Total No. of Questions : 10]

SEAT No. :

P3604

[Total No. of Pages : 3

[5153]-501

T.E. (Civil)

HYDROLOGY AND WATER RESOURCES ENGINEERING

(2012 Pattern)

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

Instructions to the candidates:

1) ***Q. No. 1 or Q. No. 2, Q. No. 3 or Q. No. 4, Q. No. 5 or Q. No. 6, Q. No. 7 or Q. No. 8, Q. No. 9 or Q. No. 10.***
2) ***Neat diagrams must be drawn whenever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain applications of hydrology. **[5]**

b) Explain Thiessen's method to estimate mean precipitation. **[5]**

OR

Q2) a) State the formula to calculate optimum number of raingauges. Explain the terms in the formula. **[5]**

b) State deltas for Gram, Maize, Sugarcane, Rice and cotton also explain methods to improve duty. **[5]**

Q3) a) Differentiate between sub-surface irrigation and sprinkler irrigation system. **[5]**

b) Explain with neat sketch tipping bucket type gauge to determine the stage of river and also state the advantages of this gauge. **[5]**

OR

Q4) a) Derive the formula to calculate discharge of a well in a confined aquifer. **[6]**

b) State various types of tube wells and explain construction of Slotted Type Tube well. **[4]**

P.T.O.

Q5) a) What is hydrograph? Explain all the parts of the typical hydrograph. Explain fern shaped catchment. **[8]**

b) Maximum values of 24 hour precipitation (mm) at a Rainguage station are 140, 113, 132, 115, 130, 118, 127, 123, 121. Estimate maximum and minimum precipitation having a recurrence interval of 5 and 15 years. Use Hazen's Method. Use graphical method. **[10]**

OR

Q6) a) What is S-curve hydrograph? Explain its construction with sketch.**[8]**

b) In a 10 hr storm rainfall depths occurred over a the catchment are**[10]**

Hour	1	2	3	4	5	6	7	8	9	10
Depths (cm/hr)	1	1.5	5	6	10.5	8.5	9	7	1.5	1.5

Surface runoff resulting from the storm is equivalent to 20 cm of depth over the catchment. Determine

i) Average infiltration,

ii) Average rate of infiltration

Q7) a) Explain how will you fix the capacity of reservoir using annual inflow and outflow. **[8]**

b) Explain fixation of reservoir capacity using elevation capacity curve and dependable yield. **[8]**

OR

Q8) a) What are various reservoir losses? What are various measures to control these losses. **[8]**

b) What is reservoir sedimentation? What is the significance of trap efficiency? Explain with neat sketch. **[8]**

Q9) a) Write a note on ancient system of water distribution which still exist in North Maharashtra. **[8]**

b) Explain Global Water Partnership (GWP). **[8]**

OR

Q10)a) What is water logging? Explain tile drain method and also state formula for spacing of tile drains. **[8]**

b) Draw a neat section for lift irrigation scheme and state various components of lift irrigation scheme. Explain various design steps in lift irrigation system. **[8]**

Total No. of Questions :12]

SEAT No. :

P2537

[Total No. of Pages :3

[5153] - 502

T.E. (Civil)

INFRASTRUCTURE ENGINEERING

(2012 Pattern) (Semester - I) (End - Semester) (301002)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10, Q11 or Q12.***
2) ***Neat diagrms must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) Discuss in detail provisions made for infrastructure of airports with reference to 12th five year plan. **[6]**

OR

Q2) What is PPP. Explain with suitable examples advantages & disadvantages of PPP projects. **[6]**

Q3) a) What is permanent way? State the parts of permanent way. **[4]**

b) Draw a neat sketch of a right hand turnout and show clearly the various parts. **[4]**

OR

Q4) a) Explain the necessity of sleepers in railway track. What are the requirements of good sleepers. **[4]**

b) Write short note on: minimum depth of ballast cushion. **[4]**

P.T.O.

