Total No. of Questions : 8]

SEAT No :

P 4458

[Total No. of Pages :3

[5355]-1

ME (Civil) (Construction and Management)

APPLICATIONS OF STATISTICAL METHODS IN CONSTRUCTIONS

(2013 Pattern) (Semester - I)

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

Instructions to candidates:

1) ***Each question carries 10 marks.***
2) ***Solve any 5 Questions out of 8.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to right indicate full marks.***
5) ***use of logarithmic tables, slide rule, electronic pocket calculator and statistical tables is allowed.***
6) ***Assume suitable data, if necessary.***

Q1) a) A bag contains 6 white and 9 black balls. Four balls are drawn at a time find the probability for the first draw to give 4 white and the second to give 4 black balls, when the balls are not replaced before the second draw. **[5]**

b) Explain Baye's theorem with example. **[5]**

Q2) a) Explain the following. **[6]**

i) Normal probability distribution.

ii) Beta probability distribution.

iii) Binomail probability distribution.

b) 10% of the blocks produced by a certain company found to be defective. Find the probability that in a sample of 10 blocks selected at randomly exactly two will be defective using.

i) Binomial distribution.

ii) Poisson distribution and comment on the results. **[4]**

P.T.O.

Q3) a) Explain the significance of the following in quality control of concrete:

i) Standard deviation.

ii) Coefficient of variance.

iii) Range. **[6]**

b) Explain the various types of hypothesis with examples. **[4]**

Q4) a) Demand for number of cement bags on a construction project was found to vary from month to month. In a sample study the following information was obtained for first ten months.

Months	Jan	Feb	Mar	Apr	May	June	July	Aug	sep	Oct
No. of cement bags	11240	11205	11100	11200	11026	11150	11250	11325	11500	11045

Use χ^2-test to assess the correctness of the hypothesis that number of cement bags demanded does not depends on months. Value of χ^2 for 5 degree of freedom at 5% level is 11.07. **[7]**

b) Explain the various risk analysis tools used in construction with examples. **[3]**

Q5) Find regression equation for the following data and determine the value of y for x=19 and x for y=30.

X	20	22	23	25	25	28	29	30	30	34
Y	18	20	22	24	21	26	26	25	27	29

[8+2]

Q6) a) Determine Spearman's rank correlation coefficient based on the following data.

Items	Points given by quality manager	Points given by sr. site engineer
Excavation	10	9
PCC	8	9
RCC	7	8
Plumbing	10	6
Plastering	5	6
Waterproofing	8	9
Woodwork	3	6
Electrification	7	7
Brickwork	8	7
Water tank	9	10

Also interpret the same. **[5+1]**

b) Explain the applications of sensitivity analysis in material management. **[4]**

Q7) a) Explain the different types of correlation coefficients and regression equations with construction examples. **[7]**

b) Explain Griffi's mathematical model for crusher plant. **[3]**

Q8) A Contractor has kept the data for last 5 projects related to duration required to complete it. Using Monte Carlo simulation, simulate the mean duration for his next 10 projects.

Project No.	Duration
1	32
2	15
3	11
4	09
5	38

Use following random numbers.

63 78 87 47 56 22 19 16 78 03 04 61 23 15 58 **[10]**

Total No. of Questions :8]

SEAT No. :

P4540

[Total No. of Pages : 2

[5355] - 102

M.E. (Mechanical-Energy Engineering)

ADVANCED THERMODYNAMICS

(2013 Course) (Semester - I)

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

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagrams must be drawn whenever necessary.***
3) ***Figures to the right side indicates full marks.***
4) ***Use of Calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) Explain Law of corresponding states. **[5]**

b) Discuss the generalised compressibility chart with suitable diagram. **[5]**

Q2) a) Explain the phase change process from solid to gas with P-V, T-S and P-T diagram for a substance which shrinks in volume on melting and also for a substance which expands in volume on melting. **[5]**

b) On mollier diagram, why do the isobars diverge from one another. **[5]**

Q3) a) Explain increase in entropy principle and entropy generation. **[5]**

b) Discuss the Law of degradation of energy and availability function of closed and open system. **[5]**

Q4) Write a note on :

a) T-dS relations **[5]**

b) Energy Destruction. **[5]**

P.T.O.

Q5) a) Write a note on Maxwell relations. **[5]**

b) Derive the relation $(Cp - Cv) = -T\left(\frac{\partial v}{\partial T}\right)_p^2\left(\frac{\partial p}{\partial v}\right)_T$. **[5]**

Q6) a) Explain The enthalpy of reaction with suitable example. **[4]**

b) Find the adiabatic flame temperature for methane-air stoichiometric mixture. Consider Initially reactants are at 1 atm and 298 K. Use following data. **[6]**

Species	Heat of formation (kJ/mol)	Specific Heat Cp at 1200 K (kJ/kmol.K)
CH_4	-74831	--
CO_2	-393546	56.21
H_2O	-241845	43.87
N_2	0	33.71

Q7) a) Discuss the Amagat's Law and Kay's Rule. **[5]**

b) As applied to statistical thermodynamics, explain the principle of equipartition of energy. **[5]**

Q8) Write a note on :

a) The criteria for chemical equilibrium. **[5]**

b) Explain Inversion Curve and Joule-Thompson Coefficient. **[5]**

Total No. of Questions : 8]

SEAT No. : ____

P4541

[Total No. of Pages : 3

[5355] - 105

M.E. (Mechanical - Energy Engineering)

ADVANCED HEAT TRANSFER

(2013 Course) (Semester - II) (502107)

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

Instructions to the candidates:

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

Q1) a) A reactors wall, 320 mm thick, is made up of an inner layer of fire brick ($k = 0.84$ W/m ^oC) covered with a layer of insulation ($k = 0.16$ W/m ^oC). The reactor operates at a temperature of 1325^oC and the ambient temperature is 25^oC. **[6]**

i) Determine the thickness of fire brick and insulation which gives minimum heat loss.

ii) Calculate the heat loss presuming that the insulating material has a maximum temperature of 1200^oC.

b) Discuss velocity boundary layer and thermal boundary layer development for flow through tubes. **[4]**

Q2) a) Derive an expression for generalized three dimensional heat conduction equation in Cylindrical Coordinates for unsteady flow. **[7]**

b) Explain the significance of Fourier Number. **[3]**

Q3) a) Explain Lumped Capacitance and its validity. **[4]**

b) Explain use of charts in solving transient conduction problems? **[3]**

c) Write a note on Spatial Effects. **[3]**

P.T.O.

Q4) a) Using dimensional analysis establish a relation between Nusselt, Prandtl and Grashof numbers. **[6]**

b) Explain Reynolds Analogy. What are the limitations? **[4]**

Q5) A horizontal tabular 1-1 condenser is used to condense saturated steam at 80^{o}C . The condenser is a shell and tube one with brass tubes (k=110 W/ m^{o}C) of 1.59cm OD and 1.34cm ID, Steam is outside tubes and cooling water enters the tubes at 20^{o}C with a velocity of 1.4m/s and leaves at 40^{o}C. If the rate of cooling water supply is 55000 Kg/h and the latent heat of condensation of steam at 80^{o}C is 2304 KJ/Kg. Calculate **[10]**

i) The number of tubes

ii) The length of each pipe

For calculating the tube side heat transfer coefficient use the Dittus-Boelter equation and for the shell side heat transfer coefficient, the average value may be taken as 10760 W/m^{2}K.

Data - Properties of water at 30^{o}C – k = 0.659 W/mK ρ= 979.8 kg/m^{3} Cp = 4.180 KJ/Kg K μ= 0.4044 × 10^{-3}.

Q6) a) Explain Chilton Colburn analogy. **[5]**

b) Air stream at 24^{o}C is flowing at 0.4 m/s across a 100W bulb at a 130^{o}C. If the bulb is approximated by a 65mm diameter sphere, calculate: **[5]**

i) The heat transfer rate and

ii) The percentage of power lost due to convection.

Use correlation Nu = 0.37 (Re)^{06}.

Properties of Air at 77^{o}C k = 0.03W/m^{o}C

ν = 2.08 × 10^{-5} m^{2}/s Pr = 0.697

Q7) a) Explain Forced Convection Boiling. **[4]**

b) Write a note on 'Radiation exchange between Emitting and Absorbing gases". **[4]**

c) What is Shape Factor? **[2]**

Q8) A metal plate 0.609m in height forms the vertical wall of an oven and is at a temperature of 171 ^{o}C. Within the oven is air at a temperature of 93.4 ^{o}C and atmospheric pressure. Assuming that natural convection conditions hold near the plate and that this case **[10]**

$Nu = 0.548(Gr.Pr)^{1/4}$

Find the mean heat transfer coefficient and the heat taken up by air per second per meter width. For air at 132.2 ^{o}C, take $k = 33.2 \times 10^{-6}$ KW/mK, $\mu = 0.232 \times 10^{-4}$ kg/ms, Cp = 1.005KJ/KgK. Assume air as an ideal gas and R = 0.287 KJ/KgK.

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Total No. of Questions : 8]

SEAT No :

P 4542

[Total No. of Pages : 2

[5355]-106

M.E. (Mechanical-Energy Engineering)

ENERGY CONVERSION SYSTEMS

(2013 Pattern) (Semester - II) (502508)

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

Instructions to the candidates:

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

Q1) a) Explain the sources of energy and their scenario with peculiar characteristics. **[6]**

b) Write a short note on photo conversion of solar energy. **[4]**

Q2) A gas turbine set draws in atmospheric air at 1 bar and 15ºC. There are two pressure stages with perfect intercooler and the total pressure ratio is 25:1. The maximum temperature of the cycle is 1300ºC and there is one turbine for expansion a regenerator is used and recovers 70% of the available heat. Determine the efficiency of the plant and the ratio of the useful work to turbine work. The turbine and compressor efficiencies may be taken as 0.87 and 0.86 respectively. Assume mechanical efficiency of whole assembly equal to 0.96 and generator efficiency as 0.98. **[10]**

Q3) a) List the factors affecting cooling tower performance. **[5]**

b) Write a note on dual pressure combined cycle gas turbine power plant. **[5]**

P.T.O.

Q4) a) Explain the operating principle of stoker fired boilers. **[4]**

b) Explain the indirect method of evaluation for boiler performance. **[6]**

Q5) a) Write a note on boiler blow down. **[5]**

b) Describe the factors affecting on performance and energy efficiency of refrigeration plants. **[5]**

Q6) a) Explain the factors affecting the selection of cogeneration system. **[5]**

b) Write a note on hybrid recuperators. **[5]**

Q7) a) Write a note on fan curves and system characteristics. **[4]**

b) Explain the compressor modulation to improve the performance of compressed air system. **[6]**

Q8) a) Explain the flow control strategies for pumps. **[5]**

b) Explain the factors affecting cooling tower performance. **[5]**

Total No. of Questions :8]

SEAT No. :

P4543

[Total No. of Pages : 2

[5355] - 107

M.E. (Mechanical) (Energy Engineering)

ENERGY MANAGEMENT

(2013 Course) (Semester - II) (502509)

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

Instructions to the candidates:

1) ***Answers any five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of logarithmic tables sliderule, Mollier charts, electronic pocket Calculator is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) a) List and explain the steps involved in detailed energy audit. **[5]**

b) Explain the safety considerations in energy audit. **[5]**

Q2) a) Explain in detail the methodology for conducting a detailed energy audit. **[5]**

b) Explain the following stating the advantages and limitations if any **[5]**

i) Simple Pay Back Period

ii) Return on Investment

iii) Internal Rate of Return

Q3) a) A 3 ϕ AC Load draws 8 KW power at 400 V supply voltage and 15 A line current. Calculate the power factor of the load. **[5]**

b) Define project and mention various steps involved in project management. **[5]**

Q4) a) Write short note on excess air control **[5]**

b) Explain in detail condensate recovery and mention benefits of condensate recovery. **[5]**

P.T.O.

Q5) a) Explain step by step approach for maximum demand control. **[5]**

b) Briefly list various energy conservation opportunities in a refrigeration plant. **[5]**

Q6) Motor Specifications **[10]**

Rated power	=	34 kW/45 HP
Voltage	=	415 Volt
Current	=	57 Amps
Speed	=	1475 rpm
Insulation class	=	F
Frame	=	LD200L
Connection	=	Delta

a) Calculate iron plus friction and windage losses

b) Calculate stator resistance at 120°C

$$R_2 = R_1 \times \frac{235 + t_2}{235 + t_1}$$

c) Calculate stator copper losses at operating temperature of resistance at 120°C

d) Calculate full load slip(s) and rotor input assuming rotor losses are slip times rotor input.

e) Determine the motor input assuming that stray losses are 0.5 % of the motor rated power.

f) Calculate motor full load efficiency and full load power factor.

Q7) a) What are the typical applications of a heat pipe in heat exchangers? **[5]**

b) What are the technical parameters to be considered while selecting cogeneration systems? **[5]**

Q8) a) Explain the classification of radioactive wastes by radioactivity concentration with the help of graph. **[5]**

b) Write short note on thermal heat wheels. **[5]**

Total No. of Questions :8]

SEAT No. :

P4544

[Total No. of Pages : 2

[5355] - 108

M.E. (Mechanical-Energy Engineering)

NUCLEAR MATERIALS AND REACTOR FUNDAMENTALS

(2013 Pattern) (Semester - III) (602513)

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

Instructions to the candidates:

1. ***Answer any Five questions from the following***
2. ***Neat sketches may be drawn wherever necessary.***
3. ***Figures to the right indicate full marks***
4. ***Use of calculator is allowed.***
5. ***Assume suitable data if necessary, and mention the same.***

Q1) a) What are the properties of the materials to be considered for nuclear steam system? **[4]**

b) Write a note on selection and radiation effects on different types of materials. **[6]**

Q2) a) Explain nuclear steam supply system with neat diagram. **[7]**

b) Write a note on radiation damage. **[3]**

Q3) Write a note on : **[10]**

a) Reactor Atomic model and nuclear model.

b) Nuclear fission and Radioactive decay.

Q4) a) Explain the Nuclear reactor with neat diagram. **[7]**

b) Write a note on nuclear diffusion **[3]**

Q5) Write the processing of nuclear fuel with respect to mining and milling. **[10]**

Q6) Write a note on : **[10]**

a) Fuel cycle economics

b) Fuel cycle management

P.T.O.

Q7) a) Why U^{235} fissions with thermal neutrons and U^{238} fissions only with fast neutrons? Explain. **[5]**

b) Describe the following scattering interactions between a neutron and a nucleus: **[5]**

i) Elastic scattering

ii) Inelastic scattering

Q8) A sample of material contains 25 micrograms of californium -252. Californium 252 have a half-life of 2.638 years. **[10]**

Calculate:

a) The number of californium -252 atoms initially present.

b) The activity of the californium - 252 in curies.

c) The number of californium -252 atoms that will remain in 10 years.

d) The time taken for the activity to reach 0.001 curies.

Total No. of Questions : 8]

SEAT No. : ____

P4545

[Total No. of Pages : 2

[5355] - 109

M.E. (Mechanical) (Energy Engineering)

ENERGY SYSTEMS MODELING AND ANALYSIS

(2013 Course) (Semester - III) (602514)

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

Instructions to the candidates:

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

Q1) a) Explain the concept of interaction between models. **[6]**

b) What do you mean by best fit and exact fit? **[4]**

Q2) a) Write note on necessity of system modeling. **[4]**

b) What are different types of model? Explain Mathematical model. **[6]**

Q3) a) Derive required expression using least square method to fit quadratic equation. **[6]**

b) Compare the simulation and analytical methods. **[4]**

Q4) For common heat exchangers, such as the parallel and counter flow heat exchangers, discuss the development of a simple mathematical model to analyze the system. **[10]**

Q5) a) The flow rate Q(m^3/s) in circular pipes is measured as a function of the diameter D and the pressure difference Δp. Obtain a best fit for data given in table, assuming a power-law dependence of Q on the two independent variables D and Δp. **[6]**

P.T.O.

D(m)	0.3	0.5	1.0	1.4
ΔP(atm)				
0.5	0.13	0.43	2.1	4.55
0.9	0.25	0.81	4.0	8.69
1.2	0.34	1.12	5.5	11.92
1.8	0.54	1.74	8.59	18.63

b) Explain different steps in simulation study. **[4]**

Q6) Use the Simplex method to find the maximum value of: **[10]**

$$z = 3x_1 + 2x_2 + x_3$$

Subject to the constraints

$$4x_1 + x_2 + x_3 = 30$$

$$2x_1 + 3x_2 + x_3 \leq 60$$

$$x_1 + 2x_2 + 3x_3 \leq 40$$

where $x_1 \geq 0$, $x_2 \geq 0$, and $x_3 \geq 0$.

Q7) a) Minimize the function $f(x) = 0.65 - [0.75/(1 + x^2)] - 0.65x \tan^{-1}(1/x)$; in the interval [0, 3] by the Fibonacci method using n = 6. Also find reduction ratio. **[5]**

b) Explain Fibonacci search technique and write its algorithm to find optimum design. **[5]**

Q8) For what purpose Lagrange multiplier method is used? Write the proof of Lagrange multiplier method. **[10]**

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Total No. of Questions : 8]

SEAT No. :

P4467

[Total No. of Pages : 2

[5355]-11

M.E. (Civil) (Environmental Engineering)

ENVIRONMENTAL LEGISLATION AND MANAGEMENT SYSTEMS

(2013 Pattern) (Semester - I)

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

Instructions to the candidates:

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

Q1) Write short note on : **[4 + 3 + 3 = 10]**

a) Kyoto agreement

b) Montreal protocol

c) Rio declaration.

Q2) Discuss the powers and functions of SPCB as perwater (p&cp) act of 1974. **[10]**

Q3) Discuss the powers and functions of SPCB as per Air (P&cp) act of 1981. **[10]**

Q4) Discuss the role and responsibilities of local bodies for Municipal Solid waste management. **[10]**

Q5) Discuss the fundamentals of Environmental Management and ISO 1400 Series. **[10]**

Q6) Explain the following : **[10]**

a) Role of Judiciary in Environmental Protection

b) Environmental Audit.

P.T.O.

Q7) Discuss the biomedical waste (M & H) rules 1998. **[10]**

Q8) Discuss the Role and Responsibilities of Pollution Control Boards under Hazardous Waste rules. **[10]**

Total No. of Questions : 7]

SEAT No. : ____

P4546

[Total No. of Pages : 2

[5355]-111

M.E. (Mechanical - Mechatronics)

SYSTEM MODELLING, IDENTIFICATION & SIMULATION

(502801) (Semester - I) (2013 Course)

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

Instructions to the candidates:

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

Q1) Determine the bond graph model for system in Fig. Q1. **[10]**

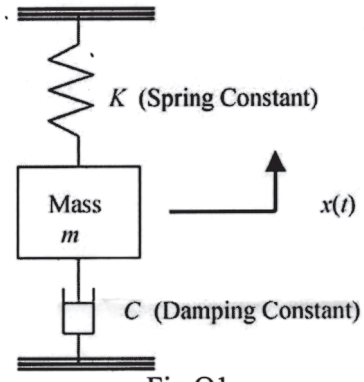
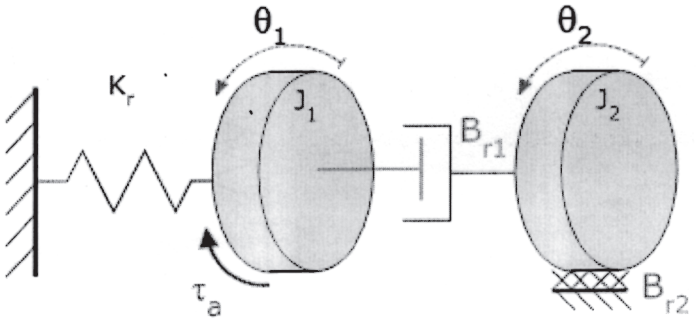


Fig Q1

Q2) Using a suitable example discuss the process of similarity transformation. Also, mention when such transformation would be helpful. **[10]**

Q3) Derive the transfer function between output θ_2 and input τ_a for the system in Fig. Q2. **[10]**



P.T.O.

Q4) Draw a flowchart and explain the process of system identification using least squares. **[10]**

Q5) Using suitable example, write 5 distinct points of differentiation between time domain and frequency domain approach. **[10]**

Q6) Draw a suitable flow chart and explain the working of Non-linear Kalman Filter. **[10]**

Q7) Using a suitable example explain, supervised learning. Also, discuss the advantages offered by supervised learning when compared with un-supervised learning. **[10]**

Total No. of Questions : 7]

SEAT No. :

P4547

[Total No. of Pages : 2

[5355]-112
M.E. (Mechanical-Mechatronics)
CONTROL SYSTEMS - I
(2013 Pattern) (Semester - I) (502802)

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

Instructions to the candidates:

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

Q1) Using a suitable example and a neat labeled block diagram, explain the operation of a regulated control system. **[10]**

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ -171 & -101.71 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u \quad y = \begin{bmatrix} 1325 & 0 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + [0]u \quad \text{Eq.1}$$

Q2) For the system represented by Eq. (1), **[10]**

- Determine location of poles & zeros
- Analyze the absolute stability of the system
- Comment on the unit step response of the system

Q3) Access the controllability as well as the observability of the system in Eq. (1). **[10]**

Q4) For the system in Eq. 1, design a full state feedback control system such that the said system is critically damped and has a 5% settling time of 0.5 second. **[10]**

P.T.O.

Q5) a) Is it possible to place poles at any desired location using full state feedback control? Is there any physical disadvantage associated with such pole placement? **[5]**

b) Discuss the significance of parameters, Q & R in an LQR type control.**[5]**

Q6) Using suitable examples, discuss how change in pole location affects the damping factor, natural frequency and transient time domain specifications.**[10]**

Q7) For the system in Eq. 1, design a full state observer system using the Ackermann's method. Assume the observer poles are co-located at - 36.**[10]**

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Total No. of Questions :7]

SEAT No. :

P4548

[Total No. of Pages : 2

[5355] - 113

M.E. (Mechanical - Mechatronics)

SENSORS, TRANSDUCERS & INTERFACING TECHNIQUES

(2013 Pattern) (Semester-I) (502803)

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

Instructions to the candidates:

1) ***Attempt any FIVE questions.***
2) ***Figures to the right indicate full marks.***
3) ***Draw neat diagrams wherever necessary.***
4) ***Use of scientific calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Define & explain the following terms - **[5]**

i) Precision

ii) Accuracy

iii) Mean & Median

iv) Standard deviation

v) Variance

b) Explain how uncertainty analysis help to reduce overall experimental uncertainty using neat example. **[5]**

Q2) a) Compare - **[5]**

i) Analog CRO with DSO

ii) Sensors with transducers.

b) Explain - **[5]**

i) Piezoelectric transducer and

ii) Photo conductive transducers using neat diagram and applications.

Q3) Explain any three pressure measurement techniques using neat diagram, features, advantages and drawbacks of each technique. **[10]**

P.T.O.

Q4) a) Explain the flow measurement by Drag coefficient. **[5]**

b) Discuss how thermocouple compensation is carried out using neat diagrams & mathematical equations. **[5]**

Q5) Write detailed notes on : **[10]**

a) pH Measurements

b) Thermal conductivity measurements

c) Heat flux meters

Q6) a) Explain the different types of strain gauges. Indicate advantages of drawbacks of each type. **[5]**

b) Draw a neat schematic of analog weight scale & explain function of each block. **[5]**

Q7) a) State important characteristics of D-to-A converters. State the different types of DAC & explain the most widely used DAC using neat circuit diagram. **[5]**

b) Explain briefly data storage & display devices used for data acquisition system. **[5]**

Total No. of Questions :8]

SEAT No. :

P4549

[Total No. of Pages :2

[5355] - 115

M.E. Mechanical (Mechatronics)

PLC PROGRAMMING

(2013 Course) (Semester - II) (502807)

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

Instructions to the candidates:

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

Q1) Prepare a i/o chart for a general purpose conveyor, which has **[10]**

a) START and STOP buttons.

b) Three locations to stop sensed by Proximity switches.

c) On Inlocation to start the conveyor, one OutLocation to stop the converyor.

d) State the assumption you make, and the Boolean equations for each rung of your ladder program.

Q2) a) Explain the role of Boolean algebra in developing PLC ladder program. Develop a Gate Logic and corresponding PLC ladder logic diagram for given equation. **[6]**

$Y = (A + B) + C.D$

$Y = C + D.\bar{E}$

b) Compare On Delayed and Off delayed timer with PLC instruction, data file and one application each. **[4]**

P.T.O.

Q3) a) Compare Count Up and Count down counters with PLC instruction, data file and one application each. **[6]**

b) Discuss the role of automation and mechanization in Indian industries. **[4]**

Q4) a) With the aid of a block diagram, explain the basic operation of a dosed-loop control system. **[2]**

b) In PLC based automatic ball sorting system, there three types of ball viz. metal, plastic and glass are to be sorted. If metallic ball is sensed, actuator A1 will be actuated and will retract touching the limit switch LSl. If palstic ball is sensed, actuator A2 will be actuated and will be retract touching the limit switch LS2. If ball is of glass, no actuators would be actuated. When balls in the hopper are reduced below low levels, a RED light should glow along with buzzer so operator. **[8]**

Q5) a) Describe the main function of each of the following main component parts of a PLC. **[6]**

i) I/O module.

ii) Programming device.

b) Assume that a thermocouple is connected to an analog input module. Explain how the temperature of the thermocouple is communicated to the processor. **[4]**

Q6) Name and draw the symbol and explain five different types of data compare instruction. **[10]**

Q7) a) Compare PLC ladder logic with contactor logic with concept, application and advantages. **[6]**

b) Explain the function of the fault routine fine. **[4]**

Q8) Draw a ladder diagram for making the paper cup come out of the outlet when a coin is inserted. At the same time, the coffee pours in the mixing container. After 2 sec, the hot water pours in. 60 sec later, the ready-made coffee will be pouring out from the coffee outlet. **[10]**

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Total No. of Questions : 7]

SEAT No. :

P4550

[Total No. of Pages : 2

[5355]-116
M.E. (Mechanical-Mechatronics)
CONTROL SYSTEMS - II
(2013 Pattern) (Semester - II) (502808)

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

Instructions to the candidates:

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

Q1) The unit step of a second order is shown in Fig. Q1. Discuss, in detail, the tuning of a parallel PID control algorithm to improve the response of the said system as well as to achieve a desired equilibrium of 1. **[10]**

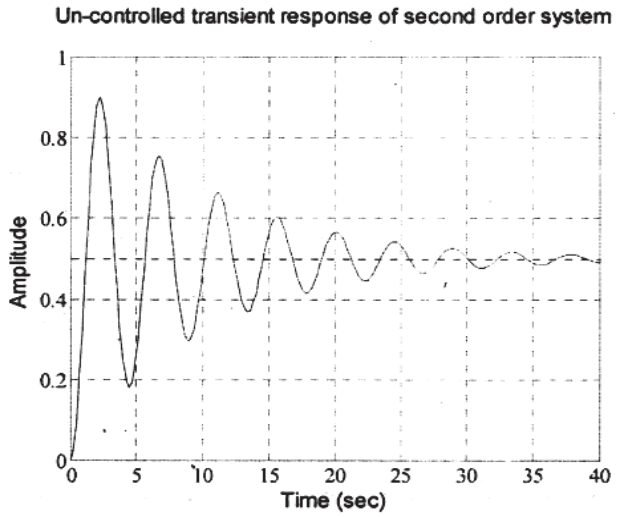

Fig Q1

Q2) Draw the root locus for the system in Eq. (1) and comment on its stability.**[10]**

$$TF = \frac{1}{(s+4)(s+2)(s+1)} \qquad \text{Eq.(1)}$$

Q3) Draw a suitable block diagram and derive the transfer function for PID control in series form. Also, discuss the dis-advantage of integral controller. **[10]**

P.T.O.

Q4) Using suitable example, differentiate between static and dynamic models. Also, discuss one technique for identification of dynamic model in time domain. **[10]**

Q5) Write down the equations for and discuss, in detail, the relationship between Sensitivity and Gain Margin. **[10]**

Q6) Draw a suitable block diagram and explain the design of the ITAE optimal control system. **[10]**

Q7) Define the nyquist stability criterion and, for a suitable SOTD system, discuss the effect of time delay on closed loop stability of the said system. **[10]**

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Total No. of Questions :8]

SEAT No. :

P4551

[Total No. of Pages : 2

[5355] - 117

M.E. (Mechanical) (Mechatronics)

INDUSTRIAL DRIVES AND ACTUATORS

(2013 Course) (Semester - II) (502809)

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

Instructions to the candidates:

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

Q1) Explain general electric drive with block diagram. **[10]**

Q2) Discuss Speed control of Induction motor by static slip power recovery scheme. **[10]**

Q3) a) Compare Gear Pump and Vane Pump on the basic of performance curves. **[5]**

b) Explain with circuit diagram any one accumulator circuit with applications. **[5]**

Q4) Explain the characteristics of typical loads with constant torque and torque proportional to speed, square of speed and inverse of speed. **[10]**

Q5) a) Compare Hydraulic accumulator and intensifier on symbol, construction and application. **[5]**

b) Explain Bleed off circuit with diagram, working and applications. **[5]**

Q6) a) Explain Permanent magnet DC motor with the help of its equivalent circuit and torque speed characteristics. **[6]**

b) Explain why synchronous motor drive is preferred over induction motor drive in some cases. **[4]**

P.T.O.

Q7) Discuss the any one selection criteria of hydraulic cylinders, tubes and couplings used in hydraulic circuits. **[10]**

Q8) Answer any two : **[10]**

a) Dynamics of motor-load system.

b) Advantages of Pneumatics over hydraulics with respect to industrial applications.

c) Comparison of conventional and modern electric drive.

Total No. of Questions :8]

SEAT No. :

P4552

[Total No. of Pages : 2

[5355] - 118

M.E. (Mechatronics) (Mechanical)

MICROCONTROLLER APPLICATIONS IN EMBEDDED SYSTEMS

(2013 Course) (Semester - III) (602813)

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

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagrams must be drawn whenever necessary.***
3) ***Figure to the right indicate full marks.***
4) ***Assume suitable data, whenever necessary.***

Q1) a) Draw and explain block diagram of PIC 18F microcontroller. **[4]**

b) Explain instruction format of PIC I8F microcontroller each with example. **[4]**

c) Discuss flags in STATUS register of PIC 18F microcontroller in detail. **[2]**

Q2) a) What is programming model of PIC18F microcontroller? Draw and Explain. **[4]**

b) Explain the result after the execution of the following instructions. Identify the content of W register and status of flags. **[4]**

MOVLW 9FH

ADDLW 58H

c) Explain with example instruction format for Byte-Oriented operations. **[2]**

Q3) a) Explain with Block diagram basic concepts in I/O Interfacing. **[4]**

b) Explain in detail interfacing of Push-Button keys. **[4]**

c) Explain stack of PIC 18F microcontroller. **[2]**

P.T.O.

Q4) a) Explain CCP Modules of PIC 18 Microcontroller. **[4]**

b) Draw and explain with block diagram Timer 0 of PIC 18F in 8-bit Mode. **[4]**

c) Enlist applications of Hardware counters and Timers? **[2]**

Q5) a) With block diagram explain successive approximation A/D conversion. **[4]**

b) Explain basic concepts in serial communication. **[4]**

c) Write different A-to-D conversion methods. **[2]**

Q6) a) Explain Software Aspect of the Time and Temperature Monitoring System (TTMS). **[4]**

b) Explain in detail designing of embedded systems. **[4]**

c) Enlist any four features of embedded systems. **[2]**

Q7) a) Explain with neat diagram support devices of PIC18F microcontroller. **[5]**

b) What is Interrupt? Explain different types of interrupts. **[5]**

Q8) a) Explain data transfer in Inter-Integrated circuit protocol. **[5]**

b) List and Explain the instructions used for Arithmetic operation and logical operation of PIC 18F microcontroller. **[5]**

Total No. of Questions :8]

SEAT No. : ____

P4553

[Total No. of Pages :2

[5355] - 119

M. E. (Mechanical - Mechatronics)

FLEXIBLE MANUFACTURING SYSTEMS

(2013 Pattern) (Semester - III) (602814)

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

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagram must be drawn whenever necessary.***
3) ***Use of non programmable calculator is allowed.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain any five functions of computer systems. **[5]**

b) State the reasons why single station manned cells are widely used in industry. **[5]**

Q2) a) Explain the ranked position weights method of line balancing algorithm with suitable example. **[10]**

Q3) a) Explain in brief the problem areas considered in analysis and design of automated production line. **[5]**

b) Enlist the conditions to be considered while implementing automated assembly in manufacturing systems. **[5]**

Q4) a) Explain in detail part classification & coding system. **[3]**

b) Five machines constitute a GT cell. The From / To data for machines are shown in the table. **[7]**

i) Determine the most logical sequence of machine for this data, and construct the network diagram, showing where and how many parts enter and exit the system.

P.T.O.

ii) Compute the percentage of in-sequence moves, bypassing moves, and backtracking moves in the solution.

iii) Develops a feasible layout plan for the cell based on the solution.

	To				
From	1	2	3	4	5
1	0	10	80	0	0
2	0	0	0	85	0
3	0	0	0	0	0
4	70	0	20	0	0
5	0	75	0	20	0

Q5) Explain the functions of human resources in FMS and state the benefits of FMS. **[10]**

Q6) a) Discuss Taguchi method in Quality Engineering. **[5]**

b) Explain how control charts are used as a feedback system in statistical process control. **[5]**

Q7) Explain the basic components of CMM and list out any three applications of CMM in industries. **[10]**

Q8) a) Write short note on shop floor planning. **[5]**

b) Explain the role of JIT of FM. **[5]**

Total No. of Questions : 8]

SEAT No. :

P4468

[Total No. of Pages : 1

[5355]-12

M.E. (Civil) (Environmental Engg.)

ENVIRONMENTAL CHEMISTRY AND MICROBIOLOGY

(2013 Pattern) (Semester - I)

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

Instructions to the candidates:

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

Q1) State various methods of analysis in Environmental Engg. **[10]**

Q2) Explain the physical processes of formation pollutants in atmosphere. **[10]**

Q3) What is mean by surfactant, Give classification of detergents and explain each in detail. **[10]**

Q4) Discuss the various mechanism of polymer decay. **[10]**

Q5) Explain difference between Gas Chromatography and liquid Chromatography. **[10]**

Q6) Explain microbial cell structure with sketch. **[10]**

Q7) Write a note on staining techniques. **[10]**

Q8) What is 'Bioremediation of contaminated soil' and explain its principle and microbiology. **[10]**

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Total No. of Questions : 8]

SEAT No. : ____

P4554

[Total No. of Pages : 3

[5355]-121
M.E. (Electronics) (Digital Systems)
MICROELECTRONICS
(2013 Pattern) (Semester - I) (504101)

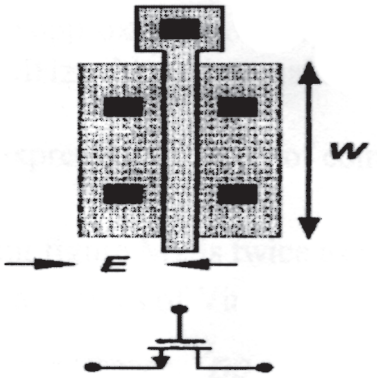
Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Attempt any five questions.***
2) ***All questions carry equal marks.***
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 Calculator is allowed.***

Q1) a) Derive the drain current equation for MOS transistor. **[5]**

b) Draw and explain MOS capacitance model, also calculate source and drain junction capacitance for below layout. **[5]**



Q2) a) What is channel length modulation? Explain the effect of channel length modulation on V-I characteristics of MOS. **[4]**

b) What is Transmission gate? Explain the characteristics of Transmission gate. **[4]**

c) What is sub-threshold conduction? **[2]**

Q3) a) What are n-well, p-well and twin tub process? Explain fabrication steps of CMOS inverter with twin tub process. **[5]**

b) What is interconnect? What is best possible metal for interconnect? Is it used? If not why? **[5]**

P.T.O.

Q4) a) Consider the design of a CMOS compound gate computing $F=\overline{(A+B).(C+D)}$ **[4]**

i) Sketch a transistor - level schematic.

ii) Sketch a stick diagram.

iii) Estimate the area from the stick diagram.

b) Sketch transistor level schematics for 4 : 1 Mux using conventional logic and transmission gate. What is advantage of using transmission gate in design? **[4]**

c) Write a short note on layout design rule. **[2]**

Q5) a) Explain RC Delay Model in detail. **[4]**

b) What are the different causes of power dissipation in CMOS? State different types of power dissipation in CMOS circuit. **[4]**

c) What is Design Margin? **[2]**

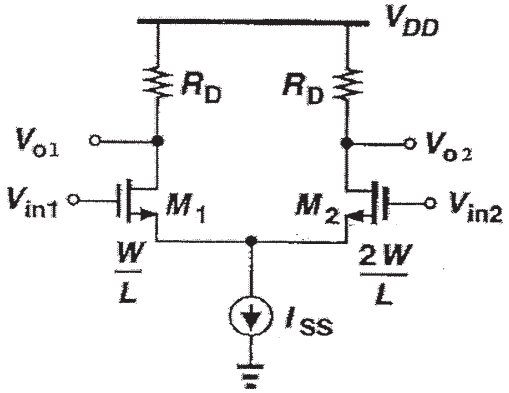
Q6) a) What are different power reduction techniques in low power design? **[4]**

b) Compare TTL, CMOS and BiCMOS logic families. **[4]**

c) Calculate the approximate power dissipation in a chip operating with Vdd = 1.8V at 100 MHz with an internal switched capacitance of 300 pF. **[2]**

Q7) a) Derive the expression for gain of common source amplifier with resistive Load. **[4]**

b) For following figure M_2 is twice as wider as M_1. Calculate the small signal gain if the bias values of V_{in1} and V_{in2} are equal. **[4]**



c) Draw the MOS small signal Model and explain. **[2]**

Q8) a) Sketch transistor level schematic for a single stage CMOS logic gate for each of the following functions. **[4]**

i) $Y = \overline{AB + CD}$

ii) $Y = \overline{(AB + C).D}$

iii) $Y = \overline{ABCD}$

iv) $Y = \overline{A + B + C + D}$

b) Write short notes (any two) : **[4]**

i) Body Effect.

ii) Dynamic Circuit.

iii) Bi CMOS Circuit.

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

Total No. of Questions : 8]

SEAT No. :

P5280

[Total No. of Pages : 2

[5355]-122

M.E. (Electronics - Digital Systems)

DIGITAL SIGNAL PROCESSING ARCHITECTURES

(2013 Course) (504102) (Semester - I)

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

Instructions to the candidates:

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

Q1) a) Find 4 point DFT of the sequence. **[6]**

$x(n) = 1$ for $0 \leq n \leq 2$

$= 0$ otherwise

Plot magnitude & phase plot.

b) Compare FIR and IIR filter. **[4]**

Q2) a) Compute eight point FFT for $x(n) = \{1\ 2\ 2\ 1\ 1\ 2\ 1\ 1\}$ using decimation in frequency FFT algorithm. **[6]**

b) Explain IIR filter design using Bilinear Transformation method. **[4]**

Q3) a) Explain DIF FFT radix2 algorithm with mathematical expressions. Draw butterfly diagram for same. **[6]**

b) What do you mean by Gibb's phenomenon? What is the cause of Gibb's phenomenon? **[4]**

Q4) a) Determine the filter coefficients $h_d(n)$ for the desired frequency response of a low pass filter given by, **[6]**

$$H_d\left(e^{jw}\right) = \begin{cases} e^{-j2w} & -\frac{\pi}{4} \leq w \leq \frac{\pi}{4} \\ 0 & \frac{\pi}{4} \leq w \leq \pi \end{cases}$$

P.T.O.

If we define new filter coefficients by, $h(n) = h_d(n)*w(n)$

Where $w(n)=\begin{cases}1 & \text{for } 0\le n\le 4\\ 0 & \text{otherwise}\end{cases}$

Then determine $h(n)$.

b) Write a note on selection of window in the design of FIR filter. **[4]**

Q5) Write short notes on : **[10]**

a) SHARC processor.

b) STFT and its applications.

Q6) Implement two stage decimator for the following specifications. **[10]**

Sampling rate of input signal = 20,000 Hz

Decimation factor = 100

Passband = 0 to 40 Hz

Transition band = 40 to 50 Hz

Passband ripple = 0.01

Stopband ripple = 0.002

Q7) a) What is need of antialiasing filter prior to downsampling and anti-imaging filter after up sampling a signal? **[4]**

b) Explain the addressing modes of TMS 320C54XX with examples. **[6]**

Q8) a) Draw and explain architecture of TMS 320C67XX. **[6]**

b) Explain barrel shifter with block schematic. **[4]**

Total No. of Questions :8]

SEAT No. :

P4555

[Total No. of Pages : 2

[5355] - 123

M.E. (Electronics) (Digital Systems)

EMBEDDED SYSTEM DESIGN

(2013 Pattern) (Semester - I)

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

Instructions to the candidates:

1) ***Attempt any FIVE questions.***
2) ***Draw neat diagrams wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***All questions carry equal marks.***
5) ***Assume suitable data if necessary.***

Q1) a) What is design Metric? Explain various metrics considered in Embedded System Design. **[5]**

b) Explain Embedded System Architecture. Explain the advantages and disadvantages of system on chip. **[5]**

Q2) a) Elaborate any two various development tools used in Embedded System Design. **[5]**

b) Explain Functional and Architectural model of Embedded System Design. **[5]**

Q3) a) Explain in detail ARM architectural support for an operating System. **[5]**

b) Explain AMBA bus architecture and enlist specifications of ARM-9-TDMA. **[5]**

Q4) a) What are the communication protocols supported by ARM. Explain any one in datail. **[5]**

b) Explain the concept of memory herarchy and role of cache memory design. **[5]**

Q5) a) Explain the role and process of Bootloader. **[5]**

b) Explain Embedded Linux system architecture. **[5]**

P.T.O.

Q6) a) What is Kernel initialization? Explain Embedded Linux Kernel initialization sequence. **[5]**

b) Draw and explain Embedded Linux development setup. **[5]**

Q7) a) Draw and explain Android Architecture structure in detail. **[5]**

b) Explain an application of Network services with reference to Android. **[5]**

Q8) a) Explain the features of Android suitable to develop mobile application. **[5]**

b) Explain various network services support provided by Android OS. **[5]**

Total No. of Questions :10]

SEAT No. :

P4556

[Total No. of Pages :2

[5355] - 124

M. E. (E & TC)

(Comm To Electronic DS / E&TC All Branches)

RESEARCH METHODOLOGY

(2013 Pattern) (Semester - I)

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

Instructions to the candidates:

1) ***Right side figure indicate marks.***
2) ***Solve Q.1 OR Q.2, Q.3 OR Q.4, Q.5 OR Q.6, Q.7 OR Q.8, Q.9 OR Q.10.***

Q1) a) What are the criteria or characteristics of good research problem? **[5]**

b) Describe the role of data collection in research? Explain data collection using digital computer systems? **[5]**

OR

Q2) a) How to define scope and objective of research problem? **[5]**

b) How to qualify in research or study in the research area? **[5]**

Q3) a) Write a short note on uncertainty analysis? **[5]**

b) Explain regression analysis in research? **[5]**

OR

Q4) a) What is State Vector Machines (SVM)? How it is useful in research? **[5]**

b) Explain the steps involved in setting up a computing model to predict performance of experimental setup. **[5]**

Q5) a) Explain family of performance curves to study trends and tendencies in experimental setup? **[5]**

b) Explain parameter to be considered in preparing prediction model for experimental setup. **[5]**

OR

P.T.O.

Q6) a) Explain in brief prediction and performance analysis in research application? **[5]**

b) Explain multiscale modeling of process system? How to verify it performance? **[5]**

Q7) a) Explain role of probability? How it is useful in research? **[4]**

b) Explain sensitivity theory and applications? **[6]**

OR

Q8) a) The following 10 observations were recorded when measuring voltage 98.5, 99.00, 98.2, 98.0, 98.1, 98.9, 98.3, 98.4, 97.6 and 97.8 V find i) Mean ii) Standard Deviation iii) Variance. **[6]**

b) Explain role statistics in research. **[4]**

Q9) a) Describe, in brief, the layout of a research report, covering all relevant points. **[5]**

b) Write a short note on 'Documentation' in the context of a research report. **[5]**

OR

Q10)a) What points will you keep in mind while preparing a research report? Explain. **[5]**

b) What are the different forms in which a research work may be reported. Describe. **[5]**

Total No. of Questions : 8]

SEAT No. :

P4557

[Total No. of Pages : 2

[5355]-125
M.E. (Electronics)
DESIGN FOR TESTABILITY
(2013 Pattern) (Semester - II) (Digital Systems)

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

Instructions to the candidates:

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

Q1) a) Consider the function $f\ (w_1, w_2, w_3, w_4) = \Sigma m\ (0, 1, 3, 6, 8, 9, 14, 15)$. Derive an implementation using the minimum possible number of three-input LUTs. **[5]**

b) Write a VHDL code for comparator. **[5]**

Q2) a) Derive a Mealy-type FSM that can act as a sequence detector that produces z = 1 when the previous two values of w were 00 or 11; otherwise z = 0. **[5]**

b) Write a VHDL code for barrel shifter using MUX. **[5]**

Q3) a) With the help of example explain the implementation of a bus using multiplexer. **[5]**

b) Design a single-input and single-output Moore-type FSM that produces an output of 1 if in the input sequence it detects either 110 or 101 patterns. Overlapping sequences should be detected. **[5]**

Q4) a) What is meant by design stability? What are the characteristics of DFT. **[5]**

b) Write VHDL code to expand 16-to-1 multiplexer using component 4-to-1 multiplexer. **[5]**

P.T.O.

Q5) a) Derive the state diagram for an FSM that has an input w and an output z. The machine has to generate $z = 1$ when the previous four values of w were 1001 or 1111; otherwise, $z = 0$. Overlapping input patterns are allowed. An example of the desired behavior is **[5]**

w : 0101111001100111111

z : 0000001001000100 11

b) Write short note on Binary Encoders. **[5]**

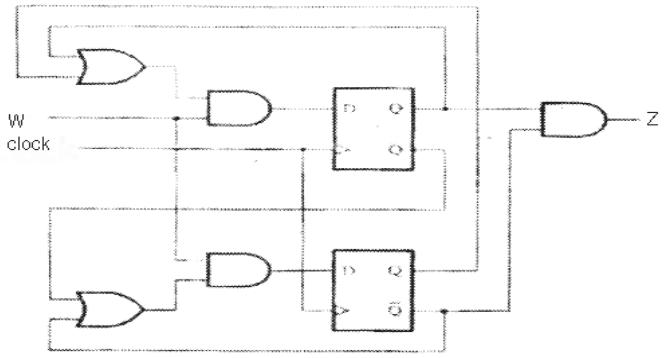
Q6) a) Describe the concept of Rest Synchronization. Explain the working of SRAM Cell. **[5]**

b) An SR flip-flop is a flip-flop that has set and reset inputs like a gated SR latch. Show how an SR flip-flop can be constructed using a D flip-flop and other logic gates. **[5]**

Q7) a) Implement f(w1, w2, w3) = Σ m (0, 4,6, 7) using 2:1 multiplexer, use Shanon's expansion similarly use 4:1 Mux for the same. **[5]**

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

Q8) a) Derive State table for given circuit also what input sequences detected on the w. **[5]**



b) A sequential circuit has two inputs, w_1 and w_2, and an output, z. Its function is to compare the input sequences on the two inputs. If $w_1 = w_2$ during any four consecutive clock cycles, the circuit produces $z = 1$; otherwise, $z = 0$. For example **[5]**

w_1 : 0110111000110

w_2 : 1110101000111

z : 0000100001110

Derive a suitable circuit.

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Total No. of Questions : 8]

SEAT No :

P 4558

[Total No. of Pages : 2

[5355]-126

M.E. (Electronics - Digital Systems)

PLDS AND ASIC DESIGN

(2013 Credit Pattern) (Semester - II) (504108)

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

Instructions to the candidates:

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

Q1) a) Discuss Static and Dynamic power dissipation in detail. **[5]**

b) What is Pipelining? Which programmable device architecture is most effective for pipelining? Why? **[5]**

Q2) a) Explain resource sharing in system design with suitable example. **[5]**

b) What is meant by fault tolerance? with neat sketch explain stuck at fault model. **[5]**

Q3) a) Explain data flow modeling style with suitable example. **[5]**

b) With neat sketch describe Architecture of complex programmabel logic device MAX-7000. **[5]**

Q4) a) Explain various simulation cycles in system design using VHDL. **[5]**

b) Describe functions and procedures in FSM coding with suitable examples. **[5]**

P.T.O.

Q5) a) Explain various routing techniques. **[5]**

b) Describe SCAN path techniques used for testing of sequential circuits. **[5]**

Q6) a) Explain various parameters used in static timing analysis. **[5]**

b) Write a note on Chipscope-Pro. **[5]**

Q7) a) Explain any two types of Mask Gate Arrays. **[5]**

b) Write a note on ASIC cell Libraries. **[5]**

Q8) a) Explain ASIC design flow with neat diagram. **[5]**

b) Write a note on IP Core. **[5]**

Total No. of Questions :8]

SEAT No. :

P4559

[Total No. of Pages : 2

[5355] - 127

M.E. (Electronics) (Digital Systems)

RANDOM SIGNALS AND PROCESSES

(2013 Revised Credit Pattern) (Semester - II)

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

Instructions to the candidates:

1) ***Answer any five questions out of 8 questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
5) ***Assume Suitable data, if necessary.***

Q1) a) If X is a random variable having binomial distribution with parameters 'n' and 'p'. Then prove that mean of binomial value is np. **[4]**

b) A box contains 2000 components of which 5% are defective. A second box contains 500 components of which 40% are defective. The two other boxes contains 1000 components each with 10% defective components. We select at random one of above boxes and draw from it at random a single component. **[4]**

i) What is the probability that this component is defective.

ii) Finding that the selected component is defective, what is the probability that it was drawn from box-2.

c) State and explain properties of first order moment. **[2]**

Q2) a) A manufacturer claims that any of his lot of items cannot have a variance more than 1 cm^2. A sample of 25 items has a variance of 1.2 cm^2. Test whether the claim of manufacturer is correct? **[5]**

b) What is moment generation function? Explain with suitable example. **[5]**

Q3) a) Explain the K-S test in detail. **[3]**

b) State and explain central limit theorem. **[3]**

c) If a random variable obeys a uniform PDF with constant value 'C' between $x = -3$ and $x = +3$. Find 'C' and mean value of random variable. **[4]**

P.T.O.

Q4) a) Explain MMSE algorithm in detail and compare it with MAP. **[5]**

b) Derive the condition of binary hypothesis testing. **[5]**

Q5) a) Find the constant 'K' such that the function

$$f_X(x) = \begin{cases} K(2x+8) , & 0 < x < 5 \\ 0 , & \text{otherwise} \end{cases}$$

is a density function.

Also find the distribution function $F_X(x)$. **[5]**

b) A random process has sample functions of the form

$X(t) = A \sin(\omega t + \theta)$

Where A and θ are statistically independent random variables and the frequency is constant. The random variable is uniformly distributed from 0 to 10, and random variable θ is uniformly distributed 0 to π. Is this process wide-sense stationary? **[5]**

Q6) a) State and explain Bay's Theorem with examples. **[5]**

b) Define central moments, skew and kurtosis of a random variable & explain in details. **[5]**

Q7) a) Explain the properties of Auto correlation function in detail. **[5]**

b) Consider a random variable 'X' with mean value 3 and variance 2. A second random variable Y is defined as $Y = 8X - 12$. Find the mean value of Y and the correlation of X and Y. **[5]**

Q8) a) State and explain Cramer-Rao inequality. **[5]**

b) Explain the different continuous distribution functions with examples. **[5]**

Total No. of Questions :8]

SEAT No. :

P4560

[Total No. of Pages : 2

[5355] - 128

M.E. (Electronics) (Digital System)

IMAGE PROCESSING AND COMPUTER VISION

(2013 Pattern) (Semester - III)

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

Instructions to the candidates:

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

Q1) a) Define Gray Level transformation. Explain Negative and Power Law Transformation. **[5]**

b) Explain the gradient operators such as Robert's cross gradient, sobel operator, Prewitt operator with example. **[5]**

Q2) a) Explain image smoothing using 3 * 3 mask. **[5]**

b) What do you understand by Histogram Equalization and Histogram Matching? **[5]**

Q3) a) Define forward and inverse 2D DCT and mention its properties. **[5]**

b) What is need of Compression? Explain the JPEG compression technique in detail. **[5]**

Q4) a) Using the second derivative develop the laplacian mask for image sharpening. **[5]**

b) Discuss the algorithm of Canny Edge Detection. **[5]**

P.T.O.

Q5) a) Explain in proper steps Marr's Theory for 3D vision. **[5]**

b) Explain Basic principle for 3D geometry. **[5]**

Q6) a) Explain with a proper ray diagram the single perspective camera with its co-ordinate system. **[5]**

b) How single camera calibration be achieved with known and unknown scene. **[5]**

Q7) a) Write a note on Intrinsic & Extrinsic parameters of the camera. **[5]**

b) What are the difficulties for 3D vision using intensity images as input. **[5]**

Q8) a) Estimate fundamental matrix from image point correspondences. **[5]**

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

i) Radiometry consideration in gray level

ii) Surface reflectance

Total No. of Questions :8]

SEAT No. :

P4561

[Total No. of Pages :2

[5355] - 129
M. E. (Electronics) (Digital system)
WIRELESS AND MOBILE TECHNOLOGIES
(2013 Pattern) (Semester - III)

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

Instructions to the candidates:

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

Q1) a) Explain the following outdoor propagation models. **[5]**

i) Long ley - Rice Model

ii) Okumura Model

b) Draw a matrix illustrating types of fading experienced as a function of **[5]**

i) Symbol Period

ii) Base band signal band width and explain it.

Q2) a) Explain the concept of frequency reuse. State the formula for capacity of cellular radio system. **[3]**

b) Explain how co-channel interference determine link performance, which inturns dictates the frequency reuse plan and over all capacity of cellulor system. **[5]**

c) What is doppler shift? **[2]**

P.T.O.

Q3) a) Explain the following scenarios in wireless networks. **[5]**

i) Hidden and exposed terminal.

ii) Near and far terminals.

b) With the help of diagram explain Demand assigned multiple access **[5]**

Q4) a) Explain spread Aloha multiple access. **[4]**

b) Explain packet reservation multiple access (PRMA). **[3]**

c) Compose TDMA and CDMA. **[3]**

Q5) a) List the entities and terms of mobile IP. Explain packet delivery to and from the mobile mode. **[5]**

b) What is tunneling? **[2]**

c) Explain fundamental differences between wired networks and ad-hoc wireless networks related to routing. **[3]**

Q6) a) Explain hierarchical ad-hoc routing. State its advantages. **[4]**

b) Explain Mobile TCP. **[3]**

c) What is the basic purpose of DHCP? Name the entities of DHCP. **[3]**

Q7) a) Draw functional architecture of a GSM system and explain. **[5]**

b) What are the two groups of logical channels used in GSM. Explain in brief. **[3]**

c) Which type of different services does GSM offer? Give some examples. **[2]**

Q8) a) Explain the various security services offered by GSM. **[3]**

b) Explain channel access cycle in the HIPERLAN-1 with diagram. **[4]**

c) Draw IEEE 802.11 protocol orchitecture and explain. **[3]**

Total No. of Questions :8]

SEAT No. :

P4469

[Total No. of Pages : 2

[5355] - 13

M.E. (Civil) (Environmental Engineering)

PHYSICO-CHEMICAL PROCESSES FOR WATER AND WASTE WATER TREATMENT

(2013 Pattern) (Semester - I) (501063)

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

Instructions to the candidates:

1) ***Figures to the right indicate full marks.***
2) ***Draw neat figures wherever necessary.***
3) ***Use of Scientific Calculators is allowed.***
4) ***Attempt any 05 questions.***
5) ***Assume suitable data if necessary clearly mentioning the same.***

Q1) a) Explain various types of reactions in wastewater treatment. **[5]**

b) Explain in detail continuous flow Stirred Tank Reactor. **[5]**

Q2) a) Discuss the concept of Boundary layer theory. **[5]**

b) Differentiate between orthokinetic and perikinetic flocculation. **[5]**

Q3) a) What is Tube Settler? Mention its various advantages. **[5]**

b) Explain the Loss of Head and Negative Head in case of filter. **[5]**

Q4) Discuss various Bio kinetic coefficients commonly incorporated in the design of biological treatment. **[10]**

Q5) a) The Particle size distribution of stock sand to be used in a filter is as follow **[7]**

Sand size in mm	0.21	0.30	0.42	0.84	1.12	1.68	2.38
Cumulative weight %	3.6	11	22	42	64	84	90

The desired effective size of the filter sand is 0.5mm and uniformity coefficient is 1.5. Determine the diameters of the fine and coarse particles that are required to be removed from the stock sand.

b) Discuss various operational problems in RSF. **[3]**

P.T.O.

Q6) a) Explain various factors affecting bactericidal efficiency of Chlorine. **[5]**

b) Write note on Kinetics of Disinfection. **[5]**

Q7) a) Design a tube settler module of a square cross-section with the following data: **[7]**

i) Average output required from the tube settler = 300 m^3/Hr

ii) Loss of water in desludging = 2%

iii) Cross-section of square tubes = 50 mm x 50 mm

iv) Length of Tubes =1 m

v) Angle of Inclination of tubes = 60°

vi) Settling velocity of particles = 120 m/day

vii) Kinematic viscosity of water = 1.007 x 10^{-6}

b) Discuss the Properties of Cellulose **[3]**

Q8) a) Write down the limitations of Oxidative processes. **[5]**

b) Write note on sludge drying beds. **[5]**

Total No. of Questions : 8]

SEAT No. :

P4562

[Total No. of Pages : 2

[5355]-131

M.E. (Electronics and Telecommunication) (Communication Network)
MODELLING & SIMULATION OF COMMUNICATION NETWORKS
(2013 Credit Pattern) (Semester-I) (504501)

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

Instructions to the candidates:

1) ***Answer any 5 questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume Suitable data if necessary.***
5) ***All question carry equal marks.***
6) ***Your answer as whole will be given weight age.***

Q1) a) Explain how simulation helps in performance studies of the following types of communication systems. **[5]**

i) Analytically tractable system

ii) Analytically tedious system

b) Elaborate various methodologies used in mapping a problem into a simulation model. **[5]**

Q2) a) Compare and contrast deterministic and stochastic simulations. **[5]**

b) What is random process modeling? How does it differ from modeling of individual blocks? **[5]**

Q3) a) Explain Multiplicative algorithm with prime modulus and non prime modulus for the generation of uniformly distributed random numbers with suitable example. **[5]**

b) How scatter plots are used to check the randomness of the given sequence. **[5]**

Q4) a) What is up sampling and down sampling? Illustrate these concepts with reference to simulation of a communication system. **[5]**

b) Explain about generation of uncorrelated Gaussian random numbers using Sum of Uniform method **[5]**

P.T.O.

Q5) a) Discuss in brief how histogram method is used to map uniform random variables to an arbitrary pdf. **[5]**

b) Demonstrate valid uses of tail extrapolation. **[5]**

Q6) a) Write an algorithm for semi analytic BER estimation for BPSK? **[5]**

b) What are the various specifications to be considered with respect to the simulation of multi path fading channel in a wireless communication system. **[5]**

Q7) a) How pdf estimators are used to overcome the long run time requirements of Monte Carlo method. **[5]**

b) Why two state Markov models are so popular for discrete channels with memory. **[5]**

Q8) a) Explain tapped delay line model for linear time invariant system and show how various tap gains are generated. **[5]**

b) What are the empirical models based on swept tone measurement? Explain any one model in detail. **[5]**

Total No. of Questions : 8]

SEAT No. :

P4563

[Total No. of Pages : 2

[5355]-132

M.E. (E & TC) (Communication Networks)
SPREAD SPECTRUM AND CDMA SYSTEMS
(2013 Pattern) (Semester - I)

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

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Assume suitable data, if necessary.***
3) ***Figures to the righ indicates full marks.***
4) ***Use of calculator is allowed.***

Q1) a) Explain multilevel FSK FH transmitter and receiver with block diagram. **[6]**

b) What is fading? Explain various types of fading mechanisms. **[4]**

Q2) a) Explain the block diagram of direct spread spectrum receiver using matched-filter code acquisition. **[6]**

b) Explain space polarization and diversity. **[4]**

Q3) a) Write short notes on : **[6]**

i) Gold codes

ii) Non-linear codes

b) With the help of neat block diagram, explain system used to evaluate a single spreading waveform phase and frequency. **[4]**

Q4) a) What is the meaning of diversity in radio system? **[2]**

b) State the properties of maximal length sequences. **[4]**

c) Explain the block diagram of synchronization system for linear sweep of uncertainty region. **[4]**

Q5) a) Explain the architecture of IS-95 system. **[5]**

b) Discuss the developments for IS 95 to 3G CDMA Technologies. **[5]**

Q6) a) Discuss the merits and demerits of CDMA digital cellular systems. **[4]**

b) State typical applications of CDMA systems. **[2]**

c) Explain WCDMA system. **[4]**

P.T.O.

Q7) a) Explain mobile propagation environment for CDMA system. **[5]**

b) Discuss EVDO and EVDV systems. **[5]**

Q8) a) Explain physical and logical channels of IS-95. **[5]**

b) Write note on : Global Positioning System. **[5]**

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Total No. of Questions :8]

SEAT No. :

P4564

[Total No. of Pages : 2

[5355] - 133

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

DETECTION AND ESTIMATION THEORY

(2013 Pattern) (Semester-I) (504503)

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

Instructions to the candidates:

1) ***Answer any 5 questions.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Assume suitable data, if necessary.***

Q1) a) Derive on expression for likelihood ratio using Boyes criterion. **[5]**

b) Explain with neat diagram, various decision criteria for simple binary hypothesis tests. **[5]**

Q2) a) Following are the observations under the two hypothesis **[4]**

$H_1 : r_i = m + n_i \qquad i = 1, 2 \ldots\ldots N$

$H_0 : r_i = \quad n_i \qquad i = 1, 2, \ldots\ldots N$

and $Pn_2(x) = \frac{1}{\sqrt{2\pi}.\sigma} \exp\left(-\frac{x^2}{2\sigma^2}\right)$

Derive on expression for likelihood ratio test.

b) Explain with assumption, Neyman - Pearson criterion. Design a likelihood ratio test to maximize P_D. **[4]**

c) Brief the significance of Gauss-Markov models in classical detection & estimation theory. **[2]**

Q3) a) With neat block diagram, explain modulation system with memory and no memory for estimation of continues waveforms. **[4]**

b) Explain with neat block diagram, the Multiple-channel systems for digital communication. **[4]**

c) List out various steps of maximum likelihood estimation for non-random variables. **[2]**

P.T.O.

Q4) a) Generate a complete orthonormal (CON) set for generation of expansion coefficients for correlator and match filter operation. **[4]**

b) Define Gaussian Process. List out various properties with expression. **[4]**

c) Explain briefly conventional characterizations of random processes. **[2]**

Q5) a) Explain with diagram and mathematical expression ARMA processes. **[5]**

b) Explain the importance of linear Transformation and orthogonality in estimation process. **[5]**

Q6) a) Derive an MAP equation, to estimate the signal under known hypothesis. **[4]**

b) Explain the significance of cost functions in Boyes estimation with neat diagram. **[4]**

c) List out characteristics of a good estimator. **[2]**

Q7) a) What is meant by Discrete wiener filters. With neat diagram explain realization process of digital filter. **[4]**

b) With neat diagram, derive an expression for finding minimum mean square error of optimum realizable filter. **[4]**

c) What is difference between prediction and filtering in pinear minimum mean square error criterian. **[2]**

Q8) a) Draw block diagram to explain the operation of optimum receiver for binary detection. **[4]**

b) With neat block diagram, signal and data processing in a modern radar system. **[4]**

c) Explain with neat derivation, cramer-Rao bound theorem of a constant parameter. **[2]**

Total No. of Questions : 8]

SEAT No. :

P4565

[Total No. of Pages : 2

[5355]-135

M.E. (Electronics & Telecommunication)

COMMUNICATION NETWORKS

Traffic Analysis And QoS (504507)

(2013 Pattern) (Semester - II)

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

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Use of calculator is allowed.***
4) ***Assume Suitable data if necessary.***

Q1) a) Explain in detail protocol analyzer. **[4]**

b) What is MPLS & Explain its merits & demerits in detail. **[4]**

c) Describe importance of performance requirement parameter? **[2]**

Q2) a) Describe importance of Qos parameters in traffic analysis? **[4]**

b) Describe congestion control mechanism merits & demerits in ATM networks. **[4]**

c) Explain merits & demerits of stop and Wait ARQ?. **[2]**

Q3) a)Write short note on Integrated services? **[4]**

b) Describe importance of congestion control mechanism? **[4]**

c) define ATM forum & its Services categories? **[2]**

Q4) a) Explain the RSVP operation by using filtering Q sub stream? **[4]**

b) What are the system utilities for management? **[4]**

c) Write integrated view of TMN? **[2]**

Q5) a) Explain optical & MAN feeder networks. **[4]**

b) What is high speed network & explain its performance modeling & estimation? **[4]**

c) What is the requirement of Fiber channel? **[2]**

P.T.O.

Q6) a) Define & describe TMN Conceptual Model? **[4]**

b) Explain with neat digram TMN Service architecture? **[4]**

c) How OAM management is useful in TAQ? **[2]**

Q7) a) Describe importance of network management system for Traffic analysis & Qos? **[4]**

b) Explain network management standards & its importance in Traffic analysis? **[4]**

c) Define & Describe SNMP in detail? **[2]**

Q8) a) Describe importance of functional model with neat diagram? **[4]**

b) Explain how broadband network services are useful in traffic control. **[4]**

c) Explain merits of functional roll of management tools? **[2]**

Total No. of Questions : 8]

SEAT No :

P 4566

[Total No. of Pages : 2

[5355]-136

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

BROADBAND WIRELESS TECHNOLOGIES

(2013 Pattern) (Semester-II)

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

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***figures to the right indicate full marks.***
3) ***Your answer will be valued as a whole.***
4) ***Neat diagrams must be drawn wherever necessary.***
5) ***Assume suitable data, if necessary.***

Q1) a) Explain OFDMA (Orthogonal frequency-division multiple access) System with a suitable block diagram. Compare and contrast OFDMA and OFDM. **[5]**

b) Explain the performance of MMSE-SIC (Minimum mean square error-based soft interference cancellation) and BI-GDFE (block-iterative generalized decision feedback equalizer) receivers. **[5]**

Q2) a) Explain Multiple-time-hopping PPM UWB system with variable bit rate transmission. **[4]**

b) Explain DS (Direct Sequence) UWB with MIMO. **[4]**

c) Label range of frequencies allotted for UWB transmission. Also name the two basic UWB system commonly used. **[2]**

Q3) a) Discuss the following Wireless MAN PHY Specifications. **[4]**

i) WirelessMAN-SC PHY

ii) WirelessMAN-SCa PHY

b) What is Service-Specific Convergence Sublayer of WiMAX MAC Sublayers? **[4]**

c) Draw and explain general form of MAC PDU format. Hence indicate Classification and CID mapping. **[2]**

P.T.O.

Q4) a) Explain general properties of WiMAX Mesh. **[4]**

b) Explain hard hand off and soft hand off with reference to mobility in WiMAX networks. **[4]**

c) Write a short note on : UMTS and WiMAX integration. **[2]**

Q5) a) What are basic functions of Multi-Point Control Protocol (MPCP)? **[4]**

b) Describe Class-of-Service Oriented Packet Scheduling (COPS) Algorithm for Dynamic Bandwidth Allocation. **[4]**

c) Draw and explain generic Multi-Point Control Protocol (MPCP) frame format. **[2]**

Q6) a) Discuss Upstream QoS and Downstream QoS for EPONs. **[4]**

b) Compare and contrast Local Admission Control (LAC) and Global Admission Control (GAC) for Traffic Characteristics and QoS Requirements of EPONs. **[4]**

c) Write a short note on: Bandwidth Management for multi channel EPON's. **[2]**

Q7) a) Explain Independent Architecture of Integrated EPON and WiMAX. **[4]**

b) Discuss Microwave-over-fiber (MoF) integration architectures and carrier signal spectrum layout using WDM PON. **[4]**

c) Write a short note on: multistage integrated EPON and WIMAX systems. **[2]**

Q8) a) What are basic steps of WOBAN routing? Hence explain Delay-Aware Routing Algorithm (DARA). **[4]**

b) Compare Fiber Topology vs. Transmission Scheme for Point-to-Point FTTx. **[4]**

c) Write a short note on: WOBAN (wireless-optical broadband access network) **[2]**

Total No. of Questions :8]

SEAT No. :

P4567

[Total No. of Pages : 2

[5355] - 137

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

OPTICAL NETWORKS

(2013 Credit Pattern) (Semester - II) (504509)

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

Instructions to the candidates:

1) ***Answer any 5 questions.***
2) ***Neat diagrams must be drawn wherever necessary.***

Q1) a) Discuss Optical packet switching in contrast with Circuit switching. How does it affect the multiplexing? **[5]**

b) Explain WDM wavelength-routing network along with the key network elements. **[5]**

Q2) a) Differentiate between four-wave mixing, Self-phase Modulation and Cross-phase Modulation. **[5]**

b) Describe Solitons in detail along with its features and applications. **[5]**

Q3) a) Explain various types of optical amplifiers with suitable diagrams. **[5]**

b) Discuss the concept of wavelength stabilization in detail. **[5]**

Q4) a) What are the various factors governing the overall optical system design? **[5]**

b) Explain the Internet transport network protocol stack for optical network in detail. **[5]**

Q5) a) Describe the SONET multiplexing hierarchy along with its Frame structure and functional components. **[5]**

b) Describe the network configurations defined for SDH with diagrams. **[5]**

P.T.O.

Q6) a) Explain the architecture of Optical Transport Networks (OTNs) in detail. **[5]**

b) Describe Generic Framing Procedure and its importance in optical multiplexing. **[5]**

Q7) a) Compare Multiprotocol Lambda switching (MPλS) and Multiprotocol Label switching (MPLS) in detail. **[5]**

b) Explain Dense Wavelength Division Multiplexing (DWDM) and Tunable DWDM Lasers. **[5]**

Q8) Write a short note on (any two) :

a) Passive Optical network. **[5]**

b) IS label switching. **[5]**

c) Label distribution and binding. **[5]**

Total No. of Questions :8]

SEAT No. :

P4568

[Total No. of Pages :2

[5355] - 138

M.E. (Communication Network)

MOBILE COMPUTING

(2013 Course) (Semester - III) (604501)

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

Instructions to the candidates:

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

Q1) a) Explain the various characteristics of mobile computing environment? **[5]**

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

Q2) a) What is mobile IP? Give in detail. **[5]**

b) What is the difference between 3G and 4 G technology? **[5]**

Q3) a) Explain GSM protocol stack. **[4]**

b) Explain in detail GSM architecture system with diagram. **[4]**

c) How can IP help to transport multimedia data? **[2]**

Q4) a) Give complete schematic of call routing in VOIP. **[4]**

b) What are the advantages and disadvantages of WLAN? Under what situation is a wireless LAN desirable over LAN? **[4]**

c) Differentiate CDMA and GSM. **[2]**

P.T.O.

Q5) a) Explain the fundamentals of wireless Markup language WML script applications. **[4]**

b) Discuss the authentication process in 802.11 frame work. **[4]**

c) What are the advantages of Wireless network? **[2]**

Q6) a) What is WAP? Explain in detail. **[4]**

b) What are the standards for wireless security? **[4]**

c) Explain dynamic channel allocation. **[2]**

Q7) a) Discuss Bluetooth and its protocol stack? **[4]**

b) How can we provide privacy in a wireless network? **[4]**

c) Write a short note on MIMO. **[2]**

Q8) a) Discuss multipath propagation with an example. **[4]**

b) Explain in details about voice over internet protocol architecture? **[4]**

c) Discuss on Pico net. **[2]**

Total No. of Questions : 8]

SEAT No. : ____

P4569

[Total No. of Pages : 3

[5355] - 139

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

DIGITAL COMMUNICATION RECEIVERS

(2013 Course) (Semester - III) (604502)

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

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicates full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Consider the functions **[5]**

$\Psi 1(t) = \exp(-|t|)$ and $\Psi 2(t) = 1 - A\exp(-2|t|)$

Determine the constant A, such that $\Psi 1(t)$ and $\Psi 2(t)$ are orthogonal over $(-\infty, \infty)$.

b) Describe the difference between equalizers that use a zero-forcing solution and those that use a minimum mean square error solution? **[5]**

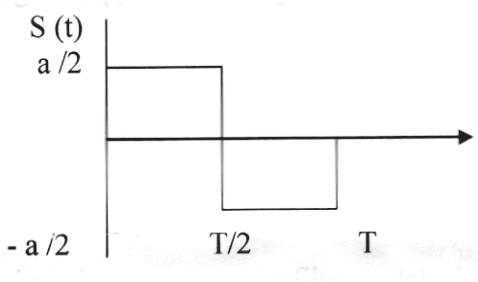
Q2) a) Draw signal space and spectral diagram of 16 QAM, 16-ary PSK, QPSk and MSK digital CW modulation and state the bandwidth requirement.**[5]**

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

Q3) a) Describe Correlation receiver and Matched filter receiver used for implementing the optimal receiver for AWGN channel with respect to MAP receiver. **[5]**

P.T.O.

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



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

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

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

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

i) Frequency-selective, fast-fading

ii) Frequency-selective, slow-fading

iii) Flat-fading, fast-fading

iv) Flat-fading, slow-fading

b) Explain Non-Decision-directed PLL for carrier phase estimation of PAM signals. **[5]**

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

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

Q7) a) Explain Blind Equalization based on Maximum Likelihood Criteria. **[5]**

b) Explain with an example, how the optimization takes place with carrier phase estimation. **[5]**

Q8) With reference to Adaptive Equalization briefly describe. **[10]**

a) Zero forcing algorithm

b) LMS algorithm

c) Adaptive decision - feedback equalizer,

d) Kalman algorithm.

EEE

Total No. of Questions : 8]

SEAT No. :

P5277

[Total No. of Pages : 2

[5355]-14

M.E. (Civil) (Environmental Engineering)

RESEARCH METHODOLOGY

(2013 Pattern) (Semester-I)

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

Instructions to the candidates:

1) ***Solve any five full questions.***
2) ***Figures to the right indicate full marks.***

Q1) a) Explain the techniques involved in defining a research problem. **[5]**

b) Discuss the important points to be considered for developing a hypothesis. **[5]**

Q2) a) Discuss in brief the format of a research proposal. **[5]**

b) Explain the significance oral presentation of research and precautions to be taken for same. **[5]**

Q3) a) Write a note on "Objectives of literature review". **[5]**

b) Explain in brief the important scaling techniques. **[5]**

Q4) a) Why should the data collected for research must be checked for reability, suitability and adequacy? **[5]**

b) Define sampling and discuss the different types of sampling. **[5]**

Q5) a) Write a note on Principal component Analysis. **[5]**

b) Explain the terms arithmetic mean, median, mode, geometric mean and harmonic mean. **[5]**

Q6) a) Discuss the important characteristics of Chi-Square test. **[5]**

b) Explain factorial Analysis. **[5]**

P.T.O.

