600 m and that there are no well losses, estimate the steady state discharge. [8]
- b) Explain in detail flow net analysis for anisotropic hydraulic conductivity in an earthen dam. [8]

SECTION - II

- Q5) a)** In a coastal phreatic aquifer in which fresh water is moving & salt water is stagnant, the slope of the water table is 1 in 1000. Determine the slope of the interface, given that the densities of fresh water & salt water are 1.00 and 1.025 g/cc. [12]
- b) Comment on GW scenario of Maharashtra. [4]
- Q6) a)** Explain in detail relation between dispersion and GW hydrology. [8]
- b) What is the importance of tracer studies. Write a note on GW tracer.[8]
- Q7) a)** Explain in detail : Ground Water Provinces of India. [8]
- b) Explain in detail : GW exploration. [8]
- Q8) a)** Explain the importance of GW modelling studies. Explain any 01 type of model in detail. [10]
- b) explain in detail : artificial recharge method. [8]



Total No. of Questions :8]

SEAT No. :

[Total No. of Pages :2

P4653

[5060] - 91

**M.E. (Mechanical) (CADME)
MANAGEMENT OF TECHNOLOGY
(2012 Course) (Semester - II)**

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) Answers to the two sections should be written in separate answer books.*
- 2) Answer any three questions from each section.*
- 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) Discuss the types of Technologies and Forms of Technologies. [8]
b) Explain in detail Technology diffusion. [8]
- Q2)** a) Discuss the relations between the organizational culture and structure of level of creativity and innovation. [8]
b) Discuss key elements and principles for developing technology strategy. [8]
- Q3)** a) Discuss the concepts of growth curves and explain four phases of “S” curve with proper example. [8]
b) Explain Exploratory technological forecasting techniques. [8]
- Q4)** Write a short note on (any three): [18]
a) Role and significance of technology and management.
b) Classification of Technology.
c) Morphological analysis.
d) Technology performance parameters.

P.T.O.

SECTION - II

- Q5)** a) Explain different factors affecting and channels of technology transfer. [8]
b) Explain a generic model of the process of new product development. [8]
- Q6)** a) Discuss with appropriate example patentable and non-patentable inventions. [8]
b) Discuss the concept of Levels of technology transfer. [8]
- Q7)** a) Discuss the concept National Innovation Scheme. [8]
b) Explain Government schemes of Innovation. [8]
- Q8)** Write a short note on (any three): [18]
a) Invention and Innovation.
b) Need of managing Research & development.
c) Analytical Hierarchical Process applied to industrial products.
d) Intellectual property rights.



Total No. of Questions : 10]

SEAT No :

P4654

[5060]-92

[Total No. of Pages : 3

M.E. (Mechanical) (CADM & E)
COMPUTERAIDED MANUFACTURING
(Semester - II) (2012 Course) (502409)

Time : 3 Hours]

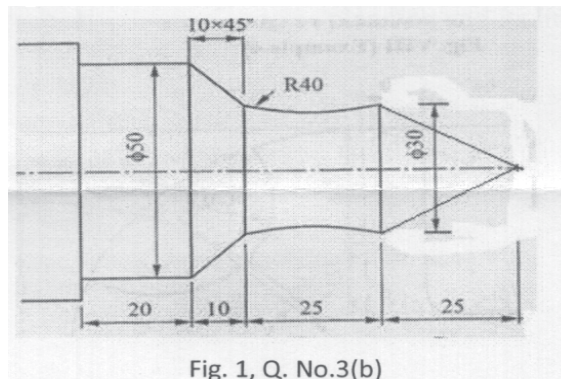
[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Attempt any three questions from each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of Electronic pocket Calculator is allowed.*
- 6) *Assume Suitable data if necessary and mention it clearly.*

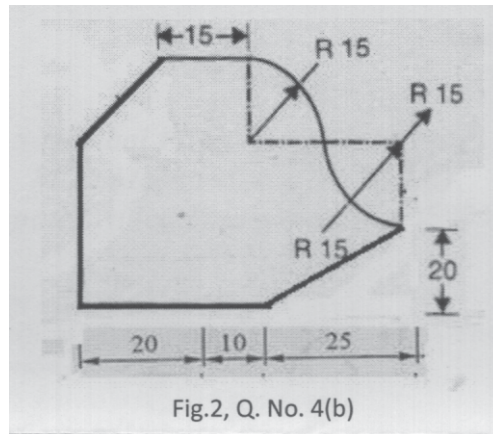
SECTION - I

- Q1)** a) Explain different types of automation used in production plant. [6]
b) Explain Hard automation used in production plant. [6]
c) Explain the modern maintenance and diagnostics systems used in automated systems. [6]
- Q2)** a) Explain with neat block diagram the configurations of DNC. [8]
b) Explain with neat sketch functions of DNC. [8]
- Q3)** a) Explain different types of formats used for writing NC part programming. [6]
b) Write a complete NC part program for the component shown in Fig.1, Draw the tool path and take raw material SS blank of 100 mm length and 60 mm diameter, spindle speed 300 RPM and feed 0.5 mm/rev. all dimensions are in mm. [10]



P.T.O.