Q5) Discuss in detail various types of hoist used in construction. **[6]**

OR

Q6) Discuss in brief any one type of slip form technique used in construction of high rise buildings. **[6]**

Q7) a) Discuss the advantages & disadvantages of tunnel over open cut. **[6]**

b) Discuss the factor affecting methods of tunneling. **[6]**

c) Write short note on: Trenchless Tunneling. **[4]**

OR

Q8) a) Write short note on following: **[6]**

i) Pilot Tunnel

ii) Twin Tunnel

b) Explain in detail New Austrian Tunneling Method. **[6]**

c) Define mucking. State methods of mucking. **[4]**

Q9) a) Explain in brief classification of harbor based upon location. **[6]**

b) Define the term breakwater. Explain any one in detail. **[6]**

c) Write short note on: Tetrapode. **[4]**

OR

Q10)a) Distinguish between natural and artificial harbours. **[6]**

b) Mention the factors which govern the choice of site for a harbour. **[6]**

c) Write short note on: Jetties. **[4]**

Q11)a) A construction company on a work site cost Rs.4,00,000 and has expected life of 5 years and salvage value of Rs.50,000 at the end of useful life. Calculate yearly depreciation of the machine using **[6]**

i) Straight line method

ii) Sum of year method.

b) Discuss in detail factors affecting output of shovel. **[6]**

c) Write short note on: Dumper. **[6]**

OR

Q12)a) Explain with labeled sketch "Dragline". Discuss the application of it on constriction site. **[6]**

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

c) What do you mean by preventive maintenance of equipment? Discuss purpose and advantages of it. **[6]**

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Total No. of Questions :10]

SEAT No. :

P2538

[Total No. of Pages :3

[5153] - 503
T.E. (Civil)
STRUCTURAL DESIGN - I
(2012 Course) (Semester - I) (End Semester)

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

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat sketches must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Take Fe 410 grade of steel.***
5) ***Take ultimate stress in bolt, f_{ub} = 400 N/mm^2.***
6) ***Assume suitable data, if necessary.***
7) ***Use of electronic pocket calculator IS: 800-2007 and steel table allowed.***
8) ***Use of cell phone is prohibited in the examination hall.***

Q1) a) Explain in brief limit strength due to yielding and rupture with suitable sketch. **[4]**

b) Explain in brief gross and net area in shearing for block shear with suitable sketch. **[2]**

c) Differentiate lacing and battening of built up column section. **[4]**

OR

Q2) a) Determine the tensile strength of a member of roof truss 2 ISA 90×90×12 mm connected to 12 mm thick gusset plate by fillet weld on either side.**[6]**

b) Define effective length of compression member using single and double angle sections. **[4]**

Q3) a) Design a column using I-section of length 5 m subjected to an axial compressive force of 1175 kN resulting from dead load and live load. One end of the column is fixed and other end is pinned. **[4]**

b) Design a slab base for a column ISHB 350 @ 661.2 N/m carrying a factored load of 1200 kN. Concrete grade is M_{20} and steel of fe_{410}. **[6]**

OR

P.T.O.

Q4) a) Design a 10 m long column using two channels back to back to carry a factored load 1100 kN. The column is restrained in position but not in direction at both ends. **[4]**

b) Design a column of building frame with an effective length 3.5 m subjected to a factored axial load 450 kN and factored bending moment 60 kNm. Check for section strength only. **[6]**

Q5) a) Explain in brief design check for web buckling, web crippling and serviceability to the design of laterally supported beam. **[6]**

b) A simply supported beam of effective span 8 m carries uniformly distributed load w kN/m throughout the span. The compression flange is laterally unsupported throughout the span. Determine intensity of uniformly distributed load w so that ISMB 400 @ 61.6 kg/m provided for beam can carry safely. **[10]**

OR

Q6) a) Define laterally restrained and unrestrained beam with suitable sketch. **[4]**

b) A simply supported beam of effective span 5 m carries a factored uniformly distributed load 50 kN/m. The section is laterally supported throughout the span. Design the beam using I-section and check for serviceability condition. **[8]**

Q7) a) Explain in brief design steps for the design of curtailment of flange plate. **[4]**

b) A beam ISMB 450 @ 72.4 kg/m transmit an end reaction of 120 kN to the column ISHB 300 @ 58.8 kg/m. Design seated bolted connection using M20 bolts of 4.6 grade. **[12]**

OR

Q8) Design the cross secion with usual check and connection of flange plate to web plate for a welded plate girder for an effective span of 24 m. The girder is loaded with a uniformly distributed load 30 kN/m due to dead load and live load. Draw cross section and connection in sectional plan. **[16]**

Q9) A truss shown in Fig.9 is used for an industrial building covered with AC sheet of self weight 150 N/m^2 located at Mumbai. Calculate the panel point dead, live and wind load. Also determine design forces in the members L_0L_1, U_1L_1 and L_0U_1. Assume spacing of trusses 4 m, $k_1 = 1$, $k_2 = 1$, $k_3 = 1$, (Cpe – Cpi) = $\pm$ 1.2. Draw the design sketches. **[18]**