Q7) a) Discuss the importance of publishing a research in a journal paper. **[5]**

b) Explain the need of a research report. **[5]**

Q8) Write a research proposal for a suitable research problem (any problem related to Civil engineering can be considered) to a funding agency with reference to the following terms:

Title, Introduction, origin of the problem, expected outcome, literature review, Significance of the study in the context of current status, objectives, methodology, year wise plan. **[10]**

Total No. of Questions : 8]

SEAT No. :

P4570

[Total No. of Pages : 2

[5355]-141

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

ELECTROMAGNETICS AND ANTENNA THEORY

(2013 Course) (Semester-I) (Revised) (504301)

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

Instructions to the candidates:

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

Q1) A wave of frequency 1 MHz travels in a large block of copper (σ=5.7X10^7, ε_r=l, and μ_r=l). Determine the values of phase velocity, intrinsic impedance, wave length. attenuation constant and phase constant. Also find the phase shift between the electric and magnetic fields and the distance that the wave must travel to be attenuated by a factor 100 (40dB) **[10]**

Q2) a) Derive the Laplace equation from Maxwell's equations and use the same derive the Capacitance between two concentric cylinders. **[5]**

b) State Uniqueness theorem and explain its significance in electromagnetic problem solution. **[2]**

c) Define the term Polarization, draw the illustrative diagrams which explain Linear, Circular, Elliptical polarization. **[3]**

Q3) Draw the radiation pattern of 8- Isotropic elements with equal amplitudes, separated by half wavelength distance. Ensure that the main lobe will be in broadside direction. **[10]**

Q4) a) The radial component of the radiated power density of an infinitesimal linear dipole length of $l << \lambda$ is given by $\overline{P}_{avg} = \frac{P_m \sin 2\theta}{r^2} \hat{a}_r \; W/m^2$ where P_m is peak value of power density. Find the directivity and then effective aperture of the antenna at λ=l.5m. **[6]**

P.T.O.

b) Find the radiation resistance of a 1.575 m long short dipole operating at 1MHz. **[2]**

c) Compare the Hertzian dipole, short dipole and half wave dipole in terms of Radiation resistance. **[2]**

Q5) a) Explain the Babinet's principle and its applications in antenna theory. **[3]**

b) Explain the principle of operation, construction, radiation pattern, gain, and design procedure for Pyramidal Horn. **[7]**

Q6) a) What will be the required diameter of a conical horn antenna operating at 3.5GHz with l5dBi directivity. **[4]**

b) A rectangular pyramidal horn has aperture lengths $a_{E\lambda}$=1.2 and $a_{h\lambda}$=l.1 per wavelength. Calculate directivity, dimension of horn gain, if operating frequency is 3GHz. **[3]**

c) Compare E-plane Horn and H-plane horn with reference to construction, operation, directivity and applications. **[3]**

Q7) a) Describe the radiation mechanism of a rectangular patch antenna. Mention its advantages and disadvantages. Compare the same with circular patch antenna. **[5]**

b) Explain the Proximity coupled feeding technique for Microstrip Patch antenna with illustrative diagrams and compare the same with micro strip line feeding technique. **[5]**

Q8) a) Describe the working principle of Spiral Antenna with the help of mathematical expressions. illustrative diagrams structural details and radiation pattern. **[3]**

b) What is rhombic antenna? Explain the design procedure with reference to height. **[4]**

c) Draw the structure of Log Periodic antenna, its salient features and its design procedure. **[3]**

Total No. of Questions : 8]

SEAT No. :

P4571

[Total No. of Pages : 2

[5355]-142
M.E. (E & TC) (Microwave)
RF AND MICROWAVE CIRCUITS
(2013 Pattern) (Semester - I) (504302)

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

Instructions to the candidates:

1) ***Solve any five questions.***
2) ***Figures to the right indicates full marks.***
3) ***Assume suitable data wherever necessary.***

Q1) a) A two port network is known to have the following scattering matrix

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

Determine if the network is reciprocal and lossless. If port 2 is terminated with a matched load, what is the return loss seen at part 1? If part 2 is terminated with a short circuit, what is the return loss seen at port 1? **[5]**

b) Derive the expressions for propagation constant, Impedance and Power Flow for the Lossless Co-axial line. **[5]**

Q2) a) Design a single-section quarter-wave matching transformer to match a 10Ω load to a 50Ω transmission line at $f_0 = 3$ GHz. Determine the percent bandwidth for which the SWR ≤ 1.5. **[5]**

b) Four different load impedances: **[5]**

i) $Z_L = 50\Omega$,

ii) $Z_L = 48.5\Omega$,

iii) $Z_L\ (75 + j25)\Omega$

iv) $Z_L = (10–j5)\Omega$ are sequentially connected to a 50Ω transmission line. Find the reflection coefficients and the SWR circles. Also determine return loss in dB.

Q3) a) Explain with equivalent circuit diagram of : **[5]**

i) Wilkinson power divider

ii) Lange coupler.

b) Write a note on dynamic range and sources of noise in microwave circuits. **[5]**

P.T.O.

Q4) a) Explain the concept of Inter symbol Interference (ISI) in microwave. How ISI affects the wireless communication. **[5]**

b) A 2W power source in connected to the input of a directional coupler with C = 20 dB, D = 35 dB and insertion loss of 0.7 dB. Find the output powers (in dBm) at the through, coupled and output ports. Assume all parts are to be matched. **[5]**

Q5) a) Describe in detail operating principle of PIN diode. **[5]**

b) Describe in detail operating principle of MESFET. **[5]**

Q6) a) Design a BJT colpitts oscillator for 200 MHz in common emitter configuration having bias point of $V_{ce} = 3V$, $I_c = 3mA$. Following circuit parameters are given at room temperature of 25°C. $C_{BC} = 0.1$ pF.
$\gamma_B = 2k\Omega$, $\gamma_{CE} = 10\ k\Omega$, $C_{BE} = 10$ pF.
If the inductance should not exceed $L_3 = l = 5$ mH, find the values for capacitances in feedback loop. **[5]**

b) Explain the concept of impedance matching related to amplifier design. **[5]**

Q7) a) Write a note on Varactor diode. **[5]**

b) A MOSFET operated at 5.7 GHz has the following sparameters. **[5]**

$$S_{11} = 0.5 \angle -60°, \quad S_{12} = 0.02 \angle 0°$$
$$S_{12} = 6.5 \angle 115°, \quad S_{22} = 0.6 \angle -35°$$

i) Determine if the circuit is unconditionally stable.

ii) Find the maximum power gain under optimal choice of the reflection coefficient assuming the unilateral design.

Q8) a) Explain working of Quartz oscillator along with its equivalent circuit. **[5]**

b) Explain in detail the concept of unitateral design for power amplifiers. **[5]**

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Total No. of Questions :6]

SEAT No. :

P4572

[Total No. of Pages : 2

[5355] - 143
M.E. (E & TC)
MICROWAVE MEASUREMENT
(2013 Course) (Semester - I)

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

Instructions to the candidates:

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

Q1) a) Define reflection coefficient and prove that $\Gamma = \frac{Z_L - Z_0}{Z_L + Z_0}$. **[5]**

b) Draw and explain the terminated loseless transmission line. **[5]**

Q2) a) Explain with necessary equation and diagram the working of Quarter-wave transformer. **[5]**

b) Define the cut-off condition and wave impedance for a loseless waveguides. **[5]**

Q3) a) State the similarities and dissimilarities between waveguides and 2-wive transmission line. **[5]**

b) Explain the term insection loss with necessary equation. **[5]**

Q4) a) State the different methods of attenuation measurement. Explain any one. **[5]**

b) What are the different consideration while making attenuation measurement. **[5]**

P.T.O.

Q5) State Any Five specification of spectrum Analyzer. Explain with neat diagram the working of spectrum analyzer. **[10]**

Q6) What is the use of power sensors in Microwave measurement. State the different types of power sensors and Explain any one in detail. **[10]**

Total No. of Questions : 8]

SEAT No. :

P4573

[Total No. of Pages : 2

[5355]-145

M.E. (Electronics & TC) (Microwave)
COMPUTATIONAL ELECTRO MAGNETICS
(2013 Pattern) (Semester - II) (504307)

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

Instructions to the candidates:

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

Q1) a) Explain various common techniques to solve an electromagnetic problems. **[5]**

b) What do you mean by Green's function in two dimensional case. **[5]**

Q2) a) Explain the concept of FDTD analysis. **[5]**

b) Explain application of one dimensional FDTD analysis. **[5]**

Q3) a) State and explain the significance of finite difference analysis for guiding structures. **[10]**

Q4) a) Explain Ritz Variational method. **[5]**

b) Explain applications of Ritz Variational method. **[5]**

Q5) a) Explain in detail method of weighted residual. **[5]**

b) Explain the advances in FDTD technique. **[5]**

Q6) a) Compare FEM and MOM. **[5]**

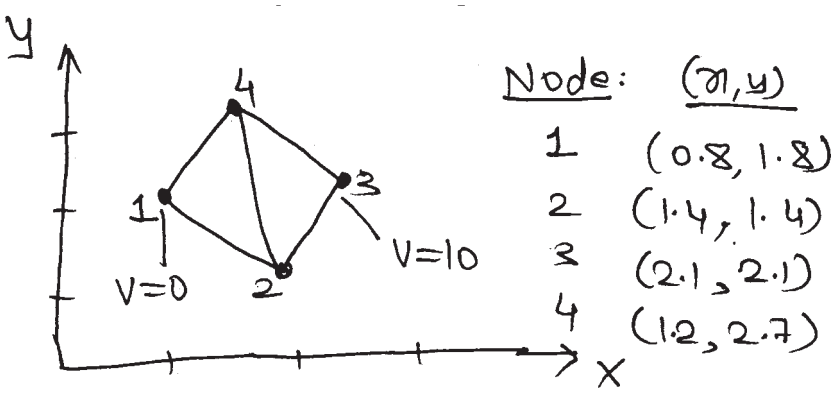
b) Compare FDM and FDTD. **[5]**

Q7) a) Explain Galerkins method. **[5]**

b) Explain Point Matching method. **[5]**

P.T.O.

Q8) Consider two element mesh as shown in figure given below. Determine the potential within the mesh using FEM technique. **[10]**



Total No. of Questions : 8]

SEAT No :

P 4574

[Total No. of Pages : 2

[5355]-146

M.E. (Electronics and Telecom) (Microwave)

RF AND MMIC TECHNOLOGY

(2013 Pattern) (Semester - II) (504308)

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

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2. Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8.***
2) ***Figures to the ritght side indicate full marks.***
3) ***Use of Calculator is allowed.***
4) ***Assume suitable data, if necessary.***

Q1) a) State the advantages and disadvantages of MMICs in comparison with hybrid MICs. **[7]**

b) Explain multichip module technology. **[6]**

OR

Q2) Explain the three important approaches used in the design of MMICs and compare them. **[13]**

Q3) a) Explain one of the important methods used for synthesis of non-linear MMICs in detail. **[7]**

b) Explain synthesis of n-port on the base of elementary two port. **[6]**

OR

Q4) What is the difference between the convolutional and transient analysis techniques used for simulation of the circuits. Explain one of them. **[13]**

Q5) What is CAD design? Explain the different CAD design features. **[12]**

OR

P.T.O.

Q6) Explain the design of switch by using any of the CAD design technique. **[12]**

Q7) a) Draw and explain complete MMIC design cycle. **[6]**

b) Write short note on MMIC test system. **[6]**

OR

Q8) a) Explain network matrix decomposition of microwave circuits. **[6]**

b) Write short note on future trends in MMICs. **[6]**

Total No. of Questions :6]

SEAT No. :

P4575

[Total No. of Pages : 2

[5355] - 147

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

WIRELESS COMMUNICATION SYSTEM

(2013 Course) (Semester - II) (504309)

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

Instructions to the candidates:

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

Q1) a) Discuss in detail about second generation (2G) and third generation (3G) wireless networks and standards. **[5]**

b) Explain the frequency reuse in cellular communication system. **[5]**

Q2) a) Explain the concept of small scale and large scale fading. Explain the factors influencing small scale fading. **[5]**

b) Explain the Cost 231 Model in detail with mathematical expressions for all the cases to be considered. **[5]**

Q3) a) Specify with relevant numerical values the Multiple Access Scheme, Spectrum Allocation, Channel bandwidth, number of users for channel, modulation scheme for the wireless standards AMPS and GSM. **[5]**

b) Write a short note on CDMA 2008 traffic types. **[5]**

Q4) a) Write a detailed note on PDPC (Packet Data Convergence Protocol) explaining the Radio Protocol Stack, Services, Functions, Operations. **[7]**

b) Explain MAC layer protocol in UMTS. **[3]**

P.T.O.

Q5) a) For given path loss exponent (a) n=4 and (b) n=3, find the frequency reuse factor and the cluster size that should be used for maximum capacity. The signal-to-noise interference ratio of 15dB is minimum required for satisfactory forward channel performance of a cellular system. There are six co-channel cells in the first tier and all of them are at the same distance from the mobile. Use suitable approximations. **[5]**

b) Explain attenuation of wave over a reflecting surface. **[5]**

Q6) a) Draw the architecture diagram of GPRS and explain the function of each element in detail. **[5]**

b) Draw the structure of Layered protocols at UTRAN and explain the each term. **[5]**

Total No. of Questions :6]

SEAT No. :

P4576

[Total No. of Pages :2

[5355] - 148

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

EMI AND EMC TECHNIQUES

(2013 Pattern) (Semester - III) (604301)

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

Instructions to the candidates:

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

Q1) a) What are the various mechanism in which electromagnetic interference can travel from its sources to the receptor? **[4]**

b) Explain the difference between grounding and bounding. **[4]**

c) What are different sources of EMI? **[2]**

Q2) a) Give the design guidelines for RF transmitter and receiver system for minimization of EMI? **[4]**

b) What is amplitude culling and frequency culling with respect to transmitter and receiver circuit? **[4]**

c) State the multievel predicition process in detail. **[2]**

Q3) a) Explain Modeling of Class B Interference. **[4]**

b) Explain with neat diagram for measurement of radiation emission and radiation susceptibility. **[4]**

c) What are the precautions required in earthing? **[2]**

P.T.O.

Q4) a) Compare Five different approaches for measurement of radiated emission (RE) and radiation suceptibility (RS) of an equipment. **[5]**

b) What is microwave anechoic chamber? How it is used for EMI testing? **[5]**

Q5) a) Explain common mode and differential mode filter design for power line. **[5]**

b) Write short note on lumped element low pass filter. **[5]**

Q6) a) Explain different parameters of design of band pass filter for micro strip antenna. **[5]**

b) What is pigtail effect with respect to EMC connector? Explain with example. **[5]**

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Total No. of Questions :8]

SEAT No. :

P4577

[Total No. of Pages : 2

[5355] - 149

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

RADAR & SATELLITE COMMUNICATIONS

(2013 Course) (Semester - III) (604302)

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

Instructions to the candidates:

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

Q1) a) Explain the basic principles of a radar system with neat block diagram. Give the limitations and applications of radars. **[4]**

b) Derive the radar range equation? Explain the factors that affect the maximum range of radar. **[3]**

c) Explain basic principle of pulsed radar system. **[3]**

Q2) a) Explain with neat block diagram the working principle of Moving Target Indicator (MTI) radar. **[5]**

b) Explain the concept of Doppler effect associated with moving targets with mathematical relevance. **[5]**

Q3) a) With respect to Doppler radar explain the following : **[4]**

i) Correlation

ii) Convolution

b) Compare analog filters with digital filters. Explain any one digital filtering technique in detail. **[6]**

Q4) Write short notes on : **[10]**

a) Military radars

b) Radar tracking

P.T.O.

Q5) a) With respect to satellite communication explain the following multiple access techniques: **[6]**

i) SDMA

ii) Random Access

b) Discuss various Satellite subsystems. **[4]**

Q6) a) Comment on various interferences and noise sources in satellite communication system. **[5]**

b) Explain in brief the concept of link design for Geostationary satellites. **[5]**

Q7) a) Explain the look angle calculations for satellite orbit. **[5]**

b) Explain in brief orbital mechanism and launching of artificial satellites. **[5]**

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

a) Link Budget

b) Kepler's Law

Total No. of Questions :8]

SEAT No. :

P4470

[Total No. of Pages :2

[5355] - 15

M.E. (Civil - Environmental Engineering)

INDUSTRIAL WASTE WATER MANAGEMENT

(2013 Course) (Semester - II)

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

Instructions to the candidates:

1) ***Answer any 5 questions.***
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.***

Q1) Explain in detail about Waste Audit and Evaluation of pollution prevention options. **[10]**

Q2) Explain in details about Flotation and Precipitation. **[10]**

Q3) With suitable example discuss the Membrane Separation Process. **[10]**

Q4) Explain with suitable methodology for safe Disposal of Treated Waste. **[10]**

Q5) Explain Manufacturing process of food processing industry and give the characteristics of effluent. **[10]**

P.T.O.

Q6) Discuss Characteristics and composition of effluent from Mineral Processing industry. **[10]**

Q7) Discuss in details about Zero effluent discharge systems. **[10]**

Q8) Discuss in detail about Treatment with polymer coagulation. **[10]**

Total No. of Questions : 8]

SEAT No. :

P4578

[Total No. of Pages : 2

[5355]-151
M.E. (E&TC) (Signal Processing)
IMAGE PROCESSING & ANALYSIS
(2013 Course) (Semester-I)

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

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right indicate full marks.***
3) ***All questions carry equal marks.***
4) ***You are advised to attempt not more than 05 questions.***
5) ***Your answers will be valued as a whole.***
6) ***Use of logarithmic tables slide rule, Molier charts, electronic pocket calculator and steam tables is allowed.***
7) ***Assume suitable data, if necessary.***

Q1) a) With reference to relation between pixel explain **[5]**

i) 4 connectivity

ii) 8 connectivity

iii) Mixed connectivity Hence compute length of shortest path for V={0,1} between p&q.

3	2	2	19
2	2	0	2
1	2	1	1
P1	0	1	2

b) With respect to the elements of visual perception, explain the following:**[5]**

i) Brightness adaption & discrimination.

ii) Mach Bands & simultaneous contrast.

Q2) a) An image of 2×2 is given. Determine the DCT coefficients. **[5]**

$$\begin{bmatrix} 4 & 4 \\ 4 & 4 \end{bmatrix}$$

b) How is image restoration different from image enhancement? Explain image restoration model and any one method of image restoration. **[5]**

P.T.O.

Q3) a) Explain following image enhancement algorithms. (Any three) : **[6]**

i) Contrast streching.

ii) Power-law transformation

iii) Bit plane slicing.

iv) Image Negative

b) Answer the following related to histogram of an image. **[4]**

i) If all pixels of an image are shuffled will there be any change in the histogram. Justify.

ii) Why does discrete histogram equalization not produce a perfectly flat histogram.

iii) Can two different images have same histogram? Justify your answers.

iv) If two images have same histogram, will they have same total power? Justify.

Q4) a) Explain frequency domain low pass filtering of an image in detail. **[6]**

b) With reference to 2-D transform explain **[4]**

i) Basis image ii) Symmetry

iii) Separability iv) Energy Compaction

Q5) a) Explain edge detection procedure using sobel mask. Discuss the problem of edge detection in noisy image. **[5]**

b) Explain local and global thresholding in segmentation. **[5]**

Q6) a) What are different ways of boundary representation. Explain eight directional chain code representation for boundary representation with example. **[5]**

b) What is Hough transform? How it is used for edge linking. **[5]**

Q7) a) What is skeleton? Explain the algorithm to obtain skeleton of an object in a digital image. **[5]**

b) Explain need of color models. Compare YIQ and HIS color models. **[5]**

Q8) a) What is difference between loss-less and lossy compression technique. Explain in detail lossy predictive encoder and decoder. **[5]**

b) Explain basic JPEG baseline encoder in detail. **[5]**

Total No. of Questions : 8]

SEAT No. :

P4579

[Total No. of Pages : 3

[5355]-152

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

SIGNAL PROCESSING TECHNIQUES

(2013 Pattern) (Semester - I) (504402)

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

Instructions to the candidates:

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

Q1) a) Design an ideal FIR high pass filter for the following specifications: **[5]**

$$H_d\left(e^{jw}\right)=\begin{cases}1 & \text{for} \quad \pi/4 \le |w| \le \pi \\ 0 & \text{for} \quad |w| \le \pi/4\end{cases}$$

Use a Hanning window. Find the values of h(n) for N = 11.

b) Explain the application of multirate DSP in oversampling ADC and CD Hi-Fi system. **[5]**

Q2) a) Design a digital Butterworth low pass filter that satisfies following specifications: **[5]**

F_{pass} = 1 kHz, F_{stop} = 3 kHz, $F_{sampling}$ = 8 kHz, Pass band ripple = 3 dB, Stop band attenuation = 30 dB. Use bilinear transformation. Assume T = 1 sec.

b) Why FIR filter provide linear phase condition? Justify with derivation.**[5]**

Q3) a) Draw a functional block diagram and explain architecture of a typical DSP processor. **[4]**

b) Explain a noise cancellation scheme based on adaptive filter. **[4]**

c) What are the advantages of Kaiser window over other windows? **[2]**

P.T.O.

Q4) a) Explain LMS algorithm for designing of FIR filter. **[4]**

b) Design a digital Butterworth filter that satisfies following specifications:

$$0.707 \le \left|H\left(e^{jw}\right)\right| \le 1 \quad \text{for } 0 \le w \le \pi/2$$

$$\left|H\left(e^{jw}\right)\right| \le 0.2 \quad \text{for } 3\pi/4 \le w \le \pi$$

Use bilinear transformation. Assume T = 1 sec. **[4]**

c) What is the need of anti-imaging filter in interpolator? Explain with neat diagram. **[2]**

Q5) a) Explain Barrel shifter and MAC of DSP processor. **[4]**

b) For a digital audio system, design a two stage interpolator for the following system specifications: **[4]**

Highest frequency of interest = 0 – 20 kHz,

Input sampling frequency = 44.1 kHz,

Output sampling frequency = 176.4 kHz,

Pass band ripple = 0.5 dB,

Stop band attenuation = 50 dB.

c) Given analog filter transfer function $H(s) = \dfrac{(s+0.1)}{(s+0.1)^2+9}$

Determine H(z) using impulse invariance method. Assume T = 1 sec. **[2]**

Q6) a) Explain the properties of retiming with example. **[4]**

b) Design a three-stage decimator to reduce sampling rate from 96 kHz to 1 kHz and satisfies following specifications: **[4]**

Pass band ripple = 0.01, Stop band ripple = 0.001, Highest frequency of interest = 450 Hz. Assume decimation factors - 8, 6, 2.

c) Compare FIR filter designing methods. **[2]**

Q7) a) Derive the Wiener-Hopf equations for the FIR Wiener filter. **[4]**

b) Obtain the polyphase decomposition of the IIR system with transfer function - $H(z)=\frac{1-4z^{-1}}{1+5z^{-1}}$ for two sections. Also draw the polyphase structure. **[4]**

c) Explain aliasing effect in impulse invariant method. **[2]**

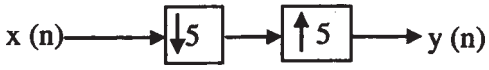
Q8) a) Write a short note on : **[4]**

i) Circular buffering

ii) Addressing modes of DSP processor

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

c) Determine y(n) in terms of x(n) for the following multirate system: **[2]**



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Total No. of Questions :8]

SEAT No. :

P4580

[Total No. of Pages : 2

[5355] - 153

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

MIXED SIGNAL PROCESSING SYSTEMS AND DESIGN

(2013 Course) (Semester - I) (504403)

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

Instructions to the candidates:

1) ***Answer any FIVE questions out of EIGHT questions.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Derive the equivalent resistance expression for the series-parallel switched capacitor resistor emulation circuit. **[3]**

b) Compare positive and negative switched capacitor transresistance emulation of a resistor. **[2]**

c) Draw the schematic of inverting switched capacitor amplifier and derive the expression for odd-even and even-even z-domain transfer function. **[5]**

Q2) a) Explain charge injection in switched capacitor circuits. How it can be minimized? **[5]**

b) Design a switched capacitor summing amplifier that gives the output voltage during the Φ_2 phase period that is equal to $12V_1 - 6V_2$, where V_1 and V_2 are held constant during a $\Phi_2 - \Phi_1$ period and then resampled for the next period. Draw circuit diagram. **[5]**

Q3) a) Explain Single Slope ADC with the help of suitable diagram. Determine the clock frequency needed to form an 8-Bit Single Slope ADC if analog signal bandwidth is 20 kHz. **[5]**

b) Perform the operation of a 3-bit successive approximation ADC with $V_{REF} = 8$. Make a table that consists of $D_2D_1D_0$ (output of successive approximation register), $B_2B_1B_0$ (output of shift register), V_{OUT} (the output from the DAC) and the comparator output, which shows the binary search algorithm of the converter for $V_{IN} = 5.5$ V. **[3]**

c) List differences in Nyquist rate and oversampling ADCs. **[2]**

P.T.O.

Q4) a) Explain Pipeline ADC with suitable diagram. Also explain how multi-bit pipeline ADC is useful in digital error correction. **[5]**

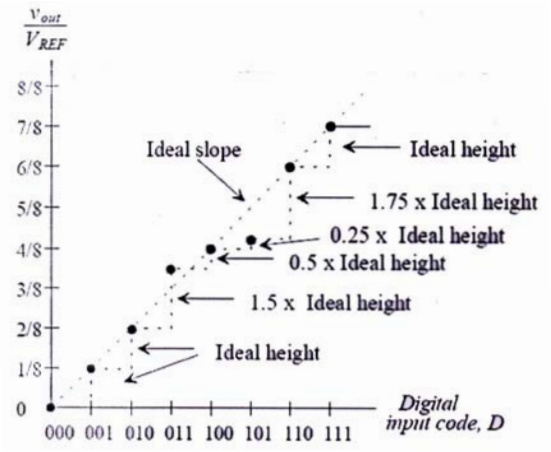
b) Explain the working of flash ADC with the help of suitable block diagram. List one advantage and one disadvantage of this type of ADC. **[5]**

Q5) a) Draw and explain R-2R ladder implementation of the binary-weighted resistor DAC. Write expression for output voltage. **[5]**

b) Find the value of the output voltage of 3-bit charge-scaling DAC for $D_2D_1D_0$ = 110 and 111. Assume that V_{REF} = 5 V and C = 0.5 pF. **[3]**

c) Define DNL, INL, gain error, and latency for DAC. **[2]**

Q6) a) Determine the DNL for 3-bit non-ideal DAC whose transfer curve is shown in figure. Assume that V_{REF} = 5 V. Also draw the DNL curve. **[5]**



b) Explain the conversion process of pipeline DAC with the help of suitable block diagram. Write expression for output voltage. **[5]**

Q7) a) Draw the block diagram of digital PLL and explain its working in detail. **[4]**

b) Explain CMOS source coupled VCO with the help of suitable diagram. Determine its frequency of oscillation. **[4]**

c) List any four applications of DDS. **[2]**

Q8) a) Draw the block diagram of delay-locked loop and explain its working in detail. **[4]**

b) Explain working of phase frequency detector (PFD) with the help of schematic diagram, input and output waveforms. **[4]**

c) List four applications of Phase-locked loop. **[2]**

Total No. of Questions : 8]

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P4581

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[5355]-155
M.E. (E & TC) (Signal Processing)
SPEECH SIGNAL PROCESSING
(2013 Pattern) (Semester - II) (504407)

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

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Black figures to the right indicate full marks.***
4) ***You are advised to attempt not more than 05 questions.***
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.***

Q1) a) What do you mean by voiced and unvoiced speech? What one the methods used for indentifying the voiced and unvoiced part of speech. **[5]**

b) What is pitch? Explain in detail auto correlation method for pitch measurement. **[5]**

Q2) a) Draw a Block schematic for the parallel processing approach for pitch detention Explain the function of each block. **[4]**

b) Explain the production of consonants like |t|, |s|, and |P| **[3]**

c) Compare STFT and FT and also with wavelet. **[3]**

Q3) a) Use Levinson-Durbin algorithm for calculation of third order predictor Co-efficients of signal $s(n)$ With auto correlation seguence r(0) = 3, r(1) = 2, r(2) = 1, and r(3) = 0.5. **[5]**

b) Explain the selection of a multiplier for jayant quantizer. Expalin working of jayant quaulizer with the help of a block schewatic. **[5]**

P.T.O.

Q4) a) What is cepstrum? Why is the cepstral dowain preferred for pitch measurement? Explain pitch period measurement using cepstral domain. **[6]**

b) Let a signal have samples given by 1.8, 2.4, 3.5, 5.1, 6.2, 9.7, 11.2, 13.2, 12.6, 10.2, 7.3, 5.9, 8, 7.4, 5.2, 3.1, and 1.8 find the step size & quantization noise power for a signal & for a difference signal if six bit quantization is used. **[4]**

Q5) a) Explain G. 726 and LPC-10 speech standards. **[4]**

b) Explain speech morphing in detail. **[4]**

c) Explain how humans recognize speech? **[2]**

Q6) a) Compare MFCC with PLP. **[4]**

b) Compare PCM with companded PCM. Explain companded PCM will improve SNR of the signal. **[4]**

C) What is the role of run down circuit in piteh measurenment? **[2]**

Q7) a) What is HMM? What is hidden bit? Draw a state diagram of HMM as a general case and show how you will write a transition Matrix. **[6]**

b) What is comb filter? How will you make the notches in the comb filter sharp? **[4]**

Q8) a) Explain different methods of speech enhancement if the speech is corrupted by,

i) Periodic noise.

ii) Wide band noise. **[4]**

b) What are three parts of echo canceller? Explain each part in detail. **[4]**

c) Compare the following.

i) Speaker identification Vs. Speaker verification. **[2]**

Total No. of Questions : 6]

SEAT No :

P 4582

[Total No. of Pages : 2

[5355]-156

M.E. (E&Tc-Signal Processing)

ARCHITECTURE FOR SIGNAL PROCESSING ALGORITHMS

(2013 Pattern) (Semester - II) (504408)

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

Instructions to the candidates:

1) ***Answer any five questions out of eight question.***
2) ***Figures on Right Indicates marks allotted.***
3) ***Use of scientific calculator is permitted.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain 1-D DFT. What is its use. State periodicity, time reversal, circular frequency shift and circular convolution property in case of 1-D DFT. **[5]**

b) When will you use Goertzel algorithm instead of FFT. Explain Goertzel algorithm in detail. **[5]**

Q2) a) Explain 2-D DFT. What are its application. Explain its use with respect to image filtering. **[5]**

b) Explain Periodicity, Linearity and Symmetry property of DFT. **[5]**

Q3) a) What are the challenges in designing architectures for DSP algorithms? Explain. **[5]**

b) What is signal flow graph(SFG)? Explain with an example. **[5]**

Q4) a) What is DCT? Expalin with application. **[5]**

b) Write a short note on DSP application demands and scaled CMOS Technologies. **[5]**

P.T.O.

Q5) a) Explain direct form of Finite impulse response digital filter. **[5]**

b) What are Unfolding technique and their properties? **[5]**

Q6) a) What are the retiming technique? Explain cutset retiming. **[5]**

b) Explain systolic array design with an example. **[5]**

Q7) a) Explain Boot-Wallace tree multiplier. **[5]**

b) Explain with neat schematic 4X4 carry save baugh Wooley multiplier. **[5]**

Q8) Write short note on. **[10]**

a) Galois field arithmetic for multiplier.

b) Canonic Signed Digit arithmetic.

Total No. of Questions :8]

SEAT No. :

P4583

[Total No. of Pages : 2

[5355] - 157

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

BIOMEDICAL SIGNAL PROCESSING

(2013 Pattern) (Semester - II) (504409)

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

Instructions to the candidates:

1) ***Answer any FIVE questions out of EIGHT questions***
2) ***Neat diagrams must be drawn whenever necessary***
3) ***Figures to the right indicates full marks***
4) ***Assume suitable data if necessary***

Q1) a) What do you mean by skin contact impedance and motion artifacts. What are the effects of these two while measuring Bio signal. **[5]**

b) Discuss important factors to be considered in the design of medical instrumentation. **[5]**

Q2) a) Explain various waves observed in EEG with their frequencies and significance. **[5]**

b) Explain electrical conduction system of heart .Draw ECG waveform label the critical parts of waveform .Show amplitude and time duration for normal ECG. **[5]**

Q3) a) Explain various types of shielding techniques implemented for electrical safety of medical instruments. **[5]**

b) What is the function of EMG? Enlist the types of EMG and explain procedure to perform EMG. **[5]**

Q4) a) Write a short note on (Any 2) : **[5]**

i) Origin of Bio-Potential

ii) Active Filter

iii) Power Spectral Density.

b) Explain different grounding techniques used in medical Instrumentation. **[5]**

P.T.O.

Q5) a) Derive Weiner Hopf equation. State applications of Weiner Hopf equation. **[5]**

b) Discuss advantages and disadvantages of FIR and IIR filtering. **[5]**

Q6) a) Explain short term Fourier transform. Discuss the shortcomings of STFT. **[5]**

b) Explain in brief AR, MA and ARMA models for spectral estimation of signals. **[5]**

Q7) a) Write a short note on phonocardiogram. How is recording of PCG signals done? **[5]**

b) Explain principle and specification of transducer. **[5]**

Q8) a) Explain the basic principle involved in reconstruction of images from PET, SPECT and CT. **[5]**

b) Explain : **[5]**

i) Transient Protection

ii) Characterization of signal in frequency domain.

Total No. of Questions :8]

SEAT No. :

P4584

[Total No. of Pages :2

[5355] - 158

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

STATISTICAL SIGNAL PROCESSING

(2013 Pattern) (Semester - III)

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

Instructions to the candidates:

1) ***Solve any 5 questions out of 8.***
2) ***Each questions carries 10 marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right side indicate full marks.***
5) ***Assume suitable data if necessary.***

Q1) a) What is signal modeling and least square method of signal modeling? Enlist advantages and disadvantages of least square method of signal modeling. **[5]**

b) Explain pade's approximation algorithm for signal modeling and explain drawback of it. **[5]**

Q2) a) State and explain Shank's method of signal modeling in detail. **[5]**

b) A signal x is given below that is to approximated. Use pade approximation for p=2, q=0 and p=q=1

X = {1, 1.500, 0.750, 0.375, 0.185, 0.0938} **[5]**

Q3) a) Explain in detail AR process. **[5]**

b) Find ARMA (1, 1) model for real valued random process x(n) having autocorrelation values $r_{x(0)} = 26$, $r_{x(1)} = 7$, $r_{x(2)} = 7/2$ Using modified Yule Walker Equation. **[5]**

P.T.O.

Q4) a) If H(Z) is a pth-order all-pole filter, given h(n) for n=0,1,....N, then the stability of H(z) may be determined. If this is true, explain the procedure and list any conditions that must be placed on p or N. If false, explain why it cannot be done. **[5]**

b) Explain MYWE method for modeling an AR(p) process. **[5]**

Q5) a) Derive Wiener Hopf equation for causal FIR wiener filter. Also give expression for minimum error in terms of autocorrelation Matrix R(x).**[5]**

b) We have a signal X(n). Obtain an all-pole model of the form.

$H(z) = \frac{b(0)}{1 + a(1)z^{-1} + a(2)z^{-2}}$ Using the autocorrelation method, find explicit formulas for b(0), a(1) and a(2) in the terms of $r_{x(0)}$, $r_{x(1)}$ and $r_{x(2)}$. **[5]**

Q6) a) Explain what do you mean by WideSence stationary processes (WSS). **[3]**

b) Explain modified covariance method of parametric spectrum estimation. **[4]**

c) Is spectrogram and Periodeogram different? Name any two methods to estimate each of these. **[3]**

Q7) a) Explain any one, Non parametric method of Spectrum estimation. **[3]**

b) Write LMS algorthms for n^{th} order FIR filter, State its convergence property. **[3]**

c) Explain MVUE-minimum variance unbiased estimates. **[4]**

Q8) a) Explain how wiener filter can be used for noise cancellation. **[3]**

b) Write a note on channel equalization using adaptive filters. **[4]**

c) Draw block diagram of adaptive filter and explain its applications. **[3]**

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Total No. of Questions :8]

SEAT No. :

P4585

[Total No. of Pages : 2

[5355] - 159

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

STILL IMAGE AND MOVING PICTURE COMPRESSION STANDARDS

(2013 Credit Pattern) (Semester - III)

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

Instructions to the candidates:

1) ***Answer any FIVE questions.***
2) ***Neat diagrams must be drawn whenever necessary.***
3) ***Figures to the right side indicates full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) State the limitations of EZW algorithm. State the basic objectives of Set Partitioning in Hierarchical Trees (SPIHT) algorithm. Outline the steps of SPIHT encoding and decoding algorithm. **[5]**

b) State the objectives and describe the features of JPEG 2000. **[5]**

Q2) a) Explain the use of wavelets for image coding. Give the properties of mother wavelet. Show the functional space relationship between scaling functions at different scales. **[5]**

b) Explain different stages of coding used in EBCOT algorithm. **[5]**

Q3) a) Give the Image formats and their sampling patterns used in Digital Video. **[5]**

b) Explain following picture assessment techniques. **[5]**

i) DSIS

ii) SSCQE

iii) DSCQE

iv) PSNR

Which technique is preferred out of the above mentioned techniques.

P.T.O.

Q4) a) With the help of Block diagram explain the Baseline JPEG encoder. **[5]**

b) Compare full search block motion and fast search motion estimation algorithms. **[5]**

Q5) a) What is the significance of Video buffer Verifier? If Variable delay parameter is 9000 and bit rate is 1.2 Mbps. Calculate the number of bits in the input buffer. **[4]**

b) Give the important features of Motion Estimation for MPEG-1. Explain any two in Detail. **[6]**

Q6) a) Compare MPEG-1 with MPEG-2. **[4]**

b) Enlist and give the need for nonscalable modes of MPEG-2. Explain any two in detail. **[6]**

Q7) a) Give the advanced motion estimation techniques and their importance in H.263. Explain any one in detail. **[5]**

b) Discuss error protection offered in H.263. **[5]**

Q8) a) What are the levels and profiles of MPEG-4? **[5]**

b) How is object based coding defined and executed for MPEG-4? **[5]**

Total No. of Questions : 8]

SEAT No :

P 4471

[Total No. of Pages : 2

[5355]-16

M.E. (Civil) (Environmental engineering)

AIR POLLUTION AND CONTROL

(2013 Pattern) (Semester-II) (501067)

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

Instructions to the candidates:

1) ***Solve any five questions.***
2) ***Figures to the right indicates full marks.***
3) ***Draw neat figures wherever necessary.***
4) ***Assume suitable data, if necessary.***
5) ***Use of Scientific Calculator is allowed.***

Q1) a) Explain photochemical smog and its importance with respect to air pollution. **[5]**

b) Explain the effect of NOx and CO on human beings with specific concentration of gases. **[5]**

Q2) a) Convert 80 μ g/m^3 of SO_2 to ppm at 25 ^oC and 101.325 kPa Pressure. **[5]**

b) Write short note on air pollution modelling. **[5]**

Q3) a) A factory uses 1.5 M1 of fuel oil per month. The exhaust gases from the factory contain the following quantities of pollutants per M1 per year. **[5]**

i) Particulate matter = 4 t/month.

ii) SO_2 = 20 t/month

Determine the safe height of the chimney required for the safe dispersion of the pollutants.

b) Write equation to estimate the ground level concentration of pollutants for different condition. **[5]**

P.T.O.

Q4) a) Calculate the number of cyclones required to treat a flow of 70 m^3/sec with an inlet velocity of 15m/sec. The diameter of cyclone is 1.8m. **[5]**

b) Explain cleaning mechanism in bughouse filter. **[5]**

Q5) a) Write the principle of wet scrub method to control gas pollutants and draw its schematic sketch and write its application. **[5]**

b) Explain combustion process to control gaseous pollutants. **[5]**

Q6) a) Write stack emission standard for any five industry. **[5]**

b) Write ambient air quality standards (2009). **[5]**

Q7) a) Define odour and explain the methods to control it. **[5]**

b) Write short note on automobile emission control. **[5]**

Q8) a) Explain indoor air pollution control through mechanical ventilation system. **[5]**

b) Write sources and effects of indoor air pollutants. **[5]**

Total No. of Questions : 8]

SEAT No. :

P4586

[Total No. of Pages : 2

[5355]-161

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

DIGITAL CMOS DESIGN

(2013 Course) (Semester-I)

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

Instructions to the candidates:

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

Q1) a) Draw equivalent ckts of MOSFET with & without parasitic capacitors. Comment on magnitudes & dynamic nature of these capacitors. **[5]**

b) What is effect of technology scaling on design efforts? **[5]**

Q2) a) Explain static, dynamic & short ckt power dissipation in logic. Thus, derive the expression for total power dissipation. **[5]**

b) What are the techniques to minimize power dissipations in CMOS logic? **[5]**

Q3) a) Explore wire sheet resistance & its parasitic capacitor in detail. **[4]**

b) List various layout design rules in chip design. **[4]**

c) Write note on stick diagrams. **[2]**

Q4) a) What is need of RC delay model? Explain the schematic of a model in brief. **[4]**

b) Explore with an example how logical efforts are applied to a certain logic ckt. **[4]**

c) Write note on design margin. **[2]**

P.T.O.

Q5) a) Draw FSM diagram & write HDL code for 11011 Moore sequence detector. **[4]**

b) Design CMOS logic for Y = ABC + D + EF. Carry out transistor sizing & calculate active area on chip. Assume 90 nm technology. **[4]**

c) What are merits of pass transistor logic? **[2]**

Q6) a) Why does the situation of uncertainity due to meta-stability arise? Explain the causes with ckt diagram. **[4]**

b) Design one bit latch using transmission gates. Compute the active area on chip. Compare with conventional method. **[4]**

c) Write merits of compound gates. **[2]**

Q7) a) What is concept & need of ratioed ckts? **[4]**

b) With the help of schematic, explain dynamic ckts. **[4]**

c) Write note on limitations of static CMOS. **[2]**

Q8) a) Draw & explain sense amplifier ckt. What are advantages? **[4]**

b) What are the advanced methods for high speed design? Explain any one in detail. **[4]**

c) Write note on materials for performance improvement. **[2]**

Total No. of Questions : 8]

SEAT No. :

P4587

[Total No. of Pages : 2

[5355]-162

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

EMBEDDED SYSTEM DESIGN

(2013 Credit Pattern) (Semester - I) (504103)

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

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***All questions carry equal marks.***
5) ***Assume suitable data, if necessary.***

Q1) a) Identify and briefly discuss the steps that comprise the waterfall life cycle model. **[5]**

b) State and explain various design metrics used for the design of an Embedded System. **[5]**

Q2) a) Explain Embedded System architecture and its aspects in detail. What are the different Categories of an Embedded System? Give examples of each category. **[4]**

b) Distinguish between functional model and architectural model of an embedded system. **[3]**

c) Write a short note on, "General Purpose Processors". **[3]**

Q3) a) With the help of block diagram and specifications explain ARM9TDMI Processor in detail. **[5]**

b) Explain the ARM architectural support for high level language. **[5]**

Q4) a) Explain the ARM floating point architecture in detail. **[4]**

b) What are different ARM exceptions? How processor will respond to it. **[3]**

c) Explain in brief the memory protection unit incorporated in an ARM processor. **[3]**

Q5) a) Explain in brief the Kernel Configuration (Kconfig) file. **[5]**

b) What is a device driver? Why device drivers are essential? **[5]**

P.T.O.

Q6) a) What is a bootloader? Explain important tasks performed by a bootloader in an Embedded Linux. **[4]**

b) Describe different file system types supported by Embedded Linux. **[3]**

c) Explain "Flash File System" in an Embedded Linux System. **[3]**

Q7) a) What is Android manifest? Explain in brief the structure of Android manifest file. **[5]**

b) Write a short note on, "Intent and Intent Filters in an Android Operating System". **[5]**

Q8) a) Explain in detail architecture of Android Operating System? **[5]**

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

i) Network Services and API with reference to Android OS.

ii) Content Providers and Services.

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Total No. of Questions :8]

SEAT No. :

P4588

[Total No. of Pages :2

[5355] - 163

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

RECONFIGURABLE COMPUTING

(2013 Pattern) (Semester - I)

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

Instructions to the candidates:

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

Q1) a) Give key differences between reconfigurable machines and conventional processors. **[4]**

b) Explain the Interconnects and instructions for general purpose computing. **[4]**

c) Explain the terms Fixed Function, Limited Operation Diversity, High Throughput. **[2]**

Q2) a) Differentiate between FPGA and conventional processor on basis of granularity, instruction control and static interconnect. **[5]**

b) Explain Metrics: Density, Diversity, and Capacity . **[5]**

Q3) a) Elaborate a RISC styled processor considering limited instruction and data bandwidth, abstraction overhead and data movement consume capacity. **[4]**

b) Draw and explain area distribution 4-LUT. **[4]**

c) Explain the terms fine grain and coarse grain. **[2]**

P.T.O.

Q4) a) Discuss the reason for failure of VLIW processor to perform at peak. **[4]**

b) Give in detail channel and wire growth according to rents rule. **[4]**

c) Define the term Network Utilization Efficiency. **[2]**

Q5) a) What is need of instruction compression? Give different techniques and explain the one suitable for RD. **[4]**

b) How to compute area on chip per bit PE? Give the expression and explain. **[4]**

c) Explain the term peak performance density. **[2]**

Q6) a) Draw and explain the architecture of TSFPGA. **[5]**

b) Explain with suitable diagram the time switched input register. **[5]**

Q7) a) Draw and explain basic functional unit (BFU) of MATRIX architecture. **[5]**

b) Compare MARTIX with general purpose computer. **[5]**

Q8) a) Explain Video streaming as the application of RC. **[4]**

b) Explain Multicontext FPGA as platform for Rc. **[4]**

c) Brief on the term partial reconfigurability. **[2]**

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Total No. of Questions : 8]

SEAT No. :

P4589

[Total No. of Pages : 2

[5355]-165

ME-(E&T/C-VLSI & Embedded Systems)

ANALOG CMOS DESIGN

(2013 Pattern) (Semester - II) (504207)

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

Instructions:

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

Q1) a) Derive the expressions for voltage gain and output resistance of any one type of CMOS inverter. **[5]**

b) What are the merits of cascode amplifier? Explore each with justification. **[5]**

Q2) a) Design single stage amplifier for voltage gain of 20. Calculate output resistance. **[5]**

b) Why is MOSFET as active resistor preferred than passive resistor? With the help of ckt, explain the concept of active resistor with expressions. **[5]**

Q3) a) Carry out dc analysis of differential amplifier in detail. **[4]**

b) What is the purpose of output amplifier in CMOS opamp? Explain with suitable schematic. **[4]**

c) Explain the concept used in high speed opamp. **[2]**

Q4) a) Explain cascode current source in detail. Give the expressions for range of output voltage & output resistance. **[4]**

b) what is the concept of V_{ON}? With ckt diagram, explain current mirror in detail. **[4]**

c) What is weak inversion? What is its utility? **[2]**

P.T.O.

Q5) a) Give the typical detail specifications of ADC. Explain any one type of ADC in brief. **[4]**

b) With an example of single stage amplifier, explain open Ckt time constant bandwidth estimation technique in detail. **[4]**

c) List the merits & demerits of open Ckt time constant bandwidth estimation technique. **[2]**

Q6) a) Explain the concept of zeros as bandwidth enhancers. Give suitable example. **[4]**

b) Explain single stage tuned amplifier. What is effect of signal frequency on its input impedance? What is solution? **[4]**

c) How does darlington pair connection improve bandwidth? **[2]**

Q7) a) With the help of schematics, explain various LNA topologies for power match versus noise match. **[4]**

b) Explain single ended LNA in detail. What are the limitations? **[4]**

c) Write note on advanced trends in RF chip design. **[2]**

Q8) a) What is multiplier based mixer? Explain in brief. **[4]**

b) Explore power constrained noise optimization **[4]**

c) List the characteristics of LNA. **[2]**

Total No. of Questions : 8]

SEAT No :

P 4590

[Total No. of Pages : 2

[5355]-166

M.E. (E & Tc) (VLSI and Embedded Systems)

SYSTEM ON CHIP DESIGN

(2013 Pattern) (Semester - II) (504208)

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

Instructions to candidates:

1) ***Answer any Five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of electronic pocket calculators is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Explain different types of optimization technique used for converting SDF graph into hardware. **[4]**

b) Explain with example horizontal and vertical microprogramming. **[4]**

c) Differentiate Concurrency Vs Parallelism. **[2]**

Q2) a) Explain with an example cooperative multithreading. **[4]**

b) How controller FSM different from a datapath FSM? **[4]**

c) Which four design principles are relevant to an SoC architecture design? **[2]**

Q3) a) Which problems of FSMs are very effectively addressed by microprogrammed controller? **[4]**

b) Explain data hazard with an example **[4]**

c) What are different categories of on chip bus? Explain their significance. **[2]**

Q4) a) What are different mechanisms used for improving bus transfer? Explain one with an example. **[4]**

b) Explain endianess byte-ordering problem with and example. **[4]**

c) Which components are commonly found in a control shell? **[2]**

P.T.O.

Q5) a) Explain the most common reasons for Simulation-Synthesis. **[4]**

b) Explain factors on which the transition time seen at the input of the gate is dependent. **[4]**

c) What are limitations of derating and where it is applied? **[2]**

Q6) a) Explain limitations of STA. **[4]**

b) How synchronizers are overcoming metastability problem? Explain with an example. **[4]**

c) Explain simulation implication on synthesis. **[2]**

Q7) a) Explain the term slack time. Where it is used? **[4]**

b) What are features of multilayered quality-aware memory controller? **[4]**

c) Draw and explain RTL to GDSII design flow. **[2]**

Q8) a) What are differentiate multilevel routing frameworks available? State its advantages and disadvantages. **[4]**

b) Explain with example bus-driven floorplanning. **[4]**

c) What are major steps involved in placement. Explain any one with example. **[2]**

Total No. of Questions :8]

SEAT No. :

P4591

[Total No. of Pages : 2

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

EMBEDDED SIGNAL PROCESSORS

(2013 Credit Pattern) (Semester - II) (504209)

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

Instructions to the candidates:

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

Q1) a) Define Causal system. Comment on causality of LTIDT system. **[4]**

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

c) Discuss Moving Average filters. **[3]**

Q2) a) Discuss Structures and Characteristics of IIR Filters. **[4]**

b) Explain Realization of FIR Filters. **[3]**

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

Q3) a) Discuss applications of Notch filters. **[4]**

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

c) Write a short note on FFT. **[3]**

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

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

c) Explain Design of FIR filters. **[3]**

P.T.O.

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

b) Justify the necessity of MAC and Barrel shifter in DSP processor. **[3]**

c) Compare and contrast fixed and floating point processors. **[3]**

Q6) a) Explain silent features of TMS 320C6713 digital signal processor. Also draw the functional diagram of the same. **[4]**

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

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

Q7) a) Explain the in detail hardware MAC unit for DSP. **[4]**

b) Explain IIR filter design methodology. **[3]**

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

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

b) Discuss DTMF application in brief. **[3]**

c) Explain Practical DSP Applications Audio Coding and Audio Effects. **[3]**

Total No. of Questions : 8]

SEAT No. : ____

P4592

[Total No. of Pages : 2

[5355]-168

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

FAULT TOLERANT SYSTEMS

(2013 Course) (Semester-III) (604201)

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

Instructions to the candidates:

1) ***Attempt any five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume suitable data if necessary.***

Q1) a) Write short notes on : External & internal models. **[4]**

b) What is statistical fault analysis? **[6]**

Q2) a) Describe the various trade-offs which need to be considered for DFT. **[6]**

b) Discuss the concept of hardcore. **[4]**

Q3) a) Explain the significance of an intersection operator with its table. **[5]**

b) Construct a binary decision diagram for $f = \bar{a}bc + a\bar{b}c + abc$ considering "a" as root node. **[5]**

Q4) a) Explain the following concepts with respect to the design for testability (DFT) technique : **[6]**

i) Monostable multivibrators.

ii) Oscillators & clocks.

b) Write a short note on fault sampling. **[4]**

Q5) a) List and explain various levels of modeling. **[3]**

b) Draw and explain state diagram of TAP controller. **[7]**

P.T.O.

Q6) a) With the help of suitable schematic explain the simulation process. **[5]**

b) Find the test vector to detect stuck-at-0 fault at the output of G2 gate in following figure. (Figure 1). **[5]**

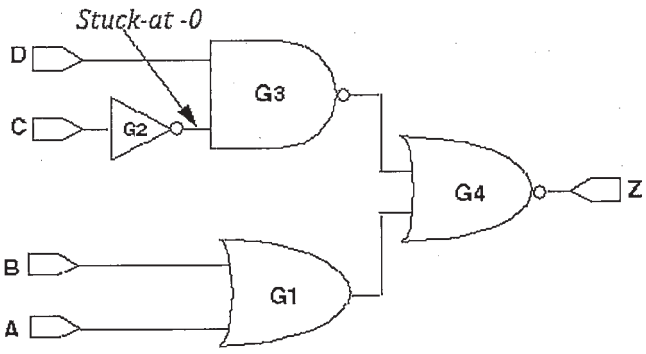

Figure 1

Q7) a) Define the following terms : **[4]**

i) Explicit fault model.

ii) Implicit fault model.

b) With the help of neat diagram explain the working of IEEE 1149.1 test bus circuitry. **[6]**

Q8) a) Write a short note on redundant circuit. **[5]**

b) Describe the following terms : **[5]**

i) Input inertial delay model.

ii) Output inertial delay model.

Total No. of Questions :8]

SEAT No. :

P4593

[Total No. of Pages :2

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M.E. (E & Tc) (VLSI and Embedded Systems)

ASIC DESIGN

(2013 Pattern) (Semester - III) (604202)

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

Instructions to the candidates:

1) ***Answer any Five questions.***
2) ***Neat diagrams must be drawn whenever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of electronic pocket calculators is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Explain the different steps in ASIC design flow. **[4]**

b) Explain in detail the gate array based ASIC. **[3]**

c) Discuss the economics of using ASICs in a product and compare the types of ASICs. **[3]**

Q2) a) What is delta delay in VHDL? Explain its significance. **[4]**

b) Write a VHDI code for a sequence detector, which detects the sequence '1101'. **[4]**

c) Explain the constructive partitioning algorithm. **[2]**

Q3) a) Explain global process variation with respect to mixed signal analog and digital design by giving an example. **[4]**

b) How does boundary of any device affects in mixed signal ASIC, explain by giving an example. **[4]**

c) Explain the different timing parameters for Static Timing Analysis. **[2]**

P.T.O.

Q4) a) Explain the hierarchical organization adopted in mixed signal ASIC. **[4]**

b) What are the different testing approaches for mixed signal Analog and Digital circuits? **[3]**

c) Explain signal integrity effects in ASIC design. **[3]**

Q5) a) Explain the constructive partitioning algorithm. **[3]**

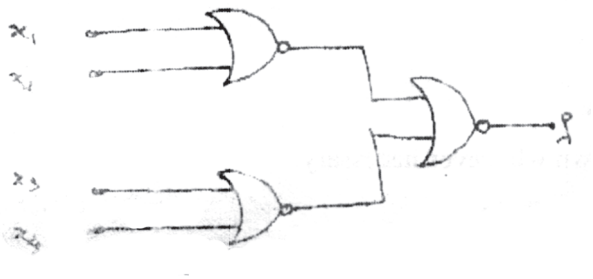
b) What are the factors contributes to best floor planning? Explain in detail. **[4]**

c) What is parameter extraction pertaining to ASIC design? **[3]**

Q6) a) What are the approaches to global routing? Explain in detail one algorithm to find shortest path. **[4]**

b) Differentiate pre layout and post layout simulation with respect to ASIC. **[3]**

c) Classify fault Model. Find the Test Set for the Circuit Shown in Fig.1. to find the maximum fault coverage. **[3]**



Q7) a) Explain in detail about ATPG algorithm using test vectors with neat diagram. **[5]**

b) Explain the ASIC verification and its issues. Write the features of any four EDA tools. **[5]**

Q8) a) Briefly describe about Boundary Scan Test with suitable example. **[5]**

b) Write short notes on (any two): **[5]**

i) Design Rule Check

ii) Fault Simulation

iii) Controllability and Observability.

♦ ♦ ♦

Total No. of Questions :9]

SEAT No. :

P4472

[Total No. of Pages : 1

[5355] - 17

M.E. (Civil - Environmental Engineering)

SOLID WASTE & HAZARDOUS WASTE MANAGEMENT

(2013 Course) (Semester-II)

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

Instructions to the candidates:

1) ***Answer any 5 questions.***
2) ***Each question carries equal marks.***
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.***

Q1) Discuss the Environmental impact of mismanagement of solid waste. **[10]**

Q2) Discuss the General considerations for waste storage at source. **[10]**

Q3) Discuss the Stages of sorting, sorting operations. **[10]**

Q4) Discuss typical material recovery facility for a commingled solid waste. **[10]**

Q5) Give the landfill design consideration in details. **[10]**

Q6) Discuss in details stagewise about Biomethanation. **[10]**

Q7) Discuss the Present scenario and measures to improve system SWM in India. **[10]**

Q8) Discuss about Economy and financial aspects of solid waste management. **[10]**

Q9) Discuss about Toxicology and risk assessment. **[10]**

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Total No. of Questions : 8]

SEAT No. :

P4594

[Total No. of Pages : 2

[5355]-171

M.E. (Electrical Control System)

COMPUTER TECHNIQUES IN CONTROL SYSTEMS

(2013 Course) (Semester - I)

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

Instructions to the candidates:

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

Q1) Use analytical method to investigate for extremum point

$f(x) = x_1^3+x_2^3+ x_3^3+3\ x_1^2+ 6x_2^2+ 9x_3^2$. **[9]**

Q2) Use analytical method to investigate for extremum point

$f(x) = x_1^3+x_2^3+ 2\ x_1^2+4x_2^2+ 6$. **[9]**

Q3) Explain what do you understand by Lagrange Function. **[9]**

Q4) Explain what do you understand by Multivariable Optimization with no constraint. Write necessary and sufficient condition. **[9]**

Q5) Explain the step by step procedure of revised simplex method. **[16]**

Q6) Use simplex method to solve **[16]**

Minimize $F = X_1 -3\ X_2 + 2\ X_3$

Subject to $3X_1-X_2 + 2X_3 < 7$

$-2X_1+4X_2 < 12$

$-4X_1+3X_2+8X_3< 10$

$x_1,x_2,x_3 > 0$

P.T.O.

Q7) a) Explain the Gomory's cutting plane method. **[8]**

b) Explain the integer nonlinear programming. **[8]**

Q8) Minimize $f = -3x_1 - 4x_2$. **[16]**

Subject to $3x_1 - x_2 + x_3 = 10$

$3x_1 + 11x_2 + 2x_4 = 64$

$x_i \geq 0$, i = 1 to 4 and x_i is integer

Total No. of Questions : 3]

SEAT No. :

P4595

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M.E. Electrical (Control System)

PROCESS CONTROL MANAGEMENT

(2013 Pattern) (Semester - I) (503102)

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

Instructions to the candidates:

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

Q1) Solve any three: **[18]**

a) What are formal & informal groups? Describe each with example.

b) Explain with suitable example control strategies for designing of control system.

c) Explain Zigler-Nichols closed loop method for tunning in detail.

d) Describe with appropriate diagram, liquid level control in process industry.

Q2) Solve any two: **[16]**

a) Draw a block diagram of Feedback control system & for each component write transfer function relating its output to input.

b) Explain generalized block diagram for feed forward-feedback control systems.

c) Develop a feed forward control system for Heat exchanger.

Q3) Solve any two: **[16]**

a) Define Relative Gain Array (RGA). Give its significance.

b) Explain the effect of interaction on stability of process control system.

c) Explain interaction of control loops in a stirred tank heater for temperature control with suitable diagram.

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Total No. of Questions :6]

SEAT No. :

P4596

[Total No. of Pages : 2

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M.E. (Electrical) (Control Systems)

NONLINEAR CONTROL SYSTEM

(2013 Course) (Semester - I)

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

Instructions to the candidates:

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

Q1) a) Explain, with neat diagram the peculiar characteristics observed in nonlinear control system. **[4]**

i) Jump resonance

ii) Amplitude frequency dependance

iii) Limit cycle

iv) Sub harmonics oscillations

b) Explain describing function of relay with hysteresis. **[5]**

c) Explain phase plane trajectory method. **[4]**

d) By Liapunov's direct method, elaborate stability analysis. **[5]**

OR

Q2) a) Classify different types of singular points with their significance. **[4]**

b) Discuss following nonlinearities. **[5]**

i) Relay with Dead zone

ii) Relay with Hysteresis

iii) Saturation

iv) Back lash

v) Ideal Relay

P.T.O.

c) Explain describing function of Relay. **[4]**

i) Ideal Relay

ii) Relay with dead zone

d) Given scalar function

$$v(x) = 2x_1^2 + x_2^2 + 3x_3^2 - x_1x_2 + x_2x_3 + 2x_3x_1$$

Express in Quadratic form and comment on definiteness. **[5]**

Q3) a) Consider a nonlinear system described by **[8]**

$$\dot{x}_1 = -x_1 + x_2$$

$$\dot{x}_2 = 2x_2 + x_1^2$$

Generate a Liapunov function v(x) and comment on definiteness of the function and stability of equilibrium state.

b) Derive $A^TP + PA = -Q$ for autonomous state equation. Where P and Q are real, symmetric and positive definite matrices. **[8]**

OR

Q4) a) Explain krasovskii method for determination of Liapunov function. **[8]**

b) Explain Liapunov direct method for stability analysis. **[8]**

Q5) a) Explain concept of sliding mode control. **[8]**

b) Elaborate Input output Linearization. **[8]**

OR

Q6) For a Given system **[16]**

$$\dot{x}_1 = x_1^2 + x_2 - 2$$

$$\dot{x}_2 = x_1 + x_2$$

Explain clearly Input - Output linearization and Input state linearization.

Total No. of Questions :6]

SEAT No. : ____

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M. E. (Electrical)

Control Systems/Power Electronics and Drives/Power Systems

RESEARCH METHODOLOGY

(2013 Pattern) (Semester - I)

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

Instructions to the candidates:

1) ***Figures to the right indicate full marks.***
2) ***Assume suitable data if necessary.***

Q1) a) Explain clearly with examples the difference between quantitative and qualitative research. **[4]**

b) What are the steps in formulation of a research problem? **[6]**

c) Explain the need of research design. **[4]**

d) Explain briefly the statistical methods used for analysis of research data **[4]**

i) Measures of Central tendency

ii) Measures of dispersion

OR

Q2) a) Explain clearly with examples the difference between applied and fundamental research. **[4]**

b) Explain the significance of literature survey in doing research. **[4]**

c) What is 'Sample Design'? What points should be taken into consideration by a researcher in developing a sample design for his research project. **[4]**

d) Explain the following processing operations in context of data collection and analysis. **[6]**

i) Editing

ii) Coding

iii) Classification.

P.T.O.

Q3) a) What are the different tools used for making oral presentation effective? **[8]**

b) What are the standard contents of thesis? **[8]**

OR

Q4) a) Explain the benefits of Latex in preparing a technical document. **[8]**

b) Explain the supplementary parts of a technical report. Also state the significance of bibliography. **[8]**

Q5) a) Explain different steps involved in preparation of a research proposal. **[10]**

b) What is plagiarism? Discuss the various forms in which research misconduct takes place. **[6]**

OR

Q6) a) Explain the different parts of a technical paper and compare between. **[8]**

i) Journal paper

ii) Conference paper

b) Write a brief note on intellectual property rights. **[8]**

Total No. of Questions : 6]

SEAT No :

P 4598

[Total No. of Pages : 2

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M.E. (Electrical) Control systems

MULTIVARIABLE AND OPTIMAL CONTROL SYSTEMS

(2013 Credit Pattern) (Semester - II)

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

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4 or Q.5 or Q,6.***
2) ***Assume suitable data if necessary.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***figures to the right indicate full marks.***
5) ***Your annswers will be valued as a whole.***

Q1) a) Outline the procedure for obtaining the optimal control law for infinite time state regulator problem. **[4]**

b) Discuss briefly model matching control. **[4]**

c) State advantages and disadvantages of representing the multivariable control system into i) Differential Operator form and ii) Transfer Matrix form. **[5]**

d) Discuss the concept of controllability and explain the conditions for full state controllability of multivariable control system. **[5]**

OR

Q2) a) State the merits and demerits of optimal control. **[4]**

b) Discuss briefly Decoupling or non-interactive control. **[5]**

c) What is an observer? Explain with neat block diagram the nature of the state estimation problem using an observer. **[4]**

d) Explain the concept of reproducibility of MOCS. **[5]**

Q3) a) Describe the procedure for solving optimal control problem using Pontryagin's minimum principle. **[8]**

P.T.O.

b) Find the optimal control u for the system $\dot{\chi} = u; x(0) = 1$ which minimizes

$J = ½x^2(4) + ½\int_0^4 u^2\,dt.$ **[8]**

OR

Q4) a) Write down the relation between the Pontryagin's minimum principle and dynamic programming. **[8]**

b) Explain the Pontryagin's minimum principle. **[8]**

OR

Q5) a) Explain the bang-bang control strategy and state the merits of bang-bang controller. **[8]**

b) Consider the system $\dot{x}_1 = \dot{x}_2 + u_1$ and $\dot{x}_2 = u_2$. Find the optimal control u for $J = ½\int_0^4 (u^2_1 + u^2_2)\,dt.$

given that $x_1(0) = x_2(0) = 1,\ x_1(4) = 0.$ **[8]**

OR

Q6) a) Draw the block diagram showing the structure of Feedback time-optimal (minimum time) control system and explain with an example the minimum time-optimal control problem. **[8]**

b) Discuss briefly singular control problem. **[8]**

Total No. of Questions : 8]

SEAT No. :

P4599

[Total No. of Pages : 2

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M.E.(Electrical) (Control System)

SYSTEM IDENTIFICATION AND ADAPTIVE CONTROL

(2013 Pattern) (503108)

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

Instructions to candidates:

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

Q1) a) What do you understand by system identification. With the help of a neat diagram explain the procedure for system identification. **[4]**

b) Compute the QR factorization of the matrix. **[6]**

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

OR

Q2) a) Explain Correlation analysis and Spectral analysis techniques of system identification. **[5]**

b) Discuss the various model structures used for system identification. **[5]**

Q3) Write notes on any four **[8]**

a) Instrument Variable Method.
b) Bayesian Learning.
c) Recursive Estimation.
d) Supervised Learning.
e) Pattern Recognition.
f) Bootstrapping Technique.

Q4) a) What are the various adaptive schemes and how are they implemented? **[8]**

b) Discuss the Diophantine equation with reference to the regulator design and explain how the pole placement design technique is implemented. **[8]**

OR

P.T.O.

Q5) a) Prove the Matrix Inversion Lemma : **[4]**

$$[A+BCD]^{-1}=A^{-1}-A^{-1}B[C^{-1}+DA^{-1}B]^{-1}DA^{-1}$$

b) With the help of a real world example discuss how a particular adaptive scheme has been incorporated to improve performance. **[8]**

c) What is the need for adaptive control? How should one choose a suitable adaptive scheme. **[4]**

Q6) An integrator given by G(s) $=\frac{b}{s}$ is to be controlled by continuous time controller given by $u(t)=-\theta_1 y(t)+\theta_2 u_c(t)$ The desired response model is given by $\frac{dy_m}{dx}=-a_m y_m+b_m u_c$. Derive using both MIT rule and Lyapunov theory, the parameter update law for an MRAS such that the error e goes to zero. Assume V $(\theta)=\frac{1}{2}\left[e^2+\frac{1}{b\gamma}(b\theta_1-a_m)^2+\frac{1}{b\gamma}(b\theta_2-b_m)^2\right]$ Draw the block diagram of the both the systems. **[16]**

OR

Q7) a) Derive the MIT rule and explain the sign-sign algorithm. **[4]**

b) Consider a position servo described by $\frac{dv}{dt}=-av+bu$ *and* $\frac{dy}{dt}=v$; where a and b are unknown. Assume the control law $u=\theta_1(u_c-y)-\theta_2 v$ is used and that it is desired to control the system in such a way that the transfer function from command signal to process output is given by $G_m(s)=\frac{\omega^2}{s^2+2\xi\omega s+\omega^2}$. Determine an adaptive control law that adjusts the parameters so that the desired objective is obtained. **[12]**

Total No. of Questions :3]

SEAT No. :

P4600

[Total No. of Pages :2

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M.E. (Electrical)(Control System)

ADVANCED DIGITAL CONTROL TECHNIQUES

(2013 Course) (Semester-II) (503109)

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

Instructions to the candidates:

1) ***Answer all questions.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagram must be drawn whenever necessary.***
4) ***Assume Suiable if necessary.***

Q1) Solve any three. **[18]**

a) Explain the concept of 'warping' and 'pre-warping' in detail.

b) Describe digital simulation with numerical integration.

c) Explain the concept of digital re-design in detail.

d) Write a short note on 'design by separation principles'.

e) For the system with pulse transfer function,

$$G(z) = \frac{(Z+1)}{(Z^2 + 1.3Z + 0.4)};$$

Draw state diagram and obtain state model by parallel digital programming method.

Q2) Solve any two. **[16]**

a) Explain finite word length effect in digital filters.

b) What is multirate DSP? Explain the concept of decimation and interpolation.

c) Draw and explain block diagram of an adoptive filter as a noise canceller.

d) What are the key features of TMS 320C5X?

P.T.O.

Q3) Solve any two. **[16]**

a) Draw and explain memory architecture of TMS 320C54X processor.

b) What is Discrete Wavelet Transform? Explain in detail.

c) What are the advantages of TMS 320C54X?

d) Explain instruction set of TMS 320C54X DSP.

* * *

Total No. of Questions :6]

SEAT No. :

P4601

[Total No. of Pages : 2

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M.E. (Electrical) (Control System)

ADVANCED DRIVES AND CONTROL

(2013 Credit Pattern) (Semester - III) (603101)

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

Instructions to the candidates:

1) *Attempt Q 1, or Q2, Q3 or Q4, Q5 or Q6.*
2) *Figures to the right indicate full marks.*

Q1) a) Why choppers are preferred for speed control of DC motors? State the applications. **[4]**

b) Write a note on Pulse Width Modulated inverter fed induction motor drive. **[4]**

c) Explain the effect of space harmonics and time harmonics present in the current on the performance of a three phase inverter fed induction motor. **[5]**

d) Write a note on " Matching of Power Electronics Controller and electric motor to drive its load" **[5]**

OR

Q2) a) Explain in details thermal consideration of the given rating of the motor. **[4]**

b) Explain vector control of three phase induction motor **[4]**

c) Explain static krammer control of drive using induction motor **[5]**

d) With neat diagram, explain system model and derive the transfer function of the converter fed D.C. motor **[5]**

Q3) Explain the following in detail:

a) Switched Reluctance Motor. **[8]**

b) Sinusoidal SPM drive. **[8]**

OR

P.T.O.

Q4) Write a note on

a) Trapezoidal SPM drive. **[8]**

b) Permanent magnet synchronous motor and its solid state controller. **[8]**

Q5) a) Write a note on modern trends in electric drives control. **[8]**

b) Explain the working principle of Phase locked loop (PLL) system and discuss the application of PLL in the closed loop controlled drives. **[8]**

OR

Q6) a) Explain the effect of RMS voltage variation on the behavior of the electric drive. **[8]**

b) Explain phase locked loop in closed loop control of electric drive. **[8]**

Total No. of Questions :6]

SEAT No. :

P4602

[Total No. of Pages :2

[5355] - 179

M.E. (Electrical - Control System)

COMPUTER AIDED CONTROL SYSTEM DESIGN

(2013 Course) (Semester - III) (603102)

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

Instructions to the candidates:

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

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

b) Derive the transfer function of the following compensator networks and draw the corresponding Bode diagrams. **[6]**
Phase – lead network

c) Explain the importance of computer as an aid in the analysis and design of control system. **[6]**

OR

Q2) a) Explain the computer method for obtaining the solution of state and output equations of a closed – loop control system represented by **[8]**

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

with usual notation. Give its algorithm.

b) Draw the block diagram of observer system and explain with the designing steps of full order observe. **[4]**

c) Explain clearly terms 'Absolute stability' and 'Relative stability'. Explain the measures of relative stability using polar plot and bode diagrams.**[6]**

P.T.O.

Q3) a) Explain with diagram the working of P,PI and PID controller. **[8]**

b) Explain step by step the design procedure of tuneable PID controller using Ziegler – Nicol's method. Give its algorithm. **[8]**

OR

Q4) a) Explain with algorithm the computer method of design of PID controller using Ziegler-Nichols method.State the limitations of this method. **[8]**

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

$$Gp(s) = \frac{30}{S^3 + 11s^2 + 36s + 36}$$

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

Q5) a) Draw the block diagram of a typical digital control system and explain clearly the working of each block. What is the effect of sampling period 'T' on the stability of the system? **[8]**

b) Consider the system **[8]**

$x(k + 1) = Gx(k) + Hx(k)$, where $G = \begin{bmatrix} 0 & 1 \\ -0.16 & -1 \end{bmatrix}, H = \begin{bmatrix} 0 \\ 1 \end{bmatrix}$

Determine a suitable state feedback gain matrix K such that the system will have the closed loop poles at z = 0.5 + j0.5, z = 0.5 - j0.5

OR

Q6) a) Discuss the advantages of digital controller over continuous time controller, also explain the problems in implementing digital control system. **[8]**

b) A discrete time control system is represented by the differential equation $x(k+1) = Fx(k) + Gu(k)$. Where k is the sampling instant, $x(k)$ is n x 1 state vector. u(k) is mx1 control vector. F and G are constant matrices of compatible dimensions. Explain the computer method for obtaining closed loop system response. Draw flow chart and give its algorithm.**[8]**

Total No. of Questions :8]

SEAT No. :

P4473

[Total No. of Pages :2

[5355] - 18

M.E.(Civil)(Environmental Engineering)

ENVIRONMENTAL SANITATION

(2013 Course)(Semester- III)

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

Instructions to the candidates:

1) ***Answer any 5 questions.***
2) ***Each question carries equal marks.***
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.***

Q1) Discuss the following in details. **[5+5=10]**

a) Methods of communication.

b) Control of Communicable diseases.

Q2) Explain in details about how plague control methods are effective in prevention of plague? **[10]**

Q3) Discuss the industrial sanitation system along with study factors and advantages with suitable example. **[10]**

Q4) Explain in details about the industrial hygiene. What is industrial plant sanitation?

[10]

Q5) Discuss with suitable example about rural sanitation and effects of improper sanitation. **[10]**

P.T.O.

Q6) Explain in details about emergency sanitation practices. **[10]**

Q7) Discuss the following terms in details. **[5+5=10]**

a) Water connection in building.

b) Flushing storage tank.

Q8) Discuss with labeled sketch of following. **[5+5=10]**

a) Gully Traps.

b) One pipe system.