- Q4) a)** Explain the different types of motion commands used in APT programming. [6]
- b) Write a complete APT part program to generate end profile for the component shown in Fig.2. Use post processor call statement MACHINE MILL, Draw the tool path and take Aluminum as raw material of 150mm x 100mm, spindle speed 400RPM and feed 0.25mm/rev. all dimensions are in mm. [10]



- Q5) a)** Explain with neat block diagram of hard wired and soft wired configuration of a CNC. [8]
- b) Explain functions of computers in DNC. [8]

SECTION - II

- Q6) a)** Explain MI-CLASS GT part classification and coding systems. [10]
- b) Explain GT applications for manufacturing processes. [8]
- Q7) a)** Explain the role of control system in FMS. [6]
- b) Explain the components of FMS. [10]
- Q8) a)** Explain Esprit CIM-OSA model. [8]
- b) Draw neat sketch siemens - CIM Model. [8]

- Q9)** a) Explain the activities of production planning department. [6]
b) Explain in brief generative type of process planning and its limitations. [10]
- Q10)** a) write short notes on MRP. [6]
b) Write short notes on CMM. [5]
c) Role of CIM in manufacturing. [5]



Total No. of Questions : 8]

SEAT No. :

P5043

[5060]-94

[Total No. of Pages : 2

**M.E. (Mechanical - CADME)
PRODUCT LIFECYCLE MANAGEMENT
(2012 Course) (Semester - II) (Elective - IV)**

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Attempt any three questions from each section.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Assume Suitable data if necessary.*

SECTION - I

Q1) Define Product Life Cycle Management. Explain the emergence of PLM from PDM. Discuss various components of PLM in detail. **[18]**

Q2) a) Elaborate the link between Product Data and Product Work Flow. **[8]**
b) What is PLM strategy? Explain the identification and selection of PLM Strategy. **[8]**

Q3) a) Explain the concept of Collaborative Engineering in detail. **[8]**
b) Explain different functions of PDM in detail. **[8]**

Q4) a) Discuss various key issues related to data management in detail. **[8]**
b) Explain PLM characteristics singularity, cohesion, traceability, reflectiveness. **[8]**

SECTION - II

Q5) Elaborate Hardware Management, Document Management and Configuration Management in PLM set up. **[18]**

P.T.O.

Q6) Explain in detail different phases of product lifecycle and corresponding technologies involved. **[16]**

Q7) a) Discuss Visualization and Collaboration in PLM. **[8]**

b) Explain Entity - Relationship model in database management. **[8]**

Q8) a) What is Distributed Database? Explain any one in detail. **[8]**

b) Explain the role of Human Resources in Product Lifecycle Management. **[8]**



Total No. of Questions : 8]

SEAT No. :

P5106

[Total No. of Pages : 2

[5060]-95

**M.E (Mechanical) - (Computer Aided Design,
Manufacturing & Engineering)
RAPID PROTOTYPING
(2008 Pattern) (Elective - IV)**

Time : 3 Hours]

[Max. Marks : 100

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

SECTION - I

- Q1)** a) What is solid based RP system? What methods are used in it to develop prototype? List solid based four systems. [8]
- b) What are advantages of RP to product designs, tool designer, manufacturing engineers and consumers? [8]
- Q2)** a) What is SGC process? Explain the steps in process. [8]
- b) What are photo polymers? What is photo polymerization? What are strengths and weakness of SLA Process? [8]
- Q3)** a) How LOM process works? Explain in brief with its schematic. [8]
- b) Compare FDM process and LOM process? [8]
- Q4)** a) What is application area for 3DP? Brief one case study. [10]
- b) What are key strengths and limitations of 3DP. [8]

P.T.O.

SECTION - II

- Q5)** a) What is need of RT? Compare conventional and rapid tooling? [8]
b) Brief indirect rapid tooling: ceramic tools and arc spray metal tooling. [8]
- Q6)** a) What is AIM and LOM tools? How they are developed and applied. [8]
b) Brief process of 3D keltool and EDM electrodes. [8]
- Q7)** a) What are features of IGES and HP/QL file? When they are preferred? [8]
b) What different problems of STL file may occur? Explain in brief. [8]
- Q8)** a) How can RP prove useful in forensic Science? Compare current technology in it with RP. [10]
b) How RP is used in material relationship area. What is RP use in GIS applications? [8]



Total No. of Questions : 8]

SEAT No. :

P4655

[5060]-96

[Total No. of Pages :2

**M.E. (Mech. Engg.) (CADME)
DATABASE MANAGEMENT SYSTEM
(2012 Pattern) (Semester-II) (Elective-IV) (502412 - C)**

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Attempt any three questions from each section.*
- 2) *Figures to the right indicate full marks.*

SECTION-I

- Q1)** a) Explain Enterprise Data Warehouse. [8]
b) Explain the E/R model as a foundation for the Relational model. [8]
- Q2)** a) Elaborate database design in Data warehouse. [8]
b) Explain dimensional Data model. [8]
- Q3)** a) Explain Operational Data store in Data Architecture. [8]
b) Elaborate Data retrieval and update facility. [8]
- Q4)** Describe: [18]
a) Data structure diagram
b) Virtual Records
c) Logic - Based Databases

SECTION-II

- Q5)** a) What is Sequential Query Language (SQL)? How SQL is used in DBMS. [8]
b) What are advantages of the indexes in DBMS? [8]

P.T.O.

Q6) a) Elaborate Extract, Transform and Load (ETL) in Data Mapping. [8]

b) Explain data state diagram in source system analysis. [8]

Q7) a) Explain Data Recovery and Concurrency in DBMS. [8]

b) Elaborate on buffer management. [8]

Q8) Describe: [18]

a) Inventory of Data Elements

b) Data Mart

c) Distributed Database