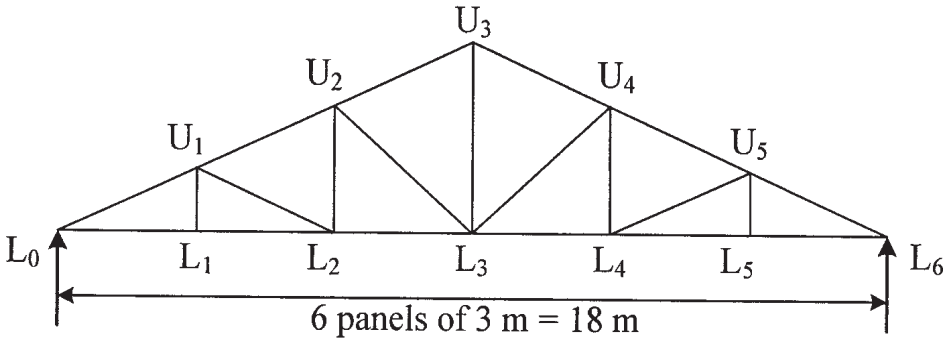

Fig. 9

OR

Q10) Design a cross section of gantry girder to carry electric overhead travelling crane for the following data: **[18]**

Weight of crane girder excluding trolley: 250 kN

Crane capacity: 250 kN

Weight of trolley: 50 kN

Span of crane girder: 12 m

Minimum hook approach: 1.2 m

Spacing of columns: 6 m

Weight of rail: 0.3 kN/m

Wheel base: 3.2 m.

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Total No. of Questions : 8]

SEAT No. :

P2539

[Total No. of Pages :3

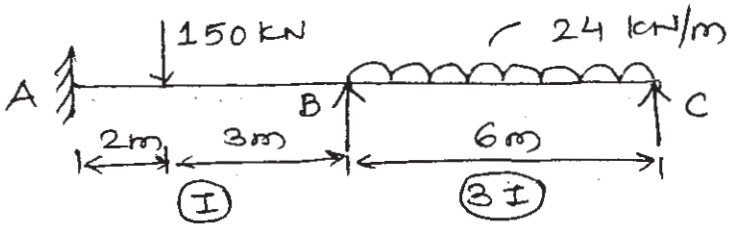
[5153]-504
T.E. (Civil)
STRUCTURAL ANALYSIS-II
(2012 Pattern) (Semester-I)

Time : 2½ Hours] *[Max. Marks :70*

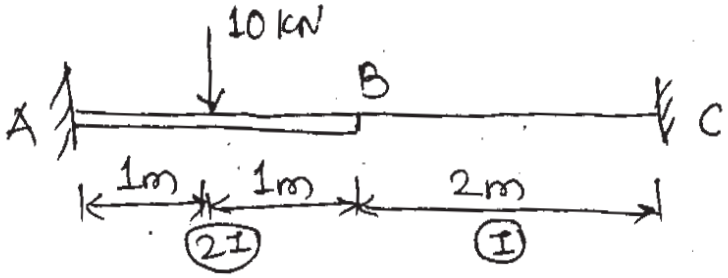
Instructions to the candidates:

1) ***Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Figure to right indicate full marks.***
3) ***Use of non-programmable calculator is allowed.***
4) ***Assume suitable data, if necessary.***