* * *

Total No. of Questions : 5]

SEAT No. :

P4603

[Total No. of Pages : 1

[5355]-181

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

MODELING AND ANALYSIS OF ELECTRICAL MACHINES

(2013 Pattern) (Semester - I)

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

Instructions to the candidates:

1) ***Attempt all questions.***
2) ***Figures to the right side indicate full marks.***

Q1) a) Discuss and derive the transformations for currents between a rotating balanced 3-phase winding and rotating 2-phase winding. **[9]**

b) Discuss the primitive machine model of dc machine and derive voltage equations. **[9]**

OR

Q2) a) Explain basic two-pole machine and how different machines like dc machine and induction machine can be explained as kron's machine model? **[9]**

b) Discuss the mathematical of three-phase induction motor and synchronously rotating reference frame. Use space phasor diagram to explain the model. **[9]**

Q3) a) Obtain an expression for instantaneous torque in a 3-phase, 4-salient pole synchronous machine fitted with amortisseurs. **[8]**

b) From the physical concepts, describe how the transformation may used to represent a three phase sunchronous machine by a primitive commutator machine. **[8]**

OR

Q4) a) Discuss the theory on armature mutual inductance of salient pole synchronous machine from a consideration of its basic parameters. **[7]**

b) Derive the Linearised model of Induction machine. **[9]**

Q5) a) Discuss small displacement stability and Eigen values. **[8]**

b) Derive the Linearised model of Synchronous machine. **[8]**

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Total No. of Questions : 6]

SEAT No. : ____

P4604

[Total No. of Pages : 1

[5355]-182

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

Energy Management and Power Quality in Electrical Drives

(2013 Course) (Semester - I) (503302)

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

Instructions to the candidates:

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

Q1) a) What are the various effects of the power quality disturbances? **[9]**

b) Write note on optimal selection of Pumps and Fans. **[9]**

OR

Q2) a) Discuss in detail various sources of harmonics. **[9]**

b) Discuss various losses in the capacitors and maintenance of capacitors. **[9]**

Q3) a) Discuss in detail different voltage variation indices. **[8]**

b) What is power quality state estimations? Elaborate the same. **[8]**

OR

Q4) a) Discuss various causes of voltage flicker? **[8]**

b) Explain in detail various voltage regulation devices. **[8]**

Q5) a) Explain objectives and consideration of power quality monitoring. **[8]**

b) Enlist the different power quality monitoring standards and explain them. **[8]**

OR

Q6) a) Explain the application of intelligent system in power quality monitoring. **[8]**

b) Write detail note on Power quality measuring equipment. **[8]**

Total No. of Questions : 6]

SEAT No :

P 4605

[Total No. of Pages : 2

[5355]-183

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

POWER CONVERTERS

(2013 Course) (Semester - I) (503303)

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

Instructions to the candidates:

1) ***Attempt Q1 or Q2 or Q3 or Q4, Q5 or Q6.***
2) ***Figures to the right indicate full marks.***
3) ***Use of electronic calculator is allowed.***
4) ***Assume suitable data, if necessary.***

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

b) Explain Single pulse width modulation and Sinusoidal pulse width modulation technique. **[8]**

OR

Q2) a) Explain six step voltage source inverter (120 deg mode) with necessary waveforms and derive line- line output voltage equation using fourier series. **[10]**

b) Explain the Boost Converter with necessary wave forms. **[8]**

Q3) a) With a neat diagram explain the working of parallel loaded resonant half bridge dc-dc converter. **[8]**

b) What are the advantages and limitations of ZCS converter. **[8]**

OR

Q4) a) Write a short note on classification of Resonant converters. **[8]**

b) Give advantages and disadvantages of ZVS resonant converters. **[8]**

P.T.O.

Q5) a) With a neat diagram explain working of a single phase full wave controller using two thyristors connected in anti-parallel supplying a resistive load. Derive the expression for average output voltage. **[8]**

b) A 230 V 1kW electric heater is fed through AC voltage controller from 230V,50Hz Ac supply. Find the load power for a firing angle delay of 70 degrees. **[8]**

OR

Q6) a) A single phase ac voltage regulator with RL load has following details supply voltage=230 V 50Hz R=4 ohms and ωL=3 ohms.

Calculate control range of firing angle, Maximum value of RMS load current Maximum power. **[8]**

b) Explain three phase AC voltage controller with necessary circuit diagram and waveforms. **[8]**

Total No. of Questions : 6]

SEAT No :

P 4606

[Total No. of Pages : 2

[5355]-185

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

AC & DC DRIVES

(2013 Pattern) (Semester-II)

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

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6.***
2) ***Assume suitable data, if necessary.***
3) ***Neat diagram must be drawn wherever necessary.***

Q1) a) Explain principle of field oriented control of induction motor. Compare DC motor control analogy with vector controlled induction motor. **[5]**

b) Explain regenerative braking of DC motor. Justify your explanation using torque speed curves. What is maximum braking speed? **[4]**

c) With necessary diagram explain four quadrant operation of converter fed DC motor for non circulating current modes of operation. State demerits of this mode of operation. **[5]**

d) With the complete implementation block diagram explain static Kramer drive system. **[4]**

OR

Q2) a) Explain the principle of vector control and its implementation for rotor flux oriented control. Justify your explanation with necessary phasor diagram and block diagrams. **[5]**

b) Explain first quadrant operation of DC chopper fed series motor drives. Write all the expressions to justify the operation of the drive. **[4]**

c) Draw a schematic diagram of slip power recovery scheme for 3 phase induction motor. Explain its working. Also develop equivalent circuit for this scheme. **[5]**

d) Explain speed control of DC separately excited motor fed by 3 phase full converter. **[4]**

P.T.O.

Discuss:

i) The output waveforms.

ii) Firing logic for power devices.

iii) Equation for converter output.

Q3) a) Explain the construction and operation of variable reluctance motor. Also discuss the control circuit and motor performance characteristics. **[8]**

b) What is the basic constructional difference between brushed and brushless DC motor. Explain how the unidirectional torque is procduced in brushless DC motor. **[8]**

OR

Q4) a) What is multistack stepper motor. Discuss its performance characteristics. **[8]**

b) Explain the modes of operation and speed control of switched reluctance drive. State the advantages of switched reluctance motor drive over other AC motor drives. **[8]**

Q5) a) Write the dynamic model of three phase Induction motor in different reference frames. **[8]**

b) Write the dynamic model of DC separately excited motor and derive the transfer function for armature controlled separately excited DC motor. **[8]**

OR

Q6) a) From the modeling equation of DC motor, draw the closed loop system with reference input is armature voltage and speed is controlled output. Explain the closed loop control. **[8]**

b) Derive the transfer function of field controlled separately excited DC motor. Hence draw the control system diagram, mentioning transfer function of each block. **[8]**

Total No. of Questions : 8]

SEAT No :

P 4607

[Total No. of Pages : 2

[5355]-186

M.E. Electrical (Power Electronics and Drives)

DESIGN OF POWER ELECTRONIC SYSTEMS

(2013 Pattern) (Semester-II) (503308)

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

Instructions to the candidates:

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

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

OR

Q2) Explain with energy flow equation the different ways of heat transfers that are considered when dsigning a heat sink and explain the process of selection of a proper heat sink for a device. **[9]**

Q3) a) Discuss important factors in selecting a heat sink. **[5]**

b) For the Boost converter, the duty ratio is adjusted to regulate the output voltage to 48V. The input dc voltage varies from 10 to 30V. The converter is switched at 40 kHz. The maximum output power is rated at 100W. The converter is operated in CCM, find;

i) The minimum value of inductor L and

ii) Value of filter C for a voltage ripple of 1% or less at this value of L. **[4]**

Q4) Explain design procedure of inductor with flow chart. **[9]**

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

OR

P.T.O.

Q6) a) Explain how dynamic models are obtained using circuit modeling. **[8]**

b) Write a short note on modeling of a Boost converter. **[8]**

Q7) a) Explain the need for snubbers with transistors and explain the Turn-off snubber in detail. **[8]**

b) Give a step by step design procedure for dc-coupled drive circuits with unipolar output. **[8]**

OR

Q8) a) For step down converter circuit, the dc input voltage V_d=500V, the load current I_o = 500A, and the switching frequency is 1kHz. The freewheeling diode has a reverse recovery time t_{rr}=10 μs. The GTO has a current fall time t_{fl}= 1 μs, a maximum applied voltage rate dv/dt=50 V/μs, and a maximum controllable anode current I_{AM}=1000A.

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

ii) Estimate the power dissipated in the snubber resistance. **[8]**

b) Why isolation is required? What are different isolation circuits? Explain any one isolation circuit in detail required for power device. **[8]**

Total No. of Questions : 6]

SEAT No. : ____

P4608

[Total No. of Pages : 2

[5355] - 187

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

ADVANCED CONTROL SYSTEMS

(2013 Pattern) (Semester - II)

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

Instructions to the candidates:

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

Q1) a) What are the different methods to find the gain matrix 'K' by the pole placement method? Explain any one method in detail. **[5]**

b) Consider a plant described by **[4]**

$$\begin{bmatrix}\dot{x}_1\\ \dot{x}_2\end{bmatrix}=\begin{bmatrix}0 & 1\\ 0 & 0\end{bmatrix}\begin{bmatrix}x_1\\ x_2\end{bmatrix}+\begin{bmatrix}0\\ 1\end{bmatrix}u$$

and has a performance index

$J=\int_0^\infty (x^TQx+u^TRu)dt$ Where $Q=\begin{bmatrix}2 & 0\\ 0 & 1\end{bmatrix}$ and R =[2]

Determine the optimal feedback gain matrix k.

c) Explain the concept of robust control. Also define small gain theorem.**[5]**

d) Explain the concept of stability in the sense of Lyapunov. Also explain the concept of asymptotic stability in the large. **[4]**

OR

Q2) a) Explain with diagram Luenberger observer. Write the necessary equations and the condition for selection of the observer poles. **[5]**

b) Explain the minimum time and the minimum energy problem in the context of optimal control. **[4]**

P.T.O.

c) Explain all signal and system norms. **[5]**

d) Find all equilibrium points for each of the following systems. **[4]**

i) $\dot{x}_1 = -x_1 + x_2 \qquad \dot{x}_2 = 0.1x_1 - 4x_2 - x_1^2 - 0.1x_1^3$

ii) $\dot{x}_1 = -x_1 + x_2(1 + x_1) \qquad \dot{x}_2 = -3x_1(1 - x_1)$

Q3) a) Explain the concept of variable structure control with an example. **[8]**

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

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

OR

Q4) a) What are the salient features of sliding mode control? Explain the reaching and the sliding phase. In which phae the system is invariant to disturbances and uncertainties? **[8]**

b) Show how matched disturbance rejection is achieved using sliding mode control. **[8]**

Q5) a) Find the transfer function of boost converter. **[8]**

b) List all power quality devices. Explain any two in detail. **[8]**

OR

Q6) a) Find the transfer function of buck converter. **[8]**

b) With diagram explain distribution generation in detail. **[8]**

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Total No. of Questions :6]

SEAT No. :

P4609

[Total No. of Pages : 2

[5355] - 188

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

POWER ELECTRONICS APPLICATIONS

(2013 Pattern) (Semester-III)

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

Instructions to the candidates:

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

Q1) a) Describe the need of power flow control in power system. **[4]**

b) Draw and explain the block diagram for integrating solar PV system with the grid. **[4]**

c) Explain the characteristic of combine operation of TCR and TSC. **[4]**

d) Explain the working of active filters and their various types. **[6]**

OR

Q2) a) Describe the application of shunt compensation in power system for damping oscillation. **[4]**

b) Explain any one method of firing angle control for convertors. **[4]**

c) Explain with a neat sketch and waveforms the TCSC type of series controller. **[4]**

d) Explain different methods for reduction of harmonics in HVDC-operation. **[6]**

Q3) a) Explain working of UPFC with the help of basic schematic diagram. **[8]**

b) State the advantages of STAT COM over SVC. **[8]**

OR

Q4) a) Draw circuit diagram of single phase STATCOM and explain its steady state control characteristic. **[8]**

b) Describe the role of series converter in UPFC. **[8]**

P.T.O.

Q5) Describe following power electronics applications using various possible techniques. **[16]**

a) Induction heating

b) Electric welding

c) Fluorescent lighting

d) Hybrid Vehicle System

OR

Q6) a) Explain its working uninterrupted power supplies with the help of block diagram. **[8]**

b) Describe application of power electronics in locomotives. **[8]**

Total No. of Questions :8]

SEAT No. :

P4610

[Total No. of Pages :2

[5355] - 189

M.E. (Electrical) (P.E.D.)

POWER ELECTRONICS IN SMART GRID

(2013 Course) (Semester - III) (603302)

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

Instructions to the candidates:

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

Q1) a) Write down any four attributes of smart grid. **[4]**

b) What are the general problems and solutions of power control? **[5]**

OR

Q2) a) Write down alternate views of a smart grid. **[4]**

b) Explain power quality and EMC. **[5]**

Q3) a) Explain any two high frequency applications in telecommunications. **[4]**

b) What are the problems of interconnected Grid system? **[5]**

OR

Q4) a) Explain the concept of Micro grid. **[5]**

b) How distributed resources are interconnected with a grid. **[4]**

Q5) a) Describe advanced Metering Infrastructure (AMI). **[8]**

b) Write a note on CLOUD computing. **[8]**

OR

P.T.O.

Q6) a) Write a note on Cyber security for Smart Grid. **[8]**

b) Differentiate between Home Area Network (HAN), and Wide Area Network (WAN) **[8]**

Q7) a) Explain dynamic static synchronous controllers. **[8]**

b) What do you mean by D–STATCOM? Write down its few applications. **[8]**

OR

Q8) a) Explain AC/AC electromechanical voltage regulator. **[8]**

b) Explain with a neat sketch dynamic voltage restorer. **[8]**

Total No. of Questions :8]

SEAT No. :

P4474

[Total No. of Pages :2

[5355] - 19

M.E.(Civil)(Environmental Engineering)

ENVIRONMENTAL IMPACT ASSESSMENT

(2013 Course)(Semester-III)

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

Instructions to the candidates:

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

Q1) Discuss the introduction, stages, and origin of EIA study. **[10]**

Q2) Discuss the Environmental Impact Assessment Methodology. **[10]**

Q3) Discuss the Impact prediction, assessment and mitigation measures for Noise environment. **[10]**

Q4) Discuss the Impact prediction, assessment and mitigation measures for water and soil environment. **[10]**

Q5) Discuss the prediction, assessment and mitigation measures for socioeconomic impacts due to any development activity. **[10]**

Q6) Discuss the objective of public participation in environmental decision making. **[10]**

P.T.O.

Q7) Discuss the post Environmental monitoring. **[10]**

Q8) Discuss the procedure for conducting public hearing and its role in obtaining Environmental Clearance for any development project. **[10]**

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Total No. of Questions : 3]

SEAT No. :

P4611

[Total No. of Pages : 2

[5355]-191

M.E. (Electrical) (Power Systems)

COMPUTER APPLICATIONS IN POWER SYSTEMS

(2013 Pattern) (Semester - I)

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

Instructions to the candidates:

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

Q1) Solve any three: **[18]**

a) Find the minima of $f(X) = x_1^2 + x_2^2 - 2x_1 + x_1x_2 + 1$.

b) Draw surface constraint diagram showing behaviour and side constraints. Also indicate bounded and unbounded, acceptable and unacceptable points on surface constraint.

c) Derive the equation used in three phase load flow analysis.

d) Explain Decoupled load flow method with assumptions.

Q2) Solve any two: **[16]**

a) Incremental fuel costs in rupees per MWh for plant consisting two units are $\frac{\partial F_1}{\partial P_{g1}} = 0.20P_{g1} + 40$ and $\frac{\partial F_2}{\partial P_{g2}} = 0.0P_{g2} + 30$. Generator limits are $30 \text{ MW} \leq p_{g1} \leq 175 \text{ MW}$ and $20 \text{ MW} \leq P_{g2} \leq 125 \text{ MW}$. Determine load shared by each generator and incremental cost if total load to be shared are 70 MW, 100MW and 250 MW.

b) State economical dispatch problem.

i) Unconstrained without loss

ii) Constrained without loss

iii) Unconstrained with loss

iv) Constrained with loss

c) Explain solution economic load dispatch problem using Newton-Raphson method.

P.T.O.

Q3) Solve any two: **[16]**

a) Derive general formula of fault current and fault voltage for LL type fault.

b) Derive transmission loss coefficient using sensitivity factor.

c) Derive B-coefficient formula used in economic dispatch.

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Total No. of Questions : 8]

SEAT No. : ____

P4612

[Total No. of Pages : 2

[5355]-192

M.E. (Electrical Power Systems)

POWER SECTOR ECONOMICS AND MANAGEMENT

(2013 Course) (Semester - I) (503202)

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

Instructions to the candidates:

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

Q1) Attempt any three of following : **[18]**

a) Explain role of Central Electricity Authority and Rural Electrification corporation.

b) For a power project initial investment of Rs. 15,00,000 is requried. The revenue generation from project for six years after implementation the project Rs. 3,00,000 per year for six years. Calculate life cycle cost of the project if discounting factor is 12%.

c) Explain regulatory process in India. Also explain Rate of Return Regulation for Tariff determination.

d) What are Non-Price issues? Explain with suitable examples.

e) Explain wholesale and retail competition models.

Q2) a) Discuss highlights of electricity reforms took place in UK system. **[8]**

b) Explain mechanism of settlement of market. **[8]**

OR

Q3) a) What is market clearing price? Explain factors affecting market clearing price. **[8]**

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

i) Dynamic spot prices.

ii) Locational marginal price.

P.T.O.

Q4) a) Discuss different methods used for transmission pricing. **[8]**

b) What is physical transmission rights? Does it affect operation of transmission services. **[8]**

OR

Q5) a) What is congestion in transmission systems? Discuss reasons for congessions. **[8]**

b) Explain Availability Based Tariff. **[4]**

c) Write a note on power purchase Agreement. **[4]**

Total No. of Questions : 6]

SEAT No : ____

P 4613

[Total No. of Pages :2

[5355]-193

M.E. (Electrical) Power Systems

POWER SYSTEM MODELING

(2013 Course) (503203) (Semester-I)

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

Instructions to the candidates:

1) ***Solve Total Three questions. Answer any 1 from Q.1 or Q. 2, Q. 3 or Q. 4, and Q. 5 or Q. 6 each.***
2) ***Assume suitable data if necessary.***
3) ***Write down all the assumptions made.***

1) ***Given $F^{abc} = [P]\, F^{dq0}$, where Park's transformation***

$$[P] = \begin{bmatrix} k_d \cos\theta & k_q \sin\theta & k_0 \\ k_d \cos\left(\theta - \frac{2\pi}{3}\right) & k_q \sin\left(\theta - \frac{2\pi}{3}\right) & k_0 \\ k_d \cos\left(\theta + \frac{2\pi}{3}\right) & k_q \sin\left(\theta + \frac{2\pi}{3}\right) & k_0 \end{bmatrix}$$

(where, $K_d = K_q = \sqrt{2/3}$ *and* $K_0 = \sqrt{1/3}$)

Q1) Derive the stator and rotor voltage equations in dq0 frame of reference for synchronous machine represented by model 2.1. Write down assumptions involve in it. **[18]**

OR

Q2) State and explain various types of transformation used in power system and then develop a mathematical model of Tap changing transformer. **[18]**

P.T.O.

Q3) Discuss the significance of exciation control system in power system. Explain with the help of suitable block diagram, or line diagram working of d.c. exciter excitation control system of alternator. **[16]**

OR

Q4) Discuss the significance of voltage regulator in power system. Explain with the help of suitable block diagram, the working of Solid state voltage regulators. **[16]**

Q5) What is the significance of load modeling in power system? Write down in details the various types of static load modeling represented in power system. Discuss about it with the help of assumptions and approximations involved in it. **[16]**

OR

Q6) With the help of appropriate transformation using α - β variables, develop the model of long transmission line. Discuss about the assumptions and approximations involved in it. **[16]**

Total No. of Questions : 7]

SEAT No :

P 4614

[Total No. of Pages : 2

[5355]-195
M.E. Electrical (Power Systems)
POWER SYSTEM DYNAMICS
(2013 Pattern) (Semester-II) (503207)

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

Instructions to the candidates:

1) ***Solve Total Four questions. Answer any Two from Q1, Q2 and Q3. Answer 1 question from Q4 or Q5, and Q6 or Q7 each.***
2) ***Assume suitable data, if necessary.***
3) ***Write down all the assumptions made.***

Q1) Explain with the help of block diagram, use of PSS in power system? **[9]**

Q2) Apply the equal area criterion method for the analysis of transient stability limits of power system for sudden increase in mechanical input. **[9]**

Q3) Draw the block diagram and write down the characteristic equation for single machine system neglecting AVR and considering field flux decay for the analysis of dynamic stability using coefficient of different power of 's' **[9]**

Q4) Calculate equivalent inertia constant for the system on a base of 100 MVA, if Power plant A and Power plant B are operating.

a) Coherently and b) non coherently

The data given for both plants are as follows.

Power plant A has 4 identical generators each rated 50 MVA and having an inertia constant of 3 MJ/MVA.

Power plant B has 2 identical generators each rated 100 MVA and each having an inertia constant of 5 MJ/MVA. **[16]**

OR

P.T.O.

Q5) Derive an expression for power flow for a system consists of 'm' machines. Also show its equivalence with the swing equation of single machine. **[16]**

Q6) Describe in brief

a) Small disturbance voltage stability.

b) Voltage stability and.

c) Voltage collapse. Also, discuss various factors affecting voltage instability and collapse. **[16]**

OR

Q7) a) Explain the concept of islanding. When it is needed to implement? How the system will behave if there is no facility of islanding? **[10]**

b) Discuss assumptions involved in transient stability analysis of multi machine system. **[06]**

Total No. of Questions : 5]

SEAT No :

P 4615

[Total No. of Pages : 2

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M.E. (Electrical) (Power Systems)

POWER SYSTEM PLANNING & RELIABILITY

(2013 Course) (Semester-II)

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

Instructions to the candidates:

1) ***Solve total three questions. Q1 is compulsory. Solve Q2 or Q3. Solve Q4 or Q5.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume suitable data, if necessary.***

Q1) Solve any three. **[18]**

a) Describe method of Extrapolation for load forecasting.

b) Explain Exponential Distribution method in details.

c) Briefly explain different reliability evaluation techniques.

d) Describe various factors affecting generation planning.

Q2) a) What do you mean by composite system reliability? Explain in detail the data required for composite system reliability. **[10]**

b) What are the objectives of transmission planning? **[6]**

OR

Q3) a) Explain the procedure and steps for transmission system planning **[10]**

b) Describe the factors affecting transmission system planning. **[6]**

P.T.O.

Q4) a) Explain the effects of lateral distribution and disconnect in distribution system. **[10]**

b) Explain interruption indices in distribution system reliability evaluation. **[6]**

OR

Q5) a) Explain the effects of protection failure and transferring loads in distribution system. **[10]**

b) Explain basic reliability evaluation techniques for parallel network. **[6]**

Total No. of Questions :5]

SEAT No. :

P4616

[Total No. of Pages : 2

[5355] - 197

M.E. (Electrical) (Power System)

HVDC AND FLEXIBLE AC TRANSMISSION

(2013 Pattern) (Semester - II) (503209)

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

Instructions to the candidates:

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

Q1) Solve any THREE : **[18]**

a) Explain operation & working principle of TCSC.

b) Explain the transient performance of UPFC.

c) Explain CIA control for HVDC link.

d) Compare HVDC and HVAC Transmission systems.

e) Explain different dc link converter topologies.

Q2) a) State & explain different configurations of Multi terminal HVDC system. **[8]**

b) What are the controls in VSC DC system implemented **[8]**

OR

Q3) a) Explain the details of HVDC system with functions of different components. **[8]**

b) Explain the importance of HVDC grounding & how it is achieved in practice? **[8]**

P.T.O.

Q4) a) Explain. 12 pulse converter operation in HVDC. **[8]**

b) Explain the principle & operation of VSC (Voltage Source Converter) of HVDC transmission. **[8]**

OR

Q5) a) Write about the different existing HVDC links and proposed links in India. **[8]**

b) Explain the HVDC protection schemes used against over voltages. **[8]**

Total No. of Questions :7]

SEAT No. :

P4617

[Total No. of Pages : 1

[5355] - 198

M.E. (Electrical) (Power System)

ADVANCED POWER SYSTEM PROTECTION

(2013 Pattern) (Semester-III)

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

Instructions to the candidates:

1) ***Solve any Four Questions.***
2) ***Answer Any Two questions from Q 1, Q2 and Q3 and Answer Any One Question from Q4 OR Q5 and Q6 OR Q7 each.***
3) ***Assume suitable data if necessary.***
4) ***Neat diagrams must be drawn wherever necessary.***
5) ***Figures to the right indicate full marks.***
6) ***Use of electronic scientific pocket calculator is allowed.***

Q1) Explain in detail Finite Impulse Response (FIR) Filter and Infinite Impulse. Response (IIR) Filter. **[9]**

Q2) Explain amplitude comparison travelling wave relay scheme; how it is useful for protection of forward fault and reverse fault in transmission line. **[9]**

Q3) Explain how injection of sub-synchronous component can protect a synchronous generator digitally. **[9]**

Q4) Bring out salient features of three stepped distance protection scheme of transmission line. **[16]**

OR

Q5) Explain importance of Relay setting and Relay co-ordination. **[16]**

Q6) Write a note on short circuit studies of Multi-Phase systems. **[16]**

OR

Q7) Describe algorithm for calculating system conditions after fault occurrence. **[16]**

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Total No. of Questions :5]

SEAT No. :

P4618

[Total No. of Pages :2

[5355] - 199

M.E. (Electrical Power Systems)

POWER QUALITY ASSESSMENT & MITIGATION

(2013 Course) (Semester - III) (603202)

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

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right indicate full marks.***
3) ***Your answers will be valued as a whole.***
4) ***Use of logarithmic tables slide rule, Mollier charts, electronic, pocket calculator and steam tables is allowed.***
5) ***Assume Suitable data. if necessary.***

Q1) Attempt any Three of following. **[18]**

a) What are symptoms of power quality? Also give characterization of power quality events.

b) For a radial system source voltage is $120 < 0^{o}$v suppling two loads having resistive impedance of 10 ohm and 6 ohm respectively. These loads are supplied through cable has impedance of $2 < 90^{o}$ ohm.

Calculate

i) Load voltage when Load 2 is switched off.

ii) Load voltage when load 2 is switched on.

iii) Voltage reduction on loads 1 due to the presence of load2.

c) Explain harmonic generation by synchronous machine and induction machines.

d) A distorted current wave form has four harmonics represented by their rms values; the fundamental component is 50A, the third harmonic component is 20 A, the fifth harmonic component is 5A and seventh harmonic component of 2A. Calculate

P.T.O.

i) rms value of distorted current waveform.

ii) Total harmonic distortion.

iii) Individual harmonic distortion due to fifth harmonic.

e) Discuss effect of fault, fault distance, fault impedance on sag characteristic and phase angle jump.

f) State different sources of voltage flicker.

Q2) a) Explain objectives of power quality monitoring. Also discuss special requirement for monitoring. **[8]**

b) Explain principles of controlling harmonics. How monitoring requirements help in controlling harmonics? **[8]**

OR

Q3) a) Explain different approaches for power quality monitoring. **[8]**

b) Can normal power quality analyser be used for recording transient events? What are the special requirements for monitoring and recording transient power quality events? **[8]**

Q4) a) Explain different indices used for assessing effect of harmonics on system components. Which indices are commonly used? Why? **[8]**

b) Explain harmonic state estimation. **[8]**

OR

Q5) a) Discuss power quality improvement techniques used for industrial application. **[8]**

b) Explain following terms associated with power quality. **[8]**

i) Active power

ii) True powerfactor

iii) Reactive power

iv) Disturtion power

♦ ♦ ♦

Total No. of Questions : 8]

SEAT No. :

P4459

[Total No. of Pages : 2

[5355]-2

M.E. (Civil Construction Management)

MANAGEMENT AND PROJECT PLANNING IN CONSTRUCTION

(2013 Pattern) (Semester - I) (501022)

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

Instructions to the candidates:

1) ***Solve any five questions out of 8.***
2) ***Each question carries 10 marks.***
3) ***Neat diagrams must be drawn whenever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Assume suitable data if necessary.***

Q1) Describe in brief, any five functions of management. **[10]**

Q2) a) Documentation is very important in a construction project because it provides a "memory" of the project. Elaborate this sentence in detail. **[6]**

b) What are the points that will be included in the Environmental Impact Assessment of a stone Crushing plant? **[4]**

Q3) a) Describe Work Breakdown Structure and its application. **[5]**

b) Write a detailed note on any one softwares which is related with Project Planning. **[5]**

Q4) a) Write the steps followed for Resource leveling. **[4]**

b) Write detailed note on Project monitoring methods. **[6]**

Q5) a) What are the methods of communications used on construction sites? Explain with the help of examples. **[6]**

b) What are the applications of MIS in construction industry? **[4]**

P.T.O.

Q6) Write detailed note on any two of the following: **[10]**

a) Standard time and various allowances.

b) Equipment performance rating.

c) Time lapse photography technique.

Q7) a) Give the list of Personal Protective Equipment and its applications of construction sites. **[5]**

b) Give the safety Programme on RMC plant. **[5]**

Q8) a) What are the points to be included while designing incentive schemes for a site engineer? **[5]**

b) Describe "Management By Objectives" with suitable examples. **[5]**

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Total No. of Questions : 8]

SEAT No. : ____

P4619

[Total No. of Pages : 3

[5355]-201

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

MATHEMATICAL METHODS IN INSTRUMENTATION

(2013 Pattern) (Semester - I)

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

Instructions to the candidates:

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

Q1) a) If $\bar{u} = (-1,1,2)$, $\bar{v} = (2,-1,2)$ then find Euclidean inner product $\langle 2\bar{u} - 3\bar{v}, 3\bar{u} + \bar{v} \rangle$. **[4]**

b) Determine basis and dimension of vectors (3, 8, –3, –5), (1, –2, 5, –3), (2, 3, 1, –4) in a vector space V = R^4. **[4]**

c) Define linear dependent and independent vectors. **[2]**

Q2) a) Obtain the Orthonormal vector from the following vectors (Use Gram-Schmidt method). $\bar{u}_1 = (1,-3)$, $\bar{u}_2 = (2,2)$. **[4]**

b) Let R^4 have a Euclidean inner product, Find the cosine of angle between the vectors $\bar{u} = (-1,2,3,4)$ and $\bar{v} = (4,1,2,1)$. **[4]**

c) Define Euclidean distance and Euclidean inner product of the vectors. **[2]**

Q3) a) Discuss the convergence of Newton Raphson method. **[5]**

b) Solve by Gauss-Seidal iteration method **[5]**

$10x_1 + x_2 + x_3 = 12,$

$2x_1 + 10x_2 + x_3 = 13,$

$x_1 + x_2 + 5x_3 = 7.$

P.T.O.

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

b) If the probability that an individual will suffers a bad reaction from injection of a given serum is 0.001, determine the probability that out of 2000 individual **[5]**

i) exactly 3

ii) more than 2, individual will suffers a bad reaction.

Q5) a) A continuous random variable X has a probability density function given by $f(x) = 2e^{-x}$, $x > 0$ and $f(x) = 0$, $x \leq 0$. Find **[5]**

i) E(X) ii) $E(X^2)$

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

i) Moments ii) Moments Generating Function.

Q6) a) A joint PDF of two continuous random variable X and Y is **[6]**

$f(x, y) = cxy$, $0 < x < 4$, $1 < y < 5$ and $f(x, y) = 0$ otherwise.

i) Find the value of constant C.

ii) Find $p[1 < x < 2, 2 < y < 3]$

iii) Find $p[x \geq 3, y \leq 2]$.

b) Explain the terms : **[4]**

i) Probability definition.

ii) Axioms of Probability.

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

$$A=\begin{bmatrix} 2 & -1 \\ 2 & 2 \end{bmatrix}.$$

b) The first four central moments of a distribution are 0, 2.5, 0.7 and 18.75. Comment on the skewness and kurtosis of the distribution. **[5]**

Q8) a) Apply Runge-kutta method of fourth order to find approximate value of y when $x = 1$, $y(0) = 1$ and $\frac{dy}{dx}=\frac{y-x}{y+x}$. **[5]**

b) Assume that the diameter of 1000 brass plugs taken consecutively from a machine form a normal distribution with mean 0.7515 cm and standard deviation 0.0020 cm. How many brass plugs are likely to be approved if the acceptable diameter is 0.752 + 0.004 and 0.752 – 0.004. (Given : Area at $z = 2.25$ is 0.4878 and Area at $z = 1.75$ is 0.4599.) **[5]**

Total No. of Questions : 8]

SEAT No. : ____

P4620

[Total No. of Pages : 2

[5355]-202

M.E. (Instrumentation & Control)

BIOMEDICAL INSTRUMENTATION

Bio-Signal Processing

(2013 Course) (Semester - I)

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

Instructions to the candidates:

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

Q1) Determine the impulse response of the system described by the difference equation : **[10]**

$y(n) = 1.9y(n-1) - 5.8y(n-2) + 3x(n)$.

Q2) Determine the cross-correlation for $x_1(n) = x_2(n) = \{2, 5, 7, 9\}$. **[10]**

Q3) Determine transfer function and sketch the pole-zero plot for a system given by : **[10]**

$$3y(n)+\frac{5}{4}y(n-1)+\frac{3}{8}y(n-2)=5x(n)+6x(n-1).$$

Q4) a) Determine the linear convolution of the following sequences using circular convolution : **[6]**

$x_1(n) = \{4, 3, 1, 16\}$

$x_2(n) = \{8, 8, 2, 12\}$

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

i) Time reverse.

ii) Frequency shift.

P.T.O.

Q5) a) Determine the order and poles of a low-pass Chebyshev-I filter that has a - 3 dB bandwidth of 600 Hz and an attenuation of 42 dB at 1200 Hz. **[5]**

b) Determine the order and poles of a low-pass Butterworth filter that has a 1 dB ripple in the passband, cut-off frequency $\Omega_p = 2000\pi$, a stopband frequency of $\Omega_s = 3000\pi$ and an attenuation of 36 dB or more for $\Omega \geq \Omega_s$. **[5]**

Q6) Explain the LMS and RLS algorithms of adaptive filtering. **[10]**

Q7) Compute the 8-point DFT of sequence $x(n) = \sin(3\pi n/2)$ using decimation-in-frequency radix-2 FFT algorithm. **[10]**

Q8) Design an FIR high-pass filter with $\omega_c = 3\pi/2$ rad/sec and M = 11. Use rectangular and Bartlet window functions. **[10]**

Total No. of Questions : 7]

SEAT No :

P 4621

[Total No. of Pages : 2

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M.E. (Biomedical Instrumentation & Control)

ANALYTICAL INSTRUMENTATION

(2013 Course) (Semester - I) (506203)

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

Instructions to the candidates:

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

Q1) a) List Advantages and disadvantages of Instrumental method over chamical analysis method. **[5]**

b) Explain following term with suitable example. **[5]**

Quantitative analysis

Q2) a) List Various IR detector, Explain any one type of IR Detector with neat sketch. **[5]**

b) Explain Atomic Absorption Spectroscopy with neat sketch. **[5]**

Q3) a) Explain phosporiometer with neat sketch. **[5]**

b) Explain with neat sketch Spectroflouriometer. **[5]**

Q4) a) Explain Magnetic deplection mass spectrometer with neat sketch. **[5]**

b) Explain Gas Chromatography with neat sketch. **[5]**

P.T.O.

Q5) a) Explain any one type of detector used in GC with neat sketch. **[5]**

b) Explain Reciprocating pump used in HPLC with neat sketch. **[5]**

Q6) a) What is ESCA? Explain in brief Auger emission spectroscopy. **[5]**

b) Explain Proportional counter with neat sketch. **[5]**

Q7) a) Explain NMR Spectroscopy with neat sketch. **[5]**

b) Explain Conductometry with neat sketch. **[5]**

Total No. of Questions :7]

SEAT No. : ____

P4622

[Total No. of Pages :2

[5355] - 204

M. E. (Process Instrumentation & Control)

RESEARCH METHODOLOGY

(2013 Pattern) (Semester - I) (506104)

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

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagram must be drawn whenever necessary.***
3) ***Figure to the right indicate full marks.***
4) ***Use of logarithmic tables slide rule, mollier charts, electronic pocket calculator and steam table is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Briefly explain the different steps in research Process. **[5]**

b) Explain the errors in selecting a research problem. **[5]**

Q2) a) Write a short notes on criteria of good research. **[5]**

b) Write a short notes on Data collection using a digital computer system. **[5]**

Q3) a) Enlist Static and dynamic characteristics of instruments used in experimental set up. **[5]**

b) List and explain method of linear regression analysis. **[5]**

Q4) a) Write a short notes on multiscale modelling. **[5]**

b) Write a short note on sensitivity theory. **[5]**

P.T.O.

Q5) a) Explain different plots to shows the performance curves in research study. **[5]**

b) Explain hypothesis testing with different types. **[5]**

Q6) a) Explain with neat sketch basic components of research proposal. **[5]**

b) Explain in brief outline of research report. **[5]**

Q7) a) Describe the layout of reaserch proposal. **[5]**

b) Explain importance of referencing in research proposal. **[5]**

Total No. of Questions : 5]

SEAT No :

P 4623

[Total No. of Pages : 2

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

TRANSDUCER DESIGN

(2013 Pattern) (Semester - II) (506207)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Neat diagram must be drawn whenever necessary.***
3) ***Figures to right indicates full marks.***
4) ***Use of electronic pocket calculator.***
5) ***Assume suitable data, if necessary.***

Q1) Attempt any two of the following.

a) Explain importance of sensors in biomedical applications. **[5]**

b) What is pH? How it can be measured? **[5]**

c) Write note on radioactive radiation detector. **[5]**

Q2) Attempt any two of the following

a) Explain how change in capacitance of capacitive sensor is converted in to voltage signal. **[5]**

b) Discuss role of semiconductor temperature sensors in measurement system. **[5]**

c) Explain design of electromechanical sensor for level measurement. **[5]**

Q3) Attempt any two of the following

a) Explain load cell for weight measurement with its signal conditioning circuits. **[5]**

b) List different types of torque sensors and discuss any one in detail. **[5]**

c) Discuss nano sensors. **[5]**

P.T.O.

Q4) Attempt any two of the following

a) Explain ultrasonic flow meter in detail. **[5]**

b) Discuss applications of gas sensors. **[5]**

c) Explain manufacturing process of MEMS with neat sketch. **[5]**

Q5) Attempt any two of the following

a) List different biosensors and explain each sensors application. **[5]**

b) List different Chemical sensors and explain any two in detail. **[5]**

c) Explain LASER application in micromachining operations. **[5]**

Total No. of Questions : 8]

SEAT No :

P 4624

[Total No. of Pages : 2

[5355]-206

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

DIGITAL IMAGE PROCESSING

(2013 Course) (Semester-II) (506208)

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

Instructions to the candidates:

1) ***Solve any 5 questions.***
2) ***Assume suitable data if necessary.***
3) ***Use of Calculators, log tables, charts is allowed.***
4) ***Figures to the right indicate full marks.***

Q1) a) Describe fundamental steps of digital image processing system. **[5]**

b) Explain spatial and intensity resoution of digital image. **[5]**

Q2) a) Define Path. Compare various distance measurements. **[4]**

b) Explain basic image geometric transformations. **[4]**

c) Explain connectivity. **[2]**

Q3) a) Obtain the 2D DCT of the following image: **[7]**

5	10	15
10	15	5
15	5	10

b) Define STFT and state its properties. **[3]**

Q4) Explain image Enhancement using Histogram Equalization. **[10]**

Q5) a) Explain image restoration with suitable example. **[5]**

b) Discuss the need of image restoration. **[5]**

P.T.O.

Q6) a) Define brightness adaption and discrimination. **[3]**

b) What is homomorphic signal processing? **[2]**

c) Explain application of homomorphic signal processing. **[5]**

Q7) a) Enhance the following image using mean filter. **[5]**

10	20	30
20	10	20
30	20	10

b) Explain classifiers for segmenation. **[5]**

Q8) a) Detect the edges in the following image using Prewitt operator. **[5]**

10	20	30
20	10	20
30	20	10

b) Explain patterns with suitable example. **[5]**

Total No. of Questions :8]

SEAT No. :

P4625

[Total No. of Pages : 2

[5355] - 207

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

COMMUNICATION PROTOCOLS FOR INSTRUMENTATION

(2013 Course) (Semester - II) (506209)

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

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right indicate full marks.***
3) ***You are advised to attempt not more than 5 questions.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain the basic rules for physical network design in Profibus. **[4]**

b) Explain the hierarchical communication model in Process Automation. Also discuss the Network requirements at different levels. **[4]**

c) Explain any two building blocks of networks. **[2]**

Q2) a) Explain the Profibus PA network elements. **[4]**

b) Elaborate the use of Function block library in Foundation Fieldbus Network. **[4]**

c) Explain the classes of HART Commands. **[2]**

Q3) a) Explain point to point and multidrop networks in HART devices. **[4]**

b) Explain the following test procedures done during commissioning of Fieldbus devices. **[4]**

i) Segment testing

ii) Field Device testing

c) Draw the ISO -OSI seven layer model. **[2]**

P.T.O.

Q4) a) Explain the information contained in the physical block of Profibus. **[4]**

b) Explain the role of Ethernet in Communication Protocols. **[4]**

c) What is a data frame in communication? List any two fields used in a frame. **[2]**

Q5) a) Explain the applications of Fieldbus in Hazardous and Non Hazardous area. **[5]**

b) List and explain any three Universal HART commands. **[3]**

c) Explain Asynchronous Communication with neat waveform. **[2]**

Q6) a) What is the Bluetooth Protocol? Explain its applications in brief. **[5]**

b) Draw and explain the various topologies applied to networks. **[3]**

c) What is the role of Device Description files? **[2]**

Q7) a) As a project incharge, create different teams and assign tasks to each team for successful implementation of a project in process industry. **[5]**

b) With neat diagrams, explain the Grounding Schemes for IC 61158-2 segment. **[5]**

Q8) Write short notes:

a) Data Highway Plus **[5]**

b) WPAN **[5]**

Total No. of Questions :8]

SEAT No. :

P4626

[Total No. of Pages : 2

[5355] - 208

M.E. (Biomedical Instrumentation & Control)

MEDICAL IMAGING TECHNIQUES

(2013 Course) (Semester - III) (606201)

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

Instructions to the candidates:

1) ***Answer any FIVE questions.***
2) ***Use of scientific calculator is allowed.***
3) ***Draw diagrams wherever necessary.***
4) ***Figures to the right indicate full marks.***

Q1) a) Which three factors affect observers ability to detect abnormality. **[4]**

b) Differentiate between Characteristic and Bremsstrahlung X-rays. **[4]**

c) What are two types of radiations? **[2]**

Q2) a) Which different signal conditioning blocks are used in Xray machine to improve the quality of Xray image. **[4]**

b) Why one should use different imaging techniques for different applications? **[4]**

c) Define Huygen's Principle. **[2]**

Q3) a) Define Optical Density. Elaborate the concept for radioopaque and radioluscent materials. **[4]**

b) What is the role of filters and grids in Xray imaging? **[4]**

c) Explain electrical matching in ultrasound transducers. **[2]**

Q4) a) With the help of graphs explain the effect of mA and KVp on quality and quantity of Xrays. **[5]**

b) What qualities of image make it readable? **[2]**

c) List factors that affect the propagation of ultrasound through the medium? Explain with the help of examples. **[3]**

P.T.O.

Q5) a) What is Housenfield No? Indicate the CT number for water, air and bone. What is the role of it in image reconstruction? **[5]**

b) Why automatic exposure control is necessary in Mammography unit and how it is achieved? **[3]**

c) Define 'Angiography' **[2]**

Q6) a) Explain the principle of nuclear magnetic imaging system with the help of appropraite illustration. **[5]**

b) What are the detectors used in Thermography? **[2]**

c) What is M mode display in ultrasound system? What are its applications in medical field? **[3]**

Q7) a) What different types of particles are emitted in radioactive emission? Explain the difference between Xray and gamma emission. **[5]**

b) With the help of a neat diagram, describe the PET Scanner. **[5]**

Q8) a) Explain the Biological effects of Radiation and Ultrasound. How they can be taken care of? **[5]**

b) Describe various generations of gantries in CT scanner. **[5]**

Total No. of Questions :8]

SEAT No. :

P4627

[Total No. of Pages :2

[5355] - 209

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

ADVANCED DIGITAL SIGNAL PROCESSING

(2013 Course) (Semester- III) (606202)

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

Instructions to the candidates:

1) ***Solve any 5 questions.***
2) ***Assume suitable data if necessary.***
3) ***Use of Calculators, log tables, charts is allowed.***
4) ***Figures to the right indicate full marks.***

Q1) a) Explain the need of TFD with suitable application. **[5]**

b) Explain STFT with its properties. **[5]**

Q2) a) Discuss sampling rate conversion by non integer factor. **[5]**

b) Compare decimation and interpolation. **[5]**

Q3) Decimate the sinusoidal signal of frequency 100 Hz by factor 3 for the $n > 0$. **[10]**

Q4) a) Explain Welch's method of PSD estimation. **[5]**

b) Discuss the need of PSD esimation. **[5]**

Q5) a) Explain Yule Walker equation and its solution. **[8]**

b) Define PSD. **[2]**

Q6) a) Explain RLS adaptive filtering algorithm with suitable block diagram. **[5]**

b) State the applications of adaptive filtering. Explain any one. **[5]**

P.T.O.

Q7) a) Explain principle of adaptive filtering with suitable block diagram. **[5]**

b) Explain homomorphic system for convolution. **[5]**

Q8) a) Compare WSS and SSS signals. **[4]**

b) State the models of stochastics processes. Explain any one with suitable diagram. **[6]**

* * *

Total No. of Questions : 8]

SEAT No. :

P4475

[Total No. of Pages : 2

[5355]-21
M.E. (Civil) (Geotechnical Engineering)
ADVANCE SOIL MECHANICS
(2013 Course) (Semester-I) (501121)

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

Instructions to the candidates:

1) ***Answer any 5 questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***All questions carry equal marks.***
5) ***Your answers will be valued as a whole.***
6) ***Assume suitable data, if necessary.***

Q1) Explain plane stress and plane strain problems in Geotechnical Engineering with suitable sketches & examples of each case. **[10]**

Q2) Explain the assumptions made in Boussinesq's theory. Also explain how stresses due to concentrated load at the surface of semi-infinite mass are evaluated using this theory. **[10]**

Q3) What are the various theories of failure related to soil strength. Explain any one theory of failure in detail. **[10]**

Q4) Explain the coulomn's Graphical method for estimation of active earth pressure behind retaining walls with suitable sketch and step by step procedure. **[10]**

Q5) What are various types of retaining walls? With suitable sketches explain how stability analysis is carried out considering. **[10]**

a) Overturning b) Sliding &

c) Bearing capacity

Q6) Explain the effect of peripheral 'smear' in the consolidation process. Also, explain how effect of smear can be reduced using Barron's concept. **[10]**

P.T.O.

Q7) Explain the directional variation of permeability in an anisotropic soil medium with sutiable sketches. **[10]**

Q8) Explain : **[10]**

a) The seepage force per unit volume of soil mass and

b) Critical hydraulic gradient, Giring suitable equations for the above two cases and their significance in design of an earth dams.

Total No. of Questions : 5]

SEAT No. : ____

P4628

[Total No. of Pages : 2

[5355]-212

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

TRANSDUCER DESIGN

(2013 Pattern) (Semester - I) (506102)

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

Instructions to the candidates:

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

Q1) Attempt any two of the following :

a) Give detail classification of transducers. **[5]**

b) Explain conductivity measurement using capacitive sensor. **[5]**

c) Discuss any two techniques used for detection of radioactive radiations. **[5]**

Q2) Attempt any two of the following :

a) In detail explain signal conditioning circuit used for piezoelectric sensor. **[5]**

b) Discuss signal conditioning circuit of RTD for temperature measurement with zero and span adjustments. **[5]**

c) Explain design of capacitive sensor for level measurement. **[5]**

Q3) Attempt any two of the following :

a) Explain strain gauge transducer for force measurement with its signal conditioning circuits. **[5]**

b) List different types of torque transducers and discuss any one in detail. **[5]**

c) Explain industrial applications of Gas sensors. **[5]**

P.T.O.

Q4) Attempt any two of the following :

a) Give selection criteria for electromagnetic flowmeter. Also explain different types excitation used in it. **[5]**

b) Explain nano sensors in detail with example. **[5]**

c) Explain manufacturing process of MEMS with neat sketch. **[5]**

Q5) Attempt any two of the following :

a) List different Biosensors and explain each sensors application. **[5]**

b) List different Chemical sensors and explain any two in detail. **[5]**

c) Explain LASER application in micromachining operations. **[5]**

Total No. of Questions : 7]

SEAT No :

P 4629

[Total No. of Pages : 2

[5355]-213

M.E. Instrumentation & Control (Process Instrumentation)

INDUSTRIAL AUTOMATION

(2013 Course) (Semester - I)

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

Instructions to the candidates:

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

Q1) a) Develop programmable ladder diagram for Stirred tank heater. (Assume suitable Sequence) **[5]**

b) Explain information flow requirements in process automation. **[5]**

Q2) a) Explain the function Safety Life cycle. **[5]**

b) Enlist specifications of any typical DCS. **[5]**

Q3) a) Discuss in brief general guidelines for designing of Field bus for process application. **[5]**

b) Explain with example HaZop and its analysis. **[5]**

Q4) a) Explain in brief what do you mean by OPC?. **[5]**

b) Explain with an example 'Sequential Function Chart'. **[5]**

P.T.O.

Q5) a) Draw and explain a famous automation hierarchy for an industrial application. **[5]**

b) Explain working principle of HART protocol in detail. **[5]**

Q6) a) Explain in brief application of safety system. **[5]**

b) Discuss the various selection criteria that must be considered for selection of a suitable PLC for a specific process control. **[5]**

Q7) a) Explain in brief different types of Sequencer? **[5]**

b) Describe the data flow and number conversions involved in PLC analog operation. **[5]**

Total No. of Questions : 7]

SEAT No :

P 4630

[Total No. of Pages : 2

[5355]-215
M.E. (Process Instrumentation)
Instrumentation & Control
ADVANCED PROCESS CONTROL
(2013 Pattern) (Semester - II) (506107)

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

Instructions to the candidates:

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

Q1) a) Describe the process reaction curve method for identifying dynamic models. **[5]**

b) Comment on Tuning of cascade Controller. **[5]**

Q2) a) Elaborate Control Objectives. **[5]**

b) Two liquid ingredients A & B are to be blended in the proportion of 1:2. Draw control Loop schematics to indicate the two ways in which this task can be achieved. **[5]**

Q3) a) What is the significance of SPC in Process Plants? **[5]**

b) Explain with example control charts. **[5]**

Q4) a) Explain in brief self tuning regulator. **[5]**

b) Explain design procedure of MRAS using MIT rule. **[5]**

P.T.O.

Q5) a) Discuss in brief advantage of adding Feedback control to Feedforward controller. **[5]**

b) Explain with suitable example cascade control system to enhance process performance. **[5]**

Q6) a) Derive fundamental model of liqud surge tank. **[5]**

b) Explain the importance of DMC in process control. **[5]**

Q7) a) Explain in brief procedure for calculating Relative Gain Array for 2x2 systems. **[5]**

b) Explain design procedure of IMC for FOPDT process. **[5]**

Total No. of Questions : 5]

SEAT No :

P 4631

[Total No. of Pages : 2

[5355]-216

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

EMBEDDED SYSTEM DESIGN

(2013 Pattern) (Semester-II)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the ritght side indicate full marks.***
4) ***Use of electronic pocket calculator.***
5) ***Assume suitable data, if necessary.***

Q1) Attempt any two of the following.

a) Explain TIFR (Timer/Counter Interrupt Flag Register) of AVR μC. **[5]**

b) Explain Timer/Counter prescalers of AVR μC. **[5]**

c) Explain with suitable block diagram Analog Comparator of AVR μC. **[5]**

Q2) Attempt any two of the following.

a) Describe ARM core architecture? **[5]**

b) Explain ARM Bus Technology? **[5]**

c) Draw and explain BLOCK DIAGRAM and HARDWARE interfacing of GSM with ARM/ARM BOARD. **[5]**

Q3) Attempt any two of the following.

a) Write short note on ISA Bus. **[5]**

b) Explain with suitable diagram RS-485 Link. **[5]**

c) Compare between SPI vs. I2C. **[5]**

P.T.O.

Q4) Attempt any two of the following.

a) Explain CAN Protocol? **[5]**

b) Explain in detail USB architecture. **[5]**

c) Explain CAN transceiver features. **[5]**

Q5) Attempt any two of the following.

a) What is the difference between a FPGA and an ASIC? **[5]**

b) Explain SRAM based programming technology of FPGAs. **[5]**

c) Explain computer vision beam system based on FPGAs. **[5]**

Total No. of Questions :5]

SEAT No. :

P4632

[Total No. of Pages : 2

[5355] - 217

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

ADVANCED CONTROL SYSTEM

(2013 Course) (Semester - II) (506109)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Neat diagram must be drawn whenever necessary.***
3) ***Figure to the right indicate full marks.***
4) ***Use of electronic pocket calculator.***
5) ***Assume suitable data, if necessary.***

Q1) Attempt any two of the following :

a) Define nonlinear system? Explain two examples of it. **[5]**

b) Explain different characteristics of nonlinear system. **[5]**

c) Explain concept of phase plane in control system analysis. **[5]**

Q2) Attempt any two of the following :

a) Find describing function for ideal relay nonlinear element. **[5]**

b) Write short note on describing function for stability analysis. **[5]**

c) Define limit cycle. Also discuss its importance in detail. **[5]**

Q3) Attempt any two of the following :

a) Explain direct method of Lyapunov with suitable example. **[5]**

b) Show that following quadratic form is positive definite. **[5]**

$V(x)=16x_1^2 + x_2^2 + 8x_3^2 + 2x_1x_2 - 8x_1x_3 - 2x_2x_3$

c) Determine the stability of a non-linear system governed by equation **[5]**

$$\dot{x}_1 = x_2 - 2x_1^2$$

$$\dot{x}_2 = -x_1$$

P.T.O.

Q4) Attempt any two of the following :

a) Explain zero dynamics in feedback linearization with example. **[5]**

b) Explain input-output linearization in detail with example. **[5]**

c) Explain input-state linearization in detail with example. **[5]**

Q5) Attempt any two of the following :

a) Design a sliding mode control for a system given by **[5]**

$$\dot{x}_1 = x_2$$

$$\dot{x}_2 = -4x_1 - 2x_2 + u$$

Where u is input. Use linear sliding surface.

b) With reference to sliding mode control theory explain sliding surface and reachability in detail with necessary diagrams. **[5]**

c) Explain chattering reduction in SMC in detail. **[5]**

Total No. of Questions :5]

SEAT No. :

P4633

[Total No. of Pages : 2

[5355] - 218

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

ADVANCED SIGNAL PROCESSINGS

(2013 Course) (Semester - III) (606101)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Neat diagram must be drawn whenever necessary.***
3) ***Figure to the right indicate full marks.***
4) ***Use of electronic pocket calculator.***
5) ***Assume suitable data, if necessary.***

Q1) **Attempt any two Questions.**

a) Compute four point DFT of given sequence $x[n] = \{1, 1, 1, 1\}$. **[5]**

b) Explain different features of STFT over DFT. **[5]**

c) Explain any one application of adaptive filtering. **[5]**

Q2) **Attempt any two Questions.**

a) List and explain various properties of Complex Cepstrum. **[5]**

b) Explain homomorphic signal processing and its application for speech processing. **[5]**

c) Explain noble identities in sampling rate conversion. **[5]**

Q3) **Attempt any two Questions.**

a) Draw and explain structure of polyphase filter with polyphase decomposition. **[5]**

b) What do you mean integer band positioning explain even and odd integer band positioning. **[5]**

c) Explain following properties of continuous wavelet transform **[5]**

i) Translation

ii) Wavelet scaling

iii) Wavelet shifting

iv) Linear combination

P.T.O.

Q4) **Attempt any two Questions.**

a) Explain errors created in QMF filter bank. **[5]**

b) Write short note on simple alias free QMF systems. **[5]**

c) Explain power symmetric QMF filter banks. **[5]**

Q5) **Attempt any one Question.**

a) Write short innovations representation of a stationary random process. **[10]**

b) Explain any two non parametric methods for power spectrum estimation. **[10]**

Total No. of Questions :7]

SEAT No. :

P4634

[Total No. of Pages :2

[5355] - 219

M.E. (Process Instrumentation & Control)

BUILDING AUTOMATION

(2013 Course) (Semester- III) (606102)

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

Instructions to the candidates:

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

Q1) a) Explain FAS components with neat sketch. **[5]**

b) Explain different fire development stages. **[5]**

Q2) a) Explain Standalone Access Control System with neat Sketch. **[5]**

b) Write a short notes on NIDS. **[5]**

Q3) a) Explian Single duct, variable air volume (VAV) systems with neat sketch. **[5]**

b) Write a short notes on Air Handling Unit(AHU). **[5]**

Q4) a) Write a short notes on.

i) FCU

ii) Unit Ventilator **[5]**

b) Explain Vapour compression cycle with neat sketch. **[5]**

P.T.O.

Q5) a) Write a short notes on Lon Works communications protocol. **[5]**

b) Write a short notes on two position and floating control. **[5]**

Q6) a) What do you mean energy management system (EMS) Explain benefits of Energy Measurement system. **[5]**

b) Explain Integrated building management system in data centre with neat sketch. **[5]**

Q7) a) Write a short notes on Role of Architect. **[5]**

b) Write a short note on "Commissioning". **[5]**

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Total No. of Questions : 8]

SEAT No. :

P4476

[Total No. of Pages : 2

[5355]-22

M.E. (Civil) (Geotechnical Engineering)
GROUND IMPROVEMENT TECHNIQUES
(2013 Pattern) (Semester - I) (501122)

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

Instructions to the candidates:

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

Q1) Explain cation exchange and clay water relations. **[10]**

Q2) a) Discuss the principle of chemical stabilisation. **[5]**

b) State the methods of chemical stabilisation and explain any one. **[5]**

Q3) a) Explain mechanism of cement stabilisation. **[5]**

b) Write short note of design of lime mixture. **[5]**

Q4) Discuss flyash and bituminous stabilisation. **[10]**

Q5) a) Write short notes on : Electro-osmosis. **[5]**

b) Discuss electro-kinetic stabilisation. **[5]**

Q6) a) Explain the preloading method of soil improvement. **[5]**

b) Discuss the vibration techniques of ground improvement. **[5]**

P.T.O.

Q7) a) What are lime columns and their applications? Explain the design criteria for the same. **[5]**

b) Write short notes on any one: **[5]**

i) Sand drains

ii) Granular trench stabilisation

Q8) Explain the design of soil grouting program and how quality control, testing for grouting can be conducted? **[10]**

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Total No. of Questions : 8]

SEAT No. : ____

P4635

[Total No. of Pages : 2

[5355]-221
M.E. (Computer Engineering)
APPLIED ALGORITHMS
(2013 Pattern) (Semester - I) (510101)

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

Instructions to the candidates:

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

Q1) a) Define and discuss importance of an Algorithm with suitable example. **[5]**

b) State whether following equalities are correct or incorrect and prove it. **[5]**

i) $10n^2 + 5n + 6 = \Omega(n^4)$

ii) $4n^4 - 6n = \theta(n^2)$

Q2) a) Explain signification of upper and lower complexity bounds. **[5]**

b) Write about the Best-case, Average-case, and Worst-case analyses of selection sorting algorithm. **[5]**

Q3) a) Explain Binary search algorithm and its time complexity. **[5]**

b) Write the Quadratic sort algorithms and its time complexity. **[5]**

Q4) a) Write short note on : Prims Algorithm and derive its time complexity. **[5]**

b) Write an algorithm to find OBST using dynamic programming. **[5]**

Q5) a) Discuss closest pair problem and any two its applications. **[5]**

b) Explain approximation algorithm using travelling salesperson problem. **[5]**

P.T.O.

Q6) a) Explain the algorithms of Binary Search Trees. **[5]**

b) What are the standard and slack forms of linear programming? **[5]**

Q7) a) Explain application of linear programming. **[5]**

b) Discuss the application of Graham scan algorithm. **[5]**

Q8) a) What is Expectation, Moments and variance with signification? **[5]**

b) What are randomized algorithms? Explain advantages and disadvantages of randomized algorithms. **[5]**

Total No. of Questions : 6]

SEAT No. : ____

P4636

[Total No. of Pages : 2

[5355]-222

M.E. (Computer Engineering)

HIGH PERFORMANCE DATABASES

(2013 Credit Pattern) (510102) (Semester - I)

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

Instructions to the candidates:

1) ***All six questions are compulsory.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume suitable data if necessary.***

Q1) a) What are the choices in tuning the conceptual schema? What are the technique and when should we apply them; settling for a weaker normal form, de-normalization and horizontal and vertical decomposition. **[4]**

b) Why do we have standardized database benchmarks, and what common Metrics are used to evaluate database system? Describe a few popular Database benchmarks. **[4]**

Q2) a) Discuss design issues of Distributed Databases Framework. **[4]**

b) Explain translation of global queries to fragment queries for distributed databases. **[4]**

Q3) a) Why was the TPC-D benchmark replaced by the TPC-H and TPC-R benchmarks? **[4]**

b) Write a short note on (Any One) : **[4]**

i) Long Duration Transaction.

ii) Main Memory Database.

P.T.O.

Q4) a) Write XML representation of the following nested-relational schema **[5]**

Emp = (ename, ChildrenSet setof(Children), SkillsSet setof(Skills))

Children = (name, Birthday)

Birthday – (dat, month, year)

Skills – (type, ExamsSet setof(Exams))

Exams = (year, city)

Write following queries in XQuery

i) Find the names of all employees who have a child who has a birthday in March.

ii) Find those employees who took an examination for the skill type "typing" in the city "Dayton".

b) Explain XSLT with suitable example. **[3]**

Q5) a) Analysis and design the requirements for any Mobile Database application which consist of semi structured and unstructured data using any standard Mobile Database. **[5]**

b) Explain Temporal Databases with suitable example. **[4]**

Q6) a) Design fully Distributed Hadoop framework for large scale data management and analytics with suitable business application. **[5]**

b) Write a short note on COUCHDB. **[4]**

Total No. of Questions : 6]

SEAT No :

P 4637

[Total No. of Pages : 3

[5355]-223

M.E.-I Computer Engg.

510103 : ADVANCED COMPUTER ARCHITECTURE

(2013 Pattern) (Semester-I)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Explain various shared memory multiprocessor models. **[5]**

b) Discuss various PRAM models. **[4]**

OR

a) Disucss in brief the fine grain and course grain scheduling with respect to multiprocessor scheduling with an example. **[5]**

b) How data Hazards are classified ? State the Bernstein's conditions used for the detection of parallelism. **[4]**

Q2) a) Discuss about the factors which affect the parallelism profile. **[4]**

b) Define the term speedup & efficiency w.r.t. scalability? How these parameters reflect the performance of parallel computers. **[4]**

OR

a) Explain Amdahl's law and Gustafson's law with respect to scalability and speedup. **[4]**

b) Brief about quality of parallelism. Also list applications of parallel processing. **[4]**

P.T.O.

Q3) a) State the following terms with respect to pipelining & superscalar computers.

i) Reservation table.

ii) MAL.

iii) Latency.

iv) Pipeline throughput. **[4]**

b) Compare the features & performance of CISC & RISC processor architecture. **[4]**

OR

a) For a 3 stage Pipeline processor function x has following reservation table. **[8]**

$\rightarrow$ Time

Stages		1	2	3	4	5	6	7	8
	S1	X					X		X
	S2		X		X				
	S3			X		X		X	

Draw the state diagram and find the minimal average latency.

Q4) a) Discuss the necessity of cache coherency in multiproccessor system. State two commonly used wirte policies with diagram. **[4]**

b) What is multithreaded architecture? Discuss various parameters of the same w.r.t to performance. **[4]**

OR

a) State advantages of vector processing over scalar processing. Also list the types of vector instructions. **[4]**

b) Explain the concept of vector chaining and vector looping implemented in cray architecture. **[4]**

Q5) a) Explain various parallel programing models. **[4]**

b) Explain the features & standard construction used in High Performance Fortran (HPF) or Fortran - 90. **[4]**

OR

a) Discuss how loop parallization & pipeling helps in parallel processing. **[4]**

b) Explain the features of C-Linda. also state different Linda Primitives. **[4]**

Q6) a) How cloud computing differs from cluster computing? State Saas, Paas & Iaas services with example. **[5]**

b) Explain the following terms w.r.t to Grid computing.

i) Middle ware.

ii) OGSA.

iii) OGSI. **[4]**

OR

a) Write a short note on Quantum Computing. **[5]**

b) Discuss the features of GPU parallel architecture. **[4]**

Total No. of Questions :6]

SEAT No. : ____

P4638

[Total No. of Pages :2

[5355] - 224

M. E. (Computer Engineering)

RESEARCH METHODOLOGY

(2013 Pattern) (Semester - I) (510104)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if required.***

Q1) a) Describe the steps involved in research process with suitable illustration. **[9]**

OR

b) Distinguish between **[9]**

i) Pure research and applied research.

ii) Exploratory and Diagnostic studies.

iii) Descriptive study and analytical study.

Q2) a) What is research problem? Define the main issues which should receive the attention of the researcher in formulating the research problem. Give suitable example to clarify your points. **[9]**

OR

b) What is literature survey? Why it is required in research? State different ways of doing literature survey? Mention top 5 journal names in your research field. **[9]**

P.T.O.

Q3) a) Give your understanding of a good research design . Is single research design suitable in all research Studies? If not, why? What are the characteristic of research? **[8]**

OR

b) Choose any research problem in computer engineering field to conduct the research. State different research designs and select suitable research design method for the problem you identified and justify why you selected that particular design method. **[8]**

Q4) a) Enumerate the different methods of collecting data. Which one is the most suitable for conducting enquiry regarding family welfare program in India? Explain its merits and demerits. **[8]**

OR

b) Write a note on following data collection methods. **[8]**

i) Observations.

ii) Experiments.

iii) Questionnaires.

Q5) a) What are the various kinds of charts and diagrams? Which are used in data analysis? Distinguish Between line chart, bar chart and histogram.**[8]**

OR

b) Distinguish between primary data and secondary data and enlist the important methods of collecting secondary data. **[8]**

Q6) a) Describe the guideline for report writing and research paper and Discuss the role played by bibliography in context of research report. **[8]**

OR

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

i) Optimization methods

ii) Queuing theory.

Total No. of Questions : 12]

SEAT No :

P 4639

[Total No. of Pages : 3

[5355]-225
M.E. (Computer Engineering)
OPERATING SYSTEM DESIGN
(2013 Pattern) (Semester - II) (510107)

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

Instructions to the candidates:

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

Q1) a) Explain the significance of base and bound registers? Comment if they could be used in system mode. **[5]**

b) What is a design problem? Relate two level implementation to software modules. **[4]**

OR

Q2) a) What is message buffering? Why is it useful. **[5]**

b) Relate the term race condition, Atomic action, critical section and mutual exclusion. **[4]**

Q3) a) Describe the following system calls Create process, fork, execv, Iseek. **[4]**

b) What are the disadvantages of using two different operating systems in a multiprocessor system? What data must be shared in multiprocessor system. **[4]**

OR

Q4) a) What is response ratio? What is the advantage of highest response ratio next scheduling over shortest job first scheduling. **[4]**

b) What is Time Quantum constant used for? Why does the process descriptor have a Time Left field? **[4]**

P.T.O.

Q5) a) Why is mutual exclusion the most important IPC Pattern for competition for resource? Why busy waiting cannot be used for solving general mutual exclusion problem? **[4]**

b) Give an analysis between massages and semaphores. Why are semaphores more efficient than massage passing? **[4]**

OR

Q6) a) What is the basic idea of client-server IPC Pattern, multiple servers and clients IPC pattern. **[4]**

b) Why is indirection useful? How does indirection help in memory management? **[4]**

Q7) a) What is late binding? Give examples of late binding. Explain the design technique of late binding in virtual memory. **[4]**

b) Compare local and global page replacement. Mention advantages of each. **[4]**

OR

Q8) a) State and explain the difference between caching and hinting. **[4]**

b) Write the significance of DMA controller. Give any two advantages of a DMA device controller over a Non-DMA device controller... **[4]**

Q9) a) Define **[4]**

i) Contrast seek time.

ii) Latency Time.

iii) Adjoined Directories.

iv) Block device and character device.

b) Compare **[4]**

i) Batching and aging.

ii) Logical and physical disks.

OR

Q10)a) What is the relationship between users and processes in terms of protection? Why protection of resources is important? **[4]**

b) What is Shortest Seek Time First (SSTF)? How elevator algorithm is useful in SSTF? State and Explain the elevator algorithm with batch processing in detail. **[4]**

Q11)a) What is meant by consumable resource? Is preemption of resource possible? If yes state with example. **[5]**

b) What is Little Law? Explain the mathematical model of scheduling as a system of queues. **[4]**

OR

Q12)a) How software protection mechanism is implemented in operating system? **[4]**

b) What is difference between authentication and authorization? Can we use RSA algorithm for authentication? If yes how to use it? **[5]**

Total No. of Questions : 6]

SEAT No :

P 4640

[Total No. of Pages : 2

[5355]-226

M.E. (Computer Engineering)

SOFTWARE DESIGN AND ARCHITECTURE

(2013 Pattern) (Semester-II)

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

Instructions to the candidates:

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

Q1) a) Explain the applicability, structure and implementation of, **[8]**

i) Adapter

ii) Flyweight

b) Describe design solution. What are the two major components of a software design method? **[8]**

OR

Q2) a) Explain design patterns? How they are documented using a template? Explain the way they are documented with examples to illustrate from Facade pattern. **[8]**

b) Illustrate, with correct examples, various design notations that can be used to depict a systems design. **[8]**

Q3) a) Explain various styles of Component-and-connector view-type. **[8]**

b) List various Quality Attributes of a system and explain the testability atribute with specific scenarios. **[8]**

OR

P.T.O.

Q4) a) Define Architectural analysis. Discuss various analysis goals that are met in Architectural analysis with an example each. **[8]**

b) Explain the styles of module view-type and execution Architecture View type. **[8]**

Q5) a) Describe the concepts of an Data-Centered Software Architecture. Evaluate the benefits and limitations of data-centered software architecture and examine data-centered architecture when incorporated with other prominent architectures. **[9]**

b) Define Model Driven Architecture (MDA). Listand explain various MDA approaches and tools. **[9]**

OR

Q6) a) Describe and depict a complete object-oriented analysis and design process and discuss general design principles employed in the context of object oriented design. **[9]**

b) Describe the concepts of Implicit asynchornous communication software architecture. Discuss the benefits and limitations of the asynchronous software architecture. **[9]**

Total No. of Questions :6]

SEAT No. :

P4641

[Total No. of Pages : 2

[5355] - 227

M.E. (Computer Engineering)

ADVANCED COMPUTER NETWORKS

(2013 Course) (Semester-II) (510109)

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

Instructions to the candidates:

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

Q1) a) Enlist and explain different network functions and its effect on type of networks built. **[9]**

OR

b) Explain the issue of mobility and reliability with suitable example in network design. **[9]**

Q2) a) Explain little's theorem with proof and suitable example. **[8]**

OR

b) Consider disk drive that can complete an average request in 10 ms. The time to complete request is exponentially distributed over a period of 30 minutes. 117000 requests were made to the disks. How long did it take to complete the average request? What is the average number of queued requests? **[8]**

Q3) a) Explain Bin Packing Algorithm with suitable example. **[8]**

OR

b) Differentiate among open, closed and semi-open queues. **[8]**

Q4) a) Explain ubiquitous computing with its applications and requirements. **[8]**

OR

b) What is Quality of Service in networks? Explain in brief queue management algorithms. **[8]**

P.T.O.

Q5) a) Explain different migration issues from IPV4 to IPV6. **[8]**

OR

b) What is IP service? Explain the terms Unreliable, Connectionless and Best effort. In which order the bytes of an IP datagram transmitted? **[8]**

Q6) Write Short notes on (any Three) : **[9]**

a) Content distribution networks

b) Cyber physical system

c) Domain specific network

d) Protocols in wireless and sensor networks

Total No. of Questions :6]

SEAT No. :

P4642

[Total No. of Pages : 2

[5355] - 228

M.E. (Computer Engineering)

ADVANCED STORAGE SYSTEMS AND INFRASTRUCTURE MANAGEMENT

(2013 Pattern) (Semester - III) (610101)

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

Instructions to the candidates:

1) ***Attempt any five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***

Q1) a) Explain why **[5]**

i) RAFD 1 is not a substitute for a backup?

ii) RAID 0 is not an option for data protection and high availability?

b) Which components constitute the disk service time? Which components constitute the largest percentage of the disk service time in a random I/o operation? **[5]**

Q2) a) Explain integrated implementations and Gateway implementations mechanism of NAS? **[5]**

b) What are the different types of storage virtualizations? What are the important challenges in storage virtualization? **[5]**

Q3) a) What are different Local Replication technologies? Explain any one in detail. **[5]**

b) Explain the concept of Recovery-point-objective (RPO) and Recovery-time-objective (RTO). **[5]**

Q4) a) Write short note on value of systems management for business. **[5]**

b) What are various infrastructure management activities? Discuss. **[5]**

P.T.O.

Q5) a) Discuss Information Technology Infrastructure Library. **[5]**

b) Explain infrastructure management pattern for IT systems management. **[5]**

Q6) a) Discuss financial management and costing. **[5]**

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

i) Configuration management

ii) Availability management

Total No. of Questions :7]

SEAT No. :

P4643

[Total No. of Pages :2

[5355] - 229

M.E. (Computer Engineering)

ADVANCED UNIX PROGRAMMING

(2013 Credit Pattern) (Semester - III) (610102)

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

Instructions to the candidates:

1) ***Attempt ANY FIVE out of SEVEN questions.***
2) ***Neat diagrams must be drawn whenever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***
5) ***Use of Calculator is allowed.***

Q1) a) Write a short note on Register Stack Engine (RSE). **[5]**

b) Explain in brief architecture of the UNIX operating system. **[5]**

Q2) a) Write a short note on Process Identifiers. What is the purpose of following functions: getpid, getppid, getuid, geteuid. **[5]**

b) Explain fork() function. Also describe how sharing of open files between parent and child is done after fork() function. **[5]**

Q3) a) Write a short note on Nonblocking I/O. Also, explain in brief two ways to specify nonblocking I/O for a given descriptor. **[5]**

b) Write a short note on readn and writen functions. **[5]**

Q4) a) Write a short note on pipes. Also explain two limitations of pipes. **[5]**

b) Explain popen and pclose functions in detail. **[5]**

P.T.O.

Q5) a) Explain in brief Prethreading and Prethreading Models. **[5]**

b) Explain in brief Linux Locking Principles. **[5]**

Q6) a) Explain different types of sockets. **[5]**

b) Design of a simple client and server based echo server with out threading. **[5]**

Q7) Write short notes on any two of the following: **[10]**

a) Thread Synchronization.

b) Stack unwinding.

c) Virtual Memory Management.

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Total No. of Questions :8]

SEAT No. :

P4477

[Total No. of Pages : 2

[5355] - 23

M.E. (Civil) (Geotechnical Engineering)

ROCK MECHANICS

(2013 Pattern) (Semester - I)

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

Instructions to the candidates:

1) ***Answer any 05 Questions from 08 questions.***
2) ***Figures to the right indicate full marks.***
3) ***Use of logarithmic tables, slide rule, Mollier charts, electronics pocket calculator and steam tables is allowed.***
4) ***Assume suitable data if necessary.***
5) ***Neat diagrams must be drawn wherever necessary.***

Q1) a) Explain the importance of rock mechanics in surface excavation for quarries and mines. **[4]**

b) What is the purpose of classification of rock masses based on Rock Mass Rating (RMR). Explain RMR by using strength of rock. **[6]**

Q2) a) Enlist the various types of rock blasting and explain the cushion blasting in detail. **[4]**

b) With respect to rock grouting explain the Grouting Intensity Numbers (GTN) method. **[6]**

Q3) a) Explain the effect of principle stress ratio on rock failure. **[4]**

b) Discuss with neat sketch the various methods of in situ stress determination on rock. **[6]**

Q4) a) With help of neat sketch explain the following test on rock. **[4]**

i) Triaxial Test

ii) Splitting tension test

b) Write a note on anisotropic rocks. **[6]**

P.T.O.

Q5) a) Explain the Griffith's theory of fracture initiation in rock masses. **[4]**

b) Explain the phenomenon of fracturing rock masses in compression **[6]**

Q6) a) Write a note on structural discontinuities in rock mass. **[4]**

b) Explain the Approximate methods for two dimensional limit equilibrium analyses of rocks systems. **[6]**

Q7) a) What are the various modes of failure of footing on rock? Draw the neat sketch for each mode of failure. **[4]**

b) Discuss the method of obtaining joint samples of rock. Draw the necessary sketch. **[6]**

Q8) a) Enlist the modes of rock failure and various factors affecting on the Rock failure. **[4]**

b) Discuss the phenomenon of Plastic behaviour around tunnel. **[6]**

Total No. of Questions : 12]

SEAT No. :

P4644

[Total No. of Pages : 2

[5355]-231

M.E. (Computer Engineering) (Computer Netwroks)
ADVANCED NETWORK ALGORITHMS
(2013 Course) (Credit Pattern) (Semester - I) (510201)

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

Instructions to the candidates:

1) ***Attempt questions Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, and Q9 or Q10, and Q11 or Q12.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume suitable data, if necessary.***

Q1) a) Define the term Network Algorithmics. What are objectives of same? **[4]**

b) Elaborate the effect of end-node bottlenecks on network performance? **[4]**

OR

Q2) a) Explain the example of scenting evil packets as Strawman's solution? **[4]**

b) What interdisciplinary domains are covered by Networks algorithmics? **[4]**

Q3) a) With the help of a neat diagram explain common protocol functions. **[4]**

b) Discuss in brief 3 groups of 15 Implementation principles. **[5]**

OR

Q4) Explain how the following factors affect network performance: **[9]**

a) Cheap complexing & Scaling,

b) Chip Speeds

c) Chip IO

d) IO Serial

e) Memory scaling

f) Power & packaging

Q5) With the help of neat diagrams, explain hashed wheels and hierarchical wheel schemes. **[8]**

OR

Q6) Write in details about issue of "Obtaining fine granularity timers". **[8]**

P.T.O.

Q7) List and explain with examples principles involved in various prefix lookup schemes. **[8]**

OR

Q8) a) Explain how the challenge of "wiere speed forwarding" is handled. **[4]**

b) What are non-algorithmic techniques for prefix matching? **[4]**

Q9) With respect to packet classification what do the following methods represent? Which of them is efficient? Why? **[8]**

a) Linear search, caching

b) Demultiplexing algorithms

c) MPLS and

d) Content addressable memories (CAMs)

OR

Q10) With respect to packet classification explain. **[8]**

a) Backtracking

b) Decision tree approach

Q11) a) With the help of a neat diagram explain Basic credit-based flow control in distributed systems. **[5]**

b) What are Bloom Filters? Why they are used? **[4]**

OR

Q12) a) Why network traffic measurement is difficult task? **[5]**

b) Explain in brief, approaches to traffic matrices computation. **[4]**

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Total No. of Questions :8]

SEAT No. :

P4645

[Total No. of Pages : 2

[5355] - 232

M.E. (Computer Networks)

WIRELESS COMMUNICATION

(2013 Course) (Semester - I) (510202)

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

Instructions to the candidates:

1) ***All questions are compulsory***
2) ***Neat diagrams must be drawn wherever necessary***
3) ***Assume suitable data, if necessary***

Q1) a) Draw and explain in brief IP - based WiMAX network architecture. Also explain functions performed across reference points. **[6]**

b) Describe Quality of Service aspects of WiMax. **[6]**

OR

Q2) a) Discuss following with respect to Advanced Antenna systems. **[6]**

i) Transit Diversity

ii) Beam forming

iii) Spatial Multiplexing

b) Define QoS, discuss about Admission Control mechanism. **[6]**

Q3) a) What do you mean by Mobile IP? What are different components of Mobile IP? **[6]**

b) Why Broadband wireless link is required to transmit multimedia data? Describe simple call setup using SIP. **[6]**

OR

Q4) a) What are the various stages of channel coding? Describe their functionalities. **[6]**

b) What is a convergence technology? Explain Header suppression technique in WiMAX with figure. **[6]**

P.T.O.

Q5) a) Draw and explain QoS functional architecture proposed by WiMAX NWG. **[6]**

b) What are the tasks performed by WiMax Radio Resource Management? **[7]**

OR

Q6) a) Explain Generic AAA roaming model, also discuss Protocol stack for user authentication in WiMAX. **[7]**

b) What are the basic requirements to design a WiMax Mobility Management architecture? **[6]**

Q7) a) Explain Methodology for Link Level simulation. **[6]**

b) What are the benefits of Multiple Antenna Techniques in WiMax. **[7]**

OR

Q8) Write Short Notes on (ANY TWO) : **[13]**

a) Open-Loop and Closed-Loop MIMO

b) WiMAX paging network reference model

c) Modelling of Computation for frequency domain MIMO channel

Total No. of Questions : 8]

SEAT No :

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M.E. (Computer Networks)
ADVANCED DATABASES
(2013 Pattern) (End-Semester) (Semester - I) (510203)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right indicates full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) What do you mean by benchmark? What are different TCP benchmark standards? Give any three standards? **[6]**

b) Discuss the data fragmentation in distributed database design and briefly explain the different types of fragmentaion. **[6]**

OR

Q2) a) Discuss the impact of Concurrency while tuning the database. **[6]**

b) Compare and Contrast the following. **[6]**

Distributed Databases Vs Distributed Processing.

Distributed Databases Vs Replicated Databases.

Q3) a) What is Transaction workflow explain with example. **[6]**

b) Discuss the Structure and Storage of XML Data. **[6]**

OR

Q4) a) Explain Distributed Transaction Management system with suitable diagram/example. **[6]**

b) Explain DOM and SAX Interfaces X Pointer? **[6]**

P.T.O.

Q5) a) What is Real Time database. Discuss how the following terms are addressed in real time databases. **[7]**

i) Transaction Processing.

ii) Concurrency control.

iii) Locking methods.

b) What is temporal database. Discuss the need of temporal database. **[6]**

OR

Q6) a) Discuss the database issues in Mobile Computing environment. **[7]**

b) Discuss about the geographic, geometric and spatial data. **[6]**

Q7) a) Describe how large scale data management is done effectively with HADOOP. **[7]**

b) Explain the need of standardization and briefly describe any standard. **[6]**

OR

Q8) a) What is CouchDB. Discuss the data model and architecture of CouchDB. **[6]**

b) Define E-Commerce and discuss any two of the following E-Commerce application: **[7]**

i) E-Catalogs.

ii) Marketplaces.

iii) Secure Payment System.

iv) Digital Cash.

Total No. of Questions :6]

SEAT No. : ____

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M. E. (Computer Networks)

RESEARCH METHODOLOGY

(2013 Pattern) (Semester - I) (510204) (Paper - I)

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

Instructions to the candidates:

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

Q1) a) Briefly describe the different steps involved in a research process. **[9]**

OR

b) Distinguish between Research methods and Research methodology. **[9]**

Q2) a) How do you define a Research problem? Give three examples to illustrate your answer. **[8]**

OR

b) Should every problem have hypothesis? Discuss the steps involved in formulation and testing the hypothesis. **[8]**

Q3) Explain with suitable examples some of the important research designs used in experimental hypothesis-testing research study. **[8]**

P.T.O.

Q4) a) Calculate coefficient of correlation, coefficient of determination, and portable error from the following data. **[8]**

X	100	200	300	400	500	600	700
Y	30	50	60	80	100	110	130

OR

b) What do you mean by multivariate analysis? Explain how it differs from bivariate analysis. **[8]**

Q5) a) What is a measure of central tendency indicate? Describe the important measures of central tendency pointing out the situation when one measure is considered relatively appropriate in comparison to other measures.**[8]**

OR

b) What do you mean by multivariate analysis? Explain how it differs from bivariate analysis? **[8]**

Q6) a) Describe the precautions that the researcher should take while interpreting his findings? **[9]**

OR

b) What is the significance of a research report? Explain different types of research reports. **[9]**

Total No. of Questions :7]

SEAT No. :

P4648

[Total No. of Pages : 2

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M.E. (Computer Networks)

NETWORK DESIGN, MODELING AND ANALYSIS

(2013 Pattern) (Semester - II) (510207)

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

Instructions to the candidates:

1) ***Solve any FIVE questions.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable data whenever necessary.***

Q1) a) Explain types of random variables with an example. How random variables are useful in network design, modeling and analysis? **[5]**

b) Explain Bayes formula with an appropriate example. **[5]**

Q2) a) Explain M/M/1 queuing model along with state transition diagram. **[5]**

b) There are 20 people in an office. During the course of an 8 hour day, they each attempt to make an average of 16 telephone calls which last an average of 3 minutes each. There are three telephone lines in the office. What is the probability of loss (the probability that a call be attempted when all three lines are busy)? **[5]**

Q3) a) What is CMST? Explain Essau- William's CMST algorithm with suitable diagram. **[5]**

b) What is binpacking? Explain First fit and Best fit binpacking algorithm with an example. **[5]**

Q4) a) Compare various access network designs. **[5]**

b) Assign terminals to the concentrators using Greedy algorithm, given that the Weight of each node=01, maximum capacity of concentrator (Wmax)=02 and calculate the total cost of connecting terminals to the concentrator. **[5]**

P.T.O.

Terminal	Concentrator		
	G	H	I
a	6	3	8
b	2	9	4
c	3	1	4
d	2	5	9
e	1	6	3
f	2	7	9

Q5) a) Explain MENTOR algorithm for router design. **[5]**

b) Explain different techniques for merging two networks. **[5]**

Q6) a) Explain various constraints in designing networks. **[5]**

b) Why access design is important? Explain multicenter local access design. **[5]**

Q7) a) Write a short note on any Two : **[6]**

i) Redesigning of networks

ii) Little's theorem

iii) Exponential distribution

b) Explain Priority Queuing. **[4]**

Total No. of Questions : 8]

SEAT No :

P 4649

[Total No. of Pages : 2

[5355]-236

M.E. Computer Engineering (Computer Networks)

510208 : DISTRIBUTED SYSTEMS

(2013 Pattern) (Semester-II)

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

Instructions to the candidates:

1) ***Sove any Three questions from question No.1,2,3,4. and any Three Questions from question No. 5,6,7,8.***
2) ***Assume suitable data, if necessary.***

Q1) a) Explain in detail challenges encountered during the design of distributed systems? **[4]**

b) Write short note on communication between distributed objects. **[4]**

Q2) a) Discuss in detail Agreement Protocols. **[4]**

b) What is deadlock? What are different issues? Discuss any one centralized deadlock detection algorithm. **[5]**

Q3) a) Discuss necessity of synchronization of computer clock. Explain vector clock. **[4]**

b) Explain singhal's dynamic information structure algorithm. **[4]**

Q4) a) Discuss causual ordering of messages. **[4]**

b) Discuss Suzuki-Kasami's broadcast algorithm. **[4]**

Q5) a) Discuss design issues of distributed file systems. **[4]**

b) Explain issues related to distributed Scheduling and any one algorithm of distributed scheduling. **[4]**

P.T.O.

Q6) a) Explain asynchronous check pointing and recovery. **[4]**

b) Write short note on distributed multimedia system. **[4]**

Q7) a) What is Committing? Explain non-blocking Commit Protocol. **[4]**

b) Write short note on backward error recovery. **[4]**

Q8) a) Explain Java messaging Service from JEE architecture. **[4]**

b) Explain WSDL and UDDI. **[5]**

Total No. of Questions :12]

SEAT No. :

P4650

[Total No. of Pages :2

[5355] - 237

M.E. (Computer Networks)

HIGH PERFORMANCE NETWORKS

(2013 Credit pattern)(Semester-II) (510209)

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

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10, Q11 or Q12.***
2) ***Neat diagram must be drawn whenever necessary.***
3) ***figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary***

Q1) a) How data flow in network with reference of TCP/IP model. **[5]**

b) Explain Token ring in detail. **[4]**

OR

Q2) a) Write short note on 4G network. **[4]**

b) Explain Wireless networks 802.11. **[5]**

Q3) a) Explain Ethernet flow control. **[4]**

b) Distinguish between ATM and X.25. **[4]**

OR

Q4) a) Describe in detail Ethernet frame structure. **[4]**

b) Explain research areas in Gigabit Ethernet. **[4]**

P.T.O.

Q5) a) Explain Adaption layer of ATM. **[4]**

b) Explain the research Area of ATM. **[4]**

OR

Q6) a) Explain Interworking with ATM with its basic task. **[4]**

b) Write in brief about ATM layers. **[4]**

Q7) a) Explain MPLS encapsulation standards. **[4]**

b) Explain in detail Fixed broadband wireless networks. **[4]**

OR

Q8) a) Explain MPLS forwarding operations in detail. **[4]**

b) Explain IP over MPLs architecture in detail. **[4]**

Q9) a) Write note on mobile broadband wireless network. **[4]**

b) Describe Mobile WiMax in detail. **[4]**

OR

Q10)a) Short note on GSM. **[4]**

b) Short note on HSPA. **[4]**

Q11)a) 3G AND 4G Architectural comparison. **[5]**

b) Short note on LTE. **[4]**

OR

Q12)a) List out SHEDULING ALGORITHM HSDPA Any 2 algorithm with details. **[5]**

b) Write in brief about WCDMA. **[4]**

* * *

Total No. of Questions :7]

SEAT No. :

P4651

[Total No. of Pages : 1

[5355] - 238

M.E. (Computer) (Computer Networks)

ADVANCED TCP/IP

(2013 Credit Pattern) (Semester - III) (610201)

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

Instructions to the candidates:

1) ***Attempt any Five questions from Q1 to Q7.***
2) ***Figures to right indicate full marks.***
3) ***Neat diagram must be drawn whenever necessary.***
4) ***Assume suitable data, if necessary.***

Q1) a) Draw and explain client server architecture? **[5]**

b) Write socket programming primitives? **[5]**

Q2) a) Explain DNS in details with example.? **[5]**

b) Explain Rlogin with diagram? **[5]**

Q3) a) Write working SMTP protocol in application layer? **[5]**

b) Write note on HTTP and HTTPS? **[5]**

Q4) a) Explain congestion control schemes? **[5]**

b) Explain TCP Tahoe and TCP Reno? **[5]**

Q5) a) Explain AODV protocol in wireless environment? **[5]**

b) Explain TCP Westwood and TCP Jersey? **[5]**

Q6) a) Explain security issues in network and transport layer? **[5]**

b) Explain firewall types? **[5]**

Q7) a) Explain FTP protocol? **[5]**

b) Draw and write description of TCP state transition diagram? **[5]**

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Total No. of Questions :12]

SEAT No. :

P4652

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[5355] - 239

M.E. Computer (Networks)

SYSTEM OPERATIONS AND MAINTENANCE

(2013 Course) (Semester - III) (610202)

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

Instructions to the candidates:

1) ***Attempt Q. No. 1 or 2, Q. No. 3 or 4, Q. No. 5 or 6, Q.7 or 8., Q.9 or 10., Q. No. 11 or 12.***
2) ***Figures to the right indicates full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable data if necessary.***

Q1) Explain in detail Cisco IOS XR Software. Also explain components of IOS XR Layered High Availability Architecture. **[9]**

OR

Q2) What are the requirements of Carrier-Grade NOS. **[9]**

Q3) What is "TURBOBOOT"? Give the steps needed to boot the IOS XR software on a router. **[8]**

OR

Q4) What is two stage configuration model? Explain with suitable example. **[8]**

Q5) What is Embedded Event Manager? Discuss EEM policies that can be implemented on router to help better fault management and event notification.**[8]**

OR

Q6) What is the role of ACS server? Explain how IOS XR router is connected to ACS server. **[8]**

P.T.O.

Q7) Compare IPv4 and IPv6 models. Also list 4 different types of Interior Gateway Protocol (IGP), Explain any two in details. **[8]**

OR

Q8) How IS-IS protocol implements connectionless network service? Illustrate. **[8]**

Q9) Draw and explain Cisco IOS XR MPLS Architecture. Also explain following MPLS Label Operations,Push, PoP, De-aggregate, Swap and push. **[8]**

OR

Q10) List and explain silent features of Label Distribution Protocol (LDP). Also draw and explain Cisco IOS XR MPLS Architecture. **[8]**

Q11) Discuss Owner and Non-owner SRD and role of SRD Privileges. **[9]**

OR

Q12) Explain Functionalities of Three-Stage Fabric Links and Multi Module Configuration in IOS XR 3.5. **[9]**

Total No. of Questions :8]

SEAT No. :

P4478

[Total No. of Pages :2

[5355] - 24

M. E. (Civil) (Geotechnical)

RESEARCH METHODOLOGY

(2013 Pattern) (Semester - I)

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

Instructions to the candidates:

1) ***Attempt any five questions out of eight questions.***
2) ***Each question carries ten marks.***

Q1) a) State the characteristics of a good research problem.

b) Explain the process of formulation of research hypotheses.

Q2) a) Which are the elements of research proposal?

b) What is the need of literature survey?

Q3) a) Elaborate the styles and strategies of literature review.

b) Enlist the various data collection methods and discuss the factors affecting their choice.

Q4) a) What are the types of measurements. Enlist the criteria of good measurements.

b) Which are the statistical measures used for data analysis. Describe their significance.

Q5) a) What is ANOVA (analysis of variance) test? In which situation is it useful?

b) Differentiate between qualitative and quantitative data analysis.

Q6) a) What is multiple regression analysis? When is it used?

b) Explain the concept of factor analysis.

P.T.O.

Q7) a) Explain various steps involved in report writing.

b) Write a note on plagiarism.

Q8) a) Describe various styles and elements of effective presentation.

b) What is patenting? How are the patents useful to society, business, and individuals?

Total No. of Questions : 5]

SEAT No. :

P4653

[Total No. of Pages : 2

[5355]-241

M.E. (Information Technology)

MATHEMATICAL FOUNDATION OF INFORMATION TECHNOLOGY

(2013 Pattern) (Semester - I) (514401)

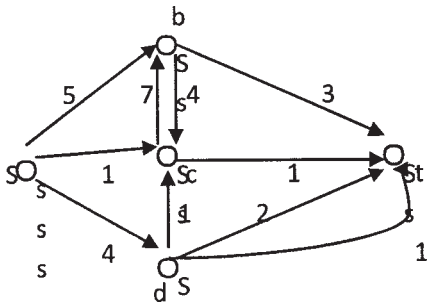
Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

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

Q1) Solve any two:

a) Define Max-Flow min cut theorem. Find the maximum flow possible in a given transport network. **[5]**



b) Design fuzzy logic system for controlling room temperature. Design a membership function for representing the same system. Assume temperature between 0 to 30 is normal, 30 to 40 is medium and 40 and above high temperature. **[5]**

c) Derive the extension principle for fuzzy logic. **[5]**

Q2) Solve any two: **[5]**

a) Explain the following terms:

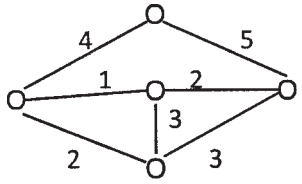
i) T-test

ii) Z-test

iii) Chi-square test

P.T.O.

b) Find MST using prim's algorithm also state the drawback of prim's algorithm. **[5]**



c) Differentiate between Binomial, Poisson, Normal and Gamma distributions. **[5]**

Q3) Solve any two:

a) Prove that Var [X + Y] = Var [X] + Var [Y], if X and Y are independent random variable. **[5]**

b) Using your own intuition and your own definition of universe of discourse, plot fuzzy membership functions to the following variables. **[5]**

i) Small
ii) Empty
iii) Full

c) A die is thrown 132 times with the following results **[5]**

Number turned up	:	1	2	3	4	5	6
Frequency	:	19	20	27	17	25	28

Is the die unbiased?

Q4) Solve any two:

a) Let G = (V, E) be an undirected graph with k components and |v| = n and |E| = m. Prove that m > = n–k. **[5]**

b) A box contains 15 white and 6 black balls. Find the number of ways 4 balls can be drawn from the box if **[5]**

i) Two balls must be white
ii) All of them must have same color

c) The elements in two fuzzy sets X and Y are given as X = {1, 2, 3, 4} Y = {p, q, r, s}. Find the various Cartesian products of these two sets. **[5]**

Q5) Solve any two:

a) Prove Max-Flow min-Cut theorem. **[5]**

b) What is Chi-square test? Explain its significance in statistical analysis. **[5]**

c) Prove 'Handshaking Lemma' using example. **[5]**

⌘⌘⌘

Total No. of Questions :8]

SEAT No. :

P4654

[Total No. of Pages : 2

[5355] - 242

M.E. (Information Technology)

APPLIED ALGORITHMS

(2013 Course) (Semester - I) (514402)

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

Instructions to the candidates:

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

Q1) a) Prove by mathematical induction that the sum of the cubes of the first n positive integers are equal to the square of the sum of these integers. **[5]**

b) Solve the following recurrence relations: **[5]**

i) $T_{(n)} = 0$ if n=0;

$T_{(n)} = 2T_{(n-1)}+1$, otherwise

ii) $T_{(n)} = 9n^2 - 15n + 106$, if n = 0, 1, 2

$T_{(n)} = 5T_{(n-1)} - 8T(n-2) + 4T(n-3)$, otherwise

Q2) a) Define and give worst case, average case and best case time complexity of recursive binary search algorithm. **[5]**

b) Write merge sort algorithm, state recurrence equation and solve it to analyze its time complexity. **[5]**

Q3) a) What is Red-Black Tree? State its properties and explain working of insert operation of Red Black tree with example. **[5]**

b) What is B-Tree? Write an algorithm for B- Tree split operation. **[5]**

Q4) a) Explain Graham's scan algorithm with example. **[5]**

b) What are the classical geometric problems? Discuss point location and voronoi diagrams. **[5]**

P.T.O.

Q5) a) What is online and offline algorithms? Explain the online Euclidean spanning tree problem solved by the Greedy method. **[5]**

b) Explain online obstacle traversal algorithm based on the balance strategy. **[5]**

Q6) a) What is online k-server problem? Write and explain k-server problem solved by the Greedy Algorithm. **[5]**

b) What is NP-complete and approximation algorithms? Prove that vertex cover problem is NP-complete. **[5]**

Q7) a) State and explain the types of randomized algorithms. Discuss applications of randomized Algorithms. **[5]**

b) Write and explain pointer jumping algorithm for parallel computers. **[5]**

Q8) a) What is splay tree? Explain and analyze insert operation of splay tree. **[5]**

b) What is the basic problem in CRCW PRAM model, when more than one processor tries to write in the same cell? Justify your answer to overcome this problem. **[5]**

Total No. of Questions : 8]

SEAT No :

P 4655

[Total No. of Pages : 2

[5355]-243
M.E. (Information Technology)
ADVANCED OPERATING SYSTEMS
(2013 Pattern) (Semester-I) (514203)

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

Instructions to the candidates:

1) ***Solve any five questions from 8 Questions.***
2) ***Figures to the right side indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable data, Wherever necessary.***

Q1) a) Explain the following UNIX system calls **[4]**

Fork, Execve.

b) Is program a process? A program has multiple processes but process has only a program, Explain with a scenario. **[3]**

c) How does the parent know the termination of child process? What action does the parent process take when the child process gets terminated? **[3]**

Q2) a) Explain kernel-level threads. **[4]**

b) Explain the relationship between pthread-join and pthread-exit APIs. **[3]**

c) What is the difference between blocking lock and non-blocking lock. **[3]**

Q3) a) Explain any one page table scheme for paging. **[5]**

b) What is working set? Explain the concept of global pool and local pool. **[3]**

c) What is a frame? **[3]**

Q4) a) Explain any four features of UNIX's S5FS. **[4]**

P.T.O.

b) What is a virtual memory? Explain the 64-bit issues for managing the memory. **[4]**

c) What is an indexed node in the context of a file system? **[2]**

Q5) a) What is a single system image in the context of distributed operating system? **[2]**

b) Explain Lamport's logical clock for the clock synchronization. **[4]**

c) Explain any four design issues in the distributed system. **[4]**

Q6) a) What is an object-based DSM? Explain with example. **[5]**

b) Explain token-based election algorithm in distributed system. **[3]**

c) Explain any two design issues for Message Passing in distributed system. **[2]**

Q7) a) Explain as to how processes are addressed in the distributed system. **[5]**

b) List and explain load transfer policies. **[5]**

Q8) a) What are different load estimation policies in distributed operating systems. **[5]**

b) Write a short note on Transparency in distributed operating systems. **[5]**

Total No. of Questions :5]

SEAT No. : ____

P4656

[Total No. of Pages :2

[5355] - 244

M. E. (Information Technology)

RESEARCH METHODOLOGY

(2013 Pattern) (Semester - I) (514404)

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

Instructions to the candidates:

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

Q1) a) What do you mean by research design? Differentiate between research methodology and research design. Illustrate your answer with suitable example. **[6]**

b) Enumerate the different methods of collecting data. Which one is the most suitable for conducting enquiry regarding family welfare program in India? Explain its merits and demerits. **[4]**

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

i) Experimental variable.

ii) Controlled variable.

iii) Intervening variable.

b) How is a problem stated? Describe the various ways of defining a research problem. **[4]**

P.T.O.

Q3) a) Distinguish between: **[6]**

i) Simple hypothesis and composite hypothesis

ii) Null hypothesis and alternative hypothesis.

b) What are the essential qualities of research report? Discuss. **[4]**

Q4) a) Describe the difference between restricted and unrestricted sampling, Convenience and purposive sampling. **[4]**

b) "Pandit Auto" one of the leading automobile companies in India, lost market share to its competitor Hero Honda in the late 2000's. In order to regain its market share, the company plans to find out the reason for its failure in the market. You are appointed as a research to M/s Pandit Auto based on following questions: **[6]**

i) What type of research design would you prefer? Support your answer with reasons.

ii) State the sources through which Pandit Auto can obtain primary data.

iii) How would you prepare a research support?

Q5) a) The mean produce of wheat of a sample of 100 fields in 200 lbs. per acre with a standard deviation of 10 lbs. Another samples of 150 fields gives the mean of 220 lbs. With a standard deviation of 12 lbs. Can the two samples be considered to have been taken from the same population whose standard deviation is 11 lbs? Use 5 per cent level of significance.**[6]**

b) Define the term 'Review of literature', how is it different from traditional meaning? Enumerate the objectives and significance of review of literature. **[4]**

Total No. of Questions : 8]

SEAT No :

P 4657

[Total No. of Pages :2

[5355]-245

M.E. (Information Technology)

WIRELESS COMMUNICATION TECHNOLOGIES

(2013 Pattern) (Semester-II) 514407

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

Instructions to candidates:

1) ***Assume suitable data if necessary.***
2) ***Answer any 5 out of 8 questions.***
3) ***Figures to the right indicate full marks.***

Q1) a) Explain advantages and disadvantages of DSDV. **[5]**

b) Explain the technical challenges in a PRNET. **[5]**

Q2) a) Explain the working of On-Demand Distance Vector Routing Algorithm. **[5]**

b) What is wireless sensor network? Explain the architecture of Wireless Sensor Node along with its components. **[5]**

Q3) a) State advantages and disadvantages of Location Aided Routing Protocol. **[5]**

b) Explain the routing protocol which uses a link-reversal algorithm. **[5]**

Q4) a) Explain Type2- update messages used in predictive location-based QoS routing protocol. **[5]**

b) Explain the DSR routing with its advantages and disadvantages. **[5]**

P.T.O.

Q5) a) What is the need of energy management in Ad-hoc wireless Networks. **[5]**

b) Differentiate hard state receiver-initiated multicast protocol and soft-initiated multicast protocol. **[5]**

Q6) a) Explain requirements and challenges for Security in Ad Hoc Wireless Networks. **[5]**

b) What are the reasons TCP does not perform well in Ad Hoc Wireless Networks? **[5]**

Q7) a) Explain the battery management protocol, which tries to increase the lifetime of the nodes by exploiting the recovery capacity effect of battery. **[5]**

b) Describe Generalized pulse discharge PAMAS protocol. **[5]**

Q8) a) Discuss the INORA QoS Frameworks for Ad hoc Wireless Network. **[5]**

b) Explain the working of TORA protocol. **[5]**

Total No. of Questions : 8]

SEAT No :

P 4658

[Total No. of Pages : 2

[5355]-246

M.E. (Information Technology)

ADVANCED DATABASE SYSTEMS

(2013 Credit Pattern) (Semester-II)

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

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Make suitable assumptions whenever necessary.***
4) ***Figure to the right indicate full marks.***
5) ***All questions carry equal marks.***

Q1) a) Explain Framework of Distribution in distributed database Design. **[5]**

b) Discuss Motivation for Standardization of DDBMS Architecture. **[5]**

Q2) a) Explain Mediator/wrapper architecture of multidatabase system. **[5]**

b) What do you mean by localization of distributed data. **[5]**

Q3) a) Explain Primary Copy and Majority Protocols for concurrency control in distributed database. **[5]**

b) Explain with an example handling of dead lock in distributed environment. **[5]**

Q4) a) Discuss Three Major Components of Distributed Reliability Protocols. **[5]**

b) Explan Write-Ahead Log (WAL) Protocol. **[5]**

Q5) a) With a neat diagram explain General Architecture of a Parallel Database System. **[5]**

b) Discuss Intra-Query Load Balancing with a example. **[5]**

P.T.O.

Q6) a) Define object identifiers (OIDs). Discuss common solutions for implementation of persistent object identifier. **[5]**

b) Discuss class partitioning algorithms. **[5]**

Q7) a) Discuss in detail Reasons for creating a data mart. **[5]**

b) Explain the main components of data warehouse. **[5]**

Q8) a) Explain Conceptual Modeling of Data Warehouses with example. **[5]**

b) Explain Decision Tree Algorithm with an example. **[5]**

Total No. of Questions :[8]

SEAT No. :

P4659

[Total No. of Pages :2

[5355] - 247

M.E. (Information Technology)

ADVANCE COMPUTER ARCHITECTURE

(2013 Course) (Semester-II) (514409)

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

Instructions to the candidates:

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

Q1) a) Explain in brief Challenges of overcoming Data Hazards with Dynamic Scheduling. **[4]**

b) Discuss Instruction Level Parallelism. **[2]**

c) Explain different Compiler Techniques for Exposing ILP. **[4]**

Q2) a) Explain and draw distributed shared memory architectures. **[4]**

b) Explain Dynamic Branch Prediction. **[2]**

c) Explain in detail difference of Hardware versus Software Speculation. **[4]**

Q3) a) Explain the performance and efficiency in advanced multiple issue processors. **[4]**

b) Explain the Models of Memory Consistency. **[4]**

c) What are the Synchronization issues? **[2]**

P.T.O.

Q4) a) Explain and draw CMP architectures. **[4]**

b) What are the design issues of SMT architecture? **[3]**

c) Explain the IBM cell architecture. **[3]**

Q5) a) Explain the Software and hardware multithreading in details. **[4]**

b) Write a note on SUN CMP architecture. **[3]**

c) Explain the Intel Multi-core architecture. **[3]**

Q6) a) Explain the term Memory Technology in detail. **[4]**

b) Explain the Memory Optimizations in the context of protection. **[4]**

c) Explain Memory hierarchy design. **[2]**

Q7) a) Write notes on: **[5]**

i) Computational models.

ii) Fine grained SIMD.

b) What are the Recent architectural trends in Computer architecture? **[5]**

Q8) a) Explain Data flow architectures. **[5]**

b) Discuss different multi core memory issues. **[5]**

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Total No. of Questions :8]

SEAT No. :

P4660

[Total No. of Pages : 2

[5355] - 248

M.E. (Information Technology)

INFORMATION ASSURANCE AND SECURITY

(2013 Course) (Semester - III) (514413)

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

Instructions to the candidates:

1) ***Answer any five questions from eight questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of Calculator is allowed.***
5) ***Assume Suitable data ifnecessary.***

Q1) a) Define confidentiality. **[2]**

b) Write the critical characteristics of information. **[4]**

c) List the components of the C.I.A. triangle? Why is CIA so commonly used in security? **[4]**

Q2) a) State components of an Information Security? **[3]**

b) Explain False Accept Rate and False Reject Rate? Write example. **[3]**

c) What is Hybrid firewall. **[4]**

Q3) a) State six components of an Information System and explain which are most directly affected by the study of computer security. **[3]**

b) Why privacy is important from an information security context? **[3]**

c) Why is data the most important asset of an organization? List assets in the organization that require protection? **[4]**

Q4) a) What is computer forensics? State its uses? **[4]**

b) What is malware? How do worms differ from viruses? **[4]**

c) Why do employees constitute one of the greatest threats to information security? **[2]**

P.T.O.

Q5) a) What is the difference between law and ethics? How policy is different from a law? **[3]**

b) How to identify vulnerabilities? **[3]**

c) State the features of Biometric Access Controls. **[4]**

Q6) a) What are the three types of security policies? **[5]**

b) What is computer forensics? When are the results of computer forensics used? **[5]**

Q7) a) Define Cyber Crime. Enlist at least six types of cybercrime. **[5]**

b) What is a honeypot? How is it different from a honeynet? **[5]**

Q8) a) Why is the identification of risks, by listing assets and their vulnerabilities, so important to the risk management process? **[5]**

b) List five generations of firewall technology. Which generations are still in common use? **[5]**

Total No. of Questions :8]

SEAT No. :

P4661

[Total No. of Pages :3

[5355] - 249

M.E. (Information Technology)

NETWORK PROGRAMMING

(2013 Course) (Semester - III)

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

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagrams must be drawn whenever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of Calculator is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) a) List out different types of messages exchanged across a routing socket with brief descriptions. **[2]**

b) Write the structure for data link socket with descriptions about each members of the data link socket structure. **[4]**

c) Explain the working of routing socket with its syntax descriptions. Mention the domain name and type for Routing sockets creation. **[4]**

Q2) a) Write a program using TCP socket to perform arithmetic operations, where multiple clients can request to the concurrent server for a specific task to be performed. **[4]**

b) Explain in brief about byte ordering used in the client server communication over a TCP network. **[2]**

c) With psudo code example describe the working of select() function to handle multiple clinent requests by the server. **[4]**

P.T.O.

Q3) a) Explain about the state transition diagram used for the description of working of TCP connection between client and server. List out different states separately for connection establishment and connection termination. **[4]**

b) Discuss about the client and server exchanges packets for connection establishment and connection termination. Discuss about the structure of packets used in the communication. **[4]**

c) Describe in brief about passive open and active open in client/server communication using TCP. **[2]**

Q4) a) With clear diagrammatic representation describe Ipv6 server on dual-stack host. **[4]**

b) Explain about the interoperability in communications with Ipv6. Also list out Ipv6 address – testing macos with clear description of each maco. **[3]**

c) Write different steps Ipv6 server uses in handling of Ipv4 TCP clients. **[3]**

Q5) a) Describe in brief about working of IP broadcasting. With an example describe how multicasting and broadcasting are used in the LAN. **[4]**

b) SNTP is used to synchronize clocks across a WAN or a LAN, how it works to provide clock synchronization in communication? Give some examples of NTP packet formats used for synchronization. **[3]**

c) With appropriate diagrammatic representation explain about sending of multicast packets on a WAN. **[3]**

Q6) a) Explain in detail about TIME_WAIT state with regard to network programming. **[4]**

b) Describe the working of resolvers along with clients and name servers with appropriate diagrammatic representations. **[4]**

c) Write in brief about the working of DNS to map between hostname and IP address. **[2]**

Q7) a) Write a program using POSIX thread to implement echo server using one thread per client. Program should contain clear comment about the functions used in the program. **[5]**

b) Explain different thread libraries available for network application developments along with the sockets. Also describe the working of pthread_create() and pthread_join() with examples. **[5]**

Q8) a) With appropriate comments write a process based concurrent server program where one child process is created to process per client's request. **[5]**

b) Write suitable segment of codes using POSIX threads and fork() to describe the working nature of concurrent servers implemented using multiple threads and processes. **[5]**

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Total No. of Questions :8]

SEAT No. :

P4479

[Total No. of Pages : 2

[5355] - 25

M.E. (Civil) (Geotechnical Engineering)

ADVANCE FOUNDATION ENGINEERING

(2013 Pattern) (Semester - II)

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

Instructions to the candidates:

1) ***Attempt any 5 questions from 8 questions.***
2) ***Figures to the right indicate full marks.***
3) ***Use of logarithmic tables, slide rule, Mollier charts, electonics pocket calculator and steam tables is allowed.***
4) ***Assume suitable data if necessary.***
5) ***Neat diagrams must be drawn wherever necessary***

Q1) a) What are the various stages in sub soil investigation program? Explain the term preliminary investigation in detail. **[4]**

b) A thin-wall tube sampler was pushed into soft clay at the bottom of a bore hole at a distance of 400mm. When the tube was recovered, a measurement down inside the tube indicated a recovered sample length of 565mm. What is the recovery ratio, and what happened to the sample? If the another sampler with 74.2mm outside diameter, 72mm inside diameter, 580mm length tube was used, what is the probable sample quality. **[6]**

Q2) a) Explain the direct cone penetration test and discuss the DCPT correlation for cohesive soil. **[4]**

b) In a clay layer, the GWT is located below 4.0m below the ground surface. The unit weight of soil above and below the GWT are 17.5 kN/m^3 and 19 kN/m^3 respectively. The cone penetration resistance below the ground surface is 0.8 MN/m^2. Determine the undrained cohesion, Cu. Also find the over consolidation7 ratio, OCR. **[6]**

Q3) a) Calculate the ultimate load, Q_{ult} for following data. **[4]**

i) Footing of size 1.2m x 1.2m is laid at a depth of 0.7m below ground level.

ii) The footing is laid in a sandy layer having $\gamma = 18.5\ kN/m^3$, $\phi' = 30°$, $C = 0$.

P.T.O.

iii) Assume that the one-way load eccentricity e=0.15m.

iv) Take N_q = 18.4 N_γ = 22.4.

b) A footing of size 1.5m x 1.0m is located at a depth of 1.0m in stronger clay. A softer clay layer is located at a depth of 1m, measured from the bottom of the foundation. **[6]**

For top layer Undrained Cohesion C_1=120kN/m^2 and γ =16.8 kN/m^3

For bottom layer Undrained Cohesion C_2=48kN/m^2 and γ =16.2 kN/m^3

Calculate the gross allowable load for the footing with an FOS of 4.

Q4) a) Write a note on Modulus of subgrade reaction k_s for raft foundation. **[4]**

b) What will be the net allowable bearing capacity of a raft foundation with dimensions of 12m x 10m constructed over a sand deposit? Here, D_f = 2.5m, the allowable settlement is 30mm and the corrected average penetration number N_{60} = 12. **[6]**

Q5) a) Discuss with hlep of neat sketch the construction sequence for backfilled structure and dredged structure sheet pile. **[4]**

b) What are the various stability check involved in the design of cantilever sheet pile wall. **[6]**

Q6) a) Write a note on Brooms method of pile design. **[4]**

b) A square concrete pile of 400 mm x 400 mm in cross section is placed in a sandy soil for which γ = 16.5 kN/m^3, ϕ' = 30°. Determine the ultimate point load carried by the pile by using Meyerhof's method.

Take Nq=55.0 **[6]**

Q7) a) What are the practical considerations in cellular cofferdam design? **[4]**

b) How will you determine bearing capacity for a cofferdam founded on soil? Enlist only the steps to be followed. **[6]**

Q8) a) Enlist and explain the factors that influence the depth of well foundation. **[4]**

b) Explain the various components and types of loading on well foundation. Draw the necessary sketch. **[6]**

Total No. of Questions : 8]

SEAT No. :

P4662

[Total No. of Pages : 3

[5355]-251

M.E. (Chemical Engg.)

MATHEMATICAL AND STATISTICAL METHODS

(2013 Pattern) (Semester - I) (509101)

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

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Black figures to the right indicate full marks.***
4) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables in allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Solve the differential equation using power series. **[5]**

$$y' - y = 0$$

$$y'' + 9y = 0$$

b) Solve the following Legendre's equation using power series. **[5]**

$(1 - x^2)\, y'' - 2x\, y' + n(n+1)\, y = 0$

Q2) Convert the Laplace equation in polar coordinates $\nabla^2 u = \frac{d^2u}{dx^2} + \frac{d^2u}{dy^2}$ Take $x = r\cos\theta$ and $y = r\sin\theta$. **[10]**

Q3) a) Find the Laurent series expansion of $(z-1)/z^2$ for $|z-1| > 1$. **[5]**

b) Find Talor's expansion of $f(z) = 1/(z+1)^2$ about the point of $z = -i$. **[5]**

Q4) a) The following mistakes per page were observed in a book. Fit the Poission distribution to fit data: **[5]**

No. of mistakes per page	0	1	2	3	4
No. of times the mistakes occurred	211	90	19	5	0

b) Suppose that a manufactured product has 2 defects per unit of product inspected, using Poission distribution, calculate the probabilities of finding the product without any defect, 3 defect, and 4 defect. **[5]**

P.T.O.

Q5) a) A random variable X has the following probability distribution. **[5]**

i) Find K,

ii) Evaluate P (X<2),

iii) Find the cdf of X and

iv) Evaluate the of X

X	–2	–1	0	1	2	3	4
P(X)	0.1	K	0.2	2K	0.3	3K	0.3

b) Compute the coefficient of correlation between X and Y using the following data: **[5]**

X	1	3	5	7	8	10
Y	8	12	15	17	18	20

Q6) a) Find the rank correlation for the following data: **[5]**

x	1	6	5	10	3	2	4	9	7	8
y	6	4	9	8	1	2	3	10	5	7

b) Find the line of regression of **[5]**

i) y on x and

ii) x on y

x	1.53	1.78	2.6	2.95	3.42
y	33.5	36.3	40.0	45.8	53.5

Q7) a) Two random sample gave the following data. Can we conclude that the two sample have been drawn from the same normal population? **[5]**

($v = 17$, $t_{0.05} = 2.11$) ($F_{0.05}$ 3.65 (10, 7))

Sample No	Size	Mean	Variance
1	8	9.6	1.2
2	11	16.5	2.5

b) Test the normality of the following distribution by using chi-square test of goodness of fit. take $\chi^2_{0.05}$ ($v = 2$) = 5.99. **[5]**

x	125	135	145	155	165	175	185	195	205
f	1	1	14	22	25	19	13	3	2

Q8) Analyze the variance in the following Latin square yield of paddy where A, B, C, D denote the difference methods of cultivation. Examine whether the difference methods of cultivation have given significantly different yields. Take $F_{5\%}(V_1 = 3, V_2 = 6) = 4.76$ **[10]**

A122	B121	C123	B122
B124	C123	A122	D125
A120	B119	D120	C121
C122	D123	B121	A121

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Total No. of Questions :8]

SEAT No. :

P4663

[Total No. of Pages : 2

[5355] - 252

M.E. (Chemical)

PROCESS OPTIMIZATION

(2013 Course) (Semester - I) (Theory)

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

Instructions to the candidates:

1) ***Answer total 5 questions from following.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Find whether the following function is strictly convex / strictly concave

$f(x) = 9x_1^2 + x_1x_2 - 2x_1 + 3x_2 - 16x_2^2 + 150$ **[5]**

b) Write the optimality criteria for the single variable optimization problems. **[3]**

c) Define saddle point. **[2]**

Q2) a) State the quadratic forms are positive definite, negative definite or neither.

i) $f = x_1^2 - x_2^2$

ii) $f = 4x_1 x_2$ **[5]**

b) Write a note on-concavity of function. **[3]**

c) What is mean by the inflection point? **[2]**

Q3) a) Explain the Simplex Search Method and demonstrate for minimization of $f(x) = 2x_1^2 + 5x_2^2 - 9$ starting at $(x^0)^T = [4\ 3]$ in the direction $s^0 = [-1\ -3]^T$. Perform 2 iterations. **[5]**

b) Find whether the given direction s at the point x is descent for the function

$f(x_1, x_2) = 2x_1^2 + x_2^2 - 2x_1x_2 + 4$

$s = (1, 1)^T$, $x = (2, 3)^T$ **[3]**

c) Explain direct search methods for optimization. **[2]**

P.T.O.

Q4) a) *Minimize* $f(x) = (x_1 - 2)^2 + x_2^2$
Subject to linear constraint s
$x_1 \geq 0$, $x_2 \geq (-10)$, $7 - 2x_1 - x_2 \geq 0$, $24 - 3x_1 - 2x_2 \leq 0$. Use Simplex method. **[5]**

b) Is the point $(0,1)^T$ Kuhn-Tucker point? **[3]**

c) Write a note on- Parabolic Penalty term. **[2]**

Q5) a) Explain Generalized reduced gradient method. **[5]**

b) Write a short note on-Constrained optimization. **[3]**

c) What is a feasible point? **[2]**

Q6) a) How to perform coding for Genetic Algorithm? **[5]**

b) What is 'crossover' operator in Genetic Algorithm? **[3]**

c) Explain Roulette wheel selection process. **[2]**

Q7) a) Minimize $f(x) = x^2 + (2/x) + (1/x^3)$. Use (a) Fibonacci Search Method, Write complete algorithm for these methods and demonstrate at least 3 steps towards finding optimized solution for the above function. **[5]**

b) Secant Method **[5]**

Write complete algorithm for this method and demonstrate at least 3 steps towards finding optimized solution for the above function.

Q8) a) Minimize $f(x) = x^2 + (3/(1 + x))$. Use Newton Raphson Method. Perform 2 iterations. **[5]**

b) Maximize $f(x) = x^3 - 15x^2 + 2$ in the interval [-1 1]. Use Internal halving Method for above function. Perform 2 iterations. **[5]**

Total No. of Questions : 8]

SEAT No :

P 4664

[Total No. of Pages : 2

[5355]-253
M.E. (Chemical)
ADVANCED SEPARATION PROCESSES
(2013 Pattern) (Semester-I) (509103)

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

Instructions to the candidates:

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

Q1) a) Explain the theory behind CFF, What are cake, film and medium resistances? **[5]**

b) What are recent advances in separation techniques based on surface properties and ionic properties? **[5]**

Q2) Discuss details of spiral wound module with typical schematic diagram? Also discuss comparison of module configuration. **[10]**

Q3) What are different types and choice of adsorbents and adsorption isotherms? Discuss details about the design procedure of adsortion column? **[10]**

Q4) Discuss the different types of equipments employed for electrophoresis and Dielectrophoresis? **[10]**

Q5) a) Discuss ion exchange selectivity in binary system. Derive relevant expression. **[6]**

b) What are the controlling factors in ionic separation? **[4]**

P.T.O.

Q6) a) What are the factors to be considered in foam stability and foam drainage? **[6]**

b) Write a note on pervaporation. **[4]**

Q7) Discuss Principle, working and application of supercritical extraction in detail? **[10]**

Q8) a) Discuss the factors for choice of extraneous agents in adductive crystallization. **[6]**

b) Write a short note on oil spill management? **[4]**

Total No. of Questions : 8]

SEAT No :

P5281

[Total No. of Pages : 2

[5355]-254
M.E. (Chemical)
RESEARCH METHODOLOGY
(2013 Course) (Semester - I)

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

Instructions to the candidates:

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

Q1) a) Explain Significance of Research. **[5]**

b) Research is nothing but proper fact finding method". Do you agree o disagree with this statement? Give suitable reasoning and example to support you answer. **[5]**

Q2) a) Compute the coefficient of correlation between X and Y using following data. **[5]**

X	1	3	5	7	8	10
Y	8	12	15	17	18	20

b) What do you mean by regression? Explain Simple Regression. **[5]**

Q3) a) Explain the concept of experimental design & Explain Experiment design procedure steps. **[5]**

b) Write an explanatory note on factorial (2^K) design. **[5]**

Q4) a) What do you mean by a 'case study'? Explain the steps involved in designing a case study to solve a research problem. **[6]**

b) What are the types of data? Describe qualitative methods of data collection. **[4]**

P.T.O.

Q5) a) How error analysis is done? Generally what percent of limit is allowed in error analysis? **[6]**

b) Elaborate on necessity of selection of choosing the right graph. **[4]**

Q6) a) Explain the sources which can and/or should be used for selecting a research problem. **[5]**

b) Discuss the important factors to be considered during presenting a research idea. **[5]**

Q7) a) Explain in detail the different types of citation methods. **[5]**

b) What do you understand by term "Intellectual Property Rights (IPR)"? What is importance of IPR in research work? What benefits researcher can receive through generation of IPR? **[5]**

Q8) a) Explain the significance of bibliography in writing a research report. **[5]**

b) Write an explanatory note on preparation of research presentation. **[5]**

Total No. of Questions :8]

SEAT No. :

P4665

[Total No. of Pages : 2

[5355] - 255

M.E. (Chemical)

ADVANCED TRANSPORT PHENOMENA

(2013 Course) (Semester-II) (Theory (509107)

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

Instructions to the candidates:

1) ***Answer 5 questions from 8 questions.***
2) ***Neat diagrams must be drawn whenever necessary.***
3) ***Use of electronics calculator is allowed.***
4) ***Assume suitable data if necessary.***
5) ***Use equations in appendix wherever necessary.***

Q1) Obtain profiles of momentum flux and velocity for flow of two adjacent immiscible fluids. Two immiscible, incompressible liquids are flowing in z-direction in a horizontal thin slit of length L and width W under the influence of a horizontal pressure gradient $(p_o - p_L)/$ L. The fluid flow rates are adjusted so that the slit is half filled with fluid I (more dense phase) and half filled with fluid II (the less dense phase). The fluids are flowing sufficiently slowly that non instabilities occurs. **[10]**

Q2) a) Derive the equation of motion for isothermal systems. **[6]**

b) Write short note on : **[4]**

i) The partial time derivative,

ii) The total time derivative, and

iii) Substantial time derivative.

Q3) Show the complex potential $w(z) = -v_\infty R\left(\frac{z}{R} + \frac{R}{z}\right)$

Describes the potential flow around circular cylinder of radius R, when the approach velocity is v_∞ in the positive x direction. **[10]**

P.T.O.

Q4) Derive the expression of temperature profile for viscous heat source. You can consider the flow of an incompressible Newtonian fluid between two coaxial cylinders. The surface of the inner and outer cylinders are maintained at $T=T_o$ and $T=T_b$ respectively. The outer cylinder rotates, each cylindrical shell of fluid 'rubs' against shell of fluid. This friction between adjacent layers of fluids produces heat. Mechanical energy is degraded into thermal energy. **[10]**

Q5) A solid body occupying the space from y=0 to $y=\infty$ is initially at temperature T_o. Beginning at time t=0, a periodic heat flux is given by

$$q_y = q_0 \cos wt = q_0 R\left[e^{iwt}\right]$$

is imposed at y=0. Hence q_o is the amplitude of the heat flux oscillations and w is the frequency. Find the temperature in system, assuming the system is steady state. **[10]**

Q6) A homogenous solid sphere of radius R, initially at a uniform temperature T_1, suddenly immersed a time t=0 in a volume V_f of well stirred fluid of temperature T_0 in an insulated tank. Find the thermal diffusivity $\alpha_s = k_s/\rho_s C_{ps}$ of the solid by observing the change of the fluid temperature T_f with time. **[10]**

Q7) Develop expression for mass flux and molar flow for solid diffusion into falling liquid film. **[10]**

Q8) In catalytic reactor dilute solution of solute A in a solvent S is in fully developed, laminar flow in the region z<0. When it encounters the catalytic wall in the region $0 \leq z \leq L$, solute A is instantaneously and irreversibly rearranged to isomer B. Write diffusion equation and find the solution for short distance into the reactor. Assume that the flow is isothermal and neglected the presence of B. **[10]**

Total No. of Questions : 8]

SEAT No :

P 4666

[Total No. of Pages : 2

[5355]-256
M.E. (Chemical)
ADVANCED PROCESS CONTROL
(Semester - II) (2013 Course) (End Semester)

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

Instructions to the candidates:

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

Q1) a) When is the empirical modeling the only reasonable approach to employ in developing a process model? **[3]**

b) What is Process Identification? Define. **[2]**

c) Why is the choice of input function used in process identification is important? **[5]**

Q2) a) Define Cascade control. **[2]**

b) Differentiate between feedforward and feedback control system. **[3]**

c) Design a steady state and dynamic feedforward controller for a stirred tank heater. Assume that Fi does not change and Fi=F. Then dh/dt=0. The inlet temperature Ti is the disturbance and amount of heat Q supplied by steam is manipulated variable. The control objective is to keep the liquid temperature T at desired set point, Tsp. **[5]**

Q3) a) Differentiate between SISO (Single input single output) and MIMO (Multiple input and multiple output) control system. **[3]**

b) Explain the control configuration for the stirred mixing tank. **[3]**

c) What do you mean by controllability and observability in multivariable control system? Explain. **[4]**

P.T.O.

Q4) a) What is ideal RGA and under what condition can it be obtained? **[5]**

b) Write short note on. **[5]**

i) Adaptive control

ii) Ratio control.

Q5) a) What is the purpose of an optimizing control system? Why is it needed? **[5]**

b) Write short note on conversion of Analog to Digital control and Digital to Analog control. **[5]**

Q6) a) In choosing sampling interval for sampled data system what are advantages and disadvantages of sampling too rapidly or too slowly? **[5]**

b) What key element in the digital to analog converter makes it possible to use the computer for implementing control action effectively? **[3]**

c) Name one of the three major issues raised by the use of digital computer for control system implementation? **[2]**

Q7) a) What are typical MPC capabilities? Enlist. **[3]**

b) What are other structurally similar MPC schemes? Enlist and explain any one of them. **[5]**

c) Define model predictive control in short. **[2]**

Q8) a) Differentiate between control system of complete chemical plant and control system of single processing unit. **[5]**

b) Enlist the examples of processes with large dead times and slow processes? How would you speed the process by redesigning the process or by designing proper control sheme. Explain with suitable example. **[5]**

Total No. of Questions : 8]

SEAT No. : ____

P4667

[Total No. of Pages : 2

[5355] - 257

M.E. (Chemical Engineering)

ADVANCED REACTION ENGINEERING

(2013 Course) (Semester - II) (509109)

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

Instructions to the candidates:

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

Q1) a) Differentiate between Homogeneous and Heterogeneous catalytic reactions. **[5]**

b) Explain shrinking core model with schematic diagram. **[3]**

c) Rate controlling steps. **[2]**

Q2) a) What is Eley Rideal Mechanism? Explain for the following reaction. **[5]**

$$A + B \rightarrow C$$

Use usual notations for kinetic and thermodynamic parameters.

b) What is RTD? Draw the neat sketch of step input with their response. **[3]**

c) Explain desirable properties of catalysts. **[2]**

Q3) a) Explain the mechanism of mass transfer, adsorption, reaction and desorption for heterogeneous reaction with the help of schematic diagram. **[5]**

b) Explain segregated flow model. **[3]**

c) Explain mixing concept in heterogeneous reactions. **[2]**

P.T.O.

Q4) a) Derive the mass transfer coefficients in packed beds. **[5]**

b) Explain modelling diffusion without reaction. **[3]**

c) Explain the boundary layer around the surface of a catalyst pellet. **[2]**

Q5) a) Explain dispersion model with the help of sketch. Mention transport equations involved. **[5]**

b) Explain effective diffusivity with equation and each term. **[3]**

c) What is mean by effectiveness factor? **[2]**

Q6) a) Derive an expression for effectiveness factor for rectangular catalyst particle. **[5]**

b) What is Thiele modulus for rectangular catalyst? **[3]**

c) Explain different contacting modes in heterogeneous reaction. **[2]**

Q7) a) Perform a steady-state mole balance on a reactant A. as it enters a spherical shell of inner radius r and outer radius $r+\Delta r$, and derive the differential equation describing diffusion and reaction. Incorporate the rate law (First-order in the gas phase concentration of A with in the pallet) in the differential equation, and specify the appropriate boundary conditions.**[5]**

b) Explain various types of heterogeneous reactions. **[3]**

c) Explain the heat effects during reactions porous catalyst. **[2]**

Q8) a) With the help of neat sketch, explain mechanism of reaction in trickle bed reactor. Give equations involved for single reactant. A undergoing first order reaction kinetics. **[5]**

b) Explain in detail about the fluidized bed reactor. **[3]**

c) Write short note on Multiphase Reactors. **[2]**

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Total No. of Questions :8]

SEAT No. :

P4668

[Total No. of Pages : 1

[5355] - 258

M.E. (Chemical)

PROCESS MODELING & SIMULATION

(2013 Course) (Semester - III) (509113)

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

Instructions to the candidates:

1) ***Attempt any Five questions.***
2) ***Neat diagram must be drawn whenever necessary.***
3) ***Assume suitable data, if necessary.***
4) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is permitted.***

Q1) All models are correct and all models are wrong, explain it with suitable example. **[10]**

Q2) What is Steady state and un steady state models? Explain it with suitable example. **[10]**

Q3) What is the use of Design of experiments? Justify it with example. **[10]**

Q4) Develop a model for Distillation. **[10]**

Q5) Write assumptions for a model of Fluidised Bed Reactor & develop a model. **[10]**

Q6) What is simulation? Explain it with a case study. **[10]**

Q7) Write note on Orthogonal collocation to solve PDEs. **[10]**

Q8) Explain Application of Optimization pertaining to Heat Transfer. **[10]**

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Total No. of Questions : 8]

SEAT No. : ____

P4669

[Total No. of Pages : 2

[5355] - 259

M.E. (Chemical Engineering)

ADVANCED THERMODYNAMICS

(2013 Course) (Semester - III) (509114)

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

Instructions to the candidates:

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

Q1) a) What are the criteria for stability in a liquid-liquid system? **[5]**

b) When does the Margules equation become equivalent to van laar equation? Derive four suffix Margules equation for activity coefficients. **[5]**

Q2) a) Derive an expression for the reaction equilibrium constant for a liquid phase reactions. **[5]**

b) Acetylene is catalytically hydrogenated to ethylene at 1,120°C and 1 bar. If the feed is an equimolar mixture of acetylene and hydrogen, what is the composition of the product stream at equilibrium? The reaction involved are: **[5]**

i) $C_2H_2 \rightarrow 2C + H_2$ and

ii) $2C + 2H_2 \rightarrow C_2H_4$. $K_1 = 4 \times 10^5$ and $K_2 = 2.5 \times 10^{-6}$.

Q3) a) Develop the following thermodynamic properties in terms of partition functions: **[5]**

i) Reaction equilibrium constant and

ii) Gibbs free energy

b) Calculate the relative number of distinguishable states in ice and water at 273K. $\Delta H_{fus} = 6$ kJ/mol at 273 K and $k = 1.38 \times 10^{-23}$ J/K. **[5]**

P.T.O.

Q4) a) How is the excess free energy related to the solvent activity and osmotic coefficient? **[5]**

b) Explain he isopiestic method. **[5]**

Q5) a) Explain the Second Law of Thermodynamics and rate of entropy production. **[5]**

b) Explain the heat balance equation for open systems. **[5]**

Q6) a) Explain what are surface properties. **[5]**

b) Explain in detail first and second order transitions. **[5]**

Q7) a) Explain the effect of centrifugal field. Give the relevant equations. **[5]**

b) Define the following terms Assembly, Canonical Assembly, Occupational number, Statistical weight factor. **[5]**

Q8) Explain the thermodynamics of biological systems. **[10]**

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Total No. of Questions : 8]

SEAT No :

P 4480

[Total No. of Pages : 2

[5355]-26

M.E. (Civil) (Geotechnical Engineering)

CONSTRUCTION METHODS IN GEOTECHNICAL

(501127) (2013 Pattern) (Semester-II)

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

Instructions to the candidates:

1) ***Answer any 05 questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***use of Calculator is allowed.***
5) ***Assume suitable data, if necessary. clearly mentioning the same.***

Q1) a) Explain pile driving with the necessary equipment. **[5]**

b) Write short note on concrete bored pile. **[5]**

Q2) Explain sheet pile cofferdams. **[10]**

Q3) How is seal construction by grout intrusion method done? Explain with sketches. **[10]**

Q4) Discuss measures to resolve problems with tremie box and buckling of long struts. **[10]**

Q5) What are the considerations for site and foundation preparation for caissons? **[10]**

P.T.O.

Q6) a) How is sinking of open caisson achieved? **[5]**

b) Write a short note on pneumatic caissons with its neat sketch. **[5]**

Q7) Write note on rock excavation with regards to its evaluation and planning criteria. **[10]**

Q8) Explain tunneling by TBM and its types. **[10]**

Total No. of Questions : 8]

SEAT No. :

P4670

[Total No. of Pages : 2

[5355]-261

M.E. (Environmental Engg.) (Chemical Engg.)
APPLIED STATISTICS FOR ENVIRONMENTAL ENGINEERS
(2013 Pattern) (Semester - I)

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

Instructions to the candidates:

1) ***Answer any five questions from each section.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Discuss Spearmans Rank Correlation coefficient. **[5]**

b) Explain probable error in vegression model. **[5]**

Q2) a) The mean weight loss of n = 16 grinding balls after a certain length of time in mill slurry is 3.42 grams with a standard deviation of 0.68 grams. Construct a 99% confidence interval for the true mean weight loss of such grinding balls under the standard conditions. **[5]**

b) What do you mean by coefficient of variance. **[5]**

Q3) a) Discuss relation between moments about mean in terms of moments about any point. **[5]**

b) Explain chebyshev's theorem to demonstrate how σ and σ^2 is indicate of the speed or dispersion. **[5]**

Q4) a) Explain merits and limitations of R type factor analyses related to maximum likelihood method of factor analysis in detail. **[5]**

b) What is variance ratio test. **[5]**

Q5) a) Establish relation between t and f distributions. **[5]**

b) Define terms : **[5]**

i) Factorial experiment

ii) Precision

iii) Parameters

P.T.O.

Q6) a) Discuss the phases of experimental design. **[5]**

b) Distinguish between statistics and parameters. **[5]**

Q7) a) Write note on least cost rule. **[5]**

b) Explain transportation Algorithm. **[5]**

Q8) a) What are the six steps of optimization. **[5]**

b) Maximize $z = 2x_1 + x_2$ **[5]**

Subject to $x_1 + 2x_1 \leq 10$

$x_1 - x_2 \leq 6$

$x_1 - x_2 \leq 2$

$x_1 - 2x_2 \leq 1$

$x_1, x_2 \geq 0$

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Total No. of Questions :8]

SEAT No. :

P4671

[Total No. of Pages : 2

[5355] - 262

M.E. (Chemical-Environmental Engineering)

ENVIRONMENTAL MANAGEMENT

(2013 Pattern) (Semester - I) (509132)

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

Instructions to the candidates:

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

Q1) a) Discuss national and internal standards for environmental management related to industries and environmental policies. **[5]**

b) Discuss various environmental management tools in detail. **[5]**

Q2) a) Discuss preliminary stages of EIA. **[5]**

b) What is 74^{th} amendment of the constitution. **[5]**

Q3) a) Explain environmental auditing objectives and scope. **[5]**

b) Explain evolution of life cycle assessment. **[5]**

Q4) a) Explain command and control regulations. **[5]**

b) How a rule is notified or Gazetted. **[5]**

Q5) a) Explain general procedure for risk assessment. **[5]**

b) What is eco-mapping. **[5]**

Q6) a) Explain the steps in the rule notification. **[5]**

b) Enlist different factory Act passed by Indian parliament. **[5]**

P.T.O.

Q7) a) How the central pollution control board functions for sustainable growth. **[5]**

b) What is carbon trading? **[5]**

Q8) a) Explain the major role played by ministry of Environment and forests in conservation of Environment. **[5]**

b) Discuss the salient features of the annual report of Environment and forests for the current year. **[5]**

Total No. of Questions : 8]

SEAT No :

P 4672

[Total No. of Pages : 1

[5355]-263
M.E. (Chemical) (Environmental)
ENVIRONMENTAL CHEMISTRY
(2013 Course) (Semester - I) (509133)

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

Instructions to the candidates:

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

Q1) a) What is Stoichiometry and mass balance in environmetal chemistry? **[5]**

b) Explain First order reactions with example. **[5]**

Q2) a) What are different water quality parameters? **[4]**

b) What are the environmental significance of water quality parameters? **[3]**

c) Explain the method to determine the TSS. **[3]**

Q3) What is Greenhouse Effect? Explain in detail. **[10]**

Q4) What is CO_2 Capturing? Explain the method in detail. **[10]**

Q5) How to remove the Metals from wastewater by using Ion Exchange? **[10]**

Q6) Explain atmospheric structure in detail. **[10]**

Q7) Explain the synthesis of Nano materials. **[10]**

Q8) Discuss the emerging areas of green chemistry. **[10]**

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Total No. of Questions : 8]

SEAT No :

[Total No. of Pages : 2

P 5282

[5355]-264
M.E. (Environmental Engg.) (Chemical)
RESEARCH METHODOLOGY
(Semester - I) (2013 Course)

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

Instructions to the candidates:

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

Q1) a) With suitable example explain Quantitative research. **[5]**

b) Explain Criteria of Good Research. **[5]**

Q2) a) Distinguish between simple hypothesis and composite hypothesis provide a suitable example. **[5]**

b) What do you mean by regression? Explain Simple Regression. **[5]**

Q3) a) Write a note on pollution free technologies. **[5]**

b) Discuss fundamentals of time series analysis and spectral analysis along with one application in research work. **[5]**

Q4) a) Write differentiating points between simple random sampling and complex random sampling designs? Explain clearly giving examples. **[6]**

b) What are the types of data? Describe qualitative methods of data collection. **[4]**

Q5) a) Explain the significance of a research report and brief the various steps involved in writing such a report. **[6]**

b) Explain the various steps in process of engineering research work. **[4]**

P.T.O.

Q6) a) Write a note on advantages and limitations of sources of Literature survey. **[5]**

b) What do you mean by Case Study? Explain the stepwise procedure to present a scientific case study. **[5]**

Q7) a) Explain in detail the different types of citation methods. **[5]**

b) What do you understand by term "Intellectual Property Rights (IPR)"? What is importance of IPR in research work? What benefits researcher can receive through generation of IPR? **[5]**

Q8) a) Write an explanatory note on "interdisciplinary research". **[5]**

b) Write an explanatory note on research hypothesis. **[5]**

Total No. of Questions :8]

SEAT No. :

P4673

[Total No. of Pages : 2

[5355] - 265

M.E. (Chemical) (Environmental Engineering)

WASTE WATER TREATEMENT AND DESIGN

(2013 Course) (Semester - II) (509137)

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

Instructions to the candidates:

1) ***Attempt any 5 questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicates full marks.***
4) ***Use of logarithmic tables slide rule. Mollier charts, electronic pocket calculator and steam tables is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) What are mass transport problems. **[5]**

b) Distinguish between ideal and non ideal reactors. **[5]**

Q2) a) Determine the theoretical power requirement to achieve a G value of 100/S in a tank with a volume of 2800 m^3. Assume that the water temperature is 15ºC. What is the corresponding value when the water temperature is 5ºC, $\mu = 1.518 \times 10^{-3}$ N-s/m^2 and μ at 15ºC is $1.13g \times 10^{-3}$ N-s/m^2. **[5]**

b) Explain back wash hydraulics. **[5]**

Q3) a) Explain PSA in the process of adsorption. **[5]**

b) Explain the design of GAC contractors. **[5]**

Q4) a) State and explain principle and mechanism of filtration. **[5]**

b) Explain freundlich and Langmuir isotherm in adsorption. **[5]**

Q5) a) Explain the concept of uptake capacity. **[5]**

b) What do you mean by carbon regeneration and reactivation. **[5]**

Q6) a) Discuss process design consideration for Rotating Biological Contactors (RBC). **[5]**

b) Explain trickling filter solid-contact process. **[5]**

P.T.O.

Q7) a) What are the objectives of biological treatement and its limitations. **[5]**

b) Discuss process kinetics and design considerations in biological processes. **[5]**

Q8) a) Explain fundamental aspects of anaerobic treatement. **[5]**

b) What are different types of anaerobic reactors. **[5]**

Total No. of Questions : 8]

SEAT No :

P 4674

[Total No. of Pages : 2

[5355]-266
M.E. Chemical-Environmental
509138 : SOLID WASTE MANAGEMENT
(2013 Course) (Semester - II)

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

Instructions to the candidates:

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

Q1) Describe solid waste management in detail. **[10]**

Q2) Describe the possibilities in solid waste management with respect to reduction, reuse and recovery. **[10]**

Q3) List out the methods for the primary collection of solid waste. **[10]**

Q4) What is composting? Explain in detail. **[10]**

Q5) Describe mechanical collection of solid wastes. **[10]**

Q6) Explain energy recovery from solid waste. **[10]**

P.T.O.

Q7) Discuss the major types of gaseous emissions from a mass burn incinerator and how each may be effectively removed from flue? **[10]**

Q8) a) Briefly explain the inter-relationship of different functional elemetns in a solid waste management system. **[5]**

b) What are the elements of financial management plan for solid waste system? **[5]**

Total No. of Questions :8]

SEAT No. :

P4675

[Total No. of Pages :1

[5355] - 267

M.E. (Chemical-Environmental)

INDUSTRIAL WASTE TREATMENT

(2013 Course)(Semester-II) (509139)

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

Instructions to the candidates:

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

Q1) Describe how strength reduction of waste can be achived in industries.**[10]**

Q2) Explain the principle and process of coagulation List the different coagulants used. **[10]**

Q3) Explain the Treatment techniques for removal of fluoride. **[10]**

Q4) Explain Effluent standards given by MPCB. **[10]**

Q5) How the operation takes place in Common Effluent treatment plant? **[10]**

Q6) Water budgeting- Explain in detail. **[10]**

Q7) Explain the characteristics of effluents from textile industry. **[10]**

Q8) Describe the method of treating the waste water from Steel industry. **[5]**

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Total No. of Questions : 8]

SEAT No. :

P4677

[Total No. of Pages : 2

[5355] - 269

M.E. (Chemical) (Environmental Engineering)

INDUSTRIAL POLLUTION PREVENTION & CLEANER PRODUCTION

(2013 Credit Pattern) (Semester - III) (509144)

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

Instructions to the candidates:

1) ***Answer any 5 questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicates full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Discuss the industrialization and sustainable development. **[5]**

b) State the different indicators of the sustainability? **[5]**

Q2) a) What are new environmental policies and regulations to encourage pollution prevention. **[5]**

b) Explain the cleaner technology and cleanerproduction concept. **[5]**

Q3) a) Discuss historical evolution of pollution prevention and control. **[5]**

b) Explain the role of industries and Government in pollution prevention and control. **[5]**

Q4) a) Write a brief note on source reduction techniques in pollution control in chemical industries. **[5]**

b) Explain the use of Internet information for pollution prevention & cleaner production. **[5]**

Q5) Justify that the process and equipment optimization is important aspect in pollution prevention & cleaner production. **[10]**

P.T.O.

Q6) Discuss the technical and environmental feasibility analysis as well as total cost analysis of pollution prevention & cleanerproduction program. **[10]**

Q7) a) Discuss the Environmental Management system (EMS). **[5]**

b) Write a note on Environmental Audit. **[5]**

Q8) Write short notes on:

a) Elements of Life Cycle Assessment (LCA). **[5]**

b) Life cyclecosting. **[5]**

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Total No. of Questions :8]

SEAT No. :

P4481

[Total No. of Pages : 2

[5355] - 27

M.E. (Civil) (Geotechnical Engineering)

STABILITY OF SLOPES AND EARTH DAMS

(2013 Course) (Semester - II) (501128)

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

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***All questions carry equal marks.***
5) ***Your answers will be valued as a whole.***
6) ***Assume Suitable data, if necessary.***

Q1) What are the assumptions made in Bishop's simplified method for slope stability analysis of finite slopes. Explain the procedure for slope stability analysis of finite slopes by Bishop's method. **[10]**

Q2) What are the various forces acting on an earth dam? Explain the I.S code provisions with respect to factor of safety of an earth dam considering (a) with earthquake and (b) without earthquake. Justify the codal provisions.**[10]**

Q3) What is phereatic line? Explain an analytical method for determination of phreatic line of an earth dam with horizontal filter. What is significance of location of phereatic line in the body of an earth dam with respect to stability of down stream slope of an earth dam. **[10]**

Q4) What are the various causes of failures of an earth dam? Explain any two in detail with suitable sketches. **[10]**

Q5) What are the objectives of Instrumentation in an earth dam? Explain working principle of settlement gauge and jointmeter with suitable sketches. **[10]**

P.T.O.

Q6) What are the various component parts of Road emhancement. Explain the practical significance of each component with a typical layout of road emhancement. **[10]**

Q7) Explain in detail the design of Geotextile reinforced earth wall. How (a) Internal and (b) External stability is evaluated. **[10]**

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

a) Soil nailing

b) Gabions construction

Total No. of Questions : 7]

SEAT No. :

P4678

[Total No. of Pages : 1

[5355]-271

M.E. (Petroleum Engineering)

NUMERICAL SIMULATION IN PETROLEUM ENGINEERING

(2013 Credit Pattern) (Semester - I) (512101)

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

Instructions to the candidates:

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

Q1) a) Note classification of Permeability. **[5]**

b) With graph, explain the Density-Pressure relation. **[5]**

Q2) Draw the sketch and explain Stochastic model for Geological modeling. **[10]**

Q3) Note and describe the *Fluid Displacement process* while choosing a simulation model. **[10]**

Q4) Write the mass *Conservation Differential Equation* and develop its relationship. **[10]**

Q5) Write the basic principles and explain the use of material balance in oil reservoirs. **[10]**

Q6) What are *single layer well models*? Explain Square Grids. **[10]**

Q7) Use the method of Bisection to find a root of the equation: **[10]**

$$f(x) = x^4 + 2x^3 - x - 1 = 0$$

Calculate until fifth iterations for root lying in the interval [0, 1].

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Total No. of Questions :8]

SEAT No. :

P4679

[Total No. of Pages : 2

[5355] - 272

M.E. (Petroleum Engineering)

GEOLOGY IN RESERVOIR DESCRIPTION

(2013 Credit Pattern) (Semester - I) (512102)

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

Instructions to the candidates:

1) ***Answer Any Five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume additional data is required.***

Q1) a) Distinguish between clastic sedimentary rocks and carbonates. **[5]**

b) Describe cyclic sedimentation with the help of a neat sketch. **[5]**

Q2) a) What is textual maturity? What are the factors controlling textural maturity? **[5]**

b) Explain the term dual porosity in shale. **[5]**

Q3) a) Write a note on porosity permeability relationship. **[5]**

b) Give Dunham classification of carbonate rocks with the help of a neat sketch. **[5]**

Q4) a) What is shale volume? How it is calculated? What information is obtained from shale volume? **[5]**

b) Draw and describe any one type of stratigraphic trap. **[5]**

Q5) a) How to recognize a sealing fault? Draw sketch in support. **[5]**

b) What is meant by P10, P50 and P 90 in reserves estimation? Give explanation. **[5]**

P.T.O.

Q6) a) How fluid saturation is calculated using logs? **[5]**

b) What is Net to Gross thickness ratio? What are the parameters to decide this? Draw diagram. **[5]**

Q7) a) Define following terms: **[5]**

Original Oil in Place, Recoverable reserves, continuous accumulation system.

b) How lithological boundary is recognized using logs? Draw neat sketches. **[5]**

Q8) a) Following are the details of different parameters required in the volumetric estimation of reserves **[5]**

Parameter	Range of value
Area	10 to 20 Km^2
Formation thickness	11 to 21m
Porosity	11 to 21 %
Water Saturation	15 to 25 %
Formation Volume Factor,	1.14 to 1.26m^3 / sm^3
Recovery Factor	25 to 35 %

What is the reason for uncertainty in different parameters? What may be the errors in the calculations?

b) Calculate Minimum and Maximum Recoverable Reserves in above example. **[5]**

Total No. of Questions : 7]

SEAT No :

P 4680

[Total No. of Pages : 2

[5355]-273

M.E. (Petroleum Engineering)

ADVANCE DRILLING ENGINEERING

(2013 Pattern) (Semester - I)

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

Instructions to the candidates:

1) ***Answer any five questions. out of 7.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of Calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) What are different types of horizontal wells? **[2]**

b) Using following coordinate find Measured depth **[8]**
Slot coordinate 15.32ft N, 5.06 ft E
TVD Target 9880ft
KOP 1650ft, Build up rate 1.5deg per 100ft.

Q2) a) Discuss different types of BHA for Build, hold, and drop assembly. **[6]**

b) Discuss balance tangential method of survey calculation. **[4]**

Q3) a) A drill string stuck at drill collar. Drill string contains drill pipe 10,000ft, 5''OD,4.276" ID, E grade 19.5ppf class2, drill collar 600ft of total weight 60,000lb. Make up torque 20,000 ft-lb and free point 9,900ft. Determine maximum torque. Tensile strength 311,540lb. **[5]**

b) Discuss different pressure losses in hydraulic system in detail. **[5]**

Q4) a) Explain squeez cementation with suitable sketch. **[6]**

b) Discuss different cement additives in detail. **[4]**

Q5) a) How many sacks of lead and tail cement will be required? **[5]**
Casing depth 3000ft, Hole size 17-1/2", casing size 13-3/8", ID 12.615", shoe track 44ft.
Cement program
Lead cement= 13.8ppg 200ft, Slurry yield 1.59ft^3/sack
Tail slurry 1000ft, yield= 1.15ft^3/sack, Excess volume =50%

b) Discuss MWD tool in detail. **[5]**

P.T.O.

Q6) a) Discuss different functions and type of drilling fluid. **[4]**

b) Discuss different types of flow (Models) in brief. **[6]**

Q7) 9-5/8" production casing section depth 2,550m, Mud weight to drill this section 11ppg, Mud weight to drill next hole section 14.1 ppg, expected pore pressure gradient in next section 13.6ppg, Influx gradient 0.1psi/ft, fracture gradient at shoe 18.1ppg.

Cement data

1000m Lead cement slurry density = 12.8ppg, 150m Tail cement slurry density =15.8ppg

Next hole section depth =3,380m TVD, Liner top = 2,300m TVD, Completion fluid 10.8ppg

Depth of perforation - 3,338m TVD, Packer depth=3,300m TVD

Calculate

a) Collapse pressure with respect to full evacuation and Plugged perforation.

b) Burst pressure with respect to next phase and Fracture at shoe.

c) Green cement pressure test Burst pressure at liner top when tubing leak. **[10]**

Total No. of Questions :8]

SEAT No. : ____

P4681

[Total No. of Pages :2

[5355] - 274

M. E. (Petroleum Engineering)

RESEARCH METHODOLOGY

(2013 Pattern) (Semester - I) (Credit Pattern) (512104)

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

Instructions to the candidates:

1) ***Attempt Any Five questions.***
2) ***Figures to the right side indicate full marks.***
3) ***Illustrate your answers with suitable examples and diagrams, wherever necessary.***
4) ***Write relevant question number before writing the answer.***

Q1) a) Differentiate clearly between research problem, research topic and research questions by giving suitable example(s). **[4]**

b) Discuss in brief steps in process of engineering research work. **[3]**

c) What is Research Methodology? Explain in brief its significance. **[3]**

Q2) a) Examine the sources of research problem. Elaborate with suitable example from Petroleum Engineering field. **[4]**

b) Describe the various data collection techniques and state their uses and limitations. **[4]**

c) Distinguish between basic and applied research. **[2]**

Q3) a) What is research design? Explain the different types of research designs and formulate a research design for your research problem. **[4]**

b) Discuss the need of multi-disciplinary and inter-disciplinary approach in research. Elaborate your answer by giving suitable example from petroleum engineering field. **[4]**

c) Briefly outline the problem faced in conducting survey research. **[2]**

P.T.O.

Q4) a) What are the guiding considerations in the construction of questionnaire? Explain. **[4]**

b) Describe the various data processing techniques and state their uses and limitations. **[4]**

c) Explain the importance of citations in research. **[2]**

Q5) a) What is mean by sampling design? Critically examine the various types of sampling design techniques. **[4]**

b) Write a comprehensive note on : "Ethics in research". **[4]**

c) "Comment on the statement : "A question well-stated is a question half-answered." **[2]**

Q6) a) Describe some of the major projective techniques and evaluate their significance as tools of scientific research. **[4]**

b) Discuss the various tools and techniques of data collection and analysis used in research. Support your answer by giving suitable example. **[4]**

c) Explain the different steps in creation of blog. **[2]**

Q7) a) Write short notes : Intellectual Property Rights (IPR) and Technology Transfer. **[5]**

b) What do you mean by a 'case study'? Explain the steps involved in designing a case study to solve a research problem. **[5]**

Q8) a) What is literature review? Give its objectives. State Creswell's five steps to conduct literature review. Discuss the various sources of literate review. **[5]**

b) Empirical research in India in particulars creates so many problems for the researchers. State the problems that are usually faced by such researchers. **[5]**

Total No. of Questions :8]

SEAT No. :

P4682

[Total No. of Pages : 2

[5355] - 275

M.E. (Petroleum Engineering)

ADVANCED RESERVOIR ENGINEERING

(2013 Pattern) (Semester - II)

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

Instructions to the candidates:

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

Q1) a) Derive the diffusivity equation in Cartesian coordinates. **[5]**

b) Draw and define the five types of reservoir fluids, along with their reservoir and separator conditions. **[3]**

c) The oil and gas rates, measured at a particular time during the producing life of a reservoir are, x stb oil/day and y scf gas/day. What is the corresponding underground withdrawal rate in reservoir barrels/day? **[2]**

Q2) a) How would you compute the GOC and OWC using capillary pressure curves? Explain in detail. **[5]**

b) Explain the difference between black oil and volatile oil from the fluid properties perspective. **[3]**

c) Calculate the mass of methane gas contained at 1000 psi and 68 deg. F, in a cylinder with volume of 3.20 cu.ft. Assume that methane is an ideal gas. **[2]**

Q3) a) Draw the graph of viscosity, formation volume factor of oil, water and gas with respect to pressure. Explain the trends and give reasons for the particular trends observed in the graphs. **[5]**

b) Calculate the density of methane at standard conditions. **[3]**

c) Write a short note on ASP flooding. **[2]**

P.T.O.

Q4) a) How does the Pc. Vs. water saturation curve change with permeability. Explain. **[5]**

b) Explain in detail 5 fluid properties for oil, and how they vary with pressure. **[3]**

c) Compute the apparent molecular weight of air, given its approximate composition, in the table below: **[2]**

Component	Mole fraction, y_1
Nitrogen	0.78
Oxygen	0.21
Argon	0.01
	1.00

Q5) a) Draw the relative permeability curves for a oil-wet rock and a water-wet rock. Explain how they are different from each other? **[5]**

b) Explain, with the help of a diagram, the various phases in an in-situ combustion process. **[3]**

c) What are the screening criteria for implementing a particular EOR method? Write in detail. **[2]**

Q6) a) Write the fractional flow equation and explain its significance. **[5]**

b) What is the significance of Buckley-Leverett equation? Explain in detail. **[5]**

Q7) Write short notes on :

a) Importance of mobility ratio in water-flooding. **[5]**

b) Thermal EOR, with its screening criteria. **[5]**

Q8) Explain in detail, what do you mean by :

a) Areal and vertical sweep efficiency. **[5]**

b) CO_2 Flooding. **[5]**

Total No. of Questions : 8]

SEAT No :

P 4683

[Total No. of Pages : 2

[5355]-276

M.E. (Petroleum Engineering)

ENVIRONMENTAL TECHNOLOGY IN PETROLEUM ENGINEERING

(2013 Credit Pattern) (Semester - II) (512108)

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

Instructions to the candidates:

1) ***Attempt Any five questions.***
2) ***Figures to the right side indicate full marks.***
3) ***Illustrate your answers with suitable examples and diagrams, Wherever necessary.***
4) ***Write relevant question number before wirting the answer.***

Q1) a) Describe different waste management methods in production operation. **[4]**

b) Write a note on: Pretreatment methods for treatment of produced water. **[3]**

c) What is Clean Development Mechanism? Discuss about difficulties with CDM. **[3]**

Q2) a) Discuss the methods used for safe disposal of hazardous waste in oil industries. **[4]**

b) Discuss in brief drilling wastes generation and management approach in Petroleum industry. **[4]**

c) What are the risks associated with oil and gas wastes? **[2]**

Q3) Write notes on: **[10]**

a) Waste management technologies used in Petroleum Industry.

b) Environmental Impact Assessment.

P.T.O.

Q4) a) Discuss in brief on Accidents in oil industry and environmental degradation. **[4]**

b) Discuss in brief various environmental Regulations, Health and safety laws applicale in oil and gas Industries. **[4]**

c) What do you mean by Job Safety Analysis? **[2]**

Q5) Define the term HAZOP. State the types of HAZOP analysis. Explain in brief the procedure to carry out a typical HAZOP Study. **[10]**

Q6) a) Write a note on: Disaster management in India. **[4]**

b) Write a brief note on: Risk Analysis and Management. **[4]**

c) Explain the principle of QRA. **[2]**

Q7) a) Write brief note on: **[5]**

i) Permit to Work.

ii) Action Taken Report.

b) Explain the different causes and preventive measures for fire and explosion hazards in petroleum industry. **[5]**

Q8) Discuss the sources of various pollution in oil and gas Industry. Discuss the methods to minimize such pollution by the Oil and gas industry. **[10]**

Total No. of Questions : 8]

SEAT No. : ____

P4684

[Total No. of Pages : 4

[5355] - 277

M.E. (Petroleum)

ADVANCED PRODUCTION ENGINEERING

(2013 Course) (Semester - II) (512109)

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

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicates full marks.***
4) ***Use of logarithmic tables, Slide rule Mollier charts, electronic pocket calculator and steam tables is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) Draw relevant graphs and demonstrate the applications of nodal analysis in detail. **[5]**

b) Explain working mechanism of plunger lifting system in brief. **[3]**

c) What are the limitations of gas lift? Write. **[2]**

Q2) a) Write inflow and outflow equations for two nodes: well head and SSSV.**[3]**

b) Use graphical procedure and decide depth for single point of gas injection for position of operating valve in case of continuous gas lifting system.**[5]**

Given data:

Wellbore depth = 8000 ft. Expected production rate = 900 bbls/day. Tubing size = $2\frac{3}{8}$ inch. Flowing well head pressure, P_{wh} = 200 psig, SBHP = 3000 psig. P. I. = 3 bbl/day-psi. Formation GLR = 250, Scf/Barrel. Sp. Gravity of injection gas = 0.68, Available pressure at surface for gas injection or surface operating pressure = 1000 psig, ^{o}API of oil = 38, Surface Temp. = 120 ^{o}F. Bottom Hole Temperature = 220 ^{o}F. Flowing gradient from FBHP for given formation GLR=300 psi / 1000 ft. Casing pressure gradient = 20 psi / 1000 ft. Consider subtraction of 100 psi from the pressure at point of balance before you fix the point of gas injection.

c) Draw typical dynamometer card for a properly loaded SRP system and explain various features of it. **[2]**

P.T.O.

Q3) a) Draw neat schematic sketch of a typical petroleum production system and describe various nodes and their pressure losses from the point of total system analysis, in brief. **[4]**

b) Discuss working of a group gathering station (GGS) in brief. **[4]**

c) Explain in brief, **[2]**

i) LACT unit.

ii) FWKO

Q4) a) With regards to working of separators, describe in detail various principle factors which govern the oil, gas and water separation process. Discuss the role of relevant features of a separator for effective separation to happen. **[5]**

b) During the oil and gas separation process in a separator, why beyond some optimum point there is actually a decrease in stock tank liquids by increasing the separator operating pressure? Explain. **[3]**

c) Derive an equation to determine ideal counterbalance effect for SRP and write benefits of counterbalance in SRP. **[2]**

Q5) a) Draw neat schematic sketch of any one kind of gas lift valve and derive an equation to calculate closing pressure of valve under operating conditions for a casing pressure operated gas lift valve. **[5]**

b) Draw neat schematic sketch of a typical four stage separation process with various components of it. **[3]**

c) Draw neat schematic sketch of a horizontal heater treater and Indicate various features of it. **[2]**

Q6) a) Describe in brief, any four practical examples of application of production optimization techniques to improve the production performance of an oil and gas field. **[4]**

b) Draw neat schematic and explain various features of a subsea production system. **[3]**

c) Write and discuss the advantages SRP system. **[3]**

Q7) a) Refer the table 04 given below and suggest the largest possible pump size to be selected if, pump is to be set in a well at the working fluid level of 4000 ft., and 200 bbl/day of fluid rate is desired at the surface. If the pumping speed is 20 spm and the effective plunger stroke is 55 inch., calculate the volumetric efficiency of the pump. Comment on pump size and plunger size. **[5]**

Table O4 Recommended pump plunger size [2].

Net lift of fluid (d=1)		Fluid production in bbl/D - 80% efficiency										Head rating	
(ft)	(m)	100	200	300	400	500	600	700	800	900	1000	(psi)	(MPa)
2 000	600	1 1/2 1 1/4	1 3/4 1 1/2	2 1 3/4	2 1/4 2	2 1/2 2 1/4	2 3/4 2 1/2	2 3/4	2 3/4	2 3/4	2 3/4	840	6
3 000	900	1 1/2 1 1/4	1 3/4 1 1/2	2 1 3/4	2 1/4 2	2 1/2 2 1/4	2 3/4 2 1/4	2 3/4 2 1/2	2 3/4	2 3/4	2 3/4	1 260	9
4 000	1 200	1 1/4	1 3/4 1 1/2	2 1 3/4	2 1/4 2	2 1/4 2	2 1/4	2 1/4	2 1/4			1 680	12
5 000	1 500	1 1/4	1 3/4 1 1/2	2 1 3/4	2 1 3/4	2	2 1/4	2 1/4				2 100	15
6 000	1 800	1 1/4	1 1/2 1 1/4	1 3/4 1 1/2	1 3/4							2 520	18
7 000	2 100	1 1/4 1 1/8	1 1/2 1 1/4									2 940	21
8 000	2 400	1 1/4 1 1/8										3 360	24
		16	32	48	64	80	96	112	128	144	160		
		Fluid production in m^3/d - 80% efficiency											

b) How to calculate daily gas injection rate for a given gas lifting operation? Explain. Also draw necessary graph and explain the concept of optimum GLR in brief. **[5]**

Q8) a) Write usability of PCP system only in terms of excellent/good/fair/ poor in a tabular form for following well conditions. Low PI, Low GLR, adaptability to deviated wells, capability to produce sand, low volume lift capability, ability to handle viscous oil and depth limits. **[5]**

b) For a petroleum production facility, design a two phase vertical separator using following data: **[5]**

Gas flow rate (Qg) = 10 MMscf/day. Oil flow rate (Qo) = 1700 bbls/day. Oil gravity = 40^{o} API. Operating pressure = 980 psia. Operating temperature = 60 ^{o}F. Specific gravity of gas = 0.6. Gas compressibility, Z = 0.83. It is given that drag coefficient Cd = 0.74 (Constant based on liquid, gas properties and for gas capacity constraint). Size of liquid droplet to be separated = dm = 120 micron. Slenderness ratio should be between 3 & 4. Consider retention time as 4, 5 and 6 minutes.

EEE

Total No. of Questions :8]

SEAT No. :

P4685

[Total No. of Pages : 2

[5355] - 278

M.E. (Petroleum Engineering)

ADVANCED WELL TESTING

(2013 Pattern) (Semester - III)

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

Instructions to the candidates:

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

Q1) a) Derive the diffusivity equation for fluid flow in radial direction. **[5]**

b) What are the various flow regions that are encountered in a derivative curve? **[3]**

c) Define and explain the various pressure regimes encountered in well testing. **[2]**

Q2) a) What do you mean by the continuity equation? What are the assumptions that are used to derive the same? **[5]**

b) Explain Horner time ratio, and describe its significance. **[3]**

c) What is the importance of the line source solution of the diffusivity equation? **[2]**

Q3) a) What are the objectives of a well test? Explain in detail. **[5]**

b) What do you mean by DST? Explain with its different time phases. **[3]**

c) What is the significance of the multiple buildups and drawdowns in a DST? **[2]**

P.T.O.

Q4) a) Explain the two main types of gas well tests conducted for tight gas reservoirs. **[5]**

b) Explain the concept of superposition in space, with appropriate diagrams. **[3]**

c) Explain what is meant by pseudo pressure. **[2]**

Q5) a) What do you mean by method of images? Explain in detail. **[5]**

b) Plot the line source solution and explain how it varies. **[3]**

c) Plot pseudo-pressure function vs. pressure, with the help of a graph. Explain. **[2]**

Q6) a) Explain the three types of empirical decline curves. **[4]**

b) Explain the difference between an IPR and a VLP? **[4]**

c) What happens when you change the node position in Nodal Analysis? Explain with graphs. **[2]**

Q7) Write short notes on:

a) Empirical decline curves. **[5]**

b) Various solutions to the diffusivity equation. **[5]**

Q8) Explain in detail, what do you mean by:

a) Fetkowich and Blasingame decline curves. **[5]**

b) Bourdet derivative and its impact on pressure transient analysis. **[5]**

Total No. of Questions : 7]

SEAT No. : ____

P4686

[Total No. of Pages : 2

[5355] - 279

M.E. (Petroleum Engineering)

ADVANCED WELL CONTROL

(2013Pattern) (Semester - III) (512114)

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

Instructions to the candidates:

1) ***Write any 5 questions out of 7 questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Well is shut in gas kick. After pressure stabilization, both the pressure are found to be rising 100psi in every 10 min. Calculate the gas migration rate. TVD = 11,000ft, Mud weight = 12.3 ppg, SIDPP = 350psi, Gas gradient = 0.115 psi/ft. **[4]**

b) Explain Primary well control, secondary well control and Tertiary well control. **[6]**

Q2) a) Discuss hard shut in procedure while drilling as per API RP 59. **[4]**

b) A well has been drilled to 10,000ft and pulling out was started for bit change. **[3]**

Mud density 10ppg What shall be the effect on bottom hole pressure after pulling out 11 stands (90ft each) of 5", ID 4.276"

Material displacement of 5" drill pipe = 0.0080 bbl/ft, 9-5/8" casing shoe =1,000 ft, casing capacity = 0.0717 bbi/ft, annular volume 5" × 9-5/8" 0.0475 bbl/ft

c) Discuss wait and weight method in detail. **[3]**

Q3) a) Discuss any two unusual situations in well control. **[5]**

b) Discuss well control in multilateral wells. **[5]**

P.T.O.

Q4) a) A 18-3/4" subsea stack having two 5M annular preventers, 4 ram preventers and six fail safe valves, requiring. 1.1 gallons fluid to open or close each valve. **[5]**

A 3000psi working pressure BOP control unit is used to operate BOP. 50% safety factor.

Annular preventer to close = 48.16 gallons,

Annular preventer to close = 37.61 gallons,

Ram preventer to close = 17.10 gallons,

Ram preventer to open = 15.60 gallons.

b) Discuss stripping operation in detail. **[5]**

Q5) a) Discuss volumetric method in detail. **[5]**

b) Write short note on pressure test of BOP. **[5]**

Q6) a) Accumulator bottle capacity = 10 gallons. **[4]**

Number of bottles = 20

Maximum operating pressure = 3000psi

Minimum operating pressure = 1200psi

Pre charge pressure =1000psi

During BOP function the pressure on accumulator bottle bank drops from 3000psi to 1900psi. How many gallons fo fluid did that function use?

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

i) gas hydrate

ii) underground blow out

Q7) Write short note on: **[10]**

a) Diverter

b) Control system of BOP stack

EEE

Total No. of Questions :8]

SEAT No. :

P4482

[Total No. of Pages :2

[5355] - 28

M.E. (Civil)

GEOTECHNICAL EARTHQUAKE ENGINEERING

(2013 Pattern) (Semester - III) (601132)

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

Instructions to the candidates:

1) ***Answer any Five questions.***
2) ***All questions carry equal marks.***
3) ***Neat diagrams must be drawn whenever necessary.***
4) ***Your answer will be valued as a whole.***
5) ***Use of electronic pocket calculators is allowed.***
6) ***Assume suitable data, if necessary.***

Q1) a) Explain 'size of earthquake'. **[5]**

b) Explain 'ground motion parameters' & its estimatiom. **[5]**

Q2) a) Explain the steps for strong motion recording with the help of seismographs. **[5]**

b) Discuss 'Elastic Rebound Theory'. **[5]**

Q3) a) Explain one field test & Two lab tests, for measurement of Dynamic Soil Properties. **[5]**

b) Explain the following development of design paramenters.

i) Site specific

ii) Cock based. **[5]**

P.T.O.

Q4) a) Discuss 'ground Response Analysis'. **[5]**

b) Explain 'green's Function Techniques'. **[5]**

Q5) a) Discuss 'Initiation & effects of liquefaction'. **[5]**

b) Explain 'Jai-Krishna' Approach. **[5]**

Q6) a) Discuss Dynamic Analysis of earthdam. **[5]**

b) Discuss different EQ induced lands lides. **[5]**

Q7) a) Explain 'Seismic Design of Retaining wall'. **[5]**

b) Discuss 'EQ induced settlement'. **[5]**

Q8) a) Explain 'Soil Improvement for Remedial Measures'. **[5]**

b) How will you mitigate EQ effects? **[5]**

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Total No. of Questions : 8]

SEAT No. :

P4687

[Total No. of Pages : 3

[5355]-281

M.E. (Polymer Engg.)

MATHEMATICAL AND STATISTICAL METHODS

(2013 Pattern) (Semester - I)

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

Instructions to the candidates:

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

Q1) a) Solve the following system of equations using Gauss-Seidel method: **[5]**

$$4x_1 - 2x_2 - x_3 = 40$$

$$x_1 - 6x_2 + 2x_3 = -28$$

$$x_1 - 2x_2 + 12x_3 = -86$$

b) Use power method to determine the largest eigen value and the corresponding eigen vector of the following matrix A : **[5]**

$$A = \begin{bmatrix} 1 & 3 & -1 \\ 3 & 2 & 4 \\ -1 & 4 & 10 \end{bmatrix}$$

Choose the initial vector $\bar{x} = \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix}$.

Q2) a) Find z-transform of the following (any two): **[6]**

i) $2^k \cos(3k + 2), k \geq 0$

ii) $k4^k, k \geq 0$

iii) $5^k + 6^k, k \geq 0$

P.T.O.

b) Find inverse z-transform of the following (any one): **[4]**

i) $\dfrac{z^2}{\left(z-\dfrac{1}{2}\right)\left(z-\dfrac{1}{3}\right)}, |z| > 1/2$

ii) $\dfrac{10z}{(z-1)(z-2)}$ using inversion integral method.

Q3) a) Solve the difference equation: **[5]**

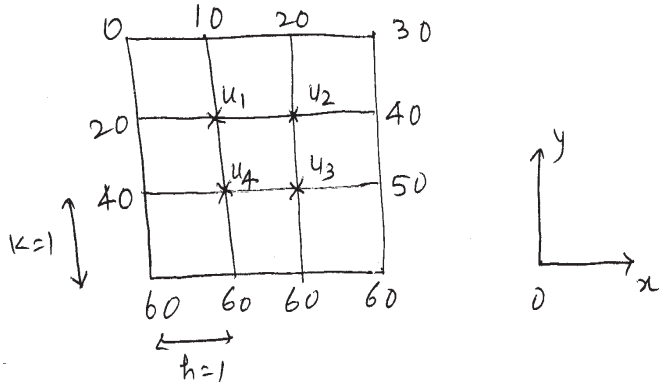
$12f(k+2)-7f(k+1)+f(k)=0,\ k\geq 0,\ f(0)=0,\ f(1)=3$

b) Evaluate $\int_{-1}^{1}\sqrt{x+2}\,dx$ using Gauss-Quadrature three point formula. **[5]**

Q4) a) Use Runge-Kutta fourth order method to find y at $x = 0.2$, **[5]**

Given $\dfrac{dy}{dx}=\sqrt{x+y},\ y(0)=1,\ h=0.1$.

b) Given the values of $u(x, y)$ on the boundary of the square given below. Evaluate the function $u(x, y)$ at nodal points 1, 2, 3 and 4 where $u(x, y)$ satisfies the equation $\dfrac{\partial^2 u}{\partial x^2}+\dfrac{\partial^2 u}{\partial y^2}=0, h=k=1$. **[5]**



Q5) a) Solve the boundary value problem using finite difference technique: **[5]**

$x^2\dfrac{d^2y}{dx^2}+x\dfrac{dy}{dx}=1,\ y(1)=0,\ y(1.4)=0.566,\ h=0.1$.

b) Explain explicit finite difference method to solve one dimensional heat flow problem. Discuss the stability of the method. **[5]**

Q6) a) Find the external of $\int_{x_1}^{x_2}\left(y'^2+2yy'-16y^2\right)dx$. **[5]**

b) Use Galerkin's method to solve $y''-y+x=0$, Given $0 \le x \le 1$, $y(0)=y(1)=0$. **[5]**

Q7) a) Reduce the following matrix into tridiagonal form. **[5]**

$$A=\begin{bmatrix}1 & 4 & 3\\ 4 & 1 & 2\\ 3 & 2 & 1\end{bmatrix}$$

b) Solve the following system of equations using LU decomposition method: **[5]**

$3x + 2y + 7z = 4$

$2x + 3y + z = 5$

$3x + 4y + z = 7$

Q8) a) A nationalized bank utilizes four teller windows to render fast services to the customers. On a particular day 800 customers were observed. They were given service at different windows as follows: **[5]**

Window Number	1	2	3	4
Observed number of customers	150	250	170	230

Test whether the customers are uniformly distributed over the windows.

Given $x_3^2 0.05 = 7.815$ (tabulated value).

b) Ten people are chosen at random and their heights are found 63, 63, 64, 65, 66, 69, 69, 70, 70, 71 (in inches). The mean height is claimed as 65. Is the claim acceptable? Given for a degree of freedom, t at 5% los = 2.262. **[5]**

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Total No. of Questions :8]

SEAT No. :

P4688

[Total No. of Pages : 2

[5355] - 282

M.E. (Polymer Engineering)

PRINCIPLES OF MANAGEMENT

(2013 Credit Pattern) (Semester - I)

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

Instructions to the candidates:

1) ***Attempt Any Five questions.***
2) ***Figures to the right side indicate full marks.***
3) ***Illustrate your answers with suitable examples and diagrams, wherever necessary.***
4) ***Write relevant question number before writing the answer.***

Q1) a) What is mean by management?

Give any two definitions of management. **[4]**

b) List out the governing factors for plant location. **[3]**

c) Write a short note on functional organization. **[3]**

Q2) a) What are the different sources of recruitment? **[4]**

b) What is the working capital? Define its various types. **[4]**

c) Give the importance of process layout. **[2]**

Q3) a) The eastern company provides the following information regarding one of its fixed assets that has been purchased on January 1,2016. **[4]**

Cost of the asset = $3500

Salvage value = $3000

Useful life = 10 years

Calculate annual depreciation expense of this asset using straight line method.

b) Define the quality control.

How it will contribute to the development of organization? **[4]**

c) State the objectives of inventory control. **[2]**

P.T.O.

Q4) a) How research and development plays a vital role in growth of polymer industry? **[4]**

b) What is line and staff organization? Explain its merits and demerits. **[4]**

c) State the importance of advertising in marketing. **[2]**

Q5) a) Explain the 4 P's of marketing mix. **[4]**

b) What is planning? Explain the steps involved in planning. **[4]**

c) Give the importance of Organizing in short **[2]**

Q6) a) Explain the principles of management. **[5]**

b) Define the work measurement. Explain its objectives and techniques. **[5]**

Q7) a) Calculate the break-even point in sales unit and sales dollars from the following information, **[5]**

Price per unit = $15

Variable cost per unit = $7

Total fixed cost = $9000

b) What is financial management? Discuss the basic aspects of financial management. **[5]**

Q8) a) Write notes on: (Any Two) **[5]**

i) Administration and management

ii) Flow process chart

iii) Game theory

b) Explain "Operation and control of technological products." **[5]**

Total No. of Questions : 8]

SEAT No :

P 4689

[Total No. of Pages : 2

[5355]-283
M.E. (Polymer Engineering)
ADVANCE POLYMER TECHNOLOGY
(2013 Pattern) (Semester - I)

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

Instructions to the candidates:

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

Q1) a) Write a note on kinetics of chain growth polymerization. **[5]**

b) What are biopolymers? Explain the advantages, disadvantages and isolation of the same. **[5]**

Q2) a) Write a note on polymer electrolytes. **[5]**

b) Explain PBI and PBO with reference to their structure and properties. **[5]**

Q3) Explain various approaches to synthesize comb and graft architectures. Discuss the process of grafting on existing polymer surfaces with one example. **[10]**

Q4) a) What are functional polymers? Explain with suitable examples, structures and their uses. **[5]**

b) Explain the concept of self-assembly. Discuss the types and elaborate on non-covalent interactions. **[5]**

P.T.O.

Q5) a) Explain ion exchange resins. Draw the representative structure. **[5]**

b) What is mini-dispersion polymerization? How is it different from dispersion polymerization? **[5]**

Q6) a) Write a note on the linkages and structural motifs in LCPs. **[5]**

b) Write a note on F-H equation. Explain its importance. **[5]**

Q7) a) Write a note on hydrogels and stimuli sensitive hydrogels. **[5]**

b) Write a note on silicone rubbers. **[5]**

Q8) a) Explain the synthesis of epichlorohydrin based rubbers. **[5]**

b) Write a note on polymers from renewable resources. **[5]**

Total No. of Questions :8]

SEAT No. : ____

P4690

[Total No. of Pages :3

[5355] - 284

M. E. (Polymer Engineering)

RESEARCH METHODOLOGY

(2013 Pattern) (End Semester) (Semester - I)

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

Instructions to the candidates:

1) ***Answer any five questions from the following.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data, if necessary.***
5) ***Use of logarithmic tables, slide rule, electronic pocket calculator is allowed.***

Q1) a) Write a note on "Types and Importance of Research Design." **[5]**

b) Explain the term Hypothesis and what are the characteristics features of a hypothesis. Explain various objectives of research. **[5]**

Q2) a) Define research and state the significance of research. **[6]**

b) Discuss the qualities of a researcher and explain different research approaches. **[4]**

Q3) a) Represent the following data by a histogram. **[3]**

Marks	No. of Students	Marks	No. of Students
0-10	4	50-60	15
10-20	8	60-70	12
20-30	10	70-80	9
30-40	18	80-90	6
45-50	26	90-100	3

P.T.O.

b) Calculate median from the following data using continuous series. **[5]**

Marks	No. of Students	Marks	No. of Students
Less than 5	29	Less than 30	644
Less than 10	224	Less than 35	650
Less than 15	465	Less than 40	653
Less than 20	582	Less than 45	655
Less than 25	634	Less than 50	645

c) Represent the following data with pie diagram of different types of groups of people and their percentage in a certain village. **[2]**

Group	Men	Women	Kids	Teenagers	Elderly
Percentage	19	16	18	12	35

Q4) a) Explain the tem Regression Coefficient and calculate the correlation Coefficient if two Regression lines of a sample are

$X + 6Y = 6$ and $3X + 2Y = 0$ **[7]**

b) Discuss the factors which should be considered while deciding the Sample size and explain how to determine Sample size. **[3]**

Q5) a) Find coefficient of correlation for the following by Karl Pearson method. **[6]**

Cost (X)	39	65	62	90	82	75	25	98	36	78
Sales (Y)	47	53	58	86	62	68	60	91	51	84

b) Weights of 50 year old mothers with 20 year old daughters are given below. Find the weight of the daughter whose mother's weight is 70 kg. **[4]**

Weight of Mothers X	71	65	66	71	70	70	73	72	68	66	67
Weight of Daughters Y	62	59	62	69	65	65	64	66	64	65	63

Q6) a) Explain general outline relating the presentation of report. **[5]**

b) Discuss in short framework of a research report. Give Dos and Don'ts of Report writing. **[5]**

Q7) a) Explain in detail the process of filing a patent. **[3]**

b) With suitable examples, comment on the relevance of IPR in research field. **[4]**

c) List at least three criteria for patentability. **[3]**

Q8) a) Write a short note on reviewing literature and writing a literature survey. **[3]**

b) Write a note on "Types of Reports". **[4]**

c) Explain in short, the role of Computer in research. **[3]**

Total No. of Questions : 8]

SEAT No :

P 4691

[Total No. of Pages : 2

[5355]-285
M.E. (Polymer Engineering)
POLYMER PROCESSING AND TESTING
(2013 Pattern) (Semester - II)

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

Instructions to the candidates:

1) ***Solve any 5 questions from total 8 questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicates full marks.***
4) ***Use of Calculator is allowed.***
5) ***Assume Suitable data, if necessary.***

Q1) a) Explain what is starve feeding in single screw extruder. State its advantages and disadvantages. **[4]**

b) Explain the three point bending test method for studying flexural properties. **[3]**

c) List the types of products made by the rotational molding. **[3]**

Q2) a) Explain the process of extrusion blow molding in detail. **[5]**

b) Discuss the test method used for determination of heat distortion temperature. **[3]**

c) Explain the significance of studying flammability of plastic products. **[2]**

Q3) a) Write a note on contigous melting model. **[5]**

b) Write a note on plug assist variant of thermoforming with neat figures. **[3]**

c) Why is devolatilization required in extrusion? **[2]**

Q4) a) Describe the complete line for extrusion of pipes and sheets. **[4]**

b) Write a detailed note on injection molding of thermosets. **[3]**

c) Explain the calendaring process with neat sketches. **[3]**

P.T.O.

Q5) a) Discuss the process of transfer molding in details. **[4]**

b) Write a detailed note on process of rotational molding. **[3]**

c) Describe the test method used to study barrier properties of films. **[3]**

Q6) a) Explain the process of injection stretch blow molding in details. **[5]**

b) List the various methods used to study impact properties of plastics. Explain any two in details. **[3]**

c) Explain the test method for determining accelerated ageing test for plastics. **[2]**

Q7) a) Explain the process of injection molding of thermoplastics in details. **[5]**

b) Explain the terms dielectric strength, surface and volume resistance. **[5]**

Q8) a) With a neat figure, explain the screw nomenclature. Discuss die and screw characteristics. **[5]**

b) List all the non-destructive test methods for plastics. Explain the radiography test in details. **[5]**

Total No. of Questions : 8]

SEAT No :

P 4692

[Total No. of Pages : 2

[5355]-286
M.E. (Polymer Engineering)
POLYMER PHYSICS AND CHARACTERIZATION
(2013 Pattern) (Semester-II) (509122)

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

Instructions to the candidates:

1) ***Solve any 5 questions from total 8 questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Write a note on ideal chain and Gaussian chain. **[5]**

b) Discuss in detail solid state electrical properties of polymers. **[5]**

Q2) a) Explain the theory of gelation. **[5]**

b) Discuss about characterization of polymer sample using DMA technique. **[5]**

Q3) a) Comment on thermodynamics of rubber elasticity. **[5]**

b) Discuss about analysis of polymers using FTIR spectroscopy. **[5]**

Q4) a) Write a note on dielectric measurements. **[5]**

b) Explain the working of SEM, and its applications. **[5]**

Q5) a) Elaborate the concept of solubility parameter, and its importance. **[5]**

b) Alongwith advantages and limitations, briefly explain GPC technique. **[5]**

P.T.O.

Q6) a) Explain the concepts - creep, stress relaxation and multiple relaxations. **[5]**

b) Write a note on degradation of polymers. **[5]**

Q7) a) With suitable examples and neat sketches explain the relevance of isothermal TGA, and DTA thermogram. **[5]**

b) Discuss the importance of DSC for determination of crystallization and blend composition. **[5]**

Q8) Discuss in detail about thermodynamics of polymer solutions and melts. **[10]**

Total No. of Questions : 8]

SEAT No. : [ ]

P4693

[Total No. of Pages : 2

[5355] - 287

M.E. (Polymer Engineering)

POLYMER STRUCTURE AND PROPERTIES

(2013 Pattern) (Semester - II)

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

Instructions to the candidates:

1) ***Solve any 5 questions from total 8 questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicates full marks.***

Q1) a) Explain the terms polymer alloys and blends. Which one will have better properties? Why? **[5]**

b) In case of polyvinyl alcohol, why its solubility in cold water decreases with increasing molecular weight? **[5]**

Q2) a) Briefly discuss the concepts related to Covalent, Ionic and Hydrogen bond. **[6]**

b) Comment on the role of polymer backbone in defining properties. **[4]**

Q3) a) With reference to polymer explain various state transitions occurring with increasing temperature. Draw suitable plot for the same. **[4]**

b) Elaborate the effect of structural features on internal rotation. **[3]**

c) Comment on effect of polymer chain orientation on fiber properties. **[3]**

Q4) a) With suitable examples, discuss about the effect of monomeric impurities present in polymer system on polymer properties. **[5]**

b) Discuss about thermodynamic factors affecting polymer properties. **[5]**

P.T.O.

Q5) a) Comment on the requirement of molecular weight and molecular weight distribution for following polymer processing techniques. Justify your answer **[6]**

i) Blow moulding

ii) Extrusion

iii) Fiber spinning

b) Write a short note on dendrimers. **[4]**

Q6) a) What is meant by *Mw*, *Mn* and polydispensity? How they influence polymer properties. **[6]**

b) Comment on the significance of molecular flexibility and freedom of rotation. **[4]**

Q7) a) Comment on effect of filler on mechanical and thermal properties of polymers. **[5]**

b) Write a short note on carbon nanotubes based polymer composites. **[5]**

Q8) a) Explain the terms, solubility parameter and cohesive energy density. Comment on their significance. **[6]**

b) Briefly explain the concept of Configuration and Conformation. **[4]**

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Total No. of Questions :8]

SEAT No. :

P4694

[Total No. of Pages : 2

[5355] - 288

M.E. (Polymer Engineering)

POLYMER RHEOLOGY

(2013 Pattern) (Semester - III)

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

Instructions to the candidates:

1) ***Solve any 5 questions from total 8 questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of Calculator is allowed.***
5) ***Assume Suitable data, if necessary.***

Q1) a) Discuss in details time dependent fluids with examples. **[5]**

b) Discuss the phenomena attributed to second normal stress difference. **[5]**

Q2) a) Explain the terms bulk modulus, shear modulus and Young's modulus in details. **[6]**

b) Explain the effect of molecular weight and molecular weight distribution on rheology of polymer melts. **[4]**

Q3) a) Write a detailed note on Rouse theory of relaxation. **[5]**

b) Analyze creep and stress relaxation behavior of viscoelastic materials using Kelvin Voight model. **[5]**

Q4) a) Discuss dynamic rheological experiments in details. Discuss storage modulus and loss modulus. **[4]**

b) Write a note on Ryan Johnson's criteria. **[6]**

Q5) a) Discuss Ellis model in details. **[5]**

b) Discuss Time-temperature superposition in details. **[5]**

P.T.O.

Q6) a) Discuss the construction and working of a capillary Rheometer. **[5]**

b) Derive an expression for velocity profile and shear rate at wall for a power law fluid through parallel plate. **[5]**

Q7) a) Write a detailed note on Doi-Edwards theory. **[5]**

b) Discuss in details the effect of plasticizers and fillers on polymer melt rheology. **[5]**

Q8) a) Derive an expression for velocity profile and shear rate at wall for a Newtonian fluid through a circular cross section. **[5]**

b) Discuss WLF equation in details. **[5]**

Total No. of Questions : 8]

SEAT No. : ____

P4695

[Total No. of Pages : 2

[5355] - 289

M.E. (Polymer Engineering)

TRANSPORT PHENOMENON IN POLYMERS

(2013 Course) (End Semester) (Semester - III)

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

Instructions to the candidates:

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

Q1) a) Differentiate between the Newtonian and Non-Newtonian fluids. **[4]**

b) Discuss different models to express rheological behavior of polymeric fluids. **[4]**

c) Explain the Cauchy's Principle with suitable example. **[2]**

Q2) a) Explain the stress tensor and Symmetric tensor. **[4]**

b) Derive equation for momentum flux and velocity for flow of two immiscible fluids. **[4]**

c) Discuss the pressure and temperature dependence of viscosity. **[2]**

Q3) a) Derive the Buckingham - Reiner equation for Bingham Plastic fluid flow in a circular tube. **[5]**

b) Discuss in detail Bingham, Ostwald-de Waele Model for non Newtonian fluids. **[5]**

Q4) a) Explain the importance of elastic and viscous effects with one example. **[5]**

b) Discuss the effect of viscosity of non Newtonian fluids in mixing operation. **[3]**

c) Write down the following steps to find out the number of theoretical stages for multistage distillation column. **[2]**

P.T.O.

Q5) a) Define solubility coefficient and permeability coefficient. Explain effect of Temperature on the permeability coefficient. **[3]**

b) Derive the necessary expression of permeability for diffusion in polymeric film. **[3]**

c) Write a short note on controlled release through polymeric film and its practical applications. **[4]**

Q6) a) Discuss with three examples different application of diffusion in polymer field. **[5]**

b) Discuss the term Diffusion Coefficient. Give the brief introduction of different theories of diffusion. **[5]**

Q7) a) Explain in details the applicable tray tower design method used in distillation. **[5]**

b) Explain in details heat transport analysis with viscous dissipation. **[5]**

Q8) a) Explain in details heat conduction with viscous heat generation of fluid flow. **[5]**

b) Compare Forced Convection and Free Convenction Heat Transfer and also explain the importance of both in polymer processing. **[5]**

EEE

Total No. of Questions :8]

SEAT No. :

P4483

[Total No. of Pages : 2

[5355] - 29

M.E. (Civil) (Geotechnical Engineering)

GEO ENVIRONMENTAL ENGINEERING

(2013 Credit Pattern) (Semester - III) (601133)

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

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable data if necessary wherever required.***

Q1) a) How hazardous, non-hazardous and domestic wastes are identified. Explain them in brief. **[5]**

b) Define leachate. What is leachate movement? How it is controlled. **[5]**

Q2) a) What are the different properties of solid waste. Explain them in brief. **[5]**

b) What are the methods which are used for detection and control of sub surface containment? Explain them in brief. **[5]**

Q3) a) What are the different methods used to transport the containment? Explain them in brief. **[5]**

b) What are the different types of landfills? Explain them in brief. **[5]**

Q4) a) Explain in detail the mechanical composting with neat sketch. **[5]**

b) What is the need for solid waste management. Explain in brief. **[5]**

Q5) a) What is landing filling? Write the planning and design aspects which are considered for disposal of solid waste in land filling. **[5]**

b) What is de-watering? What are the different methods used for de-watering? Explain them in brief. **[5]**

P.T.O.

Q6) a) Write the different methods used for environmental monitoring around landfill. Explain them in brief. **[5]**

b) Write a short note on "Soil-Waste Interaction". **[5]**

Q7) a) Write a short note on "Reclamation of old waste dumps". **[5]**

b) Determine the moisturecontent of a solid waste with the following composition. **[5]**

Sr. No.	Component	% by mass	Moisture contents in %
01	Food waste	35	70
02	Paper	20	06
03	Cardboard	05	05
04	Plastics	15	02
05	Garden waste	15	60
06	Others	10	15

Q8) a) What are the types of gases which are generated in the landfill? Explain how these gases are controlled. **[5]**

b) What factors are considered for disposal of hazardous, non-hazardous and domestic waste? Explain them in brief. **[5]**

Total No. of Questions : 8]

SEAT No. :

P4696

[Total No. of Pages : 2

[5355]-291
M.E.(Production) (CAD/CAM)
COMPUTER AIDED DESIGN
(2013Pattern) (Semester - I) (511301)

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

Instructions to the candidates:

1) ***Attempt Q1 or Q2, Q3or Q4 and Q5or Q6.***
2) ***Q7 and Q8 are compulsory.***
3) ***Figures to the right indicate full marks.***
4) ***Draw neat self -explanatory sketches wherever necessary.***
5) ***Use of calculator is allowed.***
6) ***Assume suitable data, if necessary.***

Q1) What are the various interactive input devices used in CAD/CAM? List down their advantages and disadvantages. **[5]**

OR

Q2) Discuss the use of various display commands available in a drafting package.**[5]**

Q3) Explain the three types of coordinate systems used to input, store and display model geometry and graphics. **[5]**

OR

Q4) Why parametric representation of geomertical entities are preferred in CAD software? Explain your answer with non-parametric and parametric equations of appropriate geometric entity. **[5]**

Q5) Compare the splines created by B-spline and Bezier spline techniques for the same control points. **[7]**

OR

Q6) Explain the procedure of mass property calculations in CAD software. **[7]**

Q7) a) What is Z-buffer algorithm for B-REP and CSG model? **[8]**

b) What sweep representaion scheme used for representation of a solid?**[7]**

P.T.O.

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

a) Types of animations.

b) Virtual Realism.

c) CAD/CAM integration.

d) Hidden line removal algorithm.

Total No. of Questions : 6]

SEAT No. : ____

P4697

[Total No. of Pages : 2

[5355]-292

M.E. (Production) (CAD/CAM)

COMPUTER AIDED MANUFACTURING

(2013 Pattern) (511302) (Semester - I)

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

Instructions to the candidates:

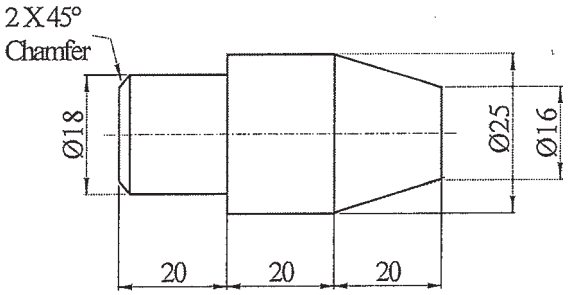
1) ***Answer Q.1 or Q.2, Q.3 or Q.4 and Q.5 and Q.6 are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable data if necessary.***

Q1) a) Explain Direct Numeric Control (DNC) system. **[5]**

b) Explain principle of rolling guide ways in CNC machines. **[5]**

OR

Q2) Write NC program for the following job and also explain the meaning of each step (block). **[10]**



Q3) a) Explain CNC-EDM in detail. **[5]**

b) Explain working principle of automatic welding machine with block diagram. **[5]**

OR

Q4) a) Explain various types of conveyors used in automated material handling system. **[5]**

b) Explain Automated Guided Vehicle (AGV) system. **[5]**

P.T.O.

Q5) a) Wrtie short note on machine vision. **[7]**

b) Explain optical inspection methods. **[8]**

Q6) a) Explain use of bar code system for shop floor data collection. **[8]**

b) Comment on : future automated factory and unemployment. **[7]**

Total No. of Questions : 6]

SEAT No : ____

P 4698

[Total No. of Pages :2

[5355]-293

M.E. (Production) (CAD/CAM)

ADVANCED MATHEMATICS AND STATISTICS

(2013 Course) (511303) (Semester-I)

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

Instructions to the candidates:

1) ***Answer 3 questions from Q.1 or Q. 2, Q. 3 or Q. 4, and Q. 5 or Q. 6.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Use of electronic pocket calculator is allowed.***
4) ***Assume suitable data, if necessary.***

Q1) a) Reduce the quadratic form $6x^2 + 3y^2 + 3z^2 - 4xy + 4xz - 2yz$ to the canonical form by an orthogonal reduction and discuss its nature. Also find the modal matrix. **[8]**

b) Show that the transformation **[8]**

$$y_1 = x_1 - x_2 + x_3$$
$$y_2 = 3x_1 - x_2 + 2x_3$$
$$y_3 = 2x_1 - 2x_2 + 3x_3$$

is regular, write down the inverse transformation.

OR

Q2) a) Show that $A = \frac{1}{2}\begin{bmatrix} 1+i & -1+i \\ 1+i & 1-i \end{bmatrix}$ is a unitary matrix. **[8]**

b) Find the curve on which the functional $\int_0^1 \left[(y')^2 + 12xy \right] dx$, with $y(0) = 0$ and $y(1) = 0$ can be extremised. **[8]**

P.T.O.

Q3) a) Solve by the method of Laplace transform the equation $y'' + 4y' + 3y = e^{-t}$ with $y(0) = y'(0) = 1$. **[9]**

b) Obtain Fourier series for the function $f(x) = \begin{cases} \pi x, & 0 \le x \le 1 \\ \pi(2-x), & 1 \le x \le 2 \end{cases}$. **[8]**

OR

Q4) a) Determine the solution of one-dimensional heat equation $\frac{\partial u}{\partial t} = C^2 \frac{\partial^2 u}{\partial x^2} = 0$ boundary conditions are $u(0, t) = 0$, $u(l, t) = 0$ and initial condition $u(x, 0) = x$. **[9]**

b) Solve the integral equation $\int_0^\infty f(x)\cos\lambda x\, dx = \begin{cases} 1-\lambda, & 0 \le \lambda \le 1 \\ 0, & \lambda > 1 \end{cases}$. **[8]**

Q5) a) A random variable X has the following Probability Distribution: **[9]**

X:	0	1	2	3	4	5	6	7
P(X):	0	k	$2k$	$2k$	$3k$	k^2	$2k^2$	$k^2 + k$

i) Find k.

ii) Find $p(X < 6)$, $p(X \ge 6)$, $P(0 \le X < 5)$.

b) For a chi-square distribution with n.d.f. establish the following recurrence relation between the moments. **[8]**

$\mu_{r+1} = 2r(\mu_r + n\mu_{r-1})$, $r \ge 1$. Hence find β_1 & β_2.

OR

Q6) a) The height of six randomly chosen sailors are (in inch): 63, 65, 68, 69, 71, 72. Those of 10 randomly chosen soldier's are 61, 62, 65, 66, 69, 70, 71, 72, 73. Discuss the light that these data thrown the suggestions that sailors are on the average toller than soldier's. **[8]**

b) Describe in brief types of simulation approaches. **[9]**

Total No. of Questions :6]

SEAT No. : ____

P4699

[Total No. of Pages :2

[5355] - 294

M. E. Production (CAD / CAM)

DESIGN OF EXPERIMENTS & RESEARCH METHODOLOGY

(2013 Pattern) (Semester - I) (511304)

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

Instructions to the candidates:

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

Q1) a) Explain in brief difference between mathematical research and experimental research. **[5]**

b) Explain research process with flow chart. **[5]**

OR

Q2) Explain following in brief: **[10]**

i) Criteria of good research.

ii) Brain Storming problem solving process.

Q3) a) Explain stages in model building. **[5]**

b) Explain porcess of formulation of model based on simulation. **[5]**

OR

Q4) Write short notes on: **[10]**

i) Factorial experimental design.

ii) Randomization and Blocking.

P.T.O.

Q5) a) Explain Taguchi approach to parameter design. **[8]**

b) Explain general factorial design. **[7]**

Q6) Write short notes on: **[15]**

i) Analysis of Variance.

ii) Uni-variate analysis.

iii) Parametric tests.

Total No. of Questions : 8]

SEAT No :

P 4700

[Total No. of Pages :2

[5355]-295

M.E.Production (CAD/CAM)

COMPUTER INTEGRATED MANUFACTURING

(2013 Course) (Semester-II) (511307)

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

Instructions to the candidates:

1) ***Attempt Q1 or Q2, Q3 or Q4 and Q5 or Q6.***
2) ***Q7 and Q8 are compulsory.***
3) ***Figures to the right indicate full marks.***
4) ***Draw neat self-explanatory sketches wherever necessary.***
5) ***Use of calculator is allowed.***
6) ***Assume suitable data, if necessary.***

Q1) Discuss the stages in product development cycle and the importance of each stage. **[5]**

OR

Q2) Discuss how CIM can act as enabling technology for concurrent engineering. **[5]**

Q3) What is a relational database? Describe the architecture of database management system. **[5]**

OR

Q4) What do you understand by the term, "group technology"? Discuss the uses of GT in various functional departments of an organization. **[5]**

Q5) What is a FMC? How does FMC ensure flexibility in manufacturing? **[7]**

OR

Q6) Which are the typical sensors that are normally used in robot? Explain. **[7]**

Q7) a) What are the requirements of an enterprise wide network? **[8]**

b) Describe the three basic network topologies? **[7]**

P.T.O.

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

a) Data associated with FMC

b) ASRS

c) ESPRIT - CIM OSA model.

d) GKS implementation in a CAD workstation.

Total No. of Questions : 6]

SEAT No :

P 4701

[Total No. of Pages : 2

[5355]-296

M.E. (Production Engg.) (CAD)(CAM)

FINITE ELEMENT ANALYSIS

(2013 Course) (Semester-II)

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

Instructions to the candidates:

1) ***Q. No. 5 and Q.No.6 are compulsory.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of non-programmable Calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Enlist different methods of weighted residuals and any one in brief. **[5]**

b) Derive relationship between stress-strain in 2D elastic body. What is meant by plain stress and plain strain condition? **[5]**

OR

Q2) a) Write a note on Pascal's Triangle for identification of 2D element interpolation function. **[4]**

b) Explain continuity requirements in FEA and write a note on C^o and C^1 Continuities with appropriate examples? **[6]**

Q3) a) What is meant by Banded and Skyline Matrix methods and how these are used for reduction in memory required to simulation in FEA? **[5]**

b) Explain the difference between CST and LST elements. **[5]**

OR

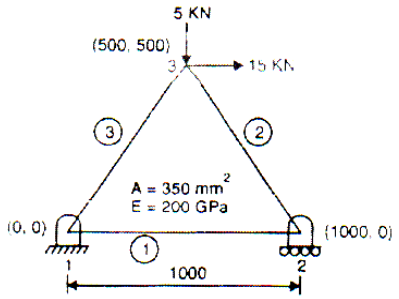
Q4) a) Explain step by step procedure for penalty approach and elimination approach. **[4]**

b) What is meant by Iso-parametric elements? Explain its types.**[6]**

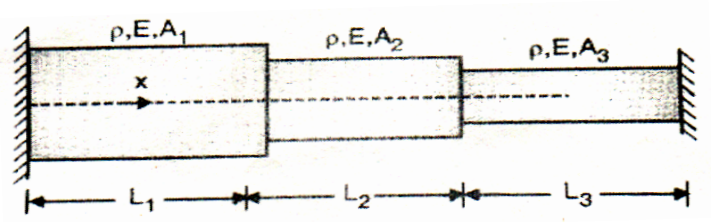
P.T.O.

Q5) a) Derive expression for elemental stiffness matrix for 3-noded 1-D bar elements. **[7]**

b) Analyze the truss as shown in figure (i.e. to find displacements at joints, stresses in the members and reaction forces. **[8]**



Q6) a) Find the un-damped natural frequencies of longitudinal vibration of the stepped bar shown in figure below with the following data using consistent mass matrices:
$L_1=L_2=L_3=0.2m$, $A_1=2$, $A_2=3$, $A_3=0.4 \times 10^{-3}\ m^2$, $E=2.1 \times 10^{11}\ N/m^2$, and $\rho=7.8 \times 10^3\ Kg/m^3$. **[10]**



b) Differentiate between consistent mass matrix and lumped mass matrix. **[5]**

Total No. of Questions : 8]

SEAT No. :

P4702

[Total No. of Pages : 2

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M.E. (Production - CAD/CAM)

OPTIMIZATION TECHNIQUES

(2013 Course) (Semester - II)

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

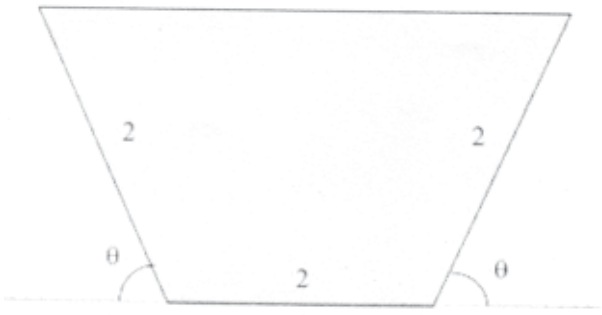
Instructions to the candidates:

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

Q1) a) Minimize $f(x, y) = x^2 - 8x + y^2 - 12y + 48$ subject to the constraint $x + y = 8$. x, y are all nonnegative. **[8]**

b) Define Hessian matrix. **[2]**

Q2) a) Determine the angle θ within bounds of 0 to π/2 so as to maximize the area of cross section of a gutter having base and edge lengths of 2 each as shown in Figure. Apply golden section search method. **[6]**



b) Explain quadratic interpolation method. **[4]**

P.T.O.

Q3) a) Using steepest descent method, Minimize $Z = 4x_1^2 + 3x_2^2 - 5x_1x_2 - 8x_1$. Assume initial solution: [0, 0] and increment be 0.5 (Perform only one iteration) **[6]**

b) Explain Fletcher-Powell method for multivariable optimization. **[4]**

Q4) a) Minimize $\frac{1}{5}.x_1^2 - \frac{1}{2}.x_2^2 - 30x_1 + 54x_1 \cdot x_2$ such that $0 \le x_1, x_2 \le 4$ using conjugate direction method. Perform first iteration only. Assume initial point as $x = \begin{Bmatrix} 0 \\ 0 \end{Bmatrix}$. **[5]**

b) Explain importance of optimization in CAD/CAM. **[5]**

Q5) Construct the 'ϕ' function, according to **[10]**

a) interior and

b) exterior

penalty function methods for the following problem.

Maximize $f = 2x$

Subjected to: $2 \le x \le 10$

Q6) Write short note on: **[10]**

a) Tournament selection in genetic algorithm.

b) Significance of hidden layer in neural networks.

Q7) a) Explain steps of an Optimized Production Technology. **[6]**

b) Explain the priori approach of multi-objective optimization. **[4]**

Q8) Explain the procedure to determine the initial temperature in case of simulated annealing. What is significance of cooling rate? **[10]**

EEE

Total No. of Questions :6]

SEAT No. :

P4703

[Total No. of Pages : 2

[5355] - 298

M.E. (Production Engineering) (CAD / CAM)

ADVANCED STRESS ANALYSIS

(2013 Course) (Semester - III) (511313)

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

Instructions to the candidates:

1) ***Question No. 5 & 6 are compulsory.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of logarithmic tables, slide rule and non-programmable electronic pocket calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) Determine the principal directions and principal values of the second order Cartesian tensor (stress tensor) T as given below. **[10]**

$$\left[\sigma_{ij}\right]=\begin{bmatrix} 3 & -1 & 0 \\ -1 & 3 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

OR

Q2) Determine the stress fields that arise from the following stress functions: **[10]**

a) $\varphi = Cy^2$

b) $\varphi = Ax^2 + Bxy + Cy^2$

c) $\varphi = Ax^3 + Bx^2y + Cxy^2 + Dy^3$

where A, B, C and D are constants

Q3) What is the significance of compatibility conditions? Derive compatibility equation by using polar-co-ordinate system. **[10]**

OR

Q4) Explain Airy stress function and its significance in stress analysis. **[10]**

P.T.O.

Q5) a) Explain how conformal mapping provides a convenient means to find elasticity solutions to interior and exterior problems of complex shape. **[10]**

b) Write note on Effect of sliding friction on contact stresses. **[5]**

Q6) a) A semicircular surface crack in a pressure vessel is 2.87 mm deep. The crack is on the inner wall of the pressure vessel and is oriented such that the hoop stress is perpendicular to the crack plane. Calculate K_1 if the local hoop stress is 132 MPa and the internal pressure = 9 MPa. Assume that the wall thickness >> 3 mm. **[10]**

b) Describe stages in crack growth. **[5]**

Total No. of Questions : 8]

SEAT No. : [ ]

P4704

[Total No. of Pages : 3

[5355] - 299

M.E. (Production) (CAD/CAM)

COMPUTER AIDED PRODUCTION PLANNING

(2013 Course) (Semester - III) (511314)

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

Instructions to the candidates:

1) ***Attempt Q1 or Q2, Q3 or Q4 and Q5 or Q6.***
2) ***Q7 and Q8 are compulsory.***
3) ***Figures to the right indicates full marks.***
4) ***Draw neat self - explanatory sketches wherever necessary.***
5) ***Use of calculator is allowed.***
6) ***Assume suitable data if necessary.***

Q1) Discuss use of quadratic assignment model adding new machines to existing facility. **[5]**

OR

Q2) Discuss different measures of forecast errors. **[5]**

Q3) Explain how the GT cell is formed? Discuss with example. **[5]**

OR

Q4) Discuss the development of CAPP and its limitations. **[5]**

Q5) Explain Generative type of Computer Aided Process Planning (CAPP). **[7]**

OR

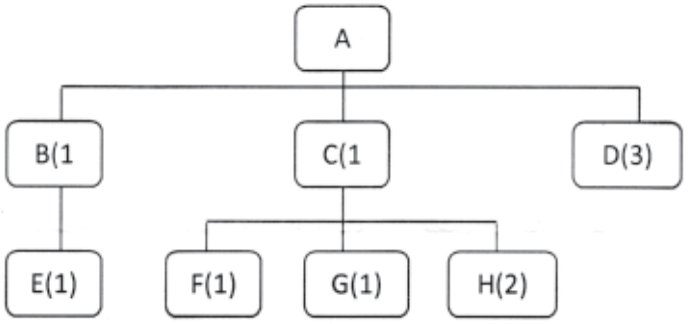
P.T.O.

Q6) Discuss Software for ERP. **[7]**

Q7) a) Find the sequence that will minimize total time required to complete the following tasks. **[8]**

Task	1	2	3	4	5	6	7	8
Machine I	2	5	4	9	6	8	7	5
Machine II	6	8	7	4	3	9	3	8

b) Product structure is as below: **[7]**



Inventory status of individual components are as shown

Product	Lead Time	EOQ	Opening Stock	On Order
A	3	500	50	0
B	5	700	100	0
C	4	800	20	0
D	2	3000	2000	0
E	6	1200	0	0
F	3	900	70	0
G	2	1000	0	0
H	3	4000	3300	0

The demand for the product ‘A’ is 500 on day 16. Prepare MRP for all items.

Q8) Write short notes (Any THREE): **[18]**

a) Gantt chart.

b) MRP II.

c) ERP implementation issues.

d) Random number generation.

e) CDS algorithm for sequencing.

EEE

Total No. of Questions :8]

SEAT No. :

P4460

[Total No. of Pages : 2

[5355] - 3

M.E. (Civil) (Construction & Management)

CONSTRUCTION TECHNOLOGY

(2013 Course) (Semester - I)

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

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat labelled diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of logarithmic tables, slide rule, Moiller charts, electronic pocket calculator and steam tables is allowed.***
5) ***Assume suitable datal information wherever necessary.***

Q1) With the help of neat labeled sketch explain the components, working and applications of crawler mounted Bull Dozers. Also explain various types of blades used on bull dozers along with their suitability. **[10]**

Q2) For the following construction operations enlist which type of crane you will adopt with suitable reasons. Also draw a line sketch of the crane for each case. **[10]**

a) Recovery of Dumper that has met with an accident.

b) Placement of concrete in case of gravity dam construction.

c) Erection of girders for a flyover project.

Q3) Explain the difference between pneumatic and hydraulic construction equipments with suitable examples. Differentiate the equipments on the basis of operating principle, investment costs, maintenance costs, ease in operations, spare part management. **[10]**

Q4) Explain the importance of compaction in construction. Discuss the various types of compaction efforts that can be adopted in construction projects. Enlist the factors considered in determining the efficiency of compaction equipments. Discuss the pneumatic tyred rollers in detail. **[10]**

P.T.O.

Q5) Explain the concept of micro-tunnelling. State its applications and differentiate this operation with conventional tunnelling operation. **[10]**

Q6) Explain the importance of dewatering process. Enlist different methods adopted for dewatering. Explain in detail any two methods with neat labeled sketches. **[10]**

Q7) Explain in detail with labeled sketch the ICOS method of coffer dam construction. **[10]**

Q8) Write short notes on:

a) Open Well Foundation **[3]**

b) Equipment economics **[4]**

c) Equipment Maintenance management **[3]**

Total No. of Questions :8]

SEAT No. :

P4705

[Total No. of Pages : 3

[5355] - 301

M.E. Production (Manufacturing and Automation)

MATHEMATICS AND STATISTICS

(2013 Pattern) (Semester - I)

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

Instructions to the candidates:

1) ***Answer any 5 questions Out of 8 Questions.***
2) ***Neat diagrams should be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***All questions carry equal marks.***
5) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and stem tables is allowed.***
6) ***Assume Suitable data, if necessary.***

Q1) a) If $f(z)$ is a regular function of z, prove that $\left(\frac{\partial^2}{\partial x^2}+\frac{\partial^2}{\partial y^2}\right)|f(z)|^2 = 4|f'(z)|^2$. **[5]**

b) Show that under the transformation $w=\frac{z-i}{z+i}$, real axis in the z plane is mapped into circle |w|=1, which portion of the z - plane corresponds to the interior of the circle? **[5]**

Q2) a) Solve the boundary value problem $y'' - y + x = 0$, $0 \le x \le 1$; $y(0) = y(1) = 0$; by Rayleigh-Ritz method. **[5]**

b) Find the extremal of the functional $\int_0^{\pi/2} (y'^2 - y^2)\,dx$ subject to $y(0)$, $y(\pi/2) = 1$ **[3]**

c) State the Lagrange's equation in generalized co-ordinates. **[2]**

Q3) a) Solve the differential equation $y''+\frac{y'}{x}+\left(8-\frac{1}{x^2}\right)y=0$. **[5]**

P.T.O.

b) Explain the standard 5-point formula to solve the Laplace equation

$$\frac{\partial^2 u}{\partial x^2}+\frac{\partial^2 u}{\partial y^2}=0 .$$ **[3]**

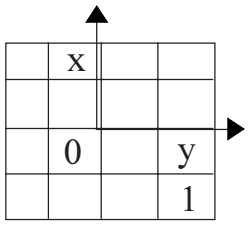
c) Determine whether the following equation is elliptic or hyperbolic

$(x+1)u_{xx} - 2(x+2)u_{xy} + (x+3)u_{yy} = 0.$ **[2]**

Q4) a) Prove that the shortest distance between two points in a plane is a straight line. **[5]**

b) By using series expression for $J_n(x)$ derive $\frac{d}{dx}[x^n J_n(x)] = x^n J_{n-1}(x)$. **[5]**

Q5) a) Solve Poisson's equation $\nabla^2 u = 8x^2 y^2$ for a square mesh of the following fig. with u(x, y) = 0 in the boundary and the mesh length 1. **[5]**



b) Write down the characteristics of Chi-square Goodness of Fit test and hypothesis. **[3]**

c) Define a Stochastic process. **[2]**

Q6) a) Find the mean recurrence time for each state of the following Markov chain.

$$P=\begin{bmatrix} 0.6 & 0.3 & 0.1 \\ 0.5 & 0.2 & 0.3 \\ 0.3 & 0.3 & 0.4 \end{bmatrix}$$ **[5]**

b) Define Moment Generating Function G(t) for a discrete or continuous random variable. **[2]**

c) Show that $P_n(-x) = (-1)^n P_n(x)$. **[3]**

Q7) a) Fit a Binomial distribution to the following data and test the goodness of fit. **[5]**

x	0	1	2	3	4
f	15	12	10	8	5

b) Evaluate $\oint_C \frac{3z^2+z}{z^2-1}dz$ where C is the circle $|z-1|=1$. **[5]**

Q8) a) Given the probability distribution calculate the mean deviation. **[5]**

x	0	1	2	3	4
P(x)	0.1	0.3	0.4	0.1	0.1

b) A controlled manufacturing process is 0.2% defective. What is the probability of taking 2 or more defective from a lot of 100 pieces? **[5]**

i) By using Binomial distribution.

ii) By using Poisson approximation.

Total No. of Questions :8]

SEAT No. :

P4706

[Total No. of Pages : 2

[5355] - 302

M.E. (Production-Manufacturing & Automation)

INDUSTRIAL AUTOMATION

(2013 Course) (Semester - I)

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

Instructions to the candidates:

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

Q1) a) A hydraulic system is operating at 80 bar with pump flow 15 lpm. The input power to the pump drive is 8 kW. The pump is loaded for 60% of the operating time. The overall efficiency when it is on load is 72%. If the ambient temperature is 20°C and maximum permissible fluid temperature in the reservoir is 65°C. Calculate the suitable size of the reservoir if it is of square section of size 'a' with length '1.4a'. **[6]**

b) A hydraulic system having cycle time of 50 seconds requires 40 lpm at 20 bar pressure for 35 seconds and 25 lpm at 70 bar pressure for the remaining time. Calculate size of the pump and input energy to pump if intensifier is used in the circuit. Hence calculate the energy saved through used of intensifier. **[4]**

Q2) a) Draw a pneumatic circuit to actuate the cylinder if sensors C and D are in the same state (ON or OFF) as that of sensor B and sensor A is in opposite state. **[4]**

b) A single stage air compressor running at 100 RPM, compress air from a pressure of 1.2 bar and temperature of 20° to a pressure of 5.5 bar. The clearance volume is 4.5 % of swept volume which is 0.38 m^3. Assuming that the compression and expansion to follow the law $PV^{1.3}$ = constant, determine the power required to drive the compressor. **[4]**

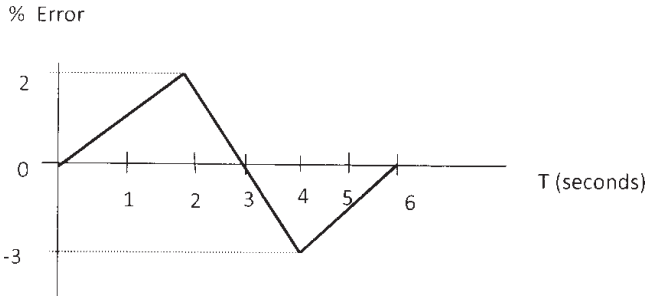
c) With neat sketch explain function of quick exhaust valve. **[2]**

P.T.O.

Q3) a) Write the program to perform following functions: **[4]**

- Load the number 6AH in register C
- Load the number 5BH in register D
- Increment the content of register D by one
- Add the content of register C and D and display the sum at port 1.

b) A PID controller has $K_p = 2$, $K = 2.2$, $K_d = 2s$. Controller output for zero error is 40%. Plot the controller output for the error shown in fig. below: **[6]**



Q4) Write short notes on:

a) Regenerative circuit. **[5]**

b) Control system components. **[5]**

Q5) a) Explain with neat sketch various job orienting and feeding devices. **[4]**

b) Derive an expression to calculate efficiency of a material handling system. **[4]**

c) Name any four bulk material handling system. **[2]**

Q6) a) With block diagram explain the function of various elements used in speed control of robot arm. **[4]**

b) Determine the coefficients of a cubic polynomial to move the joint of a single link robot with rotary joint from 32° to 75° in 4 seconds in a smooth manner. **[6]**

Q7) a) Explain need of simulation in manufacturing. **[4]**

b) Demonstrate with suitable example the use of any two artificial intelligence techniques used in manufacturing systems. **[4]**

c) Define axiomatic design for system modeling. **[2]**

Q8) Write short notes on:

a) Transfer mechanisms. **[5]**

b) Robot applications in press working. **[5]**

Total No. of Questions : 8]

SEAT No :

P 4707

[Total No. of Pages : 2

[5355]-303

M.E. (Production Engineering) (Manufacturing & Automation)

ADVANCED MANUFACTURING PROCESSES

(2013 Course) (Semester-I) (511103)

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

Instructions to the candidates:

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

Q1) a) Explain with sketch mechanism of melting and solidification during sand casting. **[4]**

b) Explain briefly injection blow molding process with neat sketch. **[4]**

c) List out the limitations of conventional machining processes. **[2]**

Q2) a) Explain with neat sketch working principle of ultrasonic machining. **[4]**

b) Describe important characteristics of heat affected zone in EDM. **[4]**

c) List out important blow molding defects with their remedies. **[2]**

Q3) a) Explain with neat sketch working principle of Electro discharge machining. **[4]**

b) Explain any four arc welding defects with their causes and remedies. **[4]**

c) Differentiate between destructive and Non-destructive testings. **[2]**

Q4) a) Describe principle of material removal, advantages and limitations of ECM. **[5]**

b) Explain various arc welding defects with their causes and remedies. **[5]**

P.T.O.

Q5) a) A wire of 20 mm diameter is to be reduced to 10 mm diameter. The die angle is 15º and the coefficient of friction at dies and wire interface is 0.5. The flow stress of wire material is 340 N/mm^2. Determine drawing stress and drawing load if the drawing speed is 0.7m/s. **[4]**

b) Explain metal high speed hot forging with neat sketch. **[4]**

c) List out various the non-conventional forming processes. **[2]**

Q6) a) Explain metal stretch forming with neat sketch. **[4]**

b) Explain high energy rate forming with neat sketch. **[4]**

c) Differentiate between hot forming and cold forming. **[2]**

Q7) a) Explain important process parameters of electro-hydraulic forming. **[4]**

b) A tube of 20 mm external diameter and 1.5 mm thickness is to be reduced to 16mm external diameter and 0.5 mm thickness. The die angle is 24º and plug angle is 16º. The coefficients of friction at die and tube interface and tube and plug (mandrel) interface is 0.5. The flow stress of tube material is 340 N/mm^2. The tube drawing is carried at a speed of 0.4 m/s. Calculate the fixed plug. **[4]**

c) What is high speed blanking? **[2]**

Q8) a) Explain forming limit diagram. **[5]**

b) Explain various rolling problems. **[5]**

Total No. of Questions :8]

SEAT No. :

P4708

[Total No. of Pages :3

[5355] - 304

M. E. (Production - Manufacturing & Automation)

RESEARCH METHODOLOGIES

(2013 Pattern) (Semester - I)

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

Instructions to the candidates:

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

Q1) a) Why it is necessary to define the research problem? What are components of research problem? **[4]**

b) With suitable examples explain the difference between quantitative approach and qualitative approach of research. **[4]**

c) What is difference between research method and research methodology? **[2]**

Q2) a) The effect of factors A, B, C (three level each) on response 'R' for 9 experiments is shown in Table. Determine most optimum level for each factor to minimize R using Taguchi method. **[8]**

P.T.O.

Expt. No.	A	B	C	R
1	1	1	1	2.48
2	1	2	2	2.876
3	1	3	3	3.264
4	2	1	3	3.382
5	2	2	1	3.506
6	2	3	2	3.982
7	3	1	2	2.834
8	3	2	3	3.278
9	3	3	1	3.306

b) What are features of good research design? **[2]**

Q3) a) Explain various digital and mechanical devices used in data collection.**[4]**

b) Explain the characteristics of case study method for qualitative analysis.**[4]**

c) Write note on : Holtzman Inkblot Test. **[2]**

Q4) Write short notes on : **[10]**

a) Research approaches

b) Content analysis.

Q5) a) A market research survey in which 170 consumer were contacted states that 36% of all consumers of certain product are motivated by product advertising. Find the confidence limit for the proportion of consumers motivated by advertising in the population for a confidence level of 0.95**[4]**

b) For the following data, determine the relation between variables X_1 and X_2 and response Y using multiple regression method. Also determine the quality of fit. **[6]**

X_1	3.5	4.5	5.5	6.5	7.5
X_2	22	25	30	32	40
Y	120	168	112	190	210

Q6) a) Determine the most suitable material using TOPSIS method for which attribute data is as shown in Table. Assume weights as 0.32, 0.28 and 0.40 for hardness, machinability rating and cost respectively.

Attribute data for materials (For this application hardness and machinability rating should be high and cost should be low) **[6]**

Material	Hardness (HB)	Machinability rating (%)	Cost (Rs. / Kg)
A	315	55	650
B	520	35	500
C	478	45	470
D	280	50	400

b) Explain steps of Graph Theory and Matrix approach. **[4]**

Q7) a) Explain general outline of a technical report. **[4]**

b) What precautions should be taken while writing a research report? **[4]**

c) How will you prepare bibliography? **[2]**

Q8) Write short note on: **[10]**

a) Analysis of variance

b) Back propagation ANN.

Total No. of Questions :8]

SEAT No. :

P4709

[Total No. of Pages : 2

[5355] - 305

M.E. (Production-Manufacturing and Automation)

COMPUTER INTEGRATED MANUFACTURING

(2013 Course) (Semester - II)

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

Instructions to the candidates:

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

Q1) a) Explain how a surface can be described mathematically in a 3D space by parametric equations. **[6]**

b) Represent a circle with center at (0, 0) and radius 50 mm in parametric form. Hence determine the co-ordinates of a point on this circle at parameter value 't' = 0.6. **[4]**

Q2) a) Write note on: Tool path generation and varification. **[6]**

b) Explain following motion commands in CNC programming: **[4]**

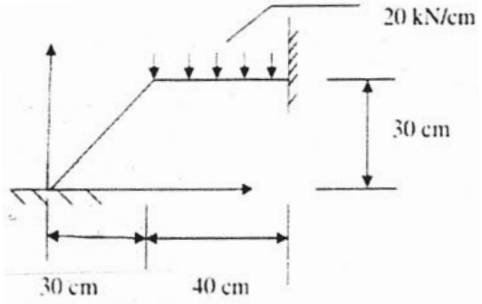
i) Rapid positioning

ii) Linear interpolation

iii) Circular interpolation

iv) Dwell

Q3) Assemble element stiffness matrix for the rigid frame shown in Fig. Consider E = 200 GPa, I_0 = 1000 cm^4, and A = 100 cm^2. **[10]**



P.T.O.

Q4) Write short notes on:

a) Shape function in FEM. **[5]**

b) Solid modeling techniques **[5]**

Q5) a) Explain database management architecture for CIM. **[5]**

b) Explain product data management. **[5]**

Q6) a) Explain manufacturing automation protocol and technical and office protocol (MAP/TOP) network standards in CIM framework. **[6]**

b) Explain computer aided material requirement planning. **[4]**

Q7) Consider the following part-machine incidence matrix. Apply Rank Order Clustering (ROC) algorithm to identify the part families. (*J*) and machine groups (*M*). **[10]**

	J_1	J_2	J_3	J_4	J_5	J_6
M_1	1				1	
M_2				1		1
M_3	1	1				
M_4			1	1		
M_5		1			1	
M_6			1	1		1

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

a) DBMS architecture.

b) Computer process monitoring

Total No. of Questions : 8]

SEAT No :

P 4710

[Total No. of Pages : 2

[5355]-306

M.E. (Production-Manufacturing & Automation)

TOOL AND DIE DESIGN

(2013 Pattern) (Semester-II)

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

Instructions to the candidates:

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

Q1) a) For turning a given steel rod by a tool of given geometry if shear force, frictional force and shear angle could be estimated to be 400N, 300N and -10° respectively, then what would be the possible values of tangential, radial, and axial components of cutting force? **[4]**

b) Explain the photocell technique to measure temperature at shear plane and tool flank. **[4]**

c) Explain effect of side cutting edge angle on surface roughness. **[2]**

Q2) a) A 2D part is to be clamped in a fixture with layout consisting of locators placed at positions (-1, -1), (1, -1) and (-3, 0) whereas two clamps are at position (0, 1), (3, 0). The workpiece origin is at (6, 6) and workpiece makes an angle 45° to χ -axis. Prove that above fixture layout will guarantee deterministic positioning. **[6]**

b) Explain with neat sketch any two principles of location. **[4]**

Q3) a) Determine the spring back angle and hence punch angle to obtain 90° bend if thickness of part is 6 mm, modulus of elasticity of work material 2.1×10^5 MPa, punch radius is 12mm, and part is subjected to a bending moment of 2800 N. **[4]**

b) Explain design procedure of progressive dies. **[4]**

c) Discuss computer applications in press tool design. **[2]**

P.T.O.

Q4) a) Write note on : V block analysis. **[5]**

b) Write note on methods of holding punches in press tools. **[5]**

Q5) a) Explain steps for design of forging dies. **[4]**

b) Define: i) Blend draft ii) Shift draft iii) Natural draft iv) Internal draft. **[4]**

c) Name the factors affecting selection of proper die material. **[2]**

Q6) a) Calculate the amount of cooling water to be circulated for cooling the injection mold for the component having following data: Injection temperature of plastic = 180 °C, temperature at the end of solidification=60ºC, Specific heat capacity of plastic 3.48 kJ/kgºC. weight of plastic component = 260gm. Cycle time for component = 15 sec., Incoming water temperature 208C, outgoing water temperature: 328C, Specific heat capacity of water:4.2 kJ/kgºC. **[4]**

b) Determine the length of the finger cam if the depth of undercut is 10mm, finger cam agle is 7º and clearance 0.5mm. **[2]**

c) What is significance of mold opening force? How it is determined? **[4]**

Q7) a) Define the terms and significance of: Capillary Number, weber number, and critical vent area. **[6]**

b) Calculate the pressure difference for a runner of circular cross section for driving aluminum liqud metal at velocity of 10m/sec, Given that runner length is 0.5m with diameter of 5mm. **[4]**

Q8) a) Write note on: Flash & flash control in forging. **[5]**

b) Write note on: Mold flow analysis. **[5]**

Total No. of Questions : 8]

SEAT No. : ____

P4711

[Total No. of Pages : 2

[5355] - 307

M.E. (Production) (Manufacturing and Automation)

ADVANCED JOINING PROCESSES

(2013 Credit Pattern) (Semester - II) (511109)

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

Instructions to the candidates:

1) ***Attempt any five questions.***
2) ***Figures to the right indicates full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Use of non-programmable electronic pocket calculator and statistical tables is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) What is Welding? Name the principal forms of arc welding differing in the manner of weld shielding against exposure to atmospheric air. **[4]**

b) Discuss the factors which are considered in choosing a welding process for a specific application. **[4]**

c) Write the equations used in the strength analysis of welds. **[2]**

Q2) a) Describe the working principal of Plasma Arc Welding process with a neat sketch. **[4]**

b) Briefly describe the important features of Laser Beam Welding process. **[4]**

c) Enumerate the various applications of Ultrasonic Welding. **[2]**

Q3) a) What characteristics are desired in a welding heat source. **[4]**

b) Briefly discuss the necessity of conducting destructive testing of welds. Why standard specimens are used for testing? State the basic considerations in choosing a test of mechanical properties. **[4]**

c) With neat sketches describe the faulty weld profiles on a butt and fillet welds. **[2]**

P.T.O.

Q4) a) How can distortion be controlled in weldments? Name the types of distortion in welded plates and articles. **[5]**

b) Describe the stovepipe technique in pipeline welding. **[5]**

Q5) a) Describe the effect of polarity on metal transfer and melting rate. **[4]**

b) Describe how the melt of rate and the deposition rate are calculated. **[4]**

c) What makes spray metal transfer superior to globular metal transfer. **[2]**

Q6) a) Discuss thermal and mechanical treatments of welds. What common thermal treatments are carried out on welds. **[4]**

b) Briefly discuss the isothermal transformations, Time Temperature Transformations in steel. **[4]**

c) What is HAZ in welding? Why a weld usually fails in HAZ area? **[2]**

Q7) a) Explain in a brief the hot air welding technique for welding of PVC plastics. **[4]**

b) Describe with an example the use of friction welding technique for welding plastic components of circular cross section. **[4]**

c) Draw a neat sketch of a test specimen with a butt joint to find out the strength of plastic sheets. **[2]**

Q8) a) With a suitable example explain how the weld metal solidifies and crystallizes. **[5]**

b) Explain the different stages of Dip Transfer in MIG/MAG welding with a neat diagram. **[5]**

EEE

Total No. of Questions :8]

SEAT No. :

P4712

[Total No. of Pages : 2

[5355] - 308

M.E. (Production Manufacturing and Automation)

ADVANCED ROBOTICS

(2013 Course) (Semester - III)

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

Instructions to the candidates:

1) ***Attempt any five questions.***
2) ***Draw neat sketches wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain the six degrees of freedom associated with the manipulator. **[4]**

b) What are essential characteristics of a spot welding manipulator? **[4]**

c) Explain with sketch a SCARA robot. **[2]**

Q2) a) Determine the rotation matrix for a rotation of 45° about y-axis followed by a rotation of 120° about z-axis. **[4]**

b) Explain the importance of homogeneous coordinates in modeling of robotic manipulators. **[4]**

c) Explain how a position vector P is expressed in homogeneous coordinates. **[2]**

Q3) a) Explain with a neat sketch an adhesive gripper. **[4]**

b) Describe the architecture of the hybrid position / force control. **[4]**

c) What do you mean by end effectors? Explain. **[2]**

Q4) a) What are fundamental rotation matrices? Obtain the three fundamental rotation matrices for rotations about x, y and z axes. **[5]**

b) Write a note on future of robots. **[5]**

P.T.O.

Q5) a) Explain lead through programming in detail. **[4]**

b) Explain first generation languages of robot programming. **[4]**

c) Explain the meaning of robot textual languages. **[2]**

Q6) a) Explain analog type touch sensors. **[4]**

b) Give the guidelines for choosing a right sensor. **[4]**

c) How are robot sensors classified? **[2]**

Q7) a) What are singularities of a manipulator? How are they classified and determined? **[4]**

b) Determine Jacobian and Joint velocities for a 3 DOF planar arm with revolute joints. **[4]**

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

Q8) a) A robotic vision system is used to aid the robot to pick parts from a conveyor belt. Parts are of only one type and are placed randomly on the conveyor. What information must the vision system acquire from the image to make the robot work intelligently? **[5]**

b) Explain the concept of low vision and high vision associated with Robot vision system. **[5]**

Total No. of Questions : 8]

SEAT No. : ____

P4713

[Total No. of Pages : 2

[5355] - 309

M.E. (Production Engineering) (Manufacturing & Automation)

SURFACE ENGINEERING

(2013 Course) (Semester - III) (611102)

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

Instructions to the candidates:

1) ***Attempt any five questions.***
2) ***Neat diagrams must be drwn wherever necessary.***
3) ***Figures to the right indicates full marks.***
4) ***Assume suitable data if necessary.***
5) ***Use of electronic pocket calculator and logarithmic tables is allowed.***

Q1) a) How wear, friction, corrosion and fatigue affect surface failure? **[5]**

b) Describe the importance and necessity of surface engineering. **[5]**

Q2) a) Explain the process details and applications of following:

i) Mechanical cleaning, **[4]**

ii) Chemical cleaning. **[4]**

b) Differentiate between diffusion and ion implantation. **[2]**

Q3) a) Write short notes on:

i) Metal cladding **[4]**

ii) Nitriding **[4]**

b) List out any four surface hardening techniques of industrial parts. **[2]**

Q4) a) Explain the process details and applications of any two diffusion coatings. **[8]**

b) List out any four surface hardening techniques of industrial parts. **[2]**

P.T.O.

Q5) a) Explain the process details and applications of any two corrosion prevention methods. **[8]**

b) List out various coatings for engineering surfaces. **[2]**

Q6) a) Explain the process details and applications of any two laboratory techniques of measuring coating thickness. **[8]**

b) Suggest suitable coating hardness testing method for following: **[2]**

i) Hard rubber & Plastics

ii) Steel, Cu, AI, Zn & Mg.

Q7) a) Write note on: High temperature metallic coatings. **[4]**

b) State the basic difference between oxidation/corrosion resistant coating and thermal barrier coating. **[6]**

Q8) a) Describe any two methods of measuring coating hardness. **[5]**

b) Write note on: 'Thermal degradation of metallic coatings during oxidation'. **[5]**

EEE

Total No. of Questions : 8]

SEAT No. :

P4484

[Total No. of Pages : 2

[5355]-31
M.E. (Civil) (Hydraulic Engg.)
FLUID MECHANICS
(2013 Course) (Semester-I) (501041)

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

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of logarithms tables, slide rule, electronics pocket calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) State assumptions made in Bernoulli's theorem. What are limitations of Bernoulli's theorem. **[4]**

b) Derive continuity equation in Cylindrical —polar coordinate system. **[6]**

Q2) a) Define stream line, path line and streak line. How these lines behave when the flow is steady. **[6]**

b) Write short note on relaxation technique. **[4]**

Q3) a) Given the complex potential, $W = \log_e Z^2$, evaluate the stream and velocity functions. Identify the flow pattern. **[4]**

b) Derive equation for velocity distribution for flow between parallel plates with both plate are at rest starting with Navier-Stokes equations. **[6]**

Q4) a) Derive equation for stream function and velocity potential for a source, Draw the streamlines and velocity potential lines. **[4]**

b) Derive Navier-Stokes equations of motion. **[6]**

P.T.O.

Q5) a) Derive boundary layer equations starting with Navier Stokes equations. **[6]**

b) What is boundary layer separation? What are its effects and how to control it? **[4]**

Q6) a) The velocity distribution in the turbulent boundary layer over a flat plate is given as $\frac{u}{U_\infty} = 2\frac{y}{\delta} - \frac{1}{2}\left(\frac{y}{\delta}\right)^2$. Obtain an expression for the displacement thickness, momentum thickness and energy thickness. **[4]**

b) Derive Karman momentum equation. **[6]**

Q7) a) Prove that fluctuating component of velocity satisfies the continuity equation. **[4]**

b) Describe the energy equation for compressible fluid flow if the system is

i) isothermal ii) adiabatic **[6]**

Q8) a) Explain temporal mean velocity, scale of turbulence, K.E. of turbulence and intensity of turbulence. **[4]**

b) What is a shock wave? What are types of shock wave? Write in brief about oblique shock wave. **[6]**

Total No. of Questions : 7]

SEAT No. :

P4714

[Total No. of Pages : 1

[5355]-311

M.E. (Printing Engg. Graphic Communication)

PROBABILITY, STATISTICS AND REGRESSION ANALYSIS

(2013 Pattern) (Semester - I)

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

Instructions to the candidates:

1) ***Attempt any five questions.***
2) ***Assume suitable data, if necessary.***

Q1) The probability of game on certain mission is 0.02. The army owns 6 rockets for a mission. What is the probability for. **[10]**

a) Losing one ship.

b) losing at most 2 ships.

Q2) Random variable X has the following function. **[10]**

Value of X (x)	0	1	2	3	4	5
P (x)	0	2K	2K	K	3K	K2

a) Find K.

b) Find P (X < 3); P (x ≥ 3)

Q3) Differentiate U & P charts in detail. **[10]**

Q4) Explain Regression analysis in detail. **[10]**

Q5) Explain producer and consumer risk. **[10]**

Q6) Explain DOE in detail for planning experiment. **[10]**

Q7) Describe about different statistical quality improvement tools? **[10]**

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Total No. of Questions :6]

SEAT No. :

P4715

[Total No. of Pages : 1

[5355] - 312

M.E. (Printing Engg. Graphic Communication)

PRINTING TECHNOLOGY MANAGEMENT

(2013 Pattern) (Semester - I)

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

Instructions to the candidates:

1) ***All questions compulsory.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume suitable data if necessary.***

Q1) a) Explain organizational structure of an Electronic Publishing business in detail. **[9]**

b) Explain different types of print products under commercial printing. **[9]**

OR

Q2) Explain any 3 problem identification techniques. **[18]**

Q3) a) What is the need for a Quality Program for a CTP unit. **[8]**

b) Explain how a customer driven quality program is necessary. **[8]**

OR

Q4) Explain activities of a quality assurance department in a book binding department. **[16]**

Q5) Explain the DMAIC. What are the advantages in any processing industry. **[16]**

OR

Q6) What is acceptance sampling? Explain its purpose in process control. **[16]**

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Total No. of Questions : 3]

SEAT No :

P 4716

[Total No. of Pages : 1

[5355]-313

M.E. (Printing Engineering & Graphic Communication)

508103 : MODERN TRENDS IN PRINTING

(2013 Pattern) (Semester-I)

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

Instructions to the candidates:

1) ***Draw neat diagram wherever necessary.***
2) ***Figures to right indicate full marks.***

Q1) a) Explain in detail different unit configurations of an offset press. **[18]**

OR

b) Explain in detail sections of offset press. **[18]**

OR

c) Explain in detail cell structures of gravure. **[18]**

OR

d) Explain the gravure process parameters on print quality. **[18]**

Q2) a) Explain the working of Shaftless technology for a web press. **[16]**

OR

b) Explain the pressurization systems for impression roller. **[16]**

Q3) a) Mention the care and maintenance for printing rollers. **[16]**

OR

b) Explain the effect of humidity on printability. **[16]**

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Total No. of Questions :6]

SEAT No. : ____

P4717

[Total No. of Pages :1

[5355] - 314

M. E. Printing Engineering

RESEARCH METHODOLOGY

(2013 Pattern) (Semester - I)

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

Instructions to the candidates:

1) ***Attempt any five questions.***
2) ***Assume suitable data, if necessary.***

Q1) State the objectives of Research? **[10]**

Q2) State steps involved in sample design? **[10]**

Q3) Explain in brief, the methods of data collection? **[10]**

Q4) State merits and demerits of case study method? **[10]**

Q5) Describe the layout of research report? **[10]**

Q6) State the features of a good research design. **[10]**

Total No. of Questions : 3]

SEAT No :

P 4718

[Total No. of Pages :1

[5355]-315

M.E.

(Printing engineering and Graphic communication)

COLOUR SCIENCE

(2013 Course) (Semester - II) 508107

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

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Assume suitable data wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***All questions are compulsory.***

Q1) Explain following with respect to ICC profile: **[18]**

a) Architecture

b) Types

c) Models

d) Making of profile

Q2) Explain following terms: **[16]**

a) Chromatic aberration of eye.

b) Image formation by eye.

c) Simultaneous contrast.

Q3) Why does the color and reflection property of material affects the printed color? Explain in details with support of different cases/materials. **[16]**

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Total No. of Questions : 3]

SEAT No :

P 4719

[Total No. of Pages : 1

[5355]-316

M.E. (Printing Engineering & Graphic Communication)

508108 : WEB HANDLING ON PRESS

(2013 Pattern) (Semester - II)

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

Instructions to the candidates:

1) ***Draw neat diagram wherever necessary.***
2) ***Figures to the right side indicate full marks.***

Q1) a) Explain the working of a viewing system used on a web press. **[18]**

OR

b) Explain the surface treatment required on the substrate. **[18]**

OR

c) Explain in detail circumferential registration control system for a press. **[18]**

OR

d) Explain in detail web tension control system. **[18]**

Q2) a) Explain static and dynamic balancing of rollers. **[16]**

OR

b) Explain the role of compensator roller and mirror backing on a web press. **[16]**

Q3) a) Explain the role of web transport rollers on a press. **[16]**

OR

b) Explain in detail deflection of web transport rollers on a press. **[16]**

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Total No. of Questions : 5]

SEAT No. : ____

P4720

[Total No. of Pages : 1

[5355] - 317

M.E. (Printing Engineering & Graphic Communication)

SUBSTRATE & INK

(2013 Course) (Semester - II)

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

Instructions to the candidates:

1) ***All question carry equal marks.***
2) ***All question are compulsory.***
3) ***Assume suitable data, if necessary.***
4) ***Use of logarithmic tables slide rule, Mollier charts, eletronic pocket calculator and stream tables is allowed.***
5) ***Figures to right indicates full marks.***
6) ***Neat diagrams must be drawn wherever necessary.***

Q1) How would you improve print transfer on non absorbent substrates? **[10]**

Q2) What is surface energy? State methods of surface tension measurement.**[10]**

Q3) Comment on substrate physical and optical properteis and their impact on print quality. **[10]**

Q4) Comment on printing ink formulation for screen printing process. **[10]**

Q5) Explain the term 'Viscosity' and its importance in printing. Also explain any one method of determining the printing ink viscosity in detail. **[10]**

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Total No. of Questions :3]

SEAT No. :

P4721

[Total No. of Pages : 1

[5355] - 318

M.E. (Printing Engineering and Graphic Communication)

PRINTED ELECTRONICS AND RFID

(2013 Course) (Semester-III) (608101)

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

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Assume suitable data, wherever necessary.***
3) ***Figures to the right indicates full marks.***
4) ***All questions are compulsory.***

Q1) What are functional inks, Explain working of conductive inks. **[16]**

Q2) a) Comment on following (any three) **[12]**

i) Stretchable Electronics

ii) Conventional method of electronics manufacturing

iii) Use of paper and polymer in low cost electronics

iv) Use of conventional printing methods for electronics manufacturing.

b) Discuss functional inks for use in printed electronics. **[4]**

Q3) Write in detail about printed RFID and its use in supply chain management. **[18]**

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Total No. of Questions : 3]

SEAT No. :

P4722

[Total No. of Pages : 1

[5355] - 319

M.E. (Printing Engineering & Graphic Communication)

ADVANCES IN CONVERTING AND PACKAGING

(2013 Course) (Semester - III) (608102)

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

Instructions to the candidates:

1) ***Draw neat diagrams wherever necessary.***
2) ***Figures to right indicates full marks.***

Q1) Explain the speciality features used in packaging. **[18]**

OR

Q1) Explain in detail varnishing techniques used for packaging. **[18]**

OR

Q1) Explain in detail blown film lamination for converting. **[18]**

OR

Q1) Explain in detail cast film lamination technique. **[18]**

Q2) Explain the Boil-in-Bag for liquid products. **[16]**

OR

Q2) Polyester plays an important role in packaging. Explain. **[16]**

Q3) Explain in detail aseptic filling of PET bottle. **[16]**

OR

Q3) Explain in detail pouching techniques used for packaging. **[16]**

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Total No. of Questions : 8]

SEAT No. : ____

P4485

[Total No. of Pages : 2

[5355]-32
M.E. (Civil) (Hydraulics)
IRRIGATION AND DRAINAGE
(2013 Course) (Semester - I) (501042)

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

Instructions to the candidates:

1) ***Attempt any five questions from eight questions.***
2) ***All questions carry equal marks.***
3) ***Figures to the right indicate full marks.***
4) ***Use of Scientific Calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) Explain flow of water in saturated and unsaturated soil. **[5]**

b) Calculate the frequency of irrigation, if **[5]**

i) Field capacity of soil = 29%

ii) Permanent wilting point = 11%

iii) Density of soil = 1300 kg/m^3

iv) Effective depth of root zone = 700 mm

v) Daily consumptive use of water = 12 mm

The moisture content must not fall below 25% of the water holding capacity between field capacity and permanent wilting point.

Q2) What major problems do salinity and alkalinity cause in irrigated soil? **[10]**

Q3) Explain the design concepts of Drip irrigation and field suitability conditions for drip irrigation. **[10]**

Q4) Draw a neat sketch of lift irrigation scheme and state various components of lift irrigation scheme. **[10]**

P.T.O.

Q5) Compare sprinkler irrigation system with drip irrigation system and explain the suitability of sprinkler irrigation system. **[10]**

Q6) Write short notes on : **[10]**

a) Command area development.

b) Onfarm structures.

Q7) What do you mean by canal outlets? Explain the following outlets. **[10]**

a) Non-Modular Outlets.

b) Modular Outlets.

c) Semi-Modular Outlets.

Q8) Explain drainage of irrigated lands considering following points : **[10]**

a) Need and purpose of drainage.

b) Design and construction of drainage systems.

Total No. of Questions : 8]

SEAT No :

P 5278

[Total No. of Pages : 2

[5355]-33

M.E. (Civil) (Hydraulics)

PLANNING AND MANAGEMENT OF WATER RESOURCES

(2013 Course) (Semester - I) (End Semester)

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

Instructions to the candidates:

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

Q1) a) Write a short note on - transfer of water from surplus areas to deficit areas. **[5]**

b) Explain the constraints for water resources development. **[5]**

Q2) a) A farmer takes a loan of Rs. 60,000 from a bank to purchase a pump costing Rs. 60,000. **[5]**

The life of the pump is 10 years and the salvage value is zero. If the bank charges 10 % rate of interest:

i) Find equal yearly installments the farmer will have to pay to repay the loan in 10 years.

ii) Give the year wise statement of the installment contribution towards payment of interest and repayment of the loan.

Find all answers if the salvage value of the pump, at the end of its life of 10 years, is Rs. 10,000; and the bank agrees to receive this amount at the end of the loan repayment period and accordingly reduce the yearly installment.

b) Explain aspects of water resources planning and management with reference to **[5]**

i) Technical aspect,

ii) Economical and financial aspect,

iii) Institutional Aspects

P.T.O.

Q3) a) Explain - Linear Programming (LP) approach for capacity estimation of an impounding reservoir. **[5]**

b) Explain - Objectives and necessity of water resource planning and management. **[5]**

Q4) a) Describe operation of an impounding reservoir in drought condition. **[5]**

b) Write a short note on - cost allocation in multipurpose projects. **[5]**

Q5) a) Write a short note on - appraisal criteria. **[5]**

b) Determine the optimal diameter of a pumping main for the following data: **[5]**

Design period = 30 yrs; discharge = 4.5 ML/D at present, increasing to 8.5 ML/D at 30 yr; length of the pumping main = 5,500 m; static lift = 32 m; Hazen William coefficient of the pipe = 120 at present, reducing to 100 at 30 yr: hours of pumping in a day = 16 hr; combined efficiency = 60%; energy charges = Rs 3/kWh; and interest rate = 8%. Assume minor losses as 10% of the frictional head loss.

Available pipe sizes and their unit cost shown in parentheses are: 200 mm (1,092 Rs/m); 250 mm (1,432 Rs/m); 300 mm (1,813 Rs/m); 350 mm (2,260 Rs/m); 400 mm (2,730 Rs/m); 450 mm (3,267 Rs/m); 500 mm (3,810 Rs/m); 600 mm (5,016 Rs/m); and 700 mm (6,553 Rs/m).

Q6) a) Explain how to compute water demand for: **[5]**

i) community water use

ii) agricultural water use

iii) industrial water use

b) Write a short note on - planning region and horizon. **[5]**

Q7) a) Write a short note on - Ground water evaluation. **[5]**

b) Write a short note on - Discounting techniques. **[5]**

Q8) a) Explain how Financialanalysis of water resources projects is carried out. **[5]**

b) Explain in detail how to estimate the groundwater runoff from a watershed. **[5]**

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Total No. of Questions :8]

SEAT No. :

P4487

[Total No. of Pages :2

[5355] - 34

M. E. (Civil) (Hydraulics Engineering)

RESEARCH METHODOLOGY

(2013 Pattern) (Semester - I)

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

Instructions to the candidates:

1) ***Solve any five questions.***
2) ***Figures to the right side indicate full marks.***

Q1) a) Explain the techniques involved in defining a research problem. **[5]**

b) Discuss the general objectives of research funding agency. **[5]**

Q2) a) Discuss in brief the format of a research proposal. **[5]**

b) Identify the ethical issues related to interpretation and reporting a research problem. **[5]**

Q3) a) Write a note on "Sources of literature review". **[5]**

b) Differentiate between Random sampling and Non-Random sampling. **[5]**

Q4) a) Why should the data collected for research must be checked for reability, suitability and adequacy? **[5]**

b) Explain type I and type II errors in hypothesis testing. **[5]**

Q5) a) Write a note on Discriminant Analysis. **[5]**

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

Q6) a) Discuss the important characteristics of Chi-Square test. **[5]**

b) Explain the centroid method of factor Analysis. **[5]**

P.T.O.

Q7) a) Discuss the prerequisites for publishing the research in a journal paper. **[5]**

b) Explain the significance of a research report. **[5]**

Q8) Write a research proposal for a suitable research problem (any problem related to Civil engineering can be considered) to a funding agency with reference to the following terms: Title, Introduction, origin of the problem, expected outcome, literature review, Significance of the study in the context of current status, objectives, methodology, year wise plan. **[10]**

Total No. of Questions : 8]

SEAT No. :

P4486

[Total No. of Pages : 2

[5355]-35
M.E. (Civil) (Hydraulics)
OPEN CHANNEL HYDRAULICS
(2013 Pattern) (Semester - II) (501046)

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

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of logarithms tables, slide rule, electronics pocket calculator is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) a) Design an economical channel with side slopes 2 H : 1 V, bed slope 1: 3600 to carry discharge of 5m^3/s. Take Manning's n=0.02. **[6]**

b) How to determine energy loss in hydraulic jump graphically? **[4]**

Q2) a) A rectangular channel with bed width of 10 m, bed slope of 1 in 2500 and Manning's n=0.002 carries a discharge of 10 $m^{3/}$s. Find the slope of water surface with respect to horizontal at the section where the depth of flow is 0.72m. **[6]**

b) Write in detail about hydraulic jump at an abrupt drop **[4]**

Q3) a) Draw the water surface profiles when. **[5]**

i) a steep slope follows a steeper slope.

ii) mild slope follows a steep slope.

b) Write a detail about standard step method to determine length of a water surface profile crated by gradually varied flow. **[5]**

Q4) a) Derive dynamic equation of GVF in standard form. **[4]**

b) A wide rectangular channel carries a discharge of 5 m^3/s/m. The bed slope of the channel is 1 in 3600 and Manning's n=0.02. If the channel ends in a drop determine how far upstream the depth of flow would be 10% of the normal depth. Use step method. Take 2 steps. **[6]**

P.T.O.

Q5) a) Write short note on flood routing. **[4]**

b) Derive equation for incresing discharge of spatially varied flow. **[6]**

Q6) a) Route the following flood through a reach of k=22 h and x=0.25. At t= 0 the outflow discharge is 40 m^3/s. **[6]**

Time (h)	0	12	24	36	48	60	72	84	96	108	120	132	144
Inflow m^3/s	40	65	165	250	240	205	170	130	115	85	70	60	54

b) Derive relation for change in the area at a uniformly discharging side weir. How these weirs can be constructed? **[4]**

Q7) a) Derive continuity equation of gradually varied unsteady flow. **[6]**

b) What is dam break problem? Is it a positive surge or negative surge? Write the basic differential equation for solving the dam break problem.**[4]**

Q8) a) A wide tidal river has a low water velocity of 1.5 m/s and depth of flow of 2.5 m/s. A tide in the sea causes a 'bore' which travels upstream. If height of bore is 0.9 m, estimate speed of the bore and velocity of flow after its passage. **[6]**

b) Derive equation for celerity of a solitary wave. **[6]**

Total No. of Questions : 8]

SEAT No :

P 4488

[Total No. of Pages : 2

[5355]-36
M.E. (Civil) (Hydraulics)
SEDIMENT TRANSPORT & RIVER MECHANICS
(2013 Course) (Semester - II) (501047)

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

Instructions to the candidates:

1) ***Solve any Five questions from Eight questions.***
2) ***All questions carry equal marks.***
3) ***Figurers to the right indicate full marks.***
4) ***Use of scientific calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) Briefly explain bulk properties of sediment. **[5]**

b) Discuss the origin and formation of sediments. **[5]**

Q2) a) Write short note on Shields analysis. **[5]**

b) What are the significance of ripples, dunes. **[5]**

Q3) a) Explain and distinguish suspended load, total load, wash load. **[7]**

b) What are the different Modes of sediment transport. **[3]**

Q4) a) Write a short note on Meyer-Peter and Muller equation. **[5]**

b) Explain "Saltation mechanism" **[5]**

P.T.O.

Q5) Compare Kennedy method and Lacey method for the design of an irrigation channel giving all the steps of design by both methods. Also Design an irrigation channel in alluvial soil according to Lacey's method for following data.

a) Full supply discharge : 65 m^3/sec

b) Lacey's silt factor-0.9

c) Channel side slope 0.5H : 1V. **[10]**

Q6) a) Write a short note on **[5]**

i) River gauging,

ii) Continuity Equation for sediment

b) Explain bifurcations and confluences. **[5]**

Q7) a) What are the methods of river training for flood control? **[5]**

b) Explain sediment control incase of river training works. **[5]**

Q8) a) State the different river models and explain any one of them considering basic concept, data requirement, its applicability and limitations. **[5]**

b) Explain Sediment transport through pipes, considering the following points.

i) Critical velocity.

ii) Head Losses. **[5]**

Total No. of Questions :8]

SEAT No. :

P4489

[Total No. of Pages : 2

[5355] - 37

M.E. (Civil) (Hydraulics Engineering)

HYDROLOGY

(2013 Course) (Semester-II)

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

Instructions to the candidates:

1) ***Answer any 5 questions***
2) ***Figure to right indicate full marks***
3) ***Assume suitable data, if necessary***
4) ***Use of electronic non programmable calculator is allowed***

Q1) a) Explain the application of Hydrology in the field of Civil Engineering. With the help of hydrological diagram explain the role of various components of hydrologic cycle in development of groundwater. **[4]**

b) What are the factors affecting evaporation and why evaporation loss needs to be accounted in design of reservoir capacity? Explain any two factors affecting evaporation in detail. **[6]**

Q2) a) Explain infiltration and infiltration capacity. Derive the Horton equation for measuring rate of infiltration. **[4]**

b) Explain the application of Depth Area Duration Analysis. A 24 hours storm produced an isohytel map and their enclosed area as below. Work out the average depth of precipitation over an area of 2500 km^2. **[6]**

Isohyets (mm)	40	39	38	37	36	35	34	33	32
Area (Km^2)	500	1100	1950	2850	3300	3900	4300	4500	4750

Q3) a) Explain Stochastic Processes as applied to hydrology and explain Stochastic Processes with Continuous Parameter and Discrete State Space. **[6]**

b) What are stationary processes and non-stationary process in Stochastic Processes and explain them with examples **[4]**

P.T.O.

Q4) a) Explain the need for flood frequency analysis and state the assumptions made in the flood frequency analysis. Explain the parameter estimation using the probability weighted moment and Linear moments method. **[6]**

b) Discuss the flood frequency method for estimation of peak flood. **[4]**

Q5) a) A 50 years storm had the following details

Duration (min)	20	40	60	80	240
Rainfall(mm)	50	70	85	110	130

A 300 ha of land is required to be drained by a culvert with a maximum length of travel of 1.5km with a slope of 0.00 1 and run off coefficient of 0.20. Find the peak flow using rational method for designing the culvert for a 50 year flood. **[6]**

b) Explain the limitation of flood frequency studies. **[4]**

Q6) a) What are the assumptions of the Dupit-Forchheimer assumption for steady flow discharge equation? Derive the equation for discharge for a steady radial flow into a confined aquifer. **[6]**

b) Define any two of the following : **[4]**

i) Aquifer parameters

ii) Hydraulic conductivity

iii) Cone of depression

Q7) a) Two wells were pumped for 15 and 100 minutes. The drawdown observed in the pumping well and another observation well 15 m away was 2.8m and 3.0m. since the pumping was started. Estimate the corresponding drawdown in another observation well 130m away from the pumping well. **[5]**

b) Explain the method of images for well adjacent to a stream or line source. **[5]**

Q8) a) What are the necessary conditions for sea water intrusion into aquifer? What are the different types of open wells and explain the construction of open well with impervious lining? **[6]**

b) What are the different types of tube wells and explain strainer type of tube well. **[4]**

Total No. of Questions : 7]

SEAT No. : ____

P4490

[Total No. of Pages : 2

[5355]-38
M.E. (Civil) (Hydraulics)
DAM ENGINEERING
(2013 Pattern) (Semester-III)

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

Instructions to the candidates:

1) ***Attempt any five questions.***
2) ***All questions carry equal marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***

Q1) Check the stability of gravity dam 35 m high. Water stands on the V/S side of dam of triangular section upto its full height. The base width of dam is 20 m. Assume **[10]**

a) Specific weight of dam = 24 kN/m^3

b) Coefficient of friction for foundation $\mu = 0.8$

c) Shear strength = 1200 kN/m^2.

Q2) a) Explain different forces acting on arch dam. **[5]**

b) Write historic development of Rock Fill dam in India. **[5]**

Q3) a) Explain with a neat sketch stability analysis of earthen dam by Slip circle method. **[6]**

b) Draw a neat sketch of Zoned type earthen dam & show all components. **[4]**

Q4) a) Explain with sketch flow net method of determination of seepage discharge through earthen dam. **[5]**

b) Write a note - Inspection and maintaince of Spillway Gates. **[5]**

P.T.O.

Q5) a) Enlist the instrument required for Earthen dam & write its significance. **[5]**

b) Write correlation between jump height and fail water depth. **[5]**

Q6) a) State design methods of gravity dam. Explain any one in detail. **[6]**

b) Write a detailed note on Colgrout Masonary dam. **[4]**

Q7) a) State the factors governing site of type of spillway. **[4]**

b) What are different types of energy dissipaters? Explain any one with a neat sketch & its suitability. **[6]**

Total No. of Questions :8]

SEAT No. :

P4491

[Total No. of Pages : 3

[5355] - 39

M.E. (Civil) (Hydraulics Engineering)

OPTIMIZATION TECHNIQUES

(2013 Course) (Semester - III) (601053)

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

Instructions to the candidates:

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

Q1) a) What is sensitivity analysis? How is useful in post optimality process? **[3]**

b) A company produces three products: P, Q, and R from three raw materials A, B, and C. One unit of product P requires 2 units of A and 3 units of B. A unit of product Q requires 2 units of Band 5 units of C and one unit of product R requires 3 units of A, 2 units of B and 4 units of C. The company has 8 units of material A, 10 units of material B, and 15 units of material C available to it. Profits per unit of products P, Q, and R are Rs. 3, Rs. 5, and Rs. 4, respectively. **[7]**

i) Formulate this problem as an LP problem.

ii) How many units of each product should be produced to maximize profit?

iii) Write the dual of this problem.

Q2) a) An investor has Rs. 6000.00 to invest. This amount can be invested in any of the three ventures available to him. But, he must invest in units of Rs. 1000.00. The potential return from investment in any one venture depends upon the amount invested according to the following table: **[5]**

Amount invested	Return from Ventures		
	A	*B*	*C*
0	0	0	0
1000	500	1500	1200
2000	1000	2000	2400
3000	3000	2200	2500
4000	3100	2300	2600
5000	3200	2400	2700
6000	3300	2500	2800

P.T.O.

Formulate the above problem as a dynamic programming problem and find the optimum investment policy.

b) Consider the following unconstrained optimization problem: **[5]**

Maximize $f(x) = 2x_1x_2 + x_2 - x_1^2 - 2x_2^2$

Starting from the initial trail solution $(x_1, x_2) = (1, 1)$, interactively apply the gradient search procedure with an error tolerance = 0.25 to obtain an approximate solution.

Q3) a) Minimize $Z = 3x_1 + x_2 + 4x_3$ **[5]**

Subject to

$$2x_1 + x_2 + 3x_3 = 60$$
$$3x_1 + 3x_2 + 5x_3 \geq 120$$

and

$$x_1, x_2, x_3 \geq 0$$

Use Big method.

b) Define the following terms in dynamic programming: i) stage, ii) state variable, iii) decision variable, iv) immediate return. **[2]**

c) What is the dynamic recursive relation? Describe the general process of backward recursion. **[3]**

Q4) a) Minimize $f = 2x_1^2 + x_2^2$ by using the steepest descent method with the starting point (l, 2) (two iterations only). **[5]**

b) What is Hessian matrix? Explain what is the significance of Hessian matrix. **[3]**

c) What are the advantages and limitations of LP models? **[2]**

Q5) a) Assume that at a bank teller window the customer arrives at an average rate of 20 per hour according to Poission distribution. Assume also that the bank teller spends an distributed customers who arrive from an infinite population are served on a first come first services basis and there is no limit to possible queue length. **[6]**

i) What is the value of utilization factor?

ii) What is the expected waiting time in the system per customer?

iii) What is the probability of zero customers in the system?

b) Explain Decision making without experimentation. **[4]**

Q6) a) Explain sequencing problem in proper detail. **[4]**

b) Explain with suitable examples the maximin and the minimax in the decision making. **[6]**

Q7) a) What do you understand by zero-sum and nonzero-sum games? **[4]**

b) Customer arrive at a service facility to get the required service. The inter arrival and service times are constant and are 2 minutes and 5 minutes respectively. Simulate the system for 15 minutes. Determine the average waiting time of customer and idle time of the service facility. **[6]**

Q8) a) Find the optimum Strategy and values of the following game. **[6]**

A	B			
	-3	4	2	9
	7	8	6	10
	6	2	4	-1

b) What is simulation? When to use it? State the advantages and limitations of the simulation techniques. **[4]**

Total No. of Questions :8]

SEAT No. :

P5306

[Total No. of Pages : 3

[5355] - 401

M.E. (Civil) (Structures)

STRUCTURAL MATHEMATICS

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

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

Instructions to the 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) Using Flexibility method, analyze the beam shown. **[12]**

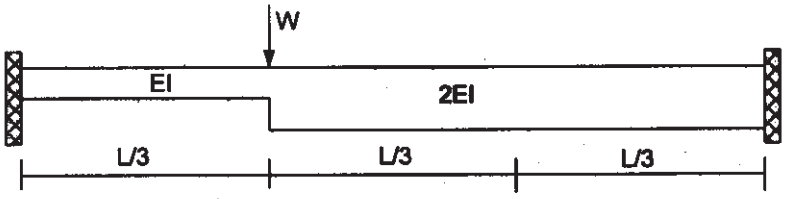


Fig.1.a

b) Compare flexibility method with stiffness method **[5]**

Q2) a) A three member pin jointed frame forms an equilateral triangle having 5m length of each member. AB member is horizontal and is attached to hinges at A & B. Joint C is subjected to horizontal force of 100 kN. Analyze the truss using stiffness method. **[12]**

b) Using standard notations, estimate the lowest buckling load of a uniform pin ended column of length L and flexural rigidity EI using Eigen value technique. Divide the column in three equal parts. **[5]**

P.T.O.

Q3) a) For a space truss member, develop the member stiffness matrix with proper sketches. **[8]**

b) With proper diagrams explain the nodal DOF of space portal frames and grid structures. **[8]**

Q4) a) Using Euler's method, find an approximate value of y when x=0.3, given that dy/dx=2xy and y=0.5 when x=0. Take h=0.1 **[7]**

b) The derivative of y with respect to x is given by dy/dx = x-y.

At x = 0, y = 1. Calculate the value of y at x =0.1 and 0.2 using an interval of 0.1. Use Runga kutta method, **[9]**

SECTION - II

Q5) a) For the fixed beam shown in Fig 1.a of variable flexural rigidity supporting a concentrated load W, estimate the deflection under the load considering three sub intervals of the beam. Use finite difference method. **[8]**

b) A simply supported uniform rectangular plate of size 3m by 6m supports a uniformly distributed load of intensity 100 kN/m^2 over the plate. Estimate the deflections at the interior nodes, assuming the thickness of the plate t=60 mm, Poisson's ratio=0.25 and Modulus of elasticity E=2 x 10^5 N/mm^2. Divide the plate into 2x4 uniform mesh having h= 1.5 m. Use finite difference method. **[9]**

Q6) a) Values of y are given at values of x as shown below. **[10]**

X	1.0	1.5	4.0	6.0
Y	16.0	22.5	40.0	36.0

Calculate the value of y at x = 4.5 using Lagrange interpolation Technique

b) Write a note on regression analysis. **[7]**

Q7) a) With a schematic diagram show the coefficients of different operators for the second order, third order and fourth order central differences. **[5]**

b) Find the cubic splines for the following table of values **[11]**

x:	1	2	3	4
y:	1	5	11	8

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

Q8) a) Compute the Integral $\int_{2}^{6}\left(1+x^{3}\right)dx$ using Gaussian three point formula. Compare it with Simpson's 3/8th rule by taking h=l. **[8]**

b) Explain the use of fourier series in calculation of deflection in simply supported beam using suitable example. **[8]**

Total No. of Questions : 8]

SEAT No. :

P5307

[Total No. of Pages : 2

[5355]-402
M.E. (Civil-Structures)
DESIGN OF FOUNDATIONS
(2008 Pattern) (Semester - I) (Elective - I)

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

Instructions to the 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) ***All relevant codes are allowed in the examination.***
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) Explain the factors that govern the type of foundation to be designed for a structure. **[8]**

b) Explain how the depth of foundation is determined. **[8]**

Q2) An industrial building consists of 20 columns. The columns are of size (350×350) mm. They are arranged in 4 rows. The center-to-center distance between the columns is 3.5m. The load on the four exterior columns is 500kN each. The load on all other columns is 700N each. The allowable pressure on the soil is not to exceed 65kN/m^2. Design the raft foundation for the industrial building. Use M30 grade concrete and steel of grade Fe500. Sketch the reinforcement details. **[16]**

Q3) A building consists of 6 columns. The columns are of size (350×450) mm. They are arranged in 3 rows. The center-to-center distance between the columns is 3.0m. The load on the four exterior columns is 400kN each. The load on all other columns is 600kN each. The allowable pressure on the soil is not to exceed 50kN/m^2. Design beam and slab type raft foundation. Use m25 grade concrete and steel of grade Fe500 sketch the reinforcement details. **[17]**

Q4) a) Based on design criteria, explain the different types of machine foundations. **[5]**

b) Explain the design criteria for foundations of machines having low operating frequency. **[12]**

P.T.O.

SECTION - II

Q5) a) What is a pile group? When is it provided? **[8]**

b) Explain negative soil friction in piles. **[8]**

Q6) A precast pile 6.0m long is driven in cohesion-less soil. The top of the pile is 0.20m above the ground level. A vertical load of 500kN and a lateral load of 80kN act at the top of the pile. The value of sub-grade reaction may be considered as 4.75×10^4 kN/m^2. Design the pile. **[16]**

Q7) A column (500×500) mm is subjected to a load of 4,000kN. The soil investigation at the site reports the following data. **[17]**

C_c = 0.10, e_0 = 0.750, unit weight (saturated) = 21kN/m^3, unconfined compression strength = 30kN/m^2. Design the pile system.

Q8) a) What are shell foundations? Explain with an example. **[5]**

b) Design an inverted umbrella type hypar shell footing for a column carrying 1,000kN. The safe bearing capacity of the soil is 50kN/m^2. **[12]**

Total No. of Questions :4]

SEAT No. :

P4397

[Total No. of Pages : 3

[5359] - 403

M.Com.

MATHEMATICS

402 - B : Operations Research

(2013 Pattern) (Semester - IV) (CBCS)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Use of statistical tables and calculator is allowed.***
4) ***Symbols have their usual meanings.***

Q1) Attempt any two of the following : **[14]**

a) Solve the following L.P.P. by graphical method

Max. $Z = 50x_1 + 40x_2$

Subject to the constraints

$$6x_1 + 4x_2 \leq 24$$

$$-x_1 + x_2 \leq 1$$

$$x_2 \leq 2$$

$$x_1 + 2x_2 \leq 6$$

$$x_1, x_2 \geq 0$$

b) Write the dual of the following L.P.P.

Min. $Z = 2x_1 + 5x_2 + 4x_3$

Subject to :

$$3x_1 + 4x_2 + x_3 \geq 11$$

$$-2x_1 - 3x_2 + 2x_3 \leq -4$$

$$x_1 - 2x_2 - 3x_3 \leq -1$$

$$3x_1 + 2x_2 + 2x_3 \geq 4$$

$$x_1, x_2, x_3, \geq 0$$

P.T.O.

c) Solve the following game using dominance principle

		I	II	III	IV	V
	I	3	5	4	9	6
Player A	II	5	6	3	7	8
	III	8	7	9	8	7
	IV	4	4	8	5	3

Q2) Attempt any two of the following : **[14]**

a) Solve the following L.P.P. using simplex method

Maximize $Z = 3x_1 + 2x_2 + 5x_3$

Subject to :

$$x_1 + x_2 + x_3 \leq 9$$

$$2x_1 + 3x_2 + 5x_3 \leq 30$$

$$2x_1 - x_2 - x_3 \leq 8$$

$$x_1, x_2, x_3, \geq 0$$

b) Obtain an initial basic feasible solution of the following transportation problem by vogel's Approximation method

Destination → / Origin ↓	D_1	D_2	D_3	D_4	Supply
O_1	23	27	16	18	30
O_2	12	17	20	51	40
O_3	22	28	12	32	53
Demand	22	35	25	41	

Also find the corresponding transportation cost.

c) Show that the following L.P.P. has unbounded solution

Maximize $Z = 14x_1 + 12x_2 - x_3 + 15x_4$

Subject to :

$$3x_1 + x_2 - 4x_3 + 5x_4 \geq -10$$

$$8x_1 - 3x_2 + x_3 + 4x_4 \leq 24$$

$$2x_1 - 7x_2 - 4x_3 + 10x_4 \leq 35$$

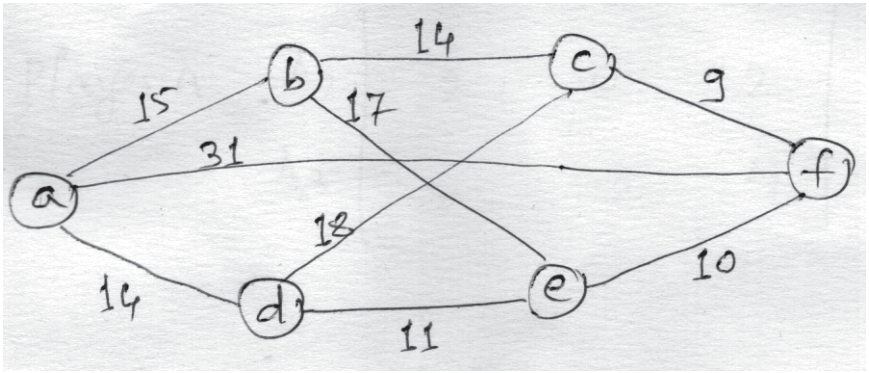
$$x_1, x_2, x_3, \geq 0$$

Q3) Attempt any two of the following : **[14]**

a) Solve the following assignment problem for maximization

	A	B	C	D
I	12	15	17	14
II	20	18	21	20
III	15	16	22	18
IV	19	18	19	16

b) Find the minimum cost spanning tree for the following network V :



c) Define network. Explain what do you mean by Directed and undirected Network? Also explain the term Node and Arc.

Q4) Attempt any two of the following : **[8]**

a) Explain the following terms with reference to transportation problem.
   i) Basic feasible solution
   ii) Optimum solution
   iii) Dummy source
   iv) Non-degenerate basic feasible solution.

b) Discuss the various steps involved in the application of PERT and CPM.

c) Determine the saddle point and optimum strategies for each player. Also find value of the game.

Player B

Player A	B_1	B_2	B_3
A_1	−3	−2	0
A_2	2	0	2
A_3	5	−2	4

Total No. of Questions : 6]

SEAT No. :

P5308

[Total No. of Pages : 2

[5355]-405
M.E. (Civil) (Structures)
MANAGEMENT IN STRUCTURAL ENGINEERING
(Semester-II) (2008 Course)

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

Instructions to the candidates:

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

SECTION-I

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

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

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

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

Q2) a) Explain the causes of inadequate durability. **[7]**

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

i) Corrosion in structures.

ii) Quality control of materials of structures.

iii) Fire safety.

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

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

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

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

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

i) Load on formwork

ii) Design criteria

iii) Design procedure

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

i) Safety precautions working at height.

ii) Material handling and stacking.

6) 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. :

P5309

[Total No. of Pages : 4

[5355]-406

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) ***From Section-I answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and from Section-II answer Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.***
2) ***Answers to the two sections should be written in separate answer books.***
3) ***Figures in bold to the right, indicate full marks.***
4) ***IS 456, IS 1893, IS 13920 are allowed in the examination.***
5) ***Neat diagrams should be drawn where ever necessary.***
6) ***If necessary, assume suitable data and indicate clearly.***
7) ***Use of electronic pocket calculator is allowed.***

SECTION-I

Q1) a) What are the causes of an earthquake? Explain with neat sketches the Plate Techtronic Theory? **[6]**

b) Classify and describe with suitable sketches, different types of waves generated by an earthquake? **[6]**

c) Explain philosophy behind earthquake resistant design of structures? Describe the difference between magnitude and intensity of an earthquake? **[4]**

OR

Q2) a) Explain with examples, the lessons learnt from past earthquakes? **[8]**

b) Explain the interior of the earth with neat sketches? Classify the earthquakes based on different parameters? **[8]**

Q3) a) What are different types of vibrations? Define natural frequency, Natural time period, Natural circular frequency and Damping ratio. **[8]**

b) Explain with examples, Over damped system, critically Damped system and Under damped system. Elaborate Logarithmic Decrement for free but damped SDOF? **[8]**

OR

P.T.O.

Q4) For the two degree freedom system shown in Figure 4.1, obtain natural frequencies and amplitude ratios. Assume K=25kN/m. **[16]**

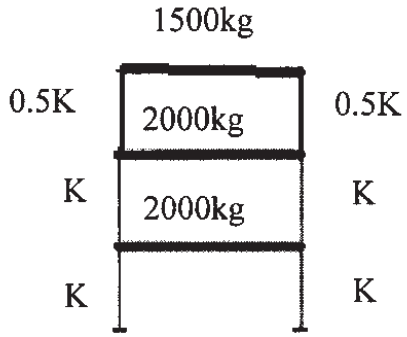


Figure 4.1

Q5) Calculate the approximate fundamental time period (*T*a), average design response acceleration (*Sa/g),* design base shear (V_b) and storey-wise distribution of V_b for a G+3 hospital building having reinforced concrete shear wall (RC Shear Wall) as lateral load resisting system (LLRS). The typical floor plan of LLRS is shown in figure 5.1 below. Use following data: **[18]**

a) The building is constructed on hard strata.

b) Dead load on floor is 5.50 kN/m^2 and on roof 2.75 kN/m^2.

c) Live load on floor is 4.00 kN/m^2 and on roof 2.00 kN/m^2.

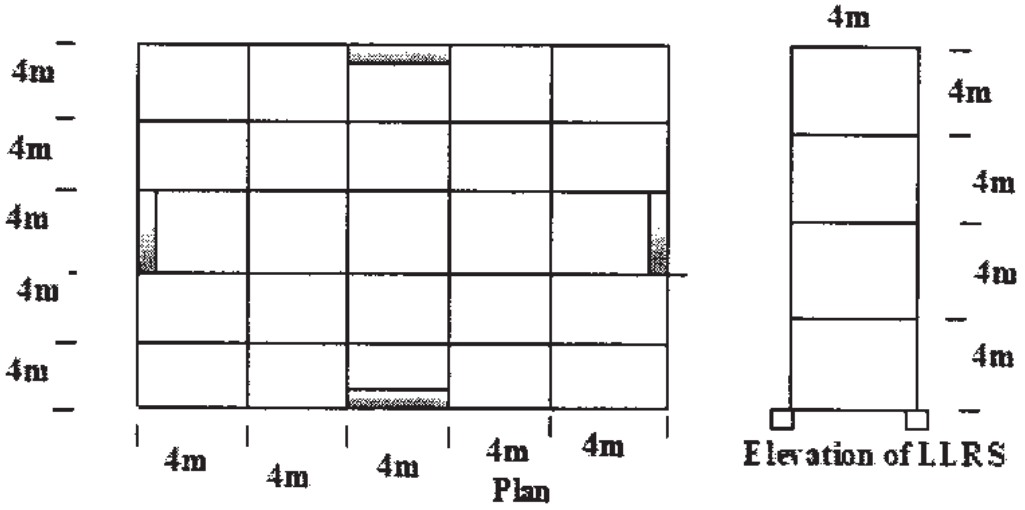


Figure 5.1

OR

Q6) Determine lateral forces at different storey levels for a plan of fourstorey school building as shown in Figure 6.1. Assume D.L. = 5kN/m^2, L.L.=4kN/m^2 on each floor and 1.5 kN/m^2 on roof. Assume floor height 4m for ground and 3m for remaining storey with soil type hard and seismic zone III. **[18]**

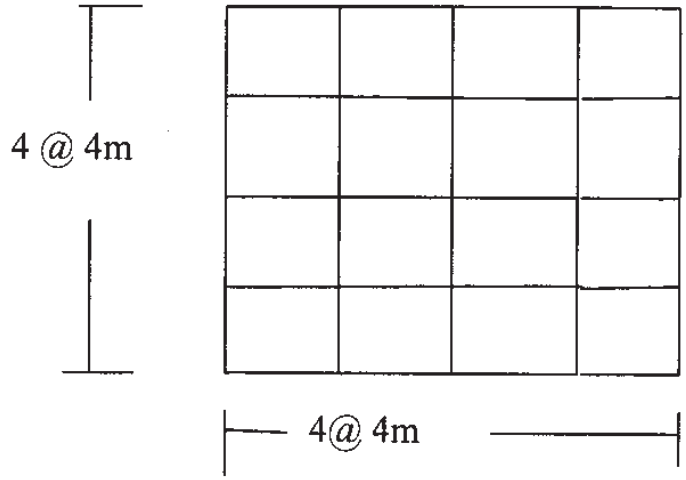


Figure 6.1

SECTION-II

Q7) a) What is the necessity of ductile detailing? Explain with neat sketches the detailing for Beam-Column joint as per IS 13920 (1993). **[9]**

b) Explain the effects and various methods to reduce the effects of liquefaction of soil? **[9]**

OR

Q8) a) Define the shear wall and its classification? Describe the structural behavior of shear wall? **[9]**

b) What is Base Isolation? Explain energy dissipation devices to improve earthquake resistance of buildings? **[9]**

Q9) a) What is strengthening and retrofitting? Explain in brief the techniques for retrofitting of RCC build constructions? **[8]**

b) Explain the terms active and passive control system? What are different types of steel frames used in earthquake prone areas? **[8]**

OR

Q10)a) Explain Tuned Mass Dampers? **[8]**

b) Explain various techniques for local retrofitting of RC buildings? Give reasons for poor performance of masonry buildings? **[8]**

Q11)a) Differentiate between retrofitting and strengthening? What are techniques for retrofitting of RC buildings? **[8]**

b) A 400 mm × 400 mm column is reinforced with 14 nos. of 16 mm dia. Bars. It is supported on an isolated footing. The load coming on footing is 1600 kN and a moment 30 kN. m. The SBC is 20 kN/m^2. Using M25 grade of concrete and steel grade Fe500, design footing and sketch the details. **[8]**

OR

Q12)Write notes on- **[16]**

a) Seismographs

b) Irregularities in buildings

c) Response spectrum analysis

d) Load Resisting systems as per IS 13920

Total No. of Questions : 6]

SEAT No :

P 5310

[Total No. of Pages : 2

[5355]-407
M.E. (Civil Structure)
BIOMECHANICS AND BIO-MATERIALS
(Elective-IV) (Semester - II) (2008 Course)

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 writtern 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 engineering properties of hard tissue (bone) use suitable elastic model to demonstrate. **[8]**

b) Explain various elastic models used to define soft tissue and hard tissue. **[8]**

c) Explain articulation joint with suitable free body diagram. **[9]**

Q2) a) Explain biocompatibility and biocompatible materials give suitable example of each. **[10]**

b) Explain various polymeric materials used as bio compatible materials with its applications. **[8]**

c) Explain different types of ceramics use as replacement components. **[7]**

Q3) a) Explain properties of bone cement PMMA. **[7]**

b) Explain silicon rubber, ultra high molecular weight poly ethylene as bio compatible material. **[8]**

c) Explain stainless steel, cobalt base alloys, Titanium base alloys use as biomaterial. **[10]**

P.T.O.

SECTION - II

Q4) a) Explain anisotropy, transverse isotropy, orthotropy for bone tissue. **[7]**

b) Explain geometry of the articulating surfaces for ankle joint, Knee joint, Hip joint. **[18]**

Q5) a) Explain device to measure wear of cartilage on cartilage material. **[7]**

b) Explain the term gait with suitable sketch, and gait analysis what are the techniques used to measure body motion. **[18]**

Q6) a) What are the fundamental design consideration for engineering design of prosthesis. **[8]**

b) Explain step by step structural design cycle of a fixation device in biological environment. **[10]**

c) What is the classification of prosthetics devices. **[7]**

Total No. of Questions :6]

SEAT No. :

P5362

[Total No. of Pages : 2

[5355]- 408

M.E. (Civil structure)

Mechanics of Modern Materials

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

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

Instructions to the candidates:

1) ***Answer any two questions from each section.***
2) ***Answer to the two sections should be written in separate answer books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right side indicate full marks.***
5) ***Use of 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 property of 'Piezoelectric material' And its applications in civil construction. **[8]**

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

Q2) a) Explain with suitable elasticity equations the orthotropic, anisotropy of composite material. **[12]**

b) Write compliance and stiffness matrices for plane stress condition, for cross ply laminate material. **[13]**

Q3) a) Enlist theories of failure and Explain at least three 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) Transversely 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 GPa, E_2=18 Gpa, E_3=18 GPA

$\mu_{12} = 0.29 = \mu_{21}$

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

Q6 a) Explain manufacturing 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]**

Total No. of Questions : 6]

SEAT No. :

P5311

[Total No. of Pages : 2

[5355]-409

M.E. (Civil) (Structures)

OPTIMIZATION TECHNIQUES

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

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

Instructions to the candidates:

1) ***Answer any 2 questions from each section.***
2) ***Answer 2 questions from Section I and 2 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) Draw the flowchart and algorithm of following

Non-Linear Programming Problem. **[25]**

a) Golden Section Method.

b) Fibonacci Method

c) Direct Root Method

d) Quadratic Interpolation Method

e) Cubic Interpolation Method

Q2) a) State the broad classification of optimization problems and techniques. **[13]**

b) Elaborate Decomposition principle, and Post-optimality analysis in Linear Programming. **[12]**

Q3) a) Explain revised simplex method with suitable examples. **[13]**

b) Elaborate single variable optimization and multivariable optimization with equality and inequality constraints. **[12]**

P.T.O.

SECTION-II

Q4) a) What is constrained optimization and what are the engineering applications. **[10]**

b) Explain **[15]**

i) Convex Programming

ii) Interior Penalty function method

iii) Reduced Gradient method,

Q5) a) What is unconstrained optimization and what are the engineering applications. **[10]**

b) Explain **[15]**

i) Random search method and Steepest Descent (Cauchy) method.

ii) Indirect search method and Direct search method,

iii) Univeriate and pattern search method.

Q6) a) Explain with suitable sketch and examples selection operator, crossover operator and mutation operator in genetic algorithm. **[12]**

b) Develop the Artificial Neural Network Model for Structural Engineering Application. **[13]**

Total No. of Questions : 8]

SEAT No. :

P4492

[Total No. of Pages : 2

[5355]-41
M.E. (Civil - Structures)
ADVANCED MECHANICS OF SOLIDS
(2013 Pattern) (Credit System)

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

Instructions to the candidates:

1) ***Attempt any five questions from the following.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figure to the right indicates full marks.***
4) ***Assume suitable data, if necessary and clearly state.***
5) ***Use of cell phone is prohibited in the examination hall.***
6) ***Use of electronic pocket calculator is allowed.***

Q1) a) With neat sketch, show the rectangular components on an element in a stressed elastic body. Hence obtain differential equation of equilibrium. **[5]**

b) Define strain compatibility. In general states of stress, assuming the strain displacement relation, obtain the necessary strain compatibility relation. **[5]**

Q2) a) Define with an example, a plane strain problem. For such case obtain the stress equation of equilibrium, the strain relation and strain compatibility. **[6]**

b) Explain relationship between Cartesian & polar coordinate system. **[4]**

Q3) a) What is Airry stress function ϕ. Neglecting body forces, obtain governing equation for the stress functions $\phi(r, \theta)$ in plane elasticity problem $\Delta^4\phi=0$. **[7]**

b) Write the basic equations for a plane stress 2D problem in polar coordinates. **[3]**

Q4) A thick cylinder of internal radius 100 mm and external radius 175 mm is subjected to an internal pressure of 10 N/mm^2 and external pressure of 12 N/mm^2. Determine variation of radial and hoop stresses in the cylinder wall. **[10]**

P.T.O.

Q5) Determine deflection at cantilever end for a quarter circle beam of radius. 1.2 m. It is loaded with a concentrated load 25 kN at its free end. Also draw shear force, bending moment and torsional moment diagram. **[10]**

Q6) a) Derive expression for stress by using Winkler-Bach theory. **[5]**

b) Derive an expression for neutral axis and bending stresses developed at any fiber of circular beam curved in elevation when it is subjected to moment. **[5]**

Q7) a) Explain st. venant's theory and derive poisson's equation for torsion of prismatic bars of non circular sections in terms of stress functions ϕ. **[6]**

b) Explain in details Prandtl's theory for torsion of solid section. **[4]**

Q8) a) What are the different types of foundations. Explain Winklers foundation. **[3]**

b) An infinite beam of width 75 mm and depth 100 mm is resting on elastic foundation with modulus of sub-grade k = 18 N/mm^3. A couple of 30 Nm is applied on the beam at a point. Determine maximum deflection and maximum bending stress in the beam. Also determine shear force in the beam. E = 200 GPa. **[7]**

Total No. of Questions :12]

SEAT No. :

P5312

[Total No. of Pages : 3

[5355] - 410

M.E. (Mechanical) (Design Engineering)

(Common to Design, Heat Power, Mechatronics and Automotive Engineering)

TECHNOLOGY AND FINANCIAL MANAGEMENT

(2008 Course) (Semester - I) (502803)

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

Instructions to the candidates:

1) ***Answer any one question from each unit.***
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

UNIT - I

Q1) a) Distinguish between 'Flexible budget' and 'Fixed Budget'? What are the main features of a budgetary control system? **[8]**

b) A company has gathered the following information for the month of July, 2001: **[8]**

Sales:	Rs. 2,00,000
Sales commissions:	10% of sales
Advertising expenses:	Rs.5000 + 2% of sales
Miscellaneous selling expenses:	Rs.1000 + 1 % of sales
Office salaries:	Rs.7000
Office supplies:	0.5% of sales
Travel and entertainment:	Rs.4000
Miscellaneous administrative expenses:	Rs.1750

Prepare a selling and administrative budget

OR

Q2) a) Write short notes on the following: **[8]**

i) Types for capital

ii) Sources of long term finance

P.T.O.

b) A factory engaged in manufacturing plastic toys is working at 40% capacity and produce 10000 toys per month. The present cost breakup for one toy is as under: **[8]**

Material	Rs.10
Labour	Rs. 3
Overhead	Rs. 5 (fixed)

The selling price is Rs. 20 per toy. If it is decided to work the factory at 50% capacity, the selling price falls by 3%. At 90% capacity the selling price falls by 5% accompanied by a similar fall in the price of material. Prepare a flexible budget statement showing profit at 50% and 90% capacities.

UNIT - II

Q3) a) What is cost accounting? What are its objectives? How do cost accounting records help in the planning and control of operations of business enterprise? **[9]**

b) From the following figures, prepare process accounts indicating the cost of process and the total cost. The production was 480 articles per week.**[9]**

	Process I	Process II	Process III
Materials	Rs.3000	Rs.1000	Rs.400
Labor	1600	4000	1200
Factory overheads	520	1440	500

Office overheads amounting to Rs.1700 should be apportioned on the basis of wages. Ignore stock in hand and work-in-progress at the beginning and end of the week.

OR

Q4) a) What is Activity-Based Costing? Why is it needed? **[6]**

b) What do you mean by marginal costing? Discuss its usefulness and limitations? **[6]**

c) The profit-volume ratio of X Ltd. is 50% and the margin of safety is 40%. Calculate the net profit if the sales volume is Rs.1 ,00,000. **[6]**

UNIT - III

Q5) a) Explain the theory of consumer's demand with the help of indifference curve analysis? Also explain Income effect and substitution effect? **[10]**

b) Distinguish between Balance of Trade and Balance of Payments **[6]**

OR

Q6) a) Discuss the role of costs in pricing. How does the consumer behavior affect pricing policies? **[10]**

b) Explain the monopoly and oligopoly types of competition with appropriate examples? **[6]**

SECTION - II
UNIT - IV

Q7) a) Distinguish between quality planning, quality control and quality improvement. Explain in brief Juran's spiral of progress in quality. **[8]**

b) Distinguish between push and pull system? Explain the role of Kanban cards in JIT cycle with the help of a neat line diagram? **[8]**

OR

Q8) a) Explain in brief different work elements normally performed by quality specialists. **[8]**

b) Explain the Deming's 14 point approach to Quality Management? **[8]**

UNIT - V

Q9) a) Explain in brief different types of concession contracts used in BOT policy of project management? **[10]**

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

OR

Q10)a) What is project management? Distinguish between PERT and CPM? **[8]**

b) Define 'Normal Time' and 'Crash Time' of an activity? **[4]**

c) Explain the concept of crashing of network with an example. How it is beneficial in project management decision making? **[6]**

UNIT - VI

Q11)a) What do you understand by Human Resource Planning. Explain the various steps in the Human Resource Planning? **[8]**

b) Define the term 'Training and Development'. Bring out the importance of Training and Development? **[8]**

OR

Q12)a) What is performance appraisal? What are its objectives? How do the results of performance appraisal affect other HR activities? **[8]**

b) Why is it important for organizations to do an effective job of recruiting? What are the advantages and disadvantages of various external recruitment sources? **[8]**

Total No. of Questions :10]

SEAT No. :

P5313

[Total No. of Pages : 2

[5355] - 411

M.E. (Mechanical) (Design Engineering)

ADVANCED MACHINE DESIGN

(2008 Course) (Semester - II) (502209)

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 book.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Use of scientific caiculators is allowed.***
6) ***Assume suitable data if necessary.***

SECTION - I

Q1) a) Explain vibration and surging in case of helical spring. **[4]**

b) Write the criteria to design helical spring under fluctuating loads. **[6]**

c) Show with neat sketch various forces acting on inner and outer ring of ring spring with their equations. **[6]**

Q2) a) What are the desirable properties of I C engine piston material? State the materials used for piston. **[6]**

b) The following data is given for the piston of four-stroke diesel engine. Cylinder bore: 250 mm; Maximum gas pressure:4 MPa; Allowable bearing pressure for skirt:0.4 MPa; Ratio of side thrust on liner to maximum gas load on piston:0.1; Width of top land:45 mm; Width of ring grooves:6 mm; Total number of piston rings :4; Axial thickness of piston rings: 7 mm.

Determine; length of skirt; and length of piston. **[10]**

Q3) a) An 18 % chromium and 8 % nickel steel at 700^{oC} had the following creep rates;

Stress $\sigma_1 = 21$ MPa; creep rate 0.128% per 1000 hrs.

$\sigma_2 = 28$ MPa; creep rate 0.64% per 1000 hrs.

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

P.T.O.

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

Q4) a) Explain the effect of various modifying factors on fatigue behaviour. **[8]**

b) Explain the modified Goodman diagram for axial and bending load with neat sketch. **[8]**

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

a) Belleville spring

b) True stress and true strain for creep

c) Design considerations for connecting rod

SECTION - II

Q6) What is difference between linear programming and geometrical programming methods? Explain penalty function method with recent engineering application. **[16]**

Q7) a) Explain the peaking and topping phenomenon as applied to gear. **[6]**

b) Two 20° full depth gear of 20 and 30 teeth are to be designed on extended centre distance system using the recommended values for clearance. Make the calculations for P_d =1. (F= 0.25/P_d). **[10]**
Find the values of q_1 and q_2; the actual angles $\varnothing$; the radius of actual pitch circle and centre distance; tooth thickness on actual pitch circle.

Q8) a) Explain the fault tree analysis. **[8]**

b) Explain design for reliability with suitable example. **[8]**

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

b) Explain fatigue strength improvement techniques for composite material component. **[8]**

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

a) S and SO gears

b) Hybrid materials and their applications

c) Analysis of variance (ANOVA)

Total No. of Questions :8]

SEAT No. :

P5314

[Total No. of Pages : 2

[5355] - 412

M.E. (Mechanical - Design)

COMPUTER AIDED ENGINEERING

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

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

Instructions to the candidates:

1) ***Answer any Three questions from each section.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of Calculator is allowed.***
5) ***Assume Suitable data if necessary.***

SECTION - I

Q1) What is Geometric Modeling? Define and Elaborate. Explain the role of Geometric Transformations in Computer Aided Design. Explain the process of Reflection about an Axis and about plane. **[18]**

Q2) Explain the concept and procedure for Boundary Element Method, Finite Volume Method and Finite Element Method in detail with their applications to various engineering domains. Enlist advantages and limitations of each approach. Why FEA is popular. **[16]**

Q3) What is difference between Feature Based Modeling and Constructive Solid Geometry? Explain in detail. Describe Bottom Up and Top Down approach for assembly modeling with suitable example. **[16]**

Q4) Discuss the role of Data Exchange in CAE. Explain any four Graphics Standards in Detail. **[16]**

P.T.O.

SECTION - II

Q5) a) What are Geometric Non Linearity and Material Non Linearity? Explain in detail. **[9]**

b) Explain the concept of Homogeneous Representation in detail. **[9]**

Q6) Elaborate detail procedure for Model Formulation, Geometry and Grid Design, and Boundary Conditions for Computational Fluid Dynamics. Define and explain Residual. **[16]**

Q7) a) Why Von Mises Stress are important in Structural Analysis. Explain. **[8]**

b) Define and Explain Convergence, Meshing, Warpage and Degree of Freedom. **[8]**

Q8) a) What is Stiffness? Explain the derivation of Stiffness Matrix in detail. **[8]**

b) Discuss different types of elements used in meshing in detail with their applicability. **[8]**

Total No. of Questions : 10]

SEAT No. :

P5315

[Total No. of Pages : 2

[5355]-413

M.E. (Mechanical) (Design Engg.)

VEHICLE DYNAMICS

(2008 Pattern) (Elective-IV) (Semester-II) (502212 - A)

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]**

P.T.O.

Q4) Explain the significance of steer angle and Derive an expression for the steer angle δf required to negotiate a given turn with usual notations. **[16]**

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 c 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 tacked vehicle. **[8]**

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

a) Frequency response of road vehicle in yaw.

b) Frequency response function.

c) Skid steering.

Total No. of Questions :8]

SEAT No. :

P5316

[Total No. of Pages : 2

[5355] - 414

M.E. (Mechanical) (Heat Power)

INTERNAL COMBUSTION ENGINES FUELS

(2008 Course) (Semester - II) (502111A) (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) Explain the effect of volatility, antiknock quality, gun deposit, sulphur content in fuel on SI and CI engine. **[8]**

b) Discuss the suitability of the alternative fuel in CI Engine. **[8]**

Q2) a) Explain the basic requirements of a good combustion chamber of C I engine and draw a neat sketch of IDI combustion chamber. **[8]**

b) Explain the phenomenon of pre-ignition. How pre-ignition leads to detonation and vice-versa? Explain how pre-ignition can be control? **[8]**

Q3) a) Explain fuel rating of CI and SI Engine. **[8]**

b) Describe the CI engine combustion on P-θ graph. **[8]**

Q4) a) What are the potential sources of biodiesel in India? Explain feasibility of it in India. **[8]**

b) What are the potential sources engine variables to optimize the combustion in CI engine to reduce knocking? **[10]**

P.T.O.

SECTION - II

Q5) a) Compare induction swirl and compression swirl in CI engine. **[8]**

b) Explain the stage of combustion is SI engine. **[8]**

Q6) a) Explain the effect of engine variables on knocking for SI Engine. **[8]**

b) Explain turbo charger agreements for power boosting for CI engine. **[8]**

Q7) a) What are the air-fuel mixture requirements during the following range of operations of SI engine. **[8]**

i) Idling and no low load

ii) Normal power range

iii) Maximum power range

b) Explain the limitation of turbocharging for SI engine. **[8]**

Q8) a) Explain the latest trends in CI engine for emission reduction. **[10]**

b) Explain four combustion chambers for SI engine. **[8]**

Total No. of Questions : 8]

SEAT No. :

P5317

[Total No. of Pages : 3

[5355]-415

M.E. (Computer)

HIGH PERFORMANCE DATABASE SYSTEMS

(2008 Course) (Semester - II) (510109)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) Consider the relation emp (eid, departmentid, post, salary) Following is the statistical information about emp relation: **[6]**

i) Hash index on primary key with no overflow

ii) Clustering index on foreign key departmentid, height = 2

iii) B+ tree index on salary, height = 4

iv) Number of tuples in emp = 60,000 blockfactor(emp = 600, number of block(emp) = 100

v) n distinct departmentid(emp) = 1000

vi) n distinct post(emp) = 20

vii) n distinct salary(emp) = 1000

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

1) Display the employee information those who are getting salary > 50,000
2) Display the employee information those who are working in departmentid 50

b) Explain TP-Monitor architecture & its components with neat diagram. **[6]**

c) Explain Join algorithm in Query Processing. **[6]**

P.T.O.

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

b) What is Performance tuning & monitoring . Discuss the types of performance Monitoring. **[6]**

c) Explain how 3 Phase Protocol responds to various types of failures? **[6]**

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

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

Q4) a) Discuss Query processing in distributed databases. **[6]**

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

SECTION - II

Q5) a) Consider the following set of transactions: **[10]**

T01 {X, Z}

T02 {U, V, W, X, Y, Z}

T03 {U, W, Y}

T04 {V, X, Z}

T05 {U, Y}

T06 {W, X, Y}

T07 {X, Y, Z}

T08 {U, Z}

T09 {V, Y}

T10 {V, W, X}

Compute the support and confidence for each of the following:

i) $V \rightarrow W$ ii) $X \rightarrow Z$

iii) $U \rightarrow Y$ iv) $Z \rightarrow V$

v) $W \rightarrow U$ vi) $Y \rightarrow X$

Assume minimum Support of 20%, calculate the frequent k-itemsets.

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

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

b) List the different data mining techniques and explain any one of them in detail. **[8]**

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

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

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

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

a) Compare Active & Deductive databases.

b) Explain LDAP Data Queries.

c) Short note on Hibernate.

Total No. of Questions : 10]

SEAT No. :

P5318

[Total No. of Pages : 2

[5355]-418

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

MEMORY TECHNOLOGIES

(2008 Course) (Elective - II) (504185 B)

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

Instructions to the candidates:

1) ***Answer any three questions from each section.***
2) ***Answers to the 2 sections 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 the schematic of SRAM memory cell. What are the various configurations of CMOS SRAM? Explain in brief. **[4]**

b) Draw and explain in detail the Silicon on insulator CMOS. **[12]**

Q2) a) Explain three transistor DRAM. Explain with block diagram typical 1Mb DRAM. **[8]**

b) Explain in detail Application Specific DRAM with an example. **[8]**

Q3) a) Compare SRAM, DRAM and ROM memory in terms of their performance parameters. Explain ROM cell structure for NOR/NAND array. **[8]**

b) Explain in brief various schematics for PROM cell designs. **[8]**

Q4) a) What is anti fuse? How this has been utilized in semiconductor memories. **[8]**

b) What is refreshing circuit? Draw typical refreshing circuit. **[8]**

P.T.O.

Q5) Write short notes on any Three. **[18]**

a) Block diagram of a typical 256 K Flash Memory.

b) RAM pseudorandom Testing.

c) Non volatile memory modeling and Testing.

d) IDDQ Fault modeling and Testing.

SECTION - II

Q6) a) What are the relevant reliability parameters related memory and how they are addressed. **[8]**

b) What are the various types of radiations 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 with block diagram typical analog memory. **[8]**

Q8) a) Explain with schematic magnetoresistive random access memory(MRAM). **[8]**

b) Describe Classical Test Algorithm GALPAT for semiconductor memory testing. **[8]**

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

b) List the faults that can occur in semiconductor chip. Out of these which affects semiconductor memory more. **[8]**

Q10) Write short notes on any three. **[18]**

a) Digital Tablet.

b) FRAMs reliability issues and radiation effects.

c) Memory Card

d) Different types of high density memory packaging techniques.

Total No. of Questions : 8]

SEAT No. :

P5319

[Total No. of Pages : 2

[5355]-419

M.E. (Electronics) (Digital Systems)

DIGITAL SIGNAL COMPRESSION

(2008 Course) (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) ***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) A source emits letters from an alphabet A = {a1, a2, a3, a4, a5} with probabilities {0.15, 0.15, 0.3, 0.2, 0.2} respectively. **[8]**

i) Calculate entropy of the source.

ii) Find the Huffman code for this source.

iii) Average length of the Huffman code.

iv) The Huffman tree.

b) Give a comparison between lossless and lossy data compression techniques. **[10]**

Q2) a) Explain EZW coding with example. **[8]**

b) Explain ADPCM coding for speech with the help of block schematic. What is the advantage of using differential coding? **[8]**

Q3) a) Explain rate distortion theory. Explain any one method to find the optimal code for given distortion? **[8]**

b) Consider a source with symbol probabilities P(a1) = 0.6, P(a2) = 0.15 and P(a3) = 0.25. Find the tag using arithmetic coding for a sequence a1, a3, a2. **[8]**

P.T.O.

Q4) a) What is Linear Predictive Coding (LPC)? How LPC is used in speech Coding? **[8]**

b) Explain the effect of variance mismatch on the performance of a uniform quantizer. Plot SNR Vs. ratio of input to design variance. **[8]**

SECTION - II

Q5) a) What is adaptive quantization? How step size will adaptively change by tracking the statistics of signal? How to select optimal delta? **[8]**

b) Explain JPEG2000 standard in details and list the important features of it. **[8]**

Q6) a) What is streaming Audio? How it is achieved? **[8]**

b) Explain how to decide the transmission rate if the tolerable distortion is given. **[8]**

Q7) a) What is wavelet? Explain any one method of wavelet decomposition. Explain meaning of perfect reconstruction filter. **[8]**

b) What is companding? Why companding is must for speech signal. Explain A-law and μ- law. **[8]**

Q8) Explain block based motion estimation and motion compensation technique. What are the advantages of block based motion compensation. **[18]**

✪ ✪ ✪

Total No. of Questions : 8]

SEAT No. : ____

P4493

[Total No. of Pages : 2

[5355]-42
M.E. (Civil-Structures)
STRUCTURAL DYNAMICS
(2013 Course) (Semester - I) (End Semester)

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

Instructions to the candidates:

1) ***Attempt any five questions.***
2) ***Figures to the right indicate full marks.***
3) ***If necessary assume suitable data and indicate clearly.***
4) ***Use of electronic pocket calculator is allowed.***

Q1) Derive all the solutions for a SDOF system subjected to free damped vibrations. **[10]**

Q2) The frame shown in Fig. 1 (a) supports a uniformly distributed total load of 150 kN. The frame is subjected to a force as shown in Fig. 1(b). Determine the horizontal displacement at t = 1s. Consider E = 200 GPa, I for end columns = 3.5×10^{-5} m^4, and for central column = 7.0×10^{-5} m^4. Damping in the structure may be neglected. **[10]**

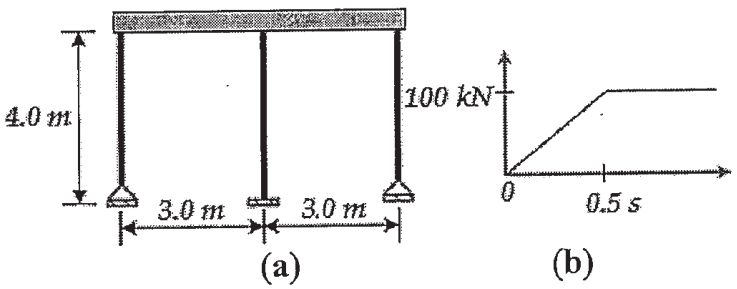


Fig. 1

Q3) Explain and derive the expression for dynamic magnification factor. **[10]**

Q4) Explain constant acceleration method. **[10]**

P.T.O.

Q5) Derive the characteristics equation of motion for the system shown in Fig.2. Consider $F_1 = F\cos(\omega t)$ and $F_2 = 0$. **[10]**

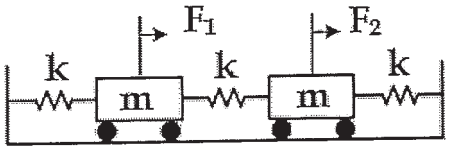


Fig. 2

Q6) What is Stodola method? Explain step-by-step procedure of this method? **[10]**

Q7) Explain step-by-step procedure of Wilson-θ method. **[10]**

Q8) Determine the free vibration frequencies and mode shapes for a beam of length *l* which is simply supported at both ends. **[10]**

Total No. of Questions : 8]

SEAT No. :

P5320

[Total No. of Pages : 2

[5355]-420

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

ORGANIZATIONAL BEHAVIOUR AND MANAGEMENT

(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) ***Figures to the right indicate full marks.***
5) ***Assume suitable data, if necessary.***

SECTION - I

Q1) Define management, explain various functions of management. Explain the role of managers in a changing business environment. **[16]**

Q2) Define man power planning. Explain its objectives, functions and techniques. **[16]**

Q3) Explain theories of motivation in detail. **[16]**

Q4) Write short notes on:

a) Attitudes and job satisfaction. **[9]**

b) Compare personality, emotions and perception. **[9]**

P.T.O.

SECTION - II

Q5) Explain the concept of leadership. Also, explain contingency theory of leadership and how it is helpful to an organization. **[16]**

Q6) Write short notes on:

a) Conflict and negotiation **[9]**

b) Group decision techniques. **[9]**

Q7) Explain the three - component model of creativity. **[16]**

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

Total No. of Questions : 8]

SEAT No. : ____

P4494

[Total No. of Pages : 3

[5355] - 43

M.E. (Civil) (Structure Engineering)

ADVANCED DESIGN OF STEEL STRUCTURES (ADSS)

(2013 Course) (Semester - I)

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

Instructions to the candidates:

1) ***Answer any five from eight questions.***
2) ***Figures to the right indicate full marks.***
3) ***Use IS-IS: 800 - 2007, IS: 800 - 1984, IS: 801, IS: 802, IS 811, SP-34 and Nonprogrammable calculator.***
4) ***Neat diagrams must be drawn wherever necessary.***
5) ***More reproduction from IS code as answer, will not be given full marks.***
6) ***Assume suitable data if necessary.***

Q1) a) Explain which are different loads are coming on Hoarding Structures. **[3]**

b) The design factored forces coming in member of a hording structure are 110 KN tensile force, and 65kN compressive force. Design a double unequal angle section back to back on opposite faces of 8 mm thick gusset plate with M20 black bolt of 4.6 grade of steel. Take length of member as 2.3m c/c. Draw the design sketch. **[7]**

Q2) a) What are castellated beams and where they are preferred. **[3]**

b) Design a castellated beam in grade Fe410 steel to carry an imposed load of 3kN/m and dead load of 5kN/m over a simply supported span of 18m. Assume that the compression flange is fully restrained. **[7]**

Q3) a) What is mean by microwave tower, write down purposes of it. **[3]**

b) A 50 m high microwave antenna lattice tower is to be built near Mumbai the terrian at the site is nearly a level ground with terrain of category 2. The diameter of the hemispherical antenna disc, fixed at the top is 4m.

P.T.O.

The width of the tower, at the top is 4m. Select a suitable configuration for the tower and determines maximum compressive fore and tension in the tower legs and also the maximum shear at the base, for the following data: **[7]**

Weight of antenna disc and fixtures : 11N

Weight of platform at the top : 0.75kN/m^2

Weight of railing at top: 0.42kN/m^2

Weight of ladder and the cage : 0.68kN/m

Weight of miscellaneous item: 3.1KN.

Q4) a) Give brief sketch of different structures used to support the electric power transmission lines? **[3]**

b) A steel tower is to be erected for transmission line of a single circuit 3-phase 60 ycles/sec, to transmit 55MW at 0.75 power factor for 269km. Assuming Suitable data determine the maximum sag of the conductor at mid span. **[7]**

Q5) a) Write a short note on **[4]**

i) Connection for tabular members.

ii) Sectional properties of round tubes.

b) A tabular column hinged at both ends has the outside diameter of the tube 130mm and is of heavy gauge (i.e@16.2 kg/m). The length of the column is 3.5m. Determine the safe load the column can carry if the column is of IS 1161 grade Y st 240 steel. **[6]**

Q6) a) Define Stiffened, Multiple Stiffened, and Un-Stiffened light-gauge sections. **[3]**

b) Design a simply supported beam using light-guage section carrying a udl of 3 kN/m (inclusive of self wt). Span of the beam is 4.0 m and consider it to be laterally un-supported. **[7]**

Q7) Design a self-supporting lined chimney to the following particulars **[10]**

Height of the chimney = 70m.

Diameter of the chimney = 3.5m.

Thickness of the lining = 120mm.

Wind Pressure = 1250N/mm^2 on flat vertical surface.

Take safe tensile stress = 135 N/mm^2.

The foundation has to rest on medium soil having bearing capacity = 230kN/m^2.

Q8) Design slab base for a column ISHB 350 @ 710.2 N/m subjected to an factored axial load of 1670 KN and moment @ major axis equal to 65 KN.m. Assume steel of grade Fe 415 and anchor bolts of grade 4.6. **[10]**

EEE

Total No. of Questions :8]

SEAT No. :

P4495

[Total No. of Pages :2

[5355] - 44

M. E. (Civil) (Structures)

RESEARCH METHODOLOGY TREATMENT

(2013 Pattern) (Semester - I)

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

Instructions to the candidates:

1) ***Solve any five questions.***
2) ***Figures to the right indicate full marks.***

Q1) a) With suitable example *Ex. post facto research.* **[5]**

b) Discuss the errors encountered in selecting a research problem. **[5]**

Q2) a) Explain the technique involved in defining a problem. **[5]**

b) Explain the significance of Research in the modern times with an example. **[5]**

Q3) a) Write a note on "Internet as a source of Literature review in Research."**[5]**

b) Enlist different types of sample designs and explain probability sampling. **[5]**

Q4) a) Explain the merits and demerits of collection of data through Observations. **[5]**

b) Write a note on "Rating scale s as a Scaling technique (with examples)."**[5]**

Q5) a) Write a note on Multiple correlation and regression. **[5]**

b) Explain the steps involved in procedure for hypothesis testing. **[5]**

P.T.O.

Q6) a) What is a t-test? When it is used and for what purpose? Explain with examples. **[5]**

b) Discuss in brief the important factors needed for a Technical report. **[5]**

Q7) a) Discuss the precautions to be taken for writing Research Reports. **[5]**

b) Explain Simple Regression Analysis Method. **[5]**

Q8) Write a research proposal for a suitable research problem (any problem related to Civil engineering can be considered) to a funding agency with reference to the following terms: Title, Introduction, origin of the problem, expected outcome, literature review, Significance of the study in the context of current status, objectives, methodology, year wise plan. **[10]**

Total No. of Questions :8]

SEAT No. :

P4496

[Total No. of Pages : 2

[5355] - 45
M.E. (Civil -Structural Engineering)
FINITE ELEMENT ANALYSIS
(2013 Course) (Semester - II)

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

Instructions to the candidates:

1) ***Attempt any 5 questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicates full marks.***
4) ***Use of non programmable electronic calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Solve using point collocation as well as least square method the given differential equation $\frac{d^2y}{dx^2}+\frac{dy}{dx}-2y=0$ with boundary conditions, $y(x=0)=0$ and $y(x=1)=1$. **[6]**

b) State the principle of minimum potential energy. Explain with a suitable example its application to derive elemental stiffness matrix. **[4]**

Q2) a) Derive the K matrix for rectangular element for plane elasticity problem using A^{-1} matrix, where A is the coordinate matrix of the element. **[6]**

b) Explain the use of Pascal's triangle and tetrahedron to write the displacement function. Explain the term 'Geometric Invariance' relevant to it with suitable example. **[4]**

Q3) A bar of 30 cm length is shown in Fig. 1. Find the end reactions for the bar and displacement at the point of application of load using direct stiffness method of FEM. **[10]**

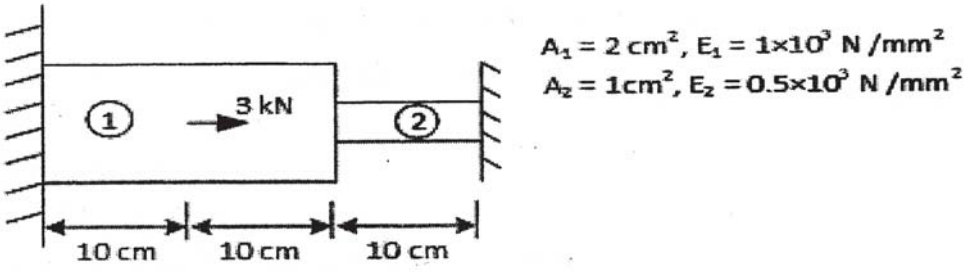


Fig 1

P.T.O.

Q4) a) Derive the shape function for a beam element from basic principle. **[5]**

b) Derive the shape function for a five noded rectangular element in natural coordinate system, where four nodes are primary external nodes and fifth is secondary external node located at midpoint of a side. **[5]**

Q5) Write a short note on the axisymmetric elements and give the elasticity matrix [D] for the axisymmetric element. Derive from the first principles (Assuming displacement function) the stiffness matrix for a typical triangular axisymmetric element. **[10]**

Q6) Explain isoparametric formulation. For the isoparametric quadrilateral element having coordinates A (3, 1), B(6, 1), C(8, 6), D(2, 5), determine the local coordinates of point having coordinates P(7, 4). **[10]**

Q7) Compare between the rectangular plate bending element with 12 degrees of freedom with that of plate bending element with 16 degrees of freedom. Emphasis on conformity of the element. **[10]**

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

a) Flat & curved shell element.

b) Ahmad's degenerated solid element.

Total No. of Questions : 8]

SEAT No :

P 4497

[Total No. of Pages : 2

[5355]-46
M.E. (Civil - Structures)
THEORY OF PLATES AND SHELLS
(2013 Credit Course) (Semester-II)

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

Instructions to the candidates:

1) ***Attempt any five questions from the following.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data, if necessary and clearly state.***
5) ***Use of cell phone is prohibited in the examination hall.***
6) ***Use of electronic pocket calculator is allowed.***

Q1) a) Differentiate small and large deflections of thin plate. Explain the assumption of small deflection theory of thin plates. **[4]**

b) Derive the relations between moments, curvatures and deflections in pure bending of plates. **[6]**

Q2) A square plate of 400 mm side and 10 mm thick is simply supported at its four corners. If it is subjected to uniformly distributed pure couple M_1 acting on edge parallel to x axis creating hogging and uniformly distributed pure couple M_2 on edge parallel to y axis creating sagging. If $M_1=M_2=$ 500 Nm, E= 200 GPa and $\upsilon = 0.3$, find lateral displacement of midpoint of edges. **[10]**

Q3) a) Derive 4^{th} order differential equation for a thin plate in Cartesian coordinate with usual notation. **[8]**

b) Explain in brief moment curvature relationship for first order shear deformation theory. **[2]**

Q4) Derive an expression for transverse displacement, moments and shearing forces for edge simply supported circular plate subjected to uniform lateral loading. **[10]**

P.T.O.

Q5) a) State and explain classification of shell based on geometric form, shell curvature and geometrical developability with sketches. **[6]**

b) Differentiate between membrane and bending theory for the analysis of cylindrical shell. **[4]**

Q6) Explain application of membrane theory for the analysis of Circular cylindrical shells and hence Derive equilibrium equations. **[10]**

Q7) a) Derive governing differential equation for circular cylindrical shells using bendign theory. **[6]**

b) Differentiate cylindrical, conical and spherical shells on the basis of analysis. **[4]**

Q8) a) Explain in brief principle of Lundgren's beam theory and its application for the analysis of cylindrical shell. **[6]**

b) Explain in brief arch analysis using beam theory. **[4]**

Total No. of Questions :8]

SEAT No. :

P4498

[Total No. of Pages : 2

[5355] - 47

M.E. (Civil - Structure)

ADVANCED DESIGN OF CONCRETE STRUCTURES

(2013 Pattern) (Semester-II)

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

Instructions to the candidates:

1) ***Attempt any five questions from the following.***
2) ***Draw neat diagrams.***
3) ***Figures to the right indicates full marks.***
4) ***Assume suitable data if necessary.***
5) ***Use of cell phone is prohibited.***
6) ***Use of electronics pocket calculator, IS 456 is allowed.***

Q1) a) Draw yield lines for the following : **[6]**

i) Rectangular slab with all four edges fixed.

ii) Rectangular slab with two adjacent edges fixed and two edges unsupported.

b) Explain equilibrium and virtual work method for slab analysis by yield line theory. **[4]**

Q2) A rectangular slab 4.5mX4.5m is simply supported at the ends. Design the slab to carry superimposed load of 4kN/m^2, If the slab is to be orthogonally reinforced. Use M25 and Fe 500. Use yield line theory. **[10]**

Q3) Design a grid slab for a floor of hall 12mX16m having square grid of l.5m. Use M20 and Fe 500. **[10]**

Q4) Design an interior panel of flat slab 4.5mX5.5m for a live load of 4.5kN/m^2 and FF 1.3kN/m^2. Use M25 and Fe 500. **[10]**

Q5) Design a circumferential and radial reinforcement in the base slab of elevated water tank for 1 lakh liters with diameter of water tank 12m using M25, Fe 415. Circumferential load on periphery is 2000kN. SBC is 200kN/m^2. **[10]**

P.T.O.

Q6) Design a square bunker to store 140 tonnes of cement for the following. Density of cement is 32kN/m^2. Angle of repose is 32°. Use M20 Fe 500. Draw details of reinforcement. **[10]**

Q7) Design raft foundation for the following : **[10]**
Center to center distance of column in both directions is 2.6m, column size 400X400mm, working axial load on each column is 800kN. The depth of the strata is 2m. Use M25 and Fe 500. SBC 140kN/m^2. Draw reinforcement details.

Q8) Design a bell type RCC shear wall for a length of 3.6m and thickness 230mm. Axial forces are 1800kN and 250kN due to dead and live load and seismic load respectively. Use M20 and Fe500. Draw reinforcement details. **[10]**

Total No. of Questions : 8]

SEAT No :

P 4499

[Total No. of Pages : 2

[5355]-48

M.E. (Civil) (Structure Engineering)

EARTHQUAKE ENGINEERING AND DISASTER MANAGEMENT

(2013 Course) (Semester - III) (601013) (End semester)

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

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Figures to the right indicate full marks.***
3) ***If necessary, assume suitable data and indicate clearly.***
4) ***Use of electronic pocket calculator is allowed.***

Q1) What is blast loading? How it affects the design of any structure? **[10]**

Q2) Explain how structural elements can be made disaster resistant. **[10]**

Q3) Explain the following: **[10]**

a) Design spectrum.

b) Response spectra.

c) Mode shapes.

d) Spectral acceleration.

Q4) A 4 m RC shear wall is subjected to the following loads: **[10]**

a) Axial load - 1,800 kN (DL + IL); 200kN (EQ)

b) Shear force - 80 kN (DL + IL); 650 kN (EQ)

c) Moment - 320 kN-m (DL + IL); 4,100 kN-m (EQ)

Design the shear wall using M30 grade concrete and Fe 500 grade steel. Also, sketch the details of reinforcement.

P.T.O.

Q5) Explain how wind blasts affects the design of structures. **[10]**

Q6) What significant effects are seen on structures below ground which are subjected to blast load? **[10]**

Q7) Explain the design of Flexural steel elements subjected to Fire loading. **[10]**

Q8) Explain any one method of repairing structural elements of framed structures. **[10]**

Total No. of Questions :8]

SEAT No. : ____

P4500

[Total No. of Pages :3

[5355] - 49

M. E. (Civil) (Structures)

DESIGN OF RCC & PRESTRESSED CEMENT CONCRETE BRIDGES

(2013 Pattern) (Semester - III)

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

Instructions to the candidates:

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

Q1) a) What are the factors affecting the span of bridge **[5]**

b) Write note on classification of bridges **[5]**

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

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

Q3) Design only slab the slab culvert with the data: **[10]**

Clear span of the culvert = 6m

Clear carriage way width = 7.5m

Size of kerb = 200mm x 600mm

Average thickness of wearing coat 80 mm

Use material M25, Fe 500

Loading class AA

Draw the cross section showing details of reinforcement at mid-span and at junction of the slab are kerb.

P.T.O.

Q4) Design the deck slab only and calculate the maximum bending moment and shear force intermediate post tensioned prestressed concrete bridge girder for the following. Effective span = 14m, width of carriageway = 7.5m, No. of beams 4, equally spaced along the carriageway width, spacing of cross girders= 4m c/c, width of footpath on either side of carriageway = 1m loading class = IRC class AA, kerb size = 200 X 600mm, Material M25 & TMT for deck slab. **[10]**

Q5) a) Differentiate between rigid frame bridges and simply supported bridges. **[5]**

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

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

Maximum vertical load = 600 kN

Dynamic vertical load = 60 kN

Transverse lateral load = 50 kN

Longitudinal load = 60 kN

Longitudinal total translation = 10 mm

Rotation at support = 0.003^{o}

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

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

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

Q7) a) Explain the forces acting on wing wall for bridges. **[5]**

b) Explain with sketches, the type's wing walls. **[5]**

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

Diameter of pier at bottom = 1.8m

Height of bearing above the maximum scour level = 20m

Permissible horizontal displacement at bearing level = 10 mm

Total vertical load including self-weight of pier = 8000 kN
Total lateral force at scour level = 160 kN
Submerged unit weight of soil = 10 kN/m^3
Material of pier and footing = M40 & Fe500
Velocity of water current = 3m/s consider cross current ratio
Design the RCC well and check the stresses at the staining.

Total No. of Questions :8]

SEAT No. :

P4462

[Total No. of Pages :2

[5355] - 5

M.E. (Civil) (Construction Management)

CONSTRUCTION CONTRACTS ADMINISTRATION AND MANAGEMENT

(2013 Course) (Semester - II) (End Semester)

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

Instructions to the candidates:

1) ***Solve any 5 questions out of 8.***
2) ***Each question carries 10 marks.***
3) ***Neat diagrams must be drawn whenever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Assume suitable data if necessary.***

Q1) Describe of following types of tendering by giving their applications, advantages and differences. **[10]**

a) Government tendering

b) Private sector tendering.

c) Overseas tendering.

Q2) a) What are the claims a contractor may claim on a construction site? **[6]**

b) What is EOI (Expression of Interest)? How and when it is used in construction? **[4]**

Q3) a) Describe in short, methods of dispute resolutions related with constructions industry. **[5]**

a) Explain the procedure of termination of mandate and substitution of arbitrator. **[5]**

P.T.O.

Q4) a) Describe in brief the key characteristics of ICE conditions of contract. **[4]**

b) Explain the FIDIC conditions of contract. What are the colour codes used by FIDIC for conditions of contract associated with Civil Engineering construction, electrical & mechanical work and design + build & turnkey projects. **[6]**

Q5) a) With reference to Indian Contract Act, explain following terms. **[6]**

i) Offer

ii) Acceptance

iii) Agreement

b) Describe in brief the workman's compensation act. **[4]**

Q6) a) What are the main objectives of Arbitration & Conciliation Act? **[6]**

b) Describe the duties of a Conciliator. **[4]**

Q7) a) On which grounds, the arbitrator may be challenged? Describe the procedure for the same. **[6]**

b) What are salient features of arbitral award? **[4]**

Q8) a) What are the applications of Bailment Act? Explain by giving suitable example. **[4]**

b) Explain following terms which are associated with Bailment. **[6]**

i) Delivery

ii) Acceptance

iii) Consideration

Total No. of Questions : 8]

SEAT No :

P 4501

[Total No. of Pages :2

[5355]-51

M.E. (Civil) (Water Resources and Environmental Engg)

PLANNING AND MANAGEMENT OF WATER RESOURCES 501081

(2013 Pattern) (Semester - I)

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

Instructions to the candidates:

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

Q1) a) Explain needs and opportunities planning and management of water resources. **[6]**

b) Explain the system components of water resources planning and management and state various approaches of planning and management of water resources. **[4]**

Q2) a) Comment on planning region and horizon in water resources. **[5]**

b) Explain constraints like non reversibility for development of water resources **[5]**

Q3) a) Explain various cost benefit study methods for single and multipurpose projects. **[6]**

b) Explain allocation of cost in multipurpose project. **[4]**

Q4) a) Explain in detail flood plain management. **[6]**

b) What provisions are made for navigation and irrigation as per CWC. **[4]**

Q5) a) Explain methods to control reservoir sedimentation. **[4]**

b) Explain any one water doctrine to avoid conflict amongst usesers. **[6]**

P.T.O.

Q6) a) Define resilience index and explain it through adaptive capacity and management aspect. **[5]**

b) How does climate affect river flow regimes. **[5]**

Q7) a) Enlist two methods to improve the Ground water content to develop the ground water resources in Maharashtra state. **[5]**

b) Explain how conjunctive use of surface and ground water play Important role in water management. **[5]**

Q8) a) What is 'Inter Basin Water Transfer' enumerate it with suitable example. **[4]**

b) How inter-basin transfer helps to manage water resources. **[6]**

Total No. of Questions : 8]

SEAT No. : ____

P4502

[Total No. of Pages : 2

[5355]-52
M.E. (Civil) (WREE)
ENVIRONMENTAL CHEMISTRY & MICROBIOLOGY
(2013 Pattern) (Semester - I) (501082)

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

Instructions to the candidates:

1) ***Attempt any five questions.***
2) ***Figures to the right indicate full marks.***
3) ***Use of electronic pocket calculator is allowed.***
4) ***Assume suitable data if necessary.***

Q1) a) Explain the procedure for selection of sampling site & minimum number of travers point. **[5]**

b) Give the procedure for particulate matter sampling. Also explain sample recovery method & necessary calculations required. **[5]**

Q2) a) What are the various air pollution dispersion models? Explain any two. **[5]**

b) A thermal power plant burns 120000 Kg of coal with 6% sulphur content. The particulate concentration in flue gases is 10 g/m^3 & the gas flow rate is 25 m^3/sec. Calculate minimum stack height required. **[5]**

Q3) a) Explain different types of reactors, their chemical reactions involved & their characteristics. **[4]**

b) Explain the following : **[6]**

i) AAS.

ii) Gas chromatograph (GC).

Q4) a) Enlist Recyclable materials observed in solid waste & Explain recycling of any two of them. **[6]**

P.T.O.

b) The initial volume of a mass of solid waste is 15 m^3. After compaction, the volume is reduced to 3m^3. **[4]**

i) Compute the percent volume reduction & the compaction ratio.

ii) If it is desired to obtain a volume reduction of 90 percent what will the compaction ratio have to be?

Q5) Enlist various adsorbent materials. Explain adsorption using activated carbon & activated alumina. **[10]**

Q6) Which are various instruments used for pollution analysis? Also explain their applications. **[10]**

Q7) a) A primary clarifer has an average influent TSS (Total Suspended Solids) concentration of 250 mg/L. If its TSS removal efficiency is expected tobe 60 percent. What is the expect average effluent TSS concentration? **[4]**

b) Explain Recirculation of flow through a trickling filter. **[6]**

Q8) a) The BOD removal efficiency of a trickling filter system is 79 percent, and the efficiency of the primary treatment that precedes it is 35 percent. If the raw BOD is 200 mg/L, what is the effluent BOD? Is the treatment plant providing an efficiency that meets the requirement for second ary treatment? **[4]**

b) An aeration tank has an MLSS concentration of 2000 mg/L. After settling for 30 min in a 1 - L graduated cylinder, the sludge volume is measured to be 150 ML. Compute the SVI of the sludge. **[2]**

c) Write a short note on contact stabilization method used as modification of activated sludge process. **[4]**

Total No. of Questions : 8]

SEAT No :

P 4503

[Total No. of Pages : 2

[5355]-53

M.E. (Civil) (Water resources and Environmental Engg.)

FLUID MECHANICS

(2013 Course) (Semester - I) (501083)

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

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of logarithms tables, slide rule electronics Pocket calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) If stream function for steady flow is given by $\Psi = y^2 - x^2$, determine whether the flow is rotational or irrotational. Find the potential function if the flow is irrotational and vorticity if the flow is rotational. **[5]**

b) Discuss development of boundary layer over a flat plate. **[5]**

Q2) a) Derive formula for rotation of fluid element about Z axis ω_Z. **[4]**

b) A flat plate of 6m length and 1m wide is kept parallel to a uniform stram of air of velocity 20 m/s. The boundary layer changes from laminar to turbulent at a Reynolds number 5×10^5. i) Find the extent of the laminar boundary layer on the plate (ii) boundary layer thickness at the edge of the laminar boundary layer. iii) boundary layer thickness at the trailing edge of the plate. The kinematic viscosity and density of air are 1.5×10^{-5} m^2/s and 1.23 kg/m^3 respectively. **[6]**

Q3) a) Derive equation for stream function and velocity potential for superposition of source and sink. Determine shape of the streamlines. **[6]**

b) Write the Navier Stokes equation in Cartesian coordinate system and explain the symbols used. **[4]**

P.T.O.

Q4) a) Write a short note on relaxation technique **[4]**

b) Derive Hagen - Poiseuille equation for laminar flow through circular pipe starting with Navier-Stokes equations. **[6]**

Q5) a) Derive Karman Integral momentum equation starting with Boundary layer equations. **[6]**

b) State factors affecting transition from laminar to turbulent flow. **[4]**

Q6) a) Write note on Karman Pohlhausen method for determining thickness of boundary layer. **[6]**

b) Define turbulence, stationary turbulence, non-stationary turbulence, Ergodic process. **[4]**

Q7) a) Derive equation of propagation of elastic wave in isothermal process. **[5]**

b) Determine the Mach number when an airplane is flying at 1000kmph through still air having a pressure of 70 kPa and temperature of -15ºC.

Determine the pressure, at the stagnation point on the nose of the airplane. **[5]**

Q8) a) Derive equation for stagnation pressure. **[6]**

b) Define normal shock wave, Rayleigh line, Fanno line. **[4]**

Total No. of Questions :8]

SEAT No. :

P4504

[Total No. of Pages :2

[5355] - 54

M. E. (Civil) WREE

Research Methodology Treatment

(2013 Pattern) (Semester - I) (501004)

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

Instructions to the candidates:

1) ***Solve any five questions.***
2) ***Figures to the right indicate full marks.***

Q1) a) Explain the techniques involved in defining a research problem. **[5]**

b) Discuss the general objectives of research funding agency. **[5]**

Q2) a) Discuss in brief the format of a research proposal. **[5]**

b) Distinguish the errors encountered in selecting a research problem. **[5]**

Q3) a) Write a note on "Sources of literature review". **[5]**

b) Explain in brief the important scaling techniques. **[5]**

Q4) a) Why should the data collected for research must be checked for reability, suitability and adequacy? **[5]**

b) Explain the importance of a good literature review. **[5]**

Q5) a) Write a note on principal component Analysis. F **[5]**

b) Explain the steps to be followed for discriminant analysis. **[5]**

Q6) a) Discuss the important characteristics of Chi-Square test. **[5]**

b) Explain the centroid method of factor Analysis. **[5]**

P.T.O.

Q7) a) Discuss the important considerations for publishing the research in a journal paper. **[5]**

b) Write the format to be followed for a research report. **[5]**

Q8) Write a research proposal for a suitable research problem (any problem related to Civil engineering can be considered) to a funding agency with reference to the following terms: Title, Introduction, origin of the problem, expected outcome, literature review, Significance of the study in the context of current status, objectives, methodology, year wise plan. **[10]**

Total No. of Questions :8]

SEAT No. :

P4505

[Total No. of Pages : 2

[5355] - 55

M.E. (WREE) (Civil)

ENVIRONMENTAL HYDRAULIC & ENVIRONMENTAL STRUCTURES

(2013 Pattern) (Semester - II) (501086)

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

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Electronic pocket calculater is allowed, Assume data if necessary.***

Q1) What are the functions of value? Explain in brief different types of values according to their functions. **[10]**

Q2) a) Write a short note on actuating force applied mannually, hydraulically & pneumatically. **[6]**

b) Explain the main parts of centrifugal pump along with a suitable diagram. **[4]**

Q3) a) What is damping & explain any two following types of damping. **[6]**

i) Viscous damping

ii) Slip or interfacial damping

iii) Dry friction damping

iv) Solid damping

b) A single stage, single acting reciprocating has a bore of 200 mm & a stroke of 300 mm. It receives vapour refrigerant at 1 bar & delivers it at 5.5 bar. If the compression & expansion follows the low $Pv^{1.3}$ = constant & the clearance volume is 5 percent of the stroke volume, determine

i) The power required to drive the compressor, if it runs at 500 r.p.m.

ii) The volumetric efficiency of the compressor. Work done by compressor is 1695 N.M. **[4]**

P.T.O.

Q4) a) Write a short note on operating characteristic curves of centrifugal pump. **[4]**

b) Write a short note on openings in pressure vessel. **[6]**

Q5) a) What is thick cylinder? When to use LAME's equation. **[6]**

b) What is fourier's law of heat conduction & fick's law of diffusion. **[4]**

Q6) a) Write a short note on i) Bimetallic strips ii) Thermistors **[6]**

b) Write a short note on LVDT. **[4]**

Q7) a) Enlist various characteristics of PTFE (teflon). **[4]**

b) Write a short note an membrane analysis in the design of circular tank with damed water & roof. **[6]**

Q8) Write a short note on design of foundation used in water retaining structures. Also explain effect of earth pressure & uplift consideration. **[10]**

Total No. of Questions : 8]

SEAT No :

P 4506

[Total No. of Pages : 2

[5355]-56
M.E. (Civil)
Water Resources and Environmental Engg.
HYDROLOGY
(2013 Course) (Semester-II) (501087)

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

Instructions to the candidates:

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

Q1) a) Explain Stanford Watershed Model (SWM). **[6]**

b) Explain construction of Depth Area Duration Curves (DAD Curves) **[4]**

Q2) a) What is Pearson type I, II and III & their uses in hydrology, **[5]**

b) Write a note on Chi-square test. **[5]**

Q3) a) Explain the method of design flood estimation using the rational method. **[4]**

b) Explain flood frequency curve and flood volume curve. **[6]**

Q4) a) Explain how the yield of an open well can be determined using recuperation test. **[5]**

b) Explain the Goodrich method of flood routing. **[5]**

Q5) a) State Dupuit-Forchheimer Assumptions and explain with sketch vertical distribution of ground water. **[5]**

b) What are the advantages of ground water compared to surface water? **[5]**

P.T.O.

Q6) a) State Thiem's equation for study confined flow (No leakage). State assumptions made. **[6]**

b) What is ground water pollution? How the industrial use of water affects on it. **[4]**

Q7) a) Enlist the various methods of artificial recharge of ground water and explain any one in detail. **[5]**

b) What are different pumping equipment used to pump the ground water? Explain one in detail with neat diagram. **[5]**

Q8) a) Explain in detail electric analog model & analog model for ground water modeling. **[6]**

b) Explain digital computer models for ground water modeling. **[4]**

Total No. of Questions :8]

SEAT No. :

P4507

[Total No. of Pages : 2

[5355] - 57

M.E. (Civil) (Water Resources and Environmental Engineering)

OPEN CHANNEL HYDRAULICS

(2013 Course) (Semester-II) (501088)

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

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of logarithms tables, slide rule, electronics pocket calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) Show that maximum velocity in a circular channel happens when y/D=0.81. **[6]**

b) Explain the characteristics of M_2 profile and state one example of its occurrence. **[4]**

Q2) a) Derive Chezy's formula. Also derive relation between Chezy's 'C' and Manning's 'n'. **[5]**

b) Explain method of direct integration for gradually varied profile computation. **[5]**

Q3) a) Classify hydraulic jump using the Froud No. Draw the sketch of each jump and state the energy dissipation possible. **[4]**

b) A triangular channel has a side slope of 1: 1 and longitudinal slope of 1/1000. Determine whether the channel is mild, steep or critical when discharge of 0.25m3/s flows through it. Take Manning's n = 0.015. Also state for which range of depths the flow will be in Zone 1, Zone 2 and Zone 3. **[6]**

Q4) a) State applications of hydraulic jump. **[2]**

b) A rectangular channel 20 m wide flow with normal depth of 2 m with a slope of bed 1 in 6400. At a certain section, the flow depth is 3 m. How far upstream or downstream of this section will the depth be 2.6 m. Use step method and take only two steps. Take Manning's coefficient = 0.015. sketch and mention the profile. **[8]**

P.T.O.

Q5) a) Derive De Marchi equation for side weir. **[6]**

b) Write short note on solitary wave. **[4]**

Q6) a) Classify the SVF profiles. **[4]**

b) Derive dynamic equation of uniformly progressive wave. **[6]**

Q7) a) Write in brief about alluvial channel bed forms. **[4]**

b) Discuss the development of Muskingum method of flood routing stating the equations and algorithm. **[6]**

Q8) a) Derive Rouse equation for suspended bed load. **[6]**

b) Explain method of characteristics for flood routing. **[4]**

Total No. of Questions : 8]

SEAT No :

P 4508

[Total No. of Pages : 2

[5355]-58

M.E. (Civil) (Water Resource & Environmental Engg.)
ADVANCED WATER & WASTE WATER TREATMENT
(2013 Course) (Semester - III)

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

Instructions:

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

Q1) Explain in detail the principle and working of electro dialysis and ion exchange for water and waste water treatment. **[10]**

Q2) Discuss the principle, concept and necessity of aeration. Explain various methods of aeration with neat sketches. **[10]**

Q3) What is the theory of disinfection? State the factors affecting disinfection. Explain break point chlorination. **[10]**

Q4) Design an aerated grit chamber for the treatment of municipal wastewater. The average flow rate is 0.5 m^3/s. Take peak factor as 2.75. **[10]**

Q5) Design an activated sludge process for municipal wastewater flow rate of 8000m^3/day, BOD of settled effluent = 180 mg/l, expected BOD of treated effluent = 10 mg/l, yield coefficient=0.5kg/kg,k_d=0.05/day, MLSS=3000mg/l,return sludge solids concetration = 10,000 mg/I, and mean cell residence time is 10 days.

Determine i) Volume of reactor, ii) F/M ratio, iii) VLR,

iv) oxygen requirement, v) Recycle ratio & vi) BOD removal efficiency. **[10]**

P.T.O.

Q6) Design a high rate trickling filter using NRC equations for

i) sewage flow = 5MLD,

ii) Recirculation ratio = 1.5,

iii) BOD of raw sewage = 300 mg/l.

iv) BOB removal in PST = 35%,

v) Final effluent BOD desired = 30 MG/L. **[10]**

Q7) State the design parameters, principle, advantages and disadvantages of UASBR. Draw a neat sketch of the reactor. **[10]**

Q8) State the sources of waste water from manufacturing process, characteristics of effluent for dairy and automobile industry, Draw the treatment flow charts. **[10]**

Total No. of Questions :8]

SEAT No. :

P4509

[Total No. of Pages :2

[5355] - 59

M. E. (Civil) Water Resources and Environmental Engineering

DAM ENGINEERING

(2013 Pattern) (Semester - III) (601093)

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

Instructions to the candidates:

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

Q1) a) Explain design of concrete dams. **[4]**

b) Explain any one foundation treatments in gravity dams in detail. **[6]**

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

b) Discuss stability analysis for sudden drawdown case in earthen dam. **[3]**

Q3) a) Explain any one theory for design of arch dam. **[7]**

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

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

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

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

b) Explain side channel and siphon spillway. **[4]**

P.T.O.

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

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

Q7) a) State objectives of Central Water Commission. **[4]**

b) Explain functioning of Global Water Partnership (GWP). **[6]**

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

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

Total No. of Questions : 8]

SEAT No. :

P4463

[Total No. of Pages : 2

[5355]-6

M.E.Civil (Construction & Management)

PROJECT ECONOMICS & FINANCIAL MANAGEMENT

(2013 Pattern) (Semester -II)

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

Instructions to the candidates:

1) ***Solve any 5 questions out of 8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Each questions carry 10 marks.***
4) ***Assume suitable data wherever necessary.***
5) ***Use of electronic pocket Calculator is allowed.***

Q1) a) What are the objectives of business firm and obstacle to growth of firm. **[4]**

b) Discuss the objectives of financial management and explain concept of finacial discipline with an example. **[6]**

Q2) a) Write a short note on cash management. **[4]**

b) A construction company invested Rs. 30 lacks in a vibrator, its useful life is four years. Find discounted payback period at 12% cost of capital & NPV at 15%, if the return froms equipment as follows. **[6]**

Years	1	2	3	4
Returns	6,00,000	11,00,000	15,00,000	10,00,000

Q3) a) Calculate life cycle costs (NPV) for projects having initial investment of Rs. 10,00,000/- each. The cash flow streams are given below. Take discount factor as 12% compare two projects for economic viability. **[6]**

Year	1	2	3	4	5	6
Project 1 cash flow (lakhs)	5	3	2	1	1	-
Project 2 cash flow (lakhs)	2	2	2	4	5	6

b) Enlist the techniques for coverage of risk explain one details. **[4]**

P.T.O.

Q4) Write short notes on- **[10]**

a) Long term finance planning

b) Borrowings

c) Public Deposit

d) Dividend

Q5) a) Enlist different types of budgets and discuss any one type in relation with construction industry. **[6]**

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

i) budget manual

ii) Budgetary control system

Q6) a) Explain roles and responsibilities of SABI infrastructure company. **[3]**

b) An investment proposal requires an initial capital of Rs. 40,00,000 with no salvage value and will be depreciated on a straight line basic for tax purpose. Earnings Before Depreciation Taxes (EBDT) during five years life are. **[7]**

Year	1	2	3	4	5
EBDT (Rs.)	1,40,000	1,52,000	1,60,000	1,20,000	1,04,000

Corporate tax Rs. 35% company evaluates investment projects at 12% cost of capital weather project should be accepted for zero infletion.

Q7) a) What is mean by Escrow Account for ppp project. **[5]**

b) Write short note **[5]**

i) Ratio analysis

ii) Profit & loss AC

Q8) Discuss in brief about case study of metro project in pune city also discus different challenges & its future development. **[10]**

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Total No. of Questions : 8]

SEAT No. : ____

P4510

[Total No. of Pages : 3

[5355] - 61
M.E. (Mechanical)
DESIGN ENGINEERING
Advanced Mathematics
(2013 Pattern) (Semester - I) (507201)

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

Instructions to the candidates:

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

Q1) a) Find an orthonormal basis for the Euclidean space R^3, by applying Gram-Schmidt's method to the following vectors : **[5]**

(2, 2, 1), (–2, 1, 2) and (18, 0, 0).

b) IF W = ϕ + iψ represents a complex potential for an electrostatic field which is analytic, if the potential function $\phi = x^3 - 3xy^2 + 3y$, find its complex conjugate ψ, which is the stream function. **[5]**

Q2) a) Evaluate $\oint_C \frac{\cos\pi z^2}{(z-1)(z-2)} dz$ where C: $|z| = 2.5$. **[5]**

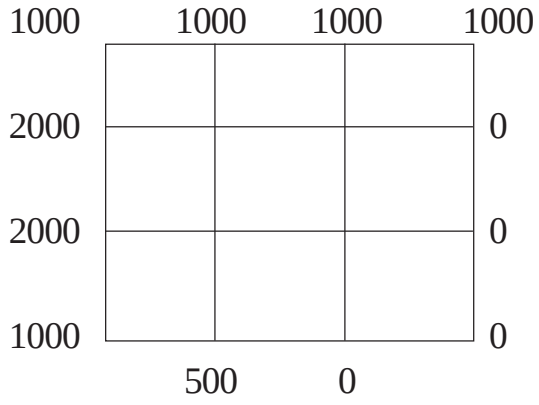
b) Find the Laplace Transform of the saw tooth wave periodic function $f(t) = \frac{kt}{T}$ for $0 < t < T$, $f(t + T) = f(t)$. **[5]**

Q3) a) Solve the initial value problem using Laplace Transform where $\frac{d^2y}{dt^2} - 4\frac{dy}{dt} + 4y = 64\sin 2t$, $y(0) = 0$, $\left(\frac{dy}{dt}\right)_0 = 1$. **[5]**

b) Find the power series solution of $(1 - x^2)\frac{d^2y}{dx^2} - 2x\frac{dy}{dx} + 2y = 0$. **[5]**

P.T.O.

Q4) a) Given the values of $u(x, y)$ on the boundary of the square as in the figure below evaluate the function $u(x, y)$ satisfying Laplace equation $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$. **[5]**



b) Find the eigen value of largest modulus and the associated eigen vector by power method of the matrix $A = \begin{bmatrix} 2 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 2 \end{bmatrix}$ and $X_0 = \begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix}$. **[5]**

Q5) a) Given $\frac{\partial U}{\partial t} = 25\frac{\partial^2 U}{\partial x^2}$ and $u(0, t) = 0 = u(10, t)$ and $u(x,0) = \frac{1}{25}x(10 - x)$, choosing $h = 1$, k suitably, find U_{ij} for $0 \le i \le 9$, $1 \le j \le 4$. **[5]**

b) Using Galerkin's method, solve the differential equation $\frac{d}{dx}\left(x\frac{dy}{dx}\right) + y = x$, where $y(0) = y(1) = 0$. **[5]**

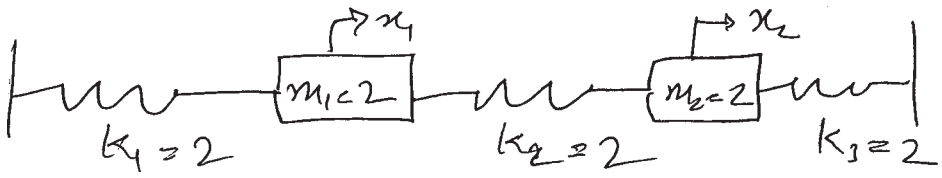
Q6) a) Find the curves on which the functional $\int_0^1 \left[(y')^2 + 12xy\right]dx$ with $y(0) = 0$ and $y(1) = 1$ can be extremized. **[5]**

b) Find the solution of Linear equation system by least square method $2x + 3y = 9$, $x - y = 5$, $3x - 2y = 1$. **[5]**

Q7) a) Show that the bilinear transformation $W=\frac{2z+3}{z-4}$ maps the circle $x^2 + y^2 - 4x = 0$ in to the line $4U + 3 = 0$. **[5]**

b) Find the Fourier transform of $f(x)=\begin{cases}1-x^2; & |x|<1\\ 0 \quad ; & |x|>1\end{cases}$. **[5]**

Q8) a) The system shown in figure begins to vibrate with initial displacement. Assuming that there is no friction, determine the normal frequencies & normal modes of vibrations. **[5]**



b) Solve $U_{tt} = U_{xx}$ upto $t = 0.5$ with a spacing 0.1 subject to $U(0, t) = 0 = U(1, t)$, $U_t(x, 0) = 0$ and $U(x, 0) = 10 + x(1 – x)$. **[5]**

Total No. of Questions :7]

SEAT No. :

P4511

[Total No. of Pages : 2

[5355] - 62

M.E. (Mechanical) (Design Engineering)

MATERIAL SCIENCE AND MECHANICAL BEHAVIOR OF MATERIALS

(2013 Course) (Semester-I) (502202)

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

Instructions to the candidates:

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

Q1) Explain structure of metals and ceramics. **[10]**

Q2) The state of stress at a point to an xyz coordinate system is given by the stress matrix **[10]**

$$[\sigma]=\begin{bmatrix}-800 & 400 & 500\\ 400 & 1200 & -600\\ 500 & -600 & -400\end{bmatrix}\text{MPa}$$

Determine the stresses on a plane whose normal has direction cosines $l=\frac{1}{4}, m=\frac{1}{2}$.

Q3) When the stress tensor at a point with reference to axes (x, y, z) is given by the array,

$$[\sigma]=\begin{bmatrix}4 & 1 & 2\\ 1 & 6 & 0\\ 2 & 0 & 8\end{bmatrix}\text{MPa}$$

show that the stress invariants remain unchanged by transformation of the axes by 45° about the *z*-axis. **[10]**

P.T.O.

Q4) Explain : **[10]**

a) Bend Test

b) Elastic recovery

Q5) Explain Strain-rate and temperature dependence of flow stress. **[10]**

Q6) Explain residual shear stresses in solid circular cylinder in torsion. **[10]**

Q7) Explain Damping and natural decay in viscoelastic materials. **[10]**

Total No. of Questions :7]

SEAT No. :

P4512

[Total No. of Pages : 2

[5355] - 63

M.E. (Mechanical) (Design Engineering)

ADVANCED STRESS ANALYSIS

(2013 Credit Pattern) (Semester-I) (502203)

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

Instructions to the candidates:

1) ***Answer any five questions out of 7.***
2) ***All the questions should be solved in one answer book and attach extra supplements if required.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Use of Calculator is allowed.***
5) ***Assume Suitable data if necessary, but state the assumptions clearly.***

Q1) Investigate the problem solved by stress function
$\phi = (A / 6)x^3 + (B / 2)\, x^2\, y + (C / 2)\, x\, y^2 + (D / 6)\, y^3$.
Sketch the stress distribution on a rectangular plate with $y = \pm h$, and $0 < x < L$. **[10]**

Q2) a) Explain Plain stress and Plane Strain condition along with examples. **[4]**

b) Obtain expressions of Tangential and Radial stress distribution on a solid disc rotating at 'ω rad/sec' starting from equilibrium equation. Also Draw the stress distribution along the radius of the disc. **[6]**

Q3) A circular plate (E = 200GPa, υ = 0.29, Yield stress = 276 Mpa) has a radius of 250 mm and thickness h = 25 mm the plate is simply supported at the edges and is subjected to a uniform pressure p of 1.38 MPa.
Determine the maximum bending stress in the plate and maximum deflection. Derive the equation for maximum deflection you use. **[10]**

Q4) A delta rosette strain gauge is mounted on a steel specimen. For a particular state of loading of the structure the strain gauge readings are -
ε_A = 200 μm/m (at 0° angle), ε_B = 900 μm/m (at 60° angle),
ε_C = 1000 μm/m (at 120° angle),
Determine orientation of the maximum principal strain, the values of the principal stress and maximum shear stress at the point, Let E = 200GPa and υ = 0.285.

P.T.O.

Q5) A hard steel ball (E = 200 GPa, υ = 0.29) of diameter 50 mm is pressed against a thick aluminum plate (E = 72 GPa, υ = 0.33 Yield stress = 450 Mpa). **[10]**

a) Determine the magnitude of load required P_y to initiate yield in the aluminum plate according to the maximum octahedral shear stress criteria of failure.

b) If the factor of safety is considered as SF - 1.75, determine the displacement of the ball relative to plate.

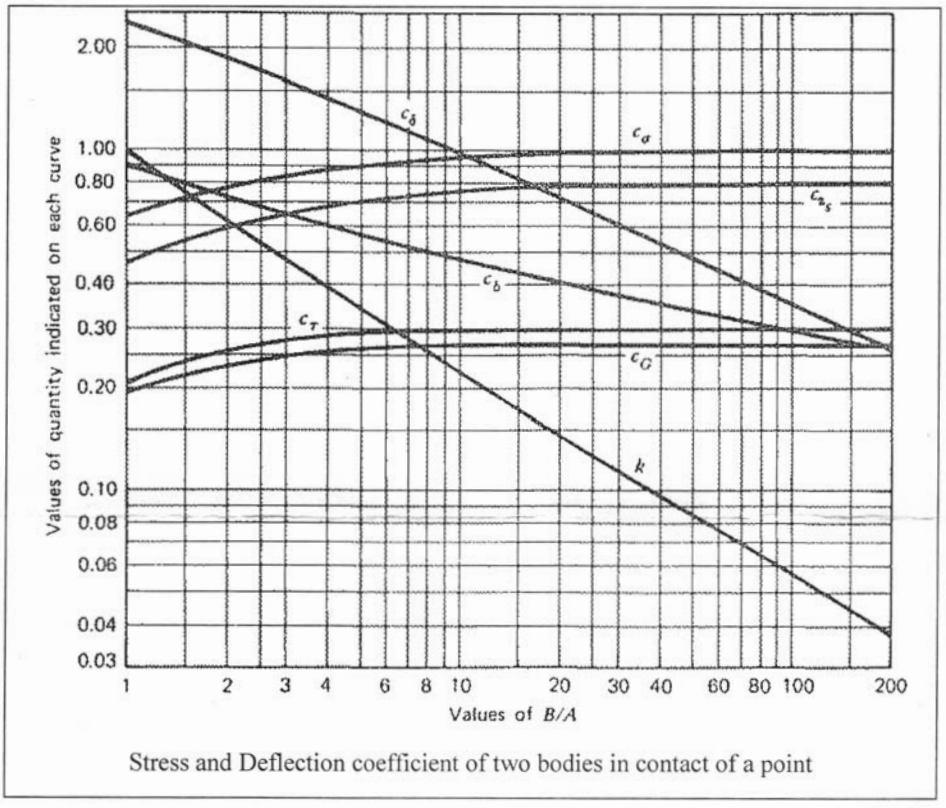
Q6) a) Explain different criterions for stress analysis using plasticity approach.**[5]**

b) Explain different types of engineering plastics with suitable examples.**[5]**

Q7) An important part of a structure which currently is being made of an aluminium alloy having a modulus of elasticity of 60 GPa is to be replaced by a composite material containing E-glass fibre in nylon matrix. **[10]**

Determine minimum volume fraction of glass fibre, if it is desired that while weight reduction is important, the specific modulus of the component should not be lower than that of the current material. The direction of loading in the composite will be in the fibre direction. The density of aluminium alloy used is 2800 kg/m^3.

Material	Density (Kg/m^3)	Modulus of Elasticity (GPa)
E-glass	2550	72
Nylon	1140	2.8



Stress and Deflection coefficient of two bodies in contact of a point

Total No. of Questions :7]

SEAT No. : ____

P4513

[Total No. of Pages :2

[5355] - 64

M. E. Mechanical (All Branches)

RESEARCH METHODOLOGY

(2013 Pattern) (Semester - I)

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

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat Diagrams should be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of pocket calculator & different gas charts as applicable is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) Discuss the motivation for doing research. **[5]**

b) Discuss the eight step model for Research Process starting from formulation of research problem till research report writing. **[5]**

Q2) a) Discuss the significance of literature review at Research during various stages of research. **[5]**

b) Discuss the steps to review literature. **[5]**

Q3) a) What is Pilot study of a Research Problem? **[5]**

b) What are the possible errors in selecting a research problem? **[5]**

Q4) a) Discuss the concept of Research Design. **[5]**

b) Discuss the format / outline of Research Proposal and explain briefly each section. **[5]**

Q5) a) Discuss simple linear models. **[5]**

b) Discuss different methods for testing hypothesis. **[5]**

P.T.O.

Q6) a) Define:

i) Mean ii) Weighted mean

iii) Median iv) Mode

v) Measure of Central tendency. **[5]**

b) Define:

i) Range ii) Accuracy

iii) Precision iv) Sensitivity

v) Resolution vi) Threshold / Dead zone. **[5]**

Q7) a) Explain Linear Regression Equation. **[5]**

b) Explain the structure for writing a research report. **[5]**

Total No. of Questions :7]

SEAT No. :

P4514

[Total No. of Pages : 3

[5355] - 65
M.E. (Mechanical)
DESIGN ENGINEERING
Analysis and Synthesis of Mechanisms (502207)
(2013 Course) (Semester - II)

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

Instructions to the candidates:

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

Q1) a) Explain with suitable figures : **[4]**

i) Motion transfer points ii) Low degree of complexity

iii) High degree of complexity iv) auxilliary points

b) In the mechanism shown in Fig. 1

w_2 = 10 rad is (clockwise) constunt,

Determine W_6 & $\alpha 6$. Given : BDC is an equilateral triangle, O_2A = 7.5 cm, AB = 5cm, BC = 7.5 cm, 0_20_5 = 12.5cm, 0_6D = 7.5cm using method of normal accelerations. **[6]**

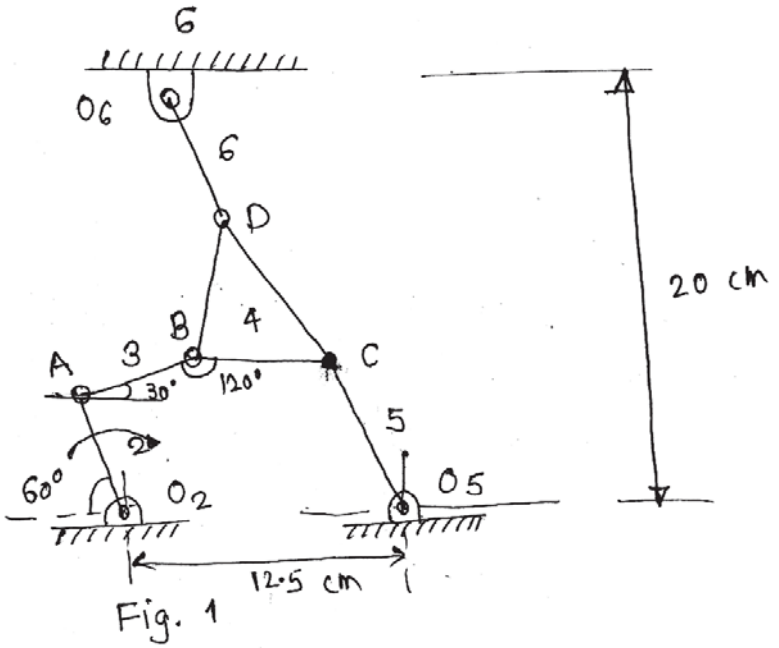


Fig. 1

P.T.O.

Q2) a) Explain the principle of superposition. Also state steps in using the principle of superposition. **[5]**

b) The connecting rod is of 2m length, & weighs 250 kg. The centre of mass is 800 mm from the big end center. Radius of gyration is 903 mm. The crank is 400 mm long & rotates at 200 rpm. Find the inertia torque on the crankshaft when crank has turned through 40° from TDC & piston is moving downwards. The engine is vertical. When it is suspended as a pendulum from the gudgeon axis, it makes 8 complete oscillations in 22 seconds. **[5]**

Q3) a) Using Hart mann construction, locate the following on it : **[5]**

i) Fixed centrode

ii) Inflection pole

iii) Inflection circle

iv) Moving centrode

v) Instant center

b) With reference to a point on the coupler of a four bar chain, derive equation of cubic of stationery curvature. **[5]**

Q4) a) Design a slider- crank mechanism to coordinate three positions of the input link and slider for the following angular and linear displacements of the input link and the slider as follows.

$Q_{12} = 40$, $S_{12} = 180$ mm

$Q_{13} = 120$, $S_{13} = 300$ mm

eccentricity is 20 mm. **[6]**

b) What is chebychev spacing & its significance. **[4]**

Q5) a) Derive freudenstein's equation for a four-bar chain. **[6]**

b) Explain the following

i) Branch & order defects

ii) Dyads

iii) Compatibility equations **[4]**

Q6) a) What are Denavit - Hartenberg parameters & find the Denavit - Hatenberg parameters for Hooke joint. **[5]**

b) Write homogeneous transformation matrix for translation (Δx, Δy, Δz) & rotation ($\Delta\theta_1$, $\Delta\theta_2$, $\Delta\theta_3$) of a cartesian co-ordinate system. **[5]**

Q7) a) Explain the following : **[5]**

i) Mobility

ii) Kutzbach criterion

iii) Gruebler condition

iv) Relative pole

b) Explain the procedure for four position synthesis using point position reduction. **[5]**

Total No. of Questions : 7]

SEAT No :

P 4515

[Total No. of Pages : 3

[5355]-66

M.E. (Mechanical) (Design Engineering)
ADVANCED MECHANICAL VIBRATIONS
(2013 Credit Pattern) (502208) (Semester - II)

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

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Draw Neat diagrams wherever necessary.***
3) ***Use of non-programmable scientific calculator is allowed.***
4) ***Assume suitable data, where ever necessary.***
5) ***Figures to the right indicate full marks.***

Q1) For the system shown in Fig. No.1, determine natural frequencies and mode shapes using influence coefficient method. Sketch the first mode. **[10]**

Take k_1=2 kN/m, k_2=1.5 kN/m, k_3=2 kN/m.

m_1=100 kg, m_2=200kg, m_3=300kg.

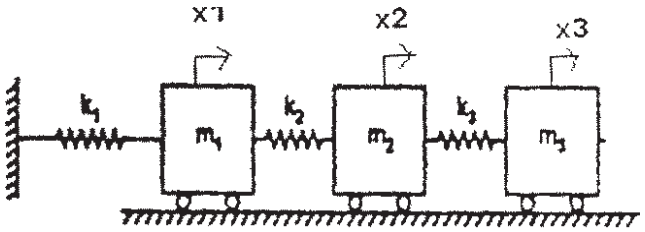


Fig. No. 1

Q2) A bar fixed at one end is pulled at the other end with a force 'F' as shown in Fig. No.2. The force is suddenly released. Investigate the vibration of the bar. **[10]**

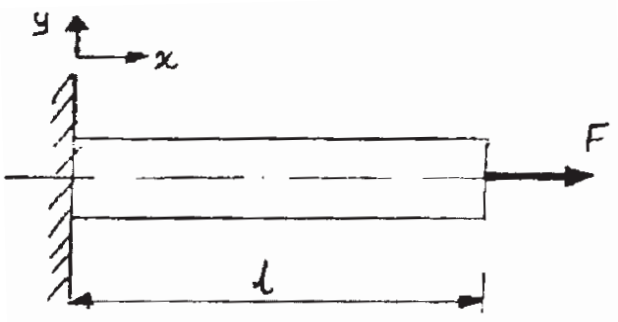


Fig. No. 2

P.T.O.

Q3) a) Use Lagranges Equation to derive the equation of motion for the system shown in Fig. No.3 **[5]**

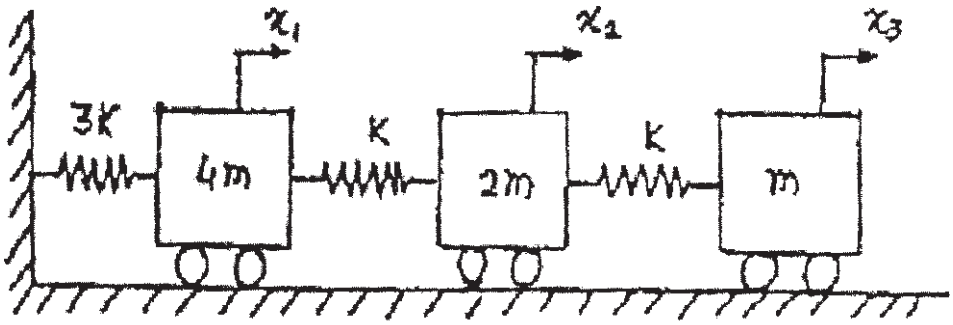


Fig. No. 3

a) Determine flexibility influence coefficient of the triple pendulum of lengths L_1, L_2, L_3 and masses m_1, m_2, m_3 attached by the string as shown in Figure No.4 **[5]**

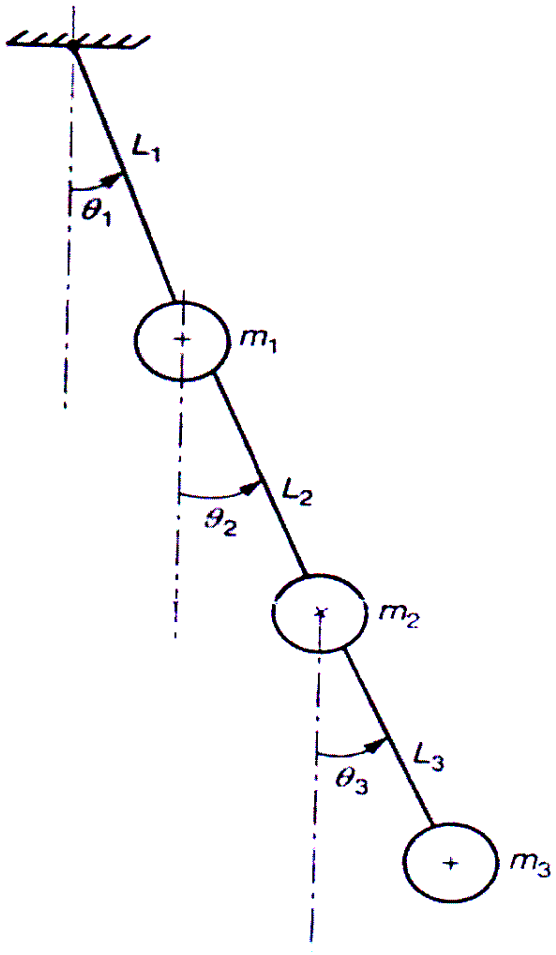


Figure No. 4

Q4) a) What is the difference between vibration isolator and a vibration absorber? **[5]**

b) What do you know by "whirling of shaft'? What is synchronous whirl. **[2]**

c) What do you mean by 'unbalancing'? What is 'In-situ Balancing'? Explain it in brief. **[3]**

Q5) a) Explain with suitable example experimental modal analysis. **[3]**

b) State and explain different machine condition monitoring and machine vibration monitoring techniques. **[7]**

Q6) a) Derive an expression for the spectral density of a derived process. **[3]**

b) Give three examples of random input. How will you proceed to find their Spectral Density? **[7]**

Calculate the Autocorrelation function corresponding to the ideal white noise and to the unit step function.

Q7) Write notes on (Any Four) **[10]**

a) Holzer Method

b) Tuned shock absorber

c) Duhamel's Integral

d) Quefrency Domain Analysis

e) Free vibration of string with various boundary conditions.

Total No. of Questions :10]

SEAT No. :

P4516

[Total No. of Pages : 2

[5355] - 67

M.E. (Mechanical : Design Engineering)

FINITE ELEMENT ANALYSIS

(2013 Course) (Semester - II) (Elective - IV) (502209)

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

Instructions to the candidates:

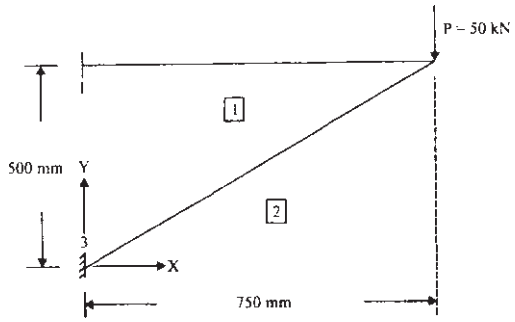
1) ***Figures to the right indicate full marks.***
2) ***Use of electronic pocket calculator is allowed.***
3) ***Assume suitable data, if necessary.***

Q1) a) Explain Weak Formulation and step by step procedure to get elemental matrix for bar element. **[6]**

b) Explain Weighted Residual Methods (1) Subdomain (2) Galerking **[4]**

OR

Q2) Determine the stiffness matrix, deformation in the truss structure shown below, assuming points 1 and 3 are fixed. Use E = 200 GPa and A = 1000 mm^2. **[10]**



Q3) a) What is meant by ISOPARAMETRIC Formulation and why it important in Element Formulation? **[4]**

b) The nodal coordinates and the nodal displacement of a triangular element, under a specific load condition are given below. **[6]**

$X_i = 0$, $Y_i = 0$, $X_j = 1$ mm, $Y_j = 3$ mm, $X_k = 4$ mm, $Y_k = 1$ mm

$U_i = 1$ mm, $V_i = 0.5$ mm, $U_j = -0.05$ mm, $V_j = 1.5$ mm, $U_k = 2$ mm, $V_k = -1$ mm

If $E = 2 \times 10^5$ N/mm^2 and $\mu = 0.3$, find the stresses in the element

OR

P.T.O.

Q4) a) Explain Serpendity Element. **[5]**

b) Explain Gauss Quadrature Integration and write note on why gauss quadrature method is preferred over other integration methods in FEA analysis. **[5]**

Q5) a) Explain Kirchoff's Plate theory. **[5]**

b) Write a note on Midline Plate Rectangular Element write its governing equation and stiffness matrix. **[5]**

OR

Q6) a) Write a note on selective and reduced integration. **[5]**

b) Write note on "Shear Locking and Hour Glass Phenomena". **[5]**

Q7) a) Write down different types of Nonlinearities can be in incorporated FEA analysis and explain geometric nonlinearity in details. **[5]**

b) Explain difference between Direct solution and Iterative solution in solving Nonlinear problems using FEA. **[5]**

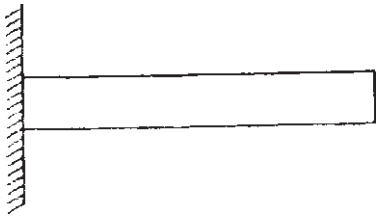
OR

Q8) a) How Linear and Nonlinear buckling analysis is carried out in FEA. **[5]**

b) Explain Newton Rapson and Modified Newton Rapson Method for Nonlinear Solutions in FEA. **[5]**

Q9) a) Derive consistent mass matrix for bar, beam and truss element. **[5]**

b) Find the natural frequencies of vibrations of a simple cantilever beam. **[5]**



OR

Q10)a) Write a note on P&H formulation in FEA analysis. **[5]**

b) Write a note on submodeling and substructuring. **[5]**

Total No. of Questions :6]

SEAT No. :

P4517

[Total No. of Pages :2

[5355] - 68

M.E. (Mechanical - Design Engineering)

OPTIMIZATION TECHNIQUES

(2013 Credit Pattern) (Semester - III) (602213)

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

Instructions to the candidates:

1) ***Attempt any five questions.***
2) ***Neat diagrams must be drawn whenever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Write a short note on multivariable optimization with no constraint? **[5]**

b) In a two-stage compressor, the working gas leaving the first stage of compression is cooled (by passing it through a heat exchanger) before it enters the second stage of compression to increase the efficiency. The total work input to a compressor (W) for an ideal gas, for isentropic compression, is given by **[5]**

$$W = c_p \, T_1 \left[\left(\frac{p_2}{p_1} \right)^{\left(\frac{k-1}{k}\right)} + \left(\frac{p_3}{p_2} \right)^{\left(\frac{k-1}{k}\right)} - 2 \right] \frac{k}{k-1}$$

where Cp is the specific heat of the gas at constant pressure, k is the ratio of specific heat at constant Pressure to that at constant volume of the gas, and T1 is the temperature at which the gas enters the compressor. Find the pressure, p_2, at which inter -cooling should be done to minimize the work input to the compressor. Also determine the minimum work done on the compressor.

OR

c) Write a short note on Equality constraint optimization. **[5]**

P.T.O.

Q2) Solve by simplex method the following L.P. problem. **[10]**

Minimize $Z = x_1 - 3x_2 + 3x_3$,

Subjected to,

$$\begin{aligned} 3x_1 - x_2 + 2x_3 &\leq 7, \\ 2x_1 + 4x_2 &\geq -12, \\ -4x_1 + 3x_2 + 8x_2 &\leq 10, \\ x_1, x_2, x_3 &\geq 0. \end{aligned}$$

Q3) a) Write a short note on simplex algorithm. **[5]**

b) Minimize the function **[5]**

$f(x) = 4x^3 + x^2 - 7x + 14$

Using Golden Section Method, in the interval of [0,1] with $n = 5$.

Q4) a) Explain any two in details. **[5]**

i) Fuzzy optimization

ii) Simulated Annealing

iii) Genetic algorithms

b) Minimize the function **[5]**

$f(X) = 0.65 - \frac{0.75}{1+x^2} - 0.65\lambda \tan^{-1}\left(\frac{1}{x}\right)$ Using quasi-Newton method with the starting point $X_1 = 0.1$ and the step size $\Delta X = 0.01$ in central difference formulas. Use $\varepsilon = 0.01$ for checking the convergence.

Q5) a) Write a short note on topology optimization for natural Frequency. **[5]**

b) Write a short note on ESO for stiffness or displacement optimization. **[5]**

OR

Q6) a) Write a short note on optimization as design tool Topology. **[5]**

b) List the different solution methods in topology optimization and Explain one of them in details. **[5]**

♦ ♦ ♦

Total No. of Questions :8]

SEAT No. :

P4518

[Total No. of Pages :3

[5355] - 69

M. E. Mechanical (Design Engineering)

MECHANICAL MEASUREMENT AND CONTROL

(2013 Pattern) (Semester - III) (602214)

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

Instructions to the candidates:

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

Q1) a) Define sensitivity drift and zero drift. What factors can cause sensitivity drift and zero drift in instrument characteristics? **[5]**

b) Instruments are normally calibrated and their characteristics defined for particular standard ambient conditions. What procedures are normally taken to avoid measurement errors when using instruments that are subjected to changing ambient conditions? **[5]**

Q2) a) In a survey of 15 owners of a certain model of car, the following figures for average petrol consumption were reported. 25.5 30.3 31.1 29.6 32.4 39.4 28.9 30.0 33.3 31.4 29.5 30.5 31.7 33.0 29.2 Calculate the mean value, the median value and the standard deviation of the data set. **[6]**

b) Explain the difference between systematic and random errors. What are the typical sources of these two types of error? **[4]**

P.T.O.

Q3) a) Following table gives the aptitude test scores and productivity indices of 8 randomly selected workers. **[6]**

Aptitude Score	57	58	59	59	60	61	62	64
Productivity Index	67	68	65	68	72	72	69	71

Calculate the correlation coefficient between the aptitude score and productivity index.

b) Explain the construction and working of electromagnetic flow meter. **[4]**

Q4) a) Explain principal and working of Acoustic thermometer. **[5]**

b) Explain principal and working of Coriolis flow meter used to measure the mass flow rate of liquids, with neat sketch. **[5]**

Q5) a) List out various methods of torque measurement. Explain any one in detail. **[5]**

b) List out various instruments for frequency measurement. Explain stroboscope in detail. **[5]**

Q6) a) Figure Q6 (A) shows an error time graph. Sketch the PD controller output w.r.t time Kp = 7% / %, K_D = 0.75% / s and m(0) = 45%. **[5]**

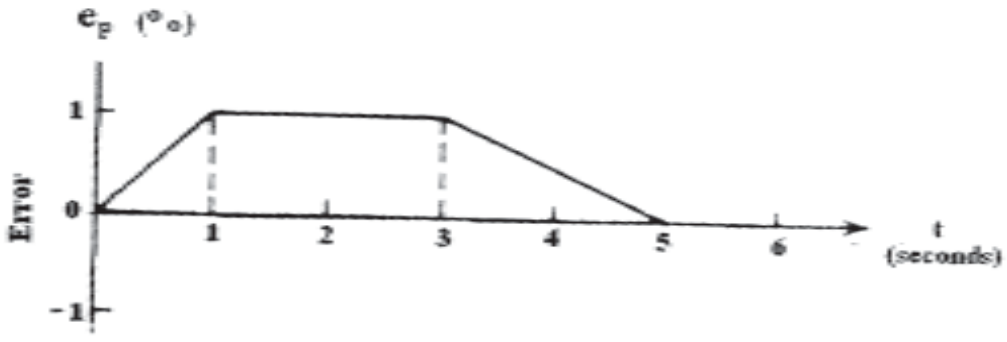


Figure Q6 (A)

b) Write a note on analysis of second order system using Bode Plots. **[5]**

Q7) a) Characteristic equation of system is given by $S^3 + 50.2S^2 + 48s + 3.053k = 0$. Find value of k, if system is stable by using Routh Hurwitz criterion. **[5]**

b) Derive the transfer function $\theta_2(S)/T_1(S)$ and input τ for the lossless gear system shown in Figure Q7 (B). **[5]**

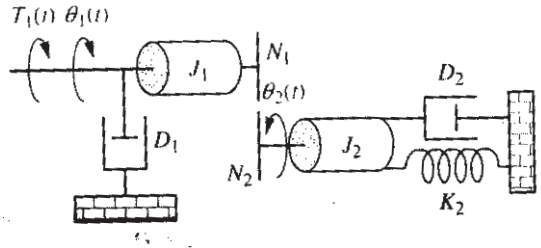


Figure Q7 (B)

Q8) a) Explain Proportional + Derivative Controller. **[6]**

b) Write a note on Pole placement using Ackerman's formula. **[4]**

Total No. of Questions :8]

SEAT No. :

P4464

[Total No. of Pages : 3

[5355] - 7

M.E. (Civil) (Construction & Management)

OPERATIONS RESEARCH

(2013 Course) (Semester-II) (501028)

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

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Figures to the right indicate full marks.***
3) ***Use of logarithmic tables, slide rule, Moiller charts, electronic pocket calculator and steam tables is allowed.***
4) ***Assume suitable data / information wherever necessary.***

Q1) A firm uses three different machines A, B & C to produce two machine parts. Tabulated below are the machine times required for each part, machining time available on different machines and the profit on each machine part. **[10]**

Type of machine	Machining Time required for machine parts (min.)		Max. Time available (min.)
	I	II	
A	6	3	1500
B	2	5	1000
C	1	1	450
Profit per unit	Rs.20	Rs.50	

Formulate the LPP and solve graphically to maximize the profit.

Q2) Aggregates are to be transported from four quarry sites to four construction sites. Determine the transportation policy that minimizes the total cost of transportation by the North west corner rule method and VAM method.**[10]**

	Ql	Q2	Q3	Q4	Available
Cl	8	10	6	2	300
C2	12	14	5	3	220
C3	10	11	7	5	140
C4	9	10	8	6	120
Required	240	200	180	160	

P.T.O.

Q3) Five masons are to be assigned to five buildings. The time required by each mason is given below. Determine the appropriate allocation of the masons so as to minimize the time. **[10]**

Masons	Buildings				
	1	2	3	4	5
A	3	9	2	3	7
B	6	1	5	6	6
C	9	4	7	10	3
D	2	5	4	2	1
E	9	6	2	4	6

Q4) A concrete pipe manufacturing operations requires the pipe to be processed through 3 machines. Tabulated below is the time required at each machine. Determine the sequence of the jobs to ensure minimum total elapsed time.**[10]**

Job	Machine A	MachineB	MachineC
1	15	8	20
2	12	10	21
3	13	14	16
4	19	11	14
5	16	13	19

Q5) An investor has to invest Rs. 60 million in 3 construction projects. The returns depending on the level of investment are tabulated below. Determine the amount of investment in each project to maximize the returns. **[10]**

Investment	Returns		
	A	B	C
0	0	0	0
10	18	26	23
20	28	27	29
30	43	33	41
40	47	44	46
50	53	55	52
60	63	62	61

Q6) a) Use Fibonacci method to maximize $f(x) = x^3(12 - x)$ in the range (0, 12) within 10% accuracy. **[5]**

b) An organization has to purchase a plate vibrator from two manufacturers. The initial investment is of the order of Rs. 10000. The expected net incremental cash flow is as under; **[5]**

Year	Company A	CompanyB
1	5000	2000
2	4000	3000
3	2000	5000
4	2000	4000

The cost of capital is 10%. Determine the NPV for each machine. Suggest which company's machine is to be selected based on NPV criteria.

Q7) a) Differentiate between constrained and unconstrained Non-linear programming techniques. **[5]**

b) State the Kuhn Tucker Conditions for non-linear optimization. **[5]**

Q8) a) State and explain the characteristics of Queuing models. **[5]**

b) Explain the terms waiting and idle time costs. State and explain Kendall's notation. **[5]**

Total No. of Questions : 8]

SEAT No. : ____

P4519

[Total No. of Pages : 4

[5355]-71

M.E. (Mechanical) (Heat Power / Energy) Engineering
ADVANCED MATHEMATICS AND NUMERICAL METHODS
(2013 Pattern) (Credit Pattern) (507101) (Semester - I)

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

Instructions to the candidates:

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

Q1) a) The pressure and volume of a gas are related by the equation $PV^{\gamma} = k$, where 'γ' and 'k' are constants. Fit this equation for the set of observations : **[5]**

P(kg/cm^2)	0.5	1	1.5	2	2.5	3
V (lit.)	1.62	1	0.75	0.62	0.52	0.46

b) Find the real root of the equation $x.\log_{10}^{x} = 1.2$ by false position method. Correct to four decimal places. **[5]**

Q2) a) Solve by LU decomposition method, the system of equations : **[5]**

$2x + 3y + z = 9$

$x + 2y + 3z = 6$

$3x + y + 2z = 8$

b) What is advantage to use Lagrange's interpolation formula? Find y at $x = 9$ for the data : **[5]**

x	5	7	11	13	17
y	150	392	1452	2366	5202

by using above formula.

P.T.O.

Q3) a) Find the natural cubic spline and evaluate $y(1.5)$ to the following data : **[5]**

x	1	2	3
y	–6	–1	16

b) Use Romberg's method to compute $\int_0^{2\pi} \frac{x^2 \sin x}{\pi^2} dx$. **[5]**

Q4) a) Find the integration of $\int_0^4 \left(x^3 - \cos x + 6\right) dx$ using 3 point Gauss-Legendre formula. **[5]**

b) Find the largest eigenvalue of the matrix using Power method. **[5]**

$$A = \begin{bmatrix} -1 & 3 & -1 \\ 3 & 2 & 4 \\ -1 & 4 & 10 \end{bmatrix}$$

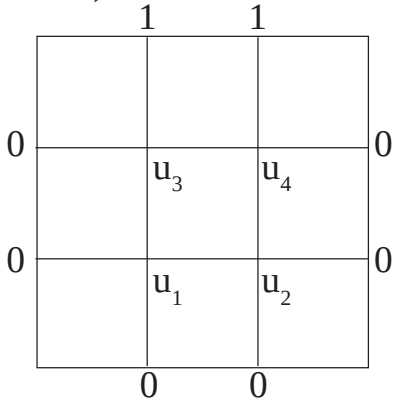
Q5) a) Using Given's method reduce the following matrix to the tridiagonal form $A = \begin{bmatrix} 2 & 1 & 3 \\ 1 & 4 & 2 \\ 3 & 2 & 3 \end{bmatrix}$. **[5]**

b) Apply Runge-Kutta method of fourth order to find approximate value of y for $x = 0.2$ in step of 0.1, if $\frac{dy}{dx} = x + y^2$, given that $y = 1$ when $x = 0$. **[5]**

Q6) a) Using Adams-Bashforth predictor corrector method find y at $x = 1.4$, given that $\frac{dy}{dx} = x^2(1 + y)$, $y(1) = 1$, $y(1.1) = 1.233$, $y(1.2) = 1.548$, $y(1.3) = 1.979$. **[5]**

b) Use Gauss-Seidel method to solve the partial differential equation :

$\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$ represented by a mechanical system. (Carry out five iterations). Given that



[5]

Q7) a) Solve the system of equations : **[5]**

$27x + 6y - z = 85$

$x + y + 54z = 110$

$6x + 15y + 2z = 72$

by Gauss-Seidel iteration method.

b) Solve the equation : $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$ **[5]**

Subject to the conditions :

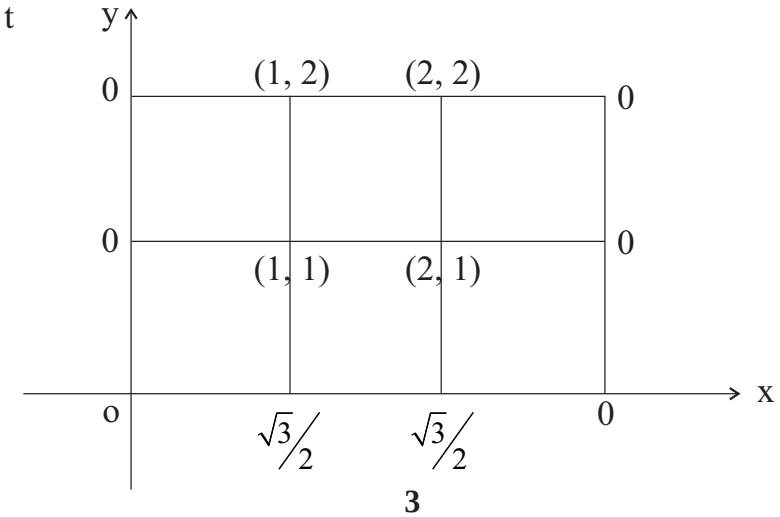
$u(x, 0) = \sin \pi x, \quad 0 \le x \le 1$

$u(0, t) = 0$ for all t

$u(1, t) = 0$ for all t

by Crank Nicolson method

(Take $h = \frac{1}{3}, k = \frac{1}{36}$)



Q8) a) Evaluate the pivotal values of the equation **[5]**

$\frac{\partial^2 u}{\partial t^2} = 16u_{xx}$, taking $4x = 1$ upto $t = 1.25$. The boundary conditions are

i) $u(0, t) = 0$, for all t

ii) $u(5, t) = 0$ for all t

iii) $\frac{\partial u}{\partial t} = 0$ at $t = 0$

iv) $u(x, 0) = x^2(5 - x)$

b) Solve the equation $\frac{d^2 y}{dx^2} = x + y$ with boundary conditions $y(0) = y(1) = 0$. **[5]**

Total No. of Questions :8]

SEAT No. :

P4520

[Total No. of Pages : 2

[5355] - 72

M.E. (Mechanical) (Heat Power Engg.)

ADVANCED THERMODYNAMICS & COMBUSTION TECHNOLOGY

(2013 Course) (Semester - I) (502102)

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

Instructions to the candidates:

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

Q1) a) State and explain law of corresponding states. Explain compressibility chart with suitable sketch. **[6]**

b) A mass of 0.25 kg of an ideal gas has a pressure of 300 kPa, a temperature of 80°C and a volume of 0.07 m^3. The gas undergoes an irreversible adiabatic process to a final pressure of 300 kPa and final volume of 0.10 m^3, during which the work done on the gas is 25kJ. Evaluate the c_p and c_v of the gas and the increase in entropy. **[4]**

Q2) a) Explain critical pressure, critical temperature, critical volume and triple point of water. **[5]**

b) A quantity of steam is heated at constant pressure of 10 bar from 0.75 dry to 250°C. Find change in specific internal energy and specific entropy. Specific heat for superheated steam may be taken as 2.1kJ/kg K. **[5]**

Q3) a) Explain thermal death of universe and third law of thermodynamics. **[5]**

b) Calculate the decrease in energy when 25 kg of water at 95°C mix with 35 kg of water at 35°C, the pressure being taken as constant and the temperature of the surrounding being 15°C (c_p of water = 4.2 kJ/kg K). **[5]**

P.T.O.

Q4) a) Explain second law of thermodynamics with Kelvin plank and Clausius statements. **[4]**

b) A body of constant heat capacity c_p and initial temperature T_1 placed in contact with a heat reservoir at temperature T_2 and comes to an thermal equilibrium with it. If $T_2 > T_1$ calculate the entropy change of the universe and show that this is always positive. **[6]**

Q5) a) Using Maxwell's Equation derive first and second Tds Equations. **[5]**

b) With usual notations derive the following thermodynamic relation: **[5]**

$$C_p - C_v = TV\beta^2 / k_T$$

Q6) a) Explain enthalpy of formation and enthalpy of combustion. **[4]**

b) A gasoline engine delivers 150 kW. The fuel used is C_8H_{18} (1) and it enters the engine at 25°C. 150% theoretical air is used and it enters at 45°C. The products of combustion leave the engine at 750 K and heat transfer from the engine is 205 kW. Determine the fuel consumption per hour, if complete combustion is achieved. **[6]**

Q7) a) What is adiabatic flame temperature? **[4]**

b) The constituents of a coal by mass are C = 80%, H_2=8%, Ash = 4%, Orsat analysis gives, **[6]**

CO_2 =10%, CO = 1.2%, O_2 = 10% by volume, Find:

i) Flue gases formed in kg/kg of fuel

ii) Percentage of excess air supplied

iii) Heat carried away by products of combustion if flue gas exit temperature is 400°C and cp of flue gas is 1.026 kJ/kg K. The ambient temperature is 30°C

Q8) a) Write a short note on fugacity and activity **[4]**

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

i) thermodynamics of Nutrition and exercise

ii) thermodynamics of biological cells

Total No. of Questions : 8]

SEAT No. :

P4521

[Total No. of Pages : 4

[5355]-73

M.E. (Mechanical) (Heat Power Engineering)

ADVANCED FLUID MECHANICS

(2013 Pattern) (Semester-I)

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

Instructions to the candidates:

1) ***Answer any five full questions.***
2) ***Answers should be written in the same answer books.***
3) ***Neat diagrams must be drawn whenever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Use of log tables slide rules Mollier charts, electronic calculator and steam table is allowed.***
6) ***Assume suitable data, if necessary.***

Q1) a) Explain Lagrangian and Eulerian description in fluid flow mechanics with an example in each. **[4]**

b) Air at 15°C forms a boundary layer near a solid wall. The velocity distribution in the boundary layer is given by : **[6]**

$$\frac{u}{U} = 1 - e^{\left(-2\frac{y}{\delta}\right)}$$

Where the free stream velocity U = 30 m/s and δ = 1cm. Assume the density of air is 1.22 kg/m^3 and the kinematic viscosity is 1.46×10^{-5}N.s/m^2. Find the shear stress at the wall where y = 0.

Q2) a) For a streamline ideal viscous steady flow, show that, **[4]**

$$\frac{dp}{\rho} + gdz + vdv = 0$$

Where, p = intensity of pressure, ρ = density of fluid, ν = velocity of fluid and z is the datum.

b) For a two-dimensional incompressible flow field, show that the continuity equation in cylindrical polar coordinates (r and θ) is given by : **[6]**

$$\frac{\partial}{\partial r}(ru_r) + \frac{\partial}{\partial_\theta}(u_\theta) = 0$$

Where, u_r and $u\theta$ are the components of velocity vector in the r and θ direction respectively and r is the radius of the cylinder.

P.T.O.

Q3) a) For a two dimensional irrotational flow, the velocity potential is given by $\phi = 2xy$ Find : **[4]**

i) The velocity of flow at (1,2) and (2,2).

ii) The discharge between the streamlines passing through these two point (1,2) and (2,2).

b) A uniform flow with a velocity of 2 m/s is flowing over a source placed at the origin. The stagnation point occurs at (-0.398,0). Determine, **[6]**

i) Strength of the source

ii) Maximum width of Rankine half body, and,

iii) Other principal dimension of Rankine body.

Q4) a) The velocity field in a fluid flow is given by : **[4]**

$$V = \left(\frac{y^3}{3} + 2x - x^2 y \right) i + \left(xy^2 - 2y - \frac{x^2}{3} \right) j$$

i) Check if the flow exists for given V.

ii) Is it compressible or incompressible? If incompressible, obtain an expression for stream function.

b) A point P(0.5,1) is situated in the flow field of a doublet of strength $5 m^2/s$. Claculate

i) Flow velocity at this point, and,

ii) Value of the stream function.

Q5) a) Consider 2-D, steady, incompressible, Newtonian fully developed laminar flow between two horizontal stationary parallel plates placed 2H distance aparts. The width is w. Obtain : **[6]**

i) An expression for velocity profile.

ii) An expression for volume flow rate, and,

iii) And expression for average and maximum velocity.

b) The velocity distribution in a circular pipe is given by Blasius on-seventh power velocity distribution as :

$$\frac{u}{u_{max}} = \left(1 - \frac{r}{R} \right)^{\frac{1}{7}}$$

where, u is the velocity at a distance of r from the center, u_{max} is the maximum velocity at the center of the pipe of radius R. Find the ratio of average velocity of flow to maximum velocity in the pipe.

Q6) a) Explain the following terms with reference to turbulent flows : **[6]**

i) Intensity of turbulence.

ii) Shear streses in turbulent flows

iii) Reynolds shear stress in turbulent flows

b) In a hydro-dynamically rough pipe of diameter 40 cm having turbulent flow, the centerline velocity is 3 m/s and the local velocity at 15 cm from pipe center is 2.5 m/s. Find : **[4]**

i) The discharge through the pipe, and,

ii) The height of roughness projections.

Q7) a) A jet plane weighs 29430 N with a wing area of 20 m^2 flies at a velocity of 250 km/hr. When the engine delivers 7357.5 kW, 65% of the power is used to overcome the drag resistance of the wing. Calculate the coefficient of lift and coefficient of drag for the wind. Assume air density as 1.21 kg/m^3. **[4]**

b) Calculate the stagnation pressure, temperature and density at the stagnation point on the nose of a plane, which is flying at 800 km/hour through still air having a pressure of 8 N/cm^2 absolute and temperature of minus 10 degree centigrade. Take R=287 J/kg K and k=1.4. **[6]**

Q8) a) Explain propagation of pressure wave in a compressible fluid, when :**[3]**

i) Mach number < 1,

ii) Mach number = 1, and

iii) Mach number > 1 with suitable diagram.

b) **[7]**

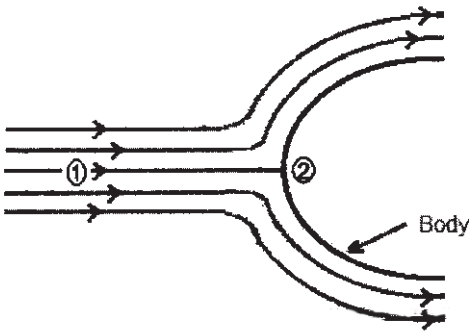


Figure 1

Consider a compressible flow flowing past an immersed body under frictionless, adiabatic conditions as shown in Figure 1. If p_1, v_1, ρ_1 are the pressure, velocity and density of fluid at point 1 on the stream line and If p_2, v_2, ρ_2 are the corresponding values of pressure, velocity and density of fluid at point 2 (stagnation point) respectively, show that the stagnation pressure (p_s) is given by :

$$p_s = p_1\left[1+\frac{k-1}{k}M_1^2\right]\frac{k}{k-1}$$

Where, k is the ratio of specific heats, M_1 is the Mach number at point 1.

Total No. of Questions :7]

SEAT No. :

P4522

[Total No. of Pages : 3

[5355] - 75

M.E. (Mechanical - Heat Power)

ADVANCED HEAT TRANSFER

(2013 Course) (Semester - II) (502107)

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

Instructions to the candidates:

1) ***Answer any five questions from following.***
2) ***Draw diagrams wherever necessary.***
3) ***Use of scientific calculator is allowed.***
4) ***Assume suitable data wherever necessary.***

Q1) a) Derive generalized heat conduction equation and state the boundary conditions used to obtain the solution. **[5]**

b) Consider the base plate of a 1200-W household iron that has a thickness of L = 0.5 cm, base area of A 300 cm^2, and thermal conductivity of k = 15 W/m·ºC. The inner surface of the base plate is subjected to uniform heat flux generated by the resistance heaters inside, and the outer surface loses heat to the surroundings at T 20ºC by convection, Taking the convection heat transfer coefficient to be 80 W/m^2. ºC and disregarding heat loss by radiation, obtain an expression for the variation of temperature in the base plate, and evaluate the temperatures at the inner and the outer surfaces. **[5]**

Q2) a) Construct lumped system analysis equation in terms of dimensionless parameters. Explain the significance of dimensionless parameters in the equation. **[5]**

b) Consider a 1000-W iron whose base plate is made of 0.5-cm-thick aluminum alloy 2024-T6 (ρ = 2770 kg/m^3, *Cp* = 875 J/kg · ºC, α = 7.3 x 10^{-5} m^2/s). The base plate has a surface area of 0.03 m^2. Initially, the iron is in thermal equilibrium with the ambient air at 22ºC. Taking the heat transfer coefficient at the surface of the base plate to be 12 W/m^2 ·ºC and assuming 85 percent of the heat generated in the resistance wires is transferred to the plate, determine how long it will take for the plate temperature to reach 140ºC. Is it realistic to assume the plate temperature to be uniform at all times? **[5]**

P.T.O.

Q3) a) Derive an expression for convection heat transfer. State boundary layer approximations. **[5]**

b) Consider an airplane cruising at an altitude of 10 km where standard atmospheric conditions are - 50ºC and 26.5 kPa at a speed of 800 km/h. Each wing of the airplane can be modeled as a 25-m x 3-m flat plate, and the friction coefficient of the wings is 0.0016. Using the momentum-heat transfer analogy, determine the heat transfer coefficient for the wings at cruising conditions. Properties of air: $Cp = 0.999$ kJ/kg-K Pr = 0.7440.**[5]**

Q4) a) Air is to be cooled in the evaporator section of a refrigerator by passing it over a bank of 0.8-cm-outer-diameter and 0.4-m-long tubes inside which the refrigerant is evaporating at -20ºC. Air approaches the tube bank in the normal direction at 0ºC and 1 atm with a mean velocity of 4 m/s. The tubes are arranged staggered with longitudinal and transverse pitches of SL - ST = 1.5 cm. There are 30 rows in the flow direction with 15 tubes in each row. Determine the refrigeration capacity of this system. [k = 0.02317 W/m-K Pr_s = 0.7408, $\mu = 1.705 \times 10^{-5}$ Ns/m^2, $\rho = 1.316$ kg/m^3, c_p = 1.006kJ/kg.K] Pr = 0.7375. **[5]**

b) Prove that for laminar flow through a pipe under constant heat flux condition, Nu=4.36. **[5]**

Q5) a) Discuss governing equations and Grashoff number for natural convection over vertical plate. **[5]**

b) A 12-cm-high and 20-cm-wide circuit board houses 100 closely spaced logic chips on its surface, each dissipating 0.05 W. The board is cooled by a fan that blows air over the hot surface of the board at 35ºC at a velocity of 0.5 m/s. The heat transfer from the back surface of the board is negligible. Determine the average temperature on the surface of the circuit board assuming the air flows vertically upwards along the 12-cm-long side by (*a*) ignoring natural convection and (*b*) considering the contribution of natural convection. Disregard any heat transfer by radiation.

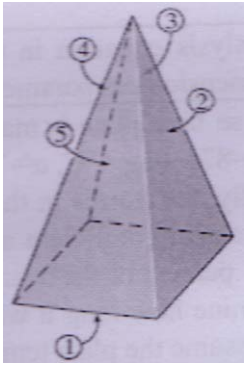
k = 0.02717 W/m-k Pr = 0.7235, v = 1.774×10^{-5}m^2/s, $\beta = 0.00312k^{-1}$**[5]**

Q6) a) Discuss External and internal flow boiling processes. **[5]**

b) Saturated ammonia vapour at 10ºC condenses on the outside of a 2-cm-outer-diameter, 8-m long horizontal tube whose outer surface is maintained at -10ºC. Determine (a) the rate of heat transfer from the ammonia and (b) the rate of condensation of ammonia. $k_1 = 0.5390$ W/m-k $C_p = 4617$ J/kg-K, $\mu_1 = 1.896 \times 10^{-4}$ kg/m-s, $\rho_1 = 638.6$ kg/m^3, **[5]**

Q7) a) Explain the terms Absorptivity, Reflectivity, and Transmissivity. **[5]**

b) Determine the view factors from the base of the pyramid shown in Figure. To each of its four side surfaces. The base of the pyramid is a square, and its side surfaces are isosceles triangles.



Nusselt number correlations for cross flow over tube banks for N > 16 and 0.7 < Pr < 500 (from Zukauskas, Ref. 15, 1987)*

Arrangement	Range of Re_D	Correlation
In-line	0–100	$Nu_D = 0.9\ Re_D^{0.4} Pr^{0.36} (Pr/Pr_s)^{0.25}$
	100–1000	$Nu_D = 0.52\ Re_D^{0.5} Pr^{0.36} (Pr/Pr_s)^{0.25}$
	1000–2×10^5	$Nu_D = 0.27\ Re_D^{0.63} Pr^{0.36} (Pr/Pr_s)^{0.25}$
	2×10^5–2×10^6	$Nu_D = 0.033\ Re_D^{0.8} Pr^{0.4} (Pr/Pr_s)^{0.25}$
Staggered	0–500	$Nu_D = 1.04\ Re_D^{0.4} Pr^{0.36} (Pr/Pr_s)^{0.25}$
	500–1000	$Nu_D = 0.71\ Re_D^{0.5} Pr^{0.36} (Pr/Pr_s)^{0.25}$
	1000–2×10^5	$Nu_D = 0.35\ (S_T/S_L)^{0.2}\ Re_D^{0.6} Pr^{0.36} (Pr/Pr_s)^{0.25}$
	2×10^5–2×10^6	$Nu_D = 0.031\ (S_T/S_L)^{0.2}\ Re_D^{0.8} Pr^{0.36} (Pr/Pr_s)^{0.25}$

*All properties except Pr_s are to be evaluated at the arithmetic mean of the inlet and outlet temperatures of the fluid (Pr_s is to be evaluated at T_s).

Correction factor F to be used in $Nu_{D,\ ND} = F Nu_D$ for $N_L < 16$ and $Re_D > 1000$ (from Zukauskas, Ref 15, 1987).

NL	1	2	3	4	5	7	10	13
In-line	0.70	0.80	0.86	0.90	0.93	0.96	0.98	0.99
Staggered	0.64	0.76	0.84	0.89	0.93	0.96	0.98	0.99

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Total No. of Questions : 7]

SEAT No. :

P5279

[Total No. of Pages : 3

[5355]-76

M.E. (Mechanical - Heat Power Engg.)
AIR CONDITIONING TECHNOLOGY
(2013 Course) (Semester - II) (502108)

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

Instructions to the candidates:

1) ***Answer any 5 questions out of 7.***
2) ***Use of steam tables, p-h chart, Psychrometric chart and scientific calculator is allowed.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Assume suitable data if necessary.***

Q1) a) What is standard psychrometric chart? Under what conditions it is applicable? **[5]**

b) Discuss the various types of fans and their operating characteristics used in Air Conditioning. **[5]**

Q2) The following information is related to a Laboratory application. **[10]**

Outdoor design : 32 ºC DBT, 13 gms/kg of dry air

Indoor design: 24 ºC DBT, 10 gms/kg of dry air

RSH = 35 kW, RLH = 19 kW, Ventilation air quantity : 71 m^3/min.

The temperature difference between room air and supply air is 11 ºC maximum.

Find :

a) ESHF,

b) ADP,

c) Reheat required with revised ESHF = 0.74,

d) Supply air quantity

e) Grand total heat.

P.T.O.

Q3) a) Enumerate all the conditions and factors governing the choice of inside design conditions. **[6]**

b) Write a note on Air Washer. Which psychrometric process is not possible using Air Washer. **[4]**

Q4) Differentiate clearly between direct and indirect evaporative cooling systems. Show the processes on chart. Explain the working of a two stage evaporative cooling system using cooling tower. **[10]**

Q5) a) Explain concept of Infiltration load with suitable examples. **[5]**

b) Desert air cooler is used to cool the air from 40 ºC DBT and 15% RH to 25 ºC by Evaporative cooling. Estimate the volume flow rate of air in m^3/min and the quantity of water required per hour for a cooling capacity of 4 TR. Assume efficiency of evaporative cooler as 90%. **[5]**

Q6) a) What are the important considerations for hotel air conditioning? **[5]**

b) Explain the concept of Air locks, Air curtains and Air Showers with suitable examples. **[5]**

Q7) Conditions of air entering the coil is 40 ºC DBT and 25 ºC WBT and leaving the coil is 24 ºC DBT and 18 ºC WBT. Air quantity is 28 m^3/min. Evaluate the performance of coil by calculating : **[10]**

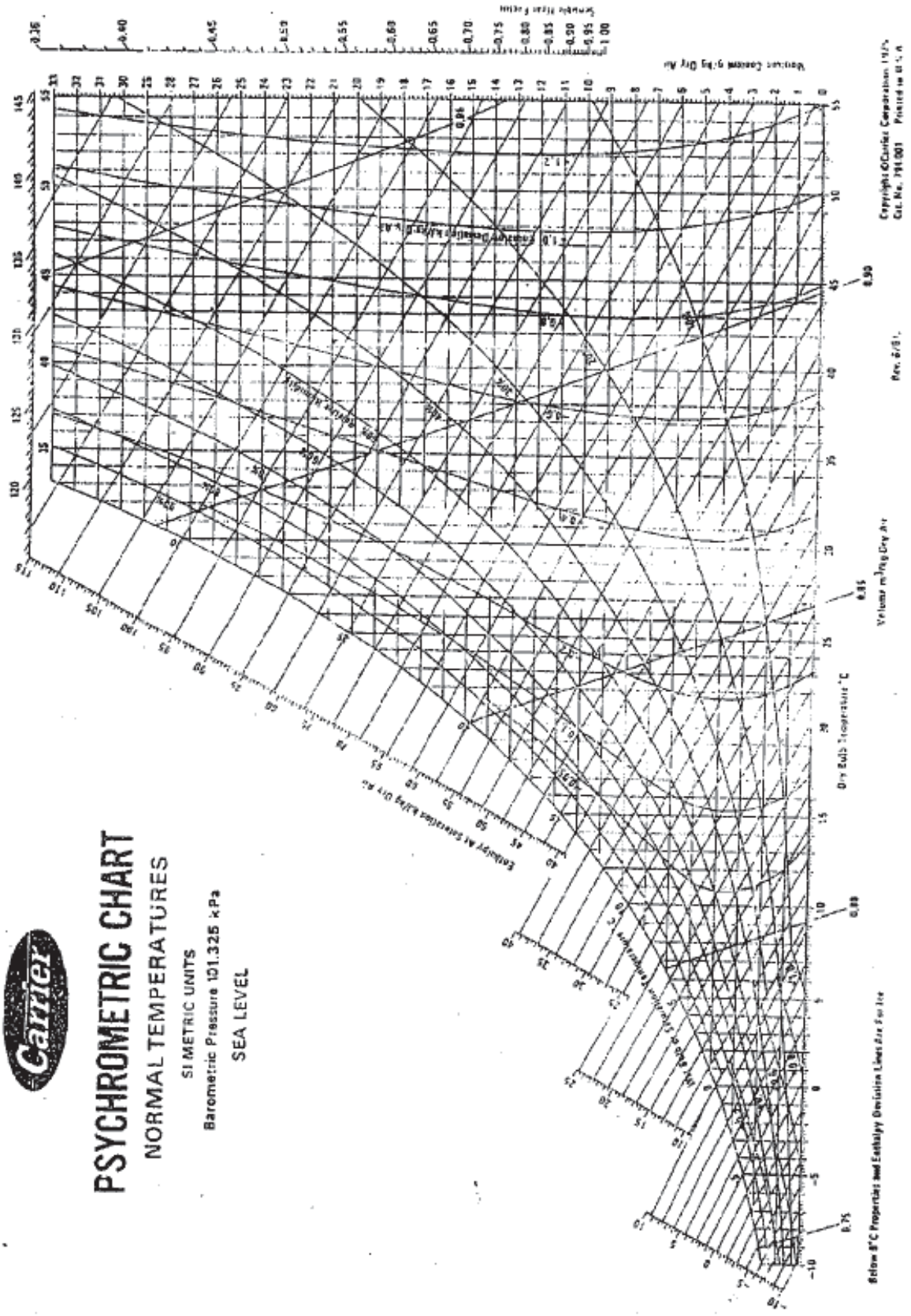
a) Cooling coil capacity in TR.

b) Sensible heat removed by the coil.

c) Latent heat removed by the coil.

d) ADP.

e) Coil bypass factor.


Carrier
PSYCHROMETRIC CHART
NORMAL TEMPERATURES
SI METRIC UNITS
Barometric Pressure 101.325 kPa
SEA LEVEL

✦✦✦✦

Total No. of Questions :7]

SEAT No. :

P4523

[Total No. of Pages : 2

[5355] - 77

M.E. (Mechanical-Heat Power Engg.)

MEASUREMENT AND CONTROLS

(2013 Course) (Semester-II)

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

Instructions to the candidates:

1) ***Solve any FIVE questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary and mention it clearly.***

Q1) a) Explain the static characteristics of the instruments. **[5]**

b) What are the functional elements of the instruments'? Explain each element in brief. **[5]**

Q2) a) Ten samples of a steel wire were tested on a universal testing machine. The breaking strengths in tonnes of the sample were: **[5]**

4.3, 4.5, 4.7, 4.2, 4.5, 4.6, 4.4, 4.6, 4.9, 4.5.

Compute the followings:

Mean, mean deviation, standard deviation, best estimate of precision of apparatus & best estimate of the uncertainty of the data.

b) With example explain how uncertainties are propagated in compound quantities. **[5]**

Q3) a) What is mean by systematic errors? Give the techniques to reduce systematic errors. **[5]**

b) Successive masses of 1 kg each were added at the hook at the lower end of a vertical hanging wire. The position of the mark at the lower end was measured using an ordinary scale. The following results were obtained.

Load × (kg)	1	2	3	4	5	6	7	8	9	10
Position of mark y (cm)	6.05	6.20	6.25	6.35	6.40	6.50	6.55	6.60	6.70	6.75

Determine the equation of the best fitting straight line using least square technique. **[5]**

P.T.O.

Q4) a) Explain the procedure for calibration of pressure transducer. **[5]**

b) Explain the working of pitot-static tube. List its advantages and limitations. **[5]**

Q5) a) Explain the use of air capture hood for air flow measurement. Discuss its working principle. **[5]**

b) With neat schematic explain the working principle of nucleonic gauge. **[5]**

Q6) a) Explain the instrument for measuring very high pressure (above 1000 atm). **[5]**

b) Explain working of a piezo-electric transducer for dynamic force measurement. **[5]**

Q7) Explain the followings : **[10]**

a) PID controller

b) Regression analysis

c) Signal conditioning in measurement

Total No. of Questions :7]

SEAT No. :

P4524

[Total No. of Pages :3

[5355] - 78

M.E. (Mechanical - Heat Power Engineering)

COMPUTATIONAL FLUID DYNAMICS

(2013 Course) (Semester - III) (602113)

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

Instructions to the candidates:

1) ***Answers any five questions.***
2) ***Neat diagrams must be drawn whenever necessary.***
3) ***Use of scientific calculator is allowed.***
4) ***Assume suitable data if necessary and mention it clearly.***

Q1) a) Derive the following governing equation. Comment on the physical principle on which it is based on. **[5]**

$$\frac{\partial(pu)}{\partial t}+\nabla\cdot(\rho uV)=-\frac{\partial p}{\partial x}+pfx$$

b) Classify the partial differential equations. How will you categorize following equations based on linearity? **[5]**

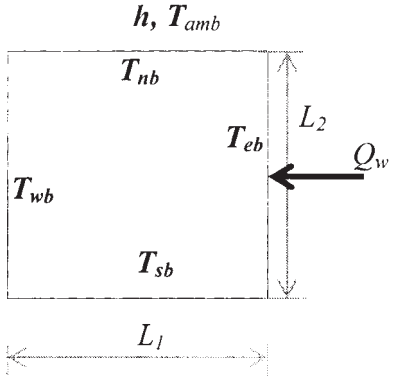
i) $\frac{\partial u}{\partial x}+c\frac{\partial u}{\partial y}=0;$ Where c = constant

ii) $\frac{\partial u}{\partial t}+u\frac{\partial u}{\partial x}=0$

iii) $\left(\frac{\partial u}{\partial x}\right)^2+\left(\frac{\partial u}{\partial y}\right)^2=1$

P.T.O.

Q2) a) Consider heat conduction in a 2D metallic plate subject to following boundary conditions as shown in following figure. Write an algorithm to find temperature distribution along the plate using central difference method. Determine the resulting system of linear algebraic equation in matrix form. Use the numerical grid size of 5 X5 with uniform grid size Δx & Δy, i.e. $i_{max} = j_{max} = 5$. **[7]**



b) justify that the central difference method is most accurate than forward difference and backward difference method. **[3]**

Q3) a) Explain in brief unstructured grid generation in CFD simulations. Explain in detail Delaunay triangulation. **[6]**

b) What is "coordinate transformation" in grid generation? Explain in detail. **[4]**

Q4) a) Discretize the second order wave equation using Lax-Wendroff method. Comment on its order of accuracy and stability condition. **[7]**

b) Differentiate between explicit and implicit time-marching approaches? **[3]**

Q5) a) Explain the need of relaxation techniques in numerical solution process. Write in brief about under-relaxation. **[5]**

b) Write in detail the CFD analysis of supersonic flow over blunt body. Draw neat sketch and explain the post-processing of the flow. **[5]**

Q6) a) Write short note on characteristics of turbulence. Justify the need of turbulence modeling? **[5]**

b) Describe various statistical representation of the flow property used in turbulent flow analysis. Comment on the length scales in turbulence modeling. **[5]**

Q7) a) Write in detail the CFD simulation process. Comment on the importance of the validation and verification process in CFD. **[5]**

b) Enlist three challenges encountered in industrial CFD applications. Comment on the solution of each challenge. **[5]**

Total No. of Questions :7]

SEAT No. : ____

P4525

[Total No. of Pages :3

[5355] - 79

M. E. (Mechanical - Heat Power Engg.)

DESIGN OF HEAT TRANSFER EQUIPMENTS

(2013 Pattern) (Semester - III)

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

Instructions to the candidates:

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

Q1) a) What are the various standards used in heat exchanger design **[5]**

OR

Give the detailed classification of heat exchangers.

b) Explain in detail the Bell Delaware Method for heat exchanger design.**[5]**

Q2) a) An oil cooler of the tubular heat exchanger cools oil from temperature of 85^{o}C to 35^{o}C by a large pool of stagnant water assumed to be at 25^{o}C. The tube carrying oil is of 35m long and 25mm inside diameter. The specific heat an specific gravity of oil are 2.51 kJ / kg.K and 0.8 respectively. Average velocity of oil in the tube is 60 cm/s. Estimate the overall heat transfer coefficient obtainable from system. **[5]**

b) Draw the temperature distribution in heat exchanger for following configuration. **[5]**

i) Evaporator
ii) Condenser
iii) One shell pass two tube pass
iv) Cross flow with both fluid unmixed

P.T.O.

Q3) a) How pressure drop in the heat exchanger affects the performance of the heat exchangers? List down the different losses in the heat exchangers. **[5]**

b) How the pressure drop in the heat exchanger presented non-dimensionally. Which are the different parameters considered in this presentation. **[5]**

OR

Which are the different parameters contributing the pressure losses in shell and tube heat exchangers.

Q4) a) Explain in detail the Wilson Plot Technique **[5]**

b) In order to cool the lubricating oil for the large industrial gas turbine engine, a counter flow concentric tube heat exchanger is used. The flow rate of the cooling water through the inner tube (D_1 = 25 mm) is 0.21 kg / s, while the flow rate is of the oil through annulus (D_o = 45 mm) is 0.11 kg / s. The inlet and outlet temperature of the oil is 100°C and 60° C respectively. The water enters at 30°C to the exchanger. Calculate the length of the tube. Neglect tube wall thermal resistance, fouling factor and the heat loss to the surrounding. Take the following properties at bulk mean temperature. **[5]**

Engine oil at 80°C : Cp = 2131 J/kgK, $\mu = 3.23 \times 10^{-6}$ N.s/m^2,

k = 0.138 w/mK

Water at 30°C : Cp = 4174 J/kgK, $\mu = 725 \times 10^{-6}$ N.s/m^2,

k = 0.6250 w/mK, Pr = 4.85.

Q5) a) What are the different parameters considered in the designing and selection of the cooling tower. **[5]**

b) Enlist the different types of cooling towers used in industrial applications. Explain any one in detail. **[5]**

Q6) a) Write a short note on induction furnace design. **[5]**

b) What are the different types of furnaces used in the industrial applications? Explain furnace used in bakery application in detail. **[5]**

Q7) Write a short note on (Any Three). **[10]**

a) Electronic cooling systems.

b) Use of nano particles in heat transfer equipments.

c) Heat transfer augmentation techniques.

d) Thermal interface materials.

e) Heat pipe.

Total No. of Questions :8]

SEAT No. :

P4465

[Total No. of Pages : 2

[5355] - 8

M.E. (Civil) (Construction Management)

ENVIRONMENT AND ENERGY FOR SUSTAINABLE CONSTRUCTION

(2013 Pattern) (Semester - III) (601032)

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

Instructions to the candidates:

1) ***Attempt any 05 questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume Suitable data if necessary.***

Q1) a) Explain in detail the requirement of energy in any mechanised waste water treatment system. Support your answer with the treatment flow sheet and energy requirement in different units. **[5]**

b) Explain in detail EIA for a mega power plant project. Explain the social impacts issues associated with such projects. **[5]**

Q2) a) Explain in detail how to carry out Fiscal Impact Analysis. **[5]**

b) With suitable examples, discuss the effect of rapid urban built environment and climate change. **[5]**

Q3) a) Explain in detail the role of UNFCCC and Government of India in implementing CDM. **[5]**

b) Explain in detail the role of artificial intelligence technique and stochastic programming in solving problems related to energy and environment systems planning. **[5]**

Q4) a) Explain in detail the term carbon finance in construction industry with relevant examples. **[5]**

b) Explain in detail the importance of participatory approach by individual for combating climate change with special reference to buildings. **[5]**

P.T.O.

Q5) a) Enlist in detail the different building services that have high energy and water consumption. Discuss various measures - design as well as tools and appliances to reduce the high energy and water consumption. **[5]**

b) Explain in detail, the role of electrical engineer in making an educational building electrically sustainable. **[5]**

Q6) a) Explain in detail the term Building Energy Efficiency (BEE) with relevant example. **[5]**

b) Explain the importance of Building Planning Principles for achieving energy sustainability in buildings. **[5]**

Q7) a) One of the major issues in transportation of utilities (water, energy etc.) is transmission and distribution losses. Explain different sustainable engineering methods to be adopted to minimize these losses to acceptable limits. **[5]**

b) Discuss in detail the different engineering and design philosophies to be adopted to regulate indoor air temperature without the use of air conditioning units. **[5]**

Q8) a) Enlist and explain the concept, production procedure, energy conservation aspects involved in any two low cost construction materials you have studied for possible application in construction industry. **[5]**

b) A critical component in successful Project Management is Project Risk Management. Lower the risk more successful is the project. Explain the significance and impact of energy and sustainable construction practices as a potential risk factor for successful project management. **[5]**

Total No. of Questions :7]

SEAT No. :

P4526

[Total No. of Pages : 2

[5355] - 82

M.E. (Mechanical - Automotive Engineering)

AUTOMOTIVE ENGINE DESIGN

(2013 Pattern) (Semester - I) (502302)

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

Instructions to the candidates:

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

Q1) a) For an engine working on ideal dual cycle the compression ratio is 10 and maximum pressure is limited to 70 bar. If the heat supplied is 1680 kJ/kg. Find the pressure & temperature at the various points of cycle & cycle efficiency. The pressure & temperature of air at commencement of compression are 1 bar & 373 k respectively. Assume C_p = 1.004 kJ/kgk & C_v = 0.717 kJ/kgk. **[6]**

b) What alternative fuels can be considered for diesel engine from performance point of view. **[4]**

Q2) a) A four cylinder petrol engine has bore of 60 mm & stroke of 90 mm. Its rated speed is 2800 rpm & it is tested at this speed against a brake which has torque arm of 0.37m. The net brake load is 160 N & fuel consumption is 8.986 lit/hr. The specific gravity of petrol used is 0.74 & fuel has calorific value of 44100 kJ/kg. A morse test is carried out & cylinders are cut out in the order of 1, 2, 3, 4 with corresponding brake loads of 110N, 107N, 104N, and 110 N respectively. Calculate for this speed.

i) Engine torque
ii) BMEP
iii) SFC
iv) Mechanical efficiency
v) IMEP **[6]**

b) Explain with neat sketch EGR system. **[4]**

P.T.O.

Q3) a) Discuss various methods for exhaust gas treatment of IC engine. **[5]**

b) Discuss the important steps in HC emission mechanism from SI engine. **[5]**

Q4) a) A conical value of an IC engine is 60 mm in diameter and is subjected to a maximum gas pressure of 4 N/mm^2. The safe stress in bending for the valve material is 46 MPa. The valve is made of steel for which k = 0.42. The angle at which the valve disc seat is tapered is 30°. Determine

i) Thickness of valve head.

ii) Stem diameter.

iii) Maximum lift of the valve. **[6]**

b) What the basi's for material selection for design of following element.

i) Crankshaft

ii) Connecting rod

iii) Piston **[4]**

Q5) The cylinder of four stroke diesel engine has the following specification. Brake power = 7.5 kw, speed = 1400 rpm, IMEP = 0.35 MPa mechanical efficiency = 80% max. gas pressure = 3.5 MPa. The cylinder liner & head are made of gray cast iron FG 260 (S_{nt} = 260 N/mm^2 & μ = 0.25). The studs are made of plain carbon steel 40C8 (S_{yt} = 380 N/mm^2). The factor of safety of all parts is 6. Take reboring allowance (c) as 3.2 mm, k = 0.162, Take l/D as 1.5, Assume clearance 15% of stroke length.

Calculate

a) Bore & length of cylinder liner.

b) Thickness of cylinder liner.

c) Thickness of cylinder head.

d) Size, number & pitch of studs. **[10]**

Q6) a) What are different parameters considered for selection of engine for particular application. **[5]**

b) Explain different forces acting on crankshaft. **[5]**

Q7) Write short notes on (Any two) : **[10]**

a) Design of cooling system.

b) Balancing of crankshaft.

c) Catalytic converter.

Total No. of Questions : 7]

SEAT No :

P 4527

[Total No. of Pages : 2

[5355]-83

M.E. (Mechanical-Automotive Engineering)

AUTOMOTIVE SAFETY AND REGULATIONS

(2013 Pattern) (Semester-I) (502303)

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

Instructions to the candidates:

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

Q1) a) Explain the role of following safety systems used in modern automobile. Describe them under category of active and passive safety system.

i) Bumpers.

ii) Seat belt.

iii) Head Restraint. **[5]**

b) Describe "Injury Measurement and criteria" for human body undergone with impact during an accident. **[5]**

Q2) a) What are various tests carried out in testing of crashworthiness of vehicle? Explain them with suitable sketch. **[5]**

b) What is road safety? What are various causes of road accidents? Explain steps to achieve global road safety. **[5]**

Q3) a) What do you understand by automobile structure? What are components of it? Describe the frame less construction indicating provision of crumple zones in it. **[5]**

b) Describe procedure for determining the "H" point and the torso angle for adult male in seating position of motor vehicle. **[5]**

P.T.O.

Q4) a) What is the role of dummies in vehicle crash testing? Describe the various features of Hybrid-III dummy used in crash testing vehicles. **[5]**

b) Discuss the steps involved in ergonomic design of various controls inside the driver cabin. Justify your answer with suitable example. **[5]**

Q5) a) Describe the construction of automobile seat and explain various parts of it Explain seat design parameters to reduce the fatigue. **[5]**

b) Describe with neat sketch luminous testing procedure for automobile head lamps. **[5]**

Q6) a) Explain with neat sketch construction of headlamp assembly. Describe beam pattern to be followed as per the ECI regulation. **[5]**

b) Name different types of driving licenses. What restrictions are imposed on a learner's driving license? Discuss in detail steps involved to get permanent license of motor vehicle. **[5]**

Q7) Write Short note on the following (Any Two) **[10]**

a). CMVR 1989.

b) AIS-16 for automobile seat and their anchorages.

c) Dimension and color coding of road signs for.

i) No entry.

ii) No parking.

d) Procedure of Insurance of motor vehicle.

e) Types of near view mirrors in automobile.

Total No. of Questions :7]

SEAT No. :

P4528

[Total No. of Pages : 2

[5355] - 85

M.E. (Mechanical - Automotive Engineering)

ENGINE COMBUSTION TECHNOLOGY

(2013 Course) (Semester - II) (502307)

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

Instructions to the candidates:

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

Q1) a) A fuel having chemical formula C_7H_{16} is burned with 10% excess air. Assume 90% carbon is burnt to CO_2 and remaining to CO. Determine volumetric analysis of dry flue gases. **[6]**

b) Iso octane is burned with 120% theoretical air in three cylinder engine, calculate.

i) Air fuel ratio

ii) Fuel air ratio

iii) Equivalence ratio **[4]**

Q2) a) Determine enthalpy of combustion of gaseous propane at 25ºC and 1 atm. Using enthalpy of formation data.

hf (Co_2) = -393520 KJ/Kmole

hf (H_2O) = -285830

hf (Propane)= -103850 KJ/Kmole **[5]**

b) Explain enthalpy of formation. **[5]**

Q3) a) Explain the dissociation effect during combustion. **[5]**

b) Compare induction swirl and compression swirl. **[5]**

P.T.O.

Q4) a) Explain with suitable sketch stages of combustion in CI engine. **[5]**

b) What are the various effects of surface ignition in SI engine. **[5]**

Q5) a) What are the various sources of emission in SI engine explain in detail. **[5]**

b) Explain NDIR analyser for CO measurement. **[5]**

Q6) a) What are the requirements of combustion chamber in gas turbine. **[5]**

b) What are the different pressure losses in the combustion system of a gas turbine? Suggest the methods to reduce tham. **[5]**

Q7) Write short notes on (Any two) : **[10]**

a) Pre ignition in SI engine.

b) Induction swirl and open combustion chamber.

c) I C engine simulation.

Total No. of Questions : 8]

SEAT No :

P 4529

[Total No. of Pages : 2

[5355]-86

M.E. (Mech. - Automotive)

NOISE VIBRATION AND HARSHNESS

(2013 Course) (Semester-II) (502308)

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

Instructions to the candidates:

1) ***Answer any Two from each questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the ritght indicate full marks.***
4) ***use of Calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) Solve any Two questions.

a) Explain the Octave Band analysis and their significance in NVH? **[5]**

b) A simply supported beam of 1 m length and 50 mm diameter is carrying a mass 100 kg at distance of 0.25m from one end. Find the natural frequency of transverse vibrations. Assume Young's modulus of beam material as 250 GN/m^3 **[5]**

c) The sound pressure level measured at 10 m from an automobile horn is 110 dB. Determine the sound pressure level at distance of i) 20 m ii) 80 m. Assume that the inverse square law holds good between intensity and distance. **[5]**

Q2) Solve any Two questions.

a) Show that as the distance from a point source doubles, the sound intensity level decreases by 6 dB. **[5]**

b) What are the Interior sources of noise in vehicle? **[5]**

c) Explain Pass by Noise measurement of Vehicle. **[5]**

P.T.O.

Q3) Solve any Two questions.

a) Explain why noise source identification is required and what the different methods are available? **[5]**

b) Explain the single source structure-borne noise transmission path analysis. **[5]**

c) The noise signal of a certain machinery in a workshop was processed in an audio frequency analyser which was equipped with the standard octave fillters. The results obtained were as follows: **[5]**

Central frequency (Hz)	63	125	250	500	1000	2000	4000	8000
SPL(dB)	84	85	84	81	72	68	66	52

Determine the overall sound pressure level in dB.

Q4) Solve any Two questions.

a) What do you mean by Modal Analysis? What are the different parameters are obtained by Expt. Modal analysis and explain their significance. **[5]**

b) Explain Porous, Membrane, Cavity and Perforated Panal Absorber. **[5]**

c) Explain construction and working principle of an Electrodynamic shaker? **[5]**

Q5) Write a Short Note (Any two)

a) Effect of noise on human beings. **[5]**

b) Digital Signal Processing technique. **[5]**

c) Occupational Safety and Health Act (OSHA) of 1970. **[5]**

Total No. of Questions :7]

SEAT No. :

P4530

[Total No. of Pages : 2

[5355] - 87

M.E. (Mechanical) (Automotive Engineering)

AUTOMOTIVE CHASSIS DESIGN

(2013 Course) (Semester - II) (502309)

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

Instructions to the candidates:

1) ***Answer any five questions***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of logarithmic tables, slide rules and electronic pocket calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) What do you understand by double wish bone suspension system? Give its advantages during different kinematic conditions of the vehicle. **[5]**

b) A motor car is fitted with a mono shock suspension system i.e. only one shock absorber is mounted in front of rear wheel. The laden mass of the bike is 200 Kg. Selecting a suitable material and assuming appropriate deflection during rough ride, design the spring specifying no. of active/ inactive coils, mean coil diameter, wire diameter, solid length, free length and types of ends. Draw a sketch showing its mounting. **[5]**

Q2) a) Compare manual steering with power assisted steering. Describe hydraulic power steering system with neat diagram. **[5]**

b) Write short note on Electrical Power Steering system. **[5]**

Q3) a) Write short note on ABS giving its advantages over normal braking system. **[5]**

b) Explain with the help of neat sketch servo - power assisted braking systems. **[5]**

Q4) a) What are the advantages and disadvantages of Tubeless Tire with respect to conventional tires? **[5]**

b) Write short note Tread design. **[5]**

P.T.O.

Q5) a) Explain types of tracks used for vehicle evaluation. **[5]**

b) Explain spring stresses in rigid six wheelers. **[5]**

Q6) a) With the help of neat diagram explain the working, construction and breaking effort of disc brake. **[5]**

b) Write short notes on Rear wheel steering. **[5]**

Q7) Write short notes on the following (Any two) : **[10]**

a) Anti – roll bar.

b) Scammell Routeman.

c) Types of car wheels.

Total No. of Questions :7]

SEAT No. :

P4531

[Total No. of Pages : 2

[5355] - 88

M.E. (Mechanical) (Automotive Engineering)

VEHICLE DYNAMICS

(2013 Course) (Semester - III) (602313)

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

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***All the questions should be solved in one answer book and attach extra supplements if required.***
3) ***Draw Diagrams wherever necessary.***
4) ***Use of scientific calculator is allowed.***
5) ***Assume suitable data wherever necessary.***

Q1) A vehicle of mass 1850 kg has a wheelbase of 2.7 m. The center of gravity is 1.15 m behind the front axle and 50 cm above ground level. The frontal area of the vehicle is 2.4 m^2 and the aerodynamic drag coefficient is 0.26. The coefficient of rolling resistance is given by $f_r = 0.0136 + 0.4 \text{ X } 10^{-7} V^2$, where V is the speed of the vehicle in kilometers per hour. The rolling radius of the tires is 30 cm. The coefficient of road adhesion is 0.82. Estimate the possible maximum speed of the vehicle on level ground as determined by the maximum tractive effort that the tire-road contact can support if the vehicle is (a) rear-wheel drive, and (b) front-wheel-drive. Plot the resultant resistance versus vehicle speed, and show the maximum thrust of the vehicle with the two types of drive. **[10]**

Q2) A passenger car weighs 14 kN and has a wheelbase of 2.7 m. The CG is 1.1 m behind the front axle and 0.55 m above ground level. The braking effort distribution on the front axle is 70 %. The coefficient of rolling resistance is 0.02. Determine which set of the tires will lock first on two road surfaces: one with a coefficient of road adhesion $\mu = 0.8$, and the other with $\mu = 0.3$ **[10]**

Q3) Determine the pitch and bounce frequencies and the location of oscillation centers of an automobile with the following data: $m_s = 1455$ *kg;* $r_y = 1.3$ *m;* $l_1 = 1.2$ *m;* $l_2 = 1.5$*;* $k_f = 35$ *kN/m;* $k_r = 38$ *kN/m.* **[10]**

P.T.O.

Q4) Consider a speed bump in the shape of a half-sine wave. Assume that the base width is 46 cm and height is 10 cm. Assume that the vehicle is a single-degree-of-freedom system with a natural frequency of 2.0 Hz and a damping value of 25%. Calculate the response of a vehicle at 16, 32 and 48 kmph speeds to this base input. **[10]**

Q5) A tracked vehicle is equipped with a controlled differential steering system having a gear ratio of 3: l. The vehicle weighs 150 kN, and has a tread of 200 cm and a contact length of 300 cm. The contact pressure of the track is assumed to be uniform. On a particular terrain, the value of the coefficient of motion resistance is 0.15, and that of the coefficient of lateral resistance is 0.5. Determine the minimum turning radius of the vehicle. Also calculate the power required to maintain a steady-state turn at the minimum turning radius when the speed of the center of gravity of the vehicle is 10 km/h. **[10]**

Q6) Explain effect of tractive forces on cornering with neat sketch. **[10]**

Q7) Explain tire axis system with neat sketch also explain tire designation. **[10]**

Total No. of Questions :8]

SEAT No. :

P4532

[Total No. of Pages :2

[5355] - 89

M. E. (Mechanical) (Automotive Engineering)

AUTOTRONICS

(2013 Pattern) (Semester - III)

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

Instructions to the candidates:

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

Q1) Explain in brief Supplemental Data Bus Networks with application in modern automobiles for communication. **[10]**

Q2) Explain Microprocessor and microcomputer applications in automobiles w.r.t. engine coordination units for wiper, power windows, air-conditioning in modern cars. **[10]**

Q3) Discuss antilock braking systems in passenger cars w.r.t. need, sensors and actuators involved and advantages. **[10]**

Q4) Describe important dash board indications with significance and sensors used. **[10]**

Q5) Discuss the safety and comfort features of Airbag and Belt tensioners. **[10]**

Q6) Explain with a neat block diagram Multi Point Fuel Injection System. **[10]**

P.T.O.

Q7) Explain with block diagram, Rollover Protection systems with sensors used and advantages. **[10]**

Q8) a) Explain automatic temperature control in modern automobiles. **[5]**

b) Explain gas analyzer with important specifications and advantages. **[5]**

Total No. of Questions : 8]

SEAT No :

P 4466

[Total No. of Pages : 2

[5355]-9

M.E. (Civil) (Construction & Management)

TQM IN CONSTRUCTION

(2013 Credit Pattern) (Semester-III)

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

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Figures to the ritght side indicate full marks.***
3) ***All questions carry equal marks.***
4) ***Use of logarithmic tables slide rule, Moillier charts, electronic pocket calculator and steam tables is allowed.***

Q1) Discuss any 5 barriers for implementing TQM in a contractor's Firm and suggest remedial measures to overcome it. **[10]**

Q2) a) Differentiate between Total Quality control and Total Quality Management with an example from Constrution Sector. **[5]**

b) Explain with examples various definition 'Quality' as given by Deming, juranCrossby and ISO 9001. **[5]**

Q3) Explain in detail the concept of 'Quality Control' and 'Quality Cost' with examples of each type of quality cost with respect to construction industry.**[10]**

Q4) a) Explain the use of Pareto Diagram in Quality Monitoring with an example. **[5]**

b) Enlist any 6types of Construction Defects and suggest remedial measures to overcome it. **[5]**

Q5) Explain eight principles of ISO:9001 Quality Management Standards with an example from Contractor's Firm. **[10]**

P.T.O.

Q6) Explain the use of

a) Quality Control Chart in monitoring quality of R.C.C Work. **[5]**

b) Fishbone Diagram in analyzing the causes of defects in brick work. **[5]**

Q7) Explain the classification adopted in the PRRT Software. Explain how this software helps in reducing the Rework at site with an example. **[10]**

Q8) Discuss with examples :

a) Importance of Quality Circle in an organization **[4]**

b) Application of Six Sigma in Construction. **[3]**

c) Quality Manual. **[3]**

Total No. of Questions :5]

SEAT No. :

P4533

[Total No. of Pages : 2

[5355] - 92

M.E. (Mechanical) (CADME)

ADVANCED MACHINE DESIGN

(2013 Pattern) (Semester-I) (502402)

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

Instructions to the candidates:

1) ***Attempt ALL questions.***
2) ***Figure to the right indicates full marks.***
3) ***All questions carry equal marks.***
4) ***Assume suitable data, if necessary.***

Q1) Attempt any Two :

a) Explain in brief the state of strain at a point. **[5]**

b) Explain the maximum elastic strain theory. **[5]**

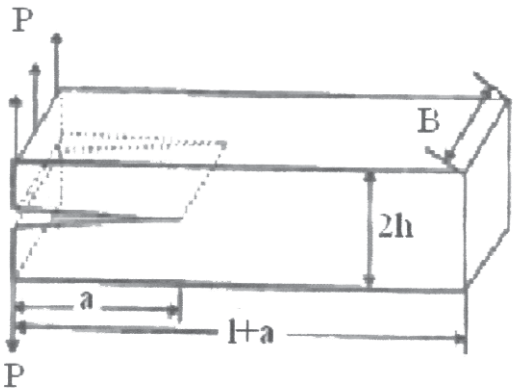
c) Derive the expression for Airy's stress function in rectangular coordinate. **[5]**

Q2) Attempt any Two :

a) Explain theory of virtual work and energy. **[5]**

b) Explain the concept of energy balance during crack growth. **[5]**

c) Determine strain energy release rate for a double cantilever beam with a>> 2h and 1>>2h as shown in figure. The P is a applied load and B is the width of beam. **[5]**



P.T.O.

Q3) Attempt any Two :

a) Explain Low cycle and High cycle fatigue. **[5]**

b) Discuss the loading and deflection of rubber springs used for simple shear load. **[5]**

c) Describe Transverse shere effect in composite laminates. **[5]**

Q4) Attempt any Two :

a) Following creep data at a certain temperature is known. **[5]**

s_1 = 12.5 MPa ε_1 = 0.015 percent per 1000 hrs

s_2 = 15 MPa ε_2 = 0.02 percent per 1000 hrs

Determine the constants of hyperbolic sine law and calculate the creep rates of stress 26 MPa and 29 MPa.

b) Explain in brief significance of interference and undercutting. **[5]**

c) Derive the expression for estimated time of rupture. **[5]**

Q5) Attempt any Two :

a) Two 10 teeth gears are to mesh without undercutting. The gears are generated using standard hob with 20° pressure angle. Module is 4 mm while clearance is 0.2 mm. Using extended centre distance method, Find. **[5]**

i) Hob shift

ii) Blank diameter and depth of cutter setting

iii) Actual pressure angle.

Take usual notations.

$$\theta = \text{inv}\phi$$

$$\phi = v - \frac{2}{15}v^3 + \frac{3}{175}v^5 \; Where \; v = \sqrt[3]{3\theta}$$

θ and ϕ are in radians.

b) List out and explain any one Fatigue strength improvement techniques. **[5]**

c) Explain octahedral shear stress theory. **[5]**

Total No. of Questions :8]

SEAT No. :

P4534

[Total No. of Pages : 2

[5355] - 93

M.E. (Mechanical) (CADME)

COMPUTER AIDED DESIGN

(2013 Course) (Semester - I) (502403)

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

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagram must be drawn whenever necessary.***
3) ***Use of non programmable calculator is allowed.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain in brief the functional areas of CAD system. **[5]**

b) Enlist the points which helps in efficient utilization of CAD software's for modeling. **[5]**

Q2) a) Compare between the parametric and non parametric representation of synthetic curves. **[5]**

b) Discuss how NURBS are different from other synthetic curves. **[5]**

Q3) Explain the Parametric representation of surface of revolution with neat sketch and explain its need and applications. **[10]**

Q4) a) Derive the condition to obtain the isometric projection or view by rotating the object about 'y' and 'x' axis. **[5]**

b) Write notes on COONs synthetic surface representation. **[5]**

Q5) Explain the parametric representation of Bezier surface with neat sketch and state its advantages and limitations. **[10]**

Q6) Classify the solid modeling techniques and compare between B_ rep and CSG modeling techniques. **[10]**

P.T.O.

Q7) a) Explain the concept of visual realism techniques used in CAD. **[5]**

b) Discuss the concept of Design by features modeling techniques. **[5]**

Q8) Explain the principle, approaches and tools used for collaborative engineering. **[10]**

Total No. of Questions :7]

SEAT No. :

P4535

[Total No. of Pages :1

[5355] - 95

M.E. (Mechanical)

COMPUTER AIDED DESIGN, MANUFACTURING & ENGINEERING

Computer Integrated Manufacturing

(2013 Pattern) (Semester - II) (502407)

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

Instructions to the candidates:

1) ***Attempt any FIVE questions from following.***
2) ***Figures to the right indicate full marks.***

Q1) What is network topology? What are it's types? When and where it is applied? **[10]**

Q2) What are features of PDM? Explain with example. What is Collaborative engineering? Where it is applied? **[10]**

Q3) Develop and document hierarchical and attribute coding system for any one component. **[10]**

Q4) Represent structure of process planning software. **[10]**

Q5) How web based manufacturing is performed for forging or forming process? **[10]**

Q6) Apply CAPP for forecasting and master production schedule. **[10]**

Q7) Discuss lean manufacturing with example and its benefits. **[10]**

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Total No. of Questions : 7]

SEAT No :

P 4536

[Total No. of Pages : 1

[5355]-96

M.E. (Mechanical Engineering) (CADME)

INDUSTRIAL PRODUCT DESIGN & PRODUCT LIFE CYCLE MANAGEMENT

(2013 Credit Pattern) (Semester-II)

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

Instructions to the candidates:

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

Q1) Discuss about characteristics and challenges in product development. **[10]**

Q2) Explain 6-3-5 method for Concept Generation with Suitable example. **[10]**

Q3) What is product bench marking? Explain in detail with example. **[10]**

Q4) What is PLM? Explain its elements in detail? **[10]**

Q5) Explain PLM Strategy and give the importance. **[10]**

Q6) Explain collaborative product development with example. **[10]**

Q7) What is PDM, explain architectures of PDM system? **[10]**

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Total No. of Questions :7]

SEAT No. :

P4537

[Total No. of Pages : 2

[5355] - 97

M.E. (Mechanical) (CADME)

AUTOMATED MANUFACTURING SYSTEM MODELING

(2013 Pattern) (Semester - II) (502409)

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

Instructions to the candidates:

1) ***Solve any five questions.***
2) ***Draw neat sketch if required.***
3) ***Use of Calculator is allowed.***
4) ***Assume Suitable data if required.***

Q1) a) Explain various plant configurations and explain with graph of product volume and variety? **[5]**

b) A CNC machine is to cut 2000 parts with cycle time of 15min. calculate no. of Machines given with 70hrs availability. The utilization of m/c is 100% calculate shift hour during the period? **[5]**

Q2) a) Explain types of Conveyors used in FMS with sketch? And also explain flexibility in material handling systems? **[5]**

b) Explain and sketch i) ASRS ii) Robot cell with single machine server. **[5]**

Q3) a) Explain Time Reversible Markov Chain and also Semi-Markov Processes in Manufacturing. **[5]**

b) Explain The M/M/1 Queue and M/M/m Queue with applications. **[5]**

Q4) a) Explain M/M/m queue model with state diagram? **[4]**

b) A CNC machine centre process raw parts one at time in M/M/1 fashion. let λ=10 parts /h and μ =12 parts /h then let $\rho < 1$ so calculate following i) machine utilization ii) mean no. of customers in system iii) mean no. of customers in queue iv) mean waiting time in system and v) mean waiting time in queue? **[6]**

P.T.O.

Q5) a) Explain and sketch a machine vertical centre with indexing table? **[5]**

b) Explain deadlock in AMS? Explain how deadlock can be avoided in 2-machine and 1-AGV used in AMS? **[5]**

Q6) A transfer line has two machines M1 and M2 with buffer space in between. Parts arrive at transfer line at a rate of 1 part every 2 min. The processing rates of M1 and M2 are 1 and 2 per min. Let λ=0.5, ρ1=0.5 and ρ2=0.25. calculate a) avg no. of parts at station 1 and station2. b) queuing delay at both the station c) MLT of system d] Throughput of the system. **[10]**

Q7) a) Explain classical and stochastic petrinets? Then state the applications of petrinet in manufacturing? **[5]**

b) Explain deadlock prevention and avoidance by petrinets in AMS? **[5]**

Total No. of Questions :7]

SEAT No. :

P4538

[Total No. of Pages : 2

[5355] - 98

M.E. (Mechanical) (CADME)

SIMULATION MODELLING

(2013 Course) (Semester - II) (602413)

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

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagram must be drawn whenever necessary.***
3) ***Use of non programmable calculator is allowed.***
4) ***Assume suitable data, if necessary.***

Q1) Discuss simulation systems in details and write any three major advantages of discrete system over continuous system simulation. **[10]**

Q2) a) Manual simulation using event scheduling with suitable example. **[5]**

b) Compare between constant multiplier and additive congruential methods of random number generation. **[5]**

Q3) A marketing firm producing detergents is interested in studying the consumer behavior in the context of purchase decision of detergents in a specific market. It would like to know in particular whether the income level of the consumers influence their choice of the brand. Currently there are two brands in the market. Brand 1 is the premium brand while Brand 2 is the economy brand. Income level was classified as Lower, Middle, Upper Middle and High and random sampling procedure was adopted covering the entire market. A sample of 300 consumers participated in this study. The following data emerged from the study. Analyze the data using chi-square test and draw your conclusions. **[10]**

Income level	Brand 1	Brand 2
Lower	25	65
Middle	30	30
Upper Middle	50	22
High	60	18

P.T.O.

Q4) Classify the distribution system, Explain exponential distribution system with suitable example. **[10]**

Q5) Discuss in detail Weibull distribution and Empirical continuous distribution. **[10]**

Q6) Verification and validation of simulation models using variance reduction techniques. **[10]**

Q7) a) Explain the machine downtime with suitable example. **[5]**

b) Describe in brief sources of randomness. **[5]**

Total No. of Questions :7]

SEAT No. :

P4539

[Total No. of Pages :2

[5355] - 99
M. E. (Mechanical) (CADM&E)
OPTIMIZATION TECHNIQUES
(2013 Pattern) (Semester - III)

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

Instructions to the candidates:

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

Q1) Maximize : $f = x_1 + 2x_2 + x_3$ **[10]**

Subject to $2x_1 + x_2 - x_3 \le 2$

$-2x_1 + x_2 - 5x_3 \ge -6$

$4x_1 + x_2 + x_3 \le 6$

$X_{1\ge} 0, i = 1,2,3$ using Simplex Method.

Q2) How optimization problem can be formed & Discuss classification of optimization problem. **[10]**

Q3) Solve Minimize $f(x) = x^2 + 54/x$ using Newton Raphson Method. **[10]**

Q4) Discuss Exhaustive Search Method & Bounding phase method for bracketing **[10]**

Q5) Find OPtimum solution using variable elimination Method, Minimize $F(X_1, X_2) = [X_1^2 + X_2 - 11]^2 + [X_1 + X_2^2 - 7]^2$ **[10]**

P.T.O.

Q6) Explain the concept of Particle Swarm Optimization. **[10]**

Q7) Explain the working variable elimination method & cubic search method particle Swarm Optimization. **[10]**