Q1) a) Analyze the beam by slope deflection method. Draw BMD. **[10]**

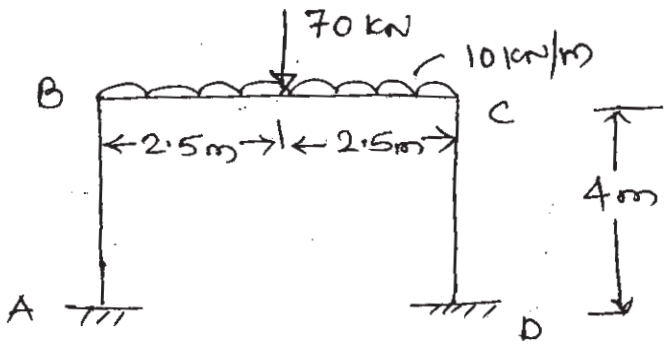


b) Analyze the beam by flexibility method. Draw BMD. **[10]**



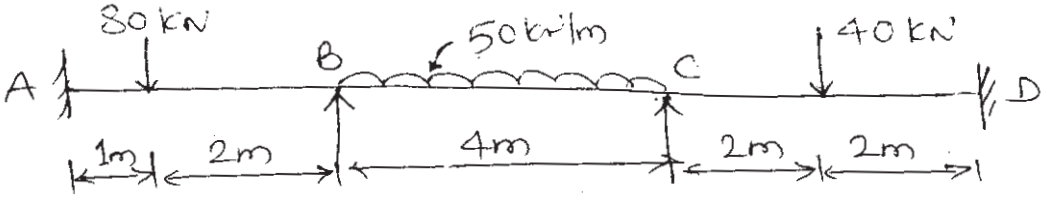
OR

Q2) a) Analyze the frame by slope deflection method. Draw BMD. **[10]**

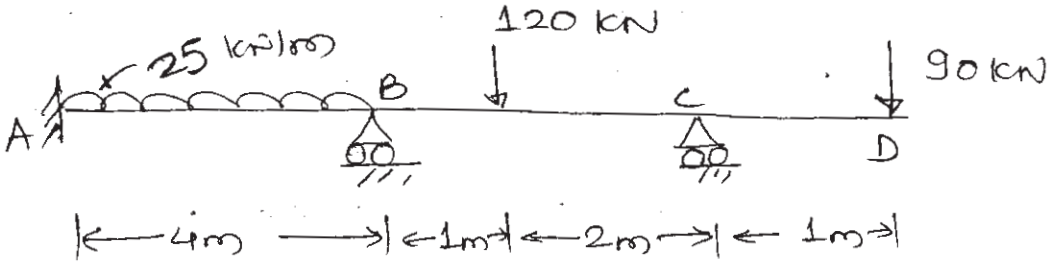


P.T.O.

b) Analyze the beam by moment distribution method. Draw BMD. **[10]**

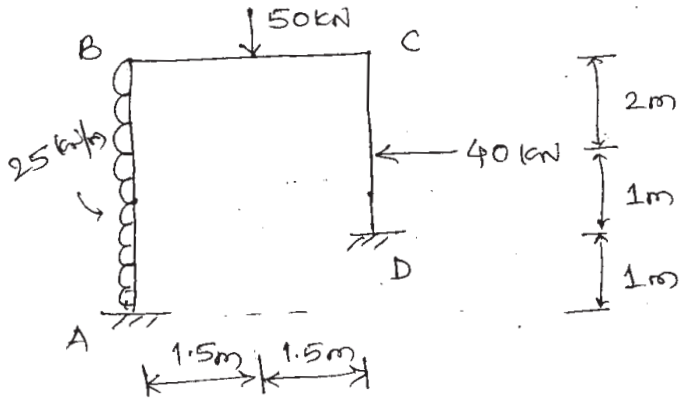


Q3) Analyze the beam by stiffness matrix method Draw SFD and BMD. **[16]**

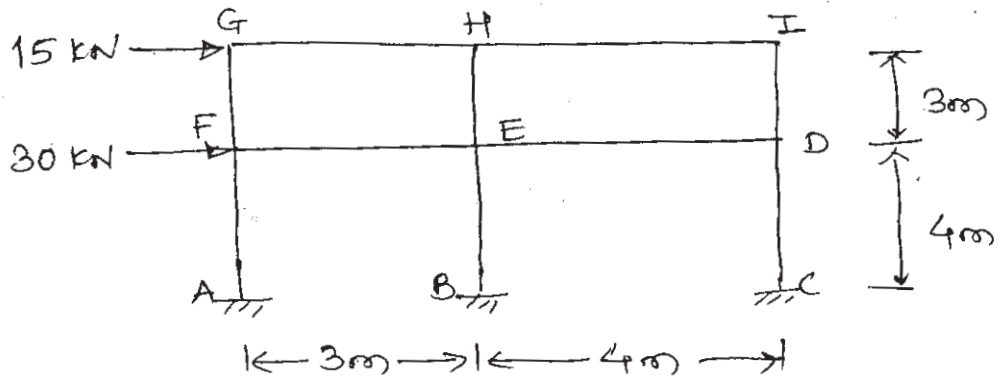


OR

Q4) Analyze the portal frame by stiffness matrix method. Take EI = constant. Draw SFD & BMD. **[16]**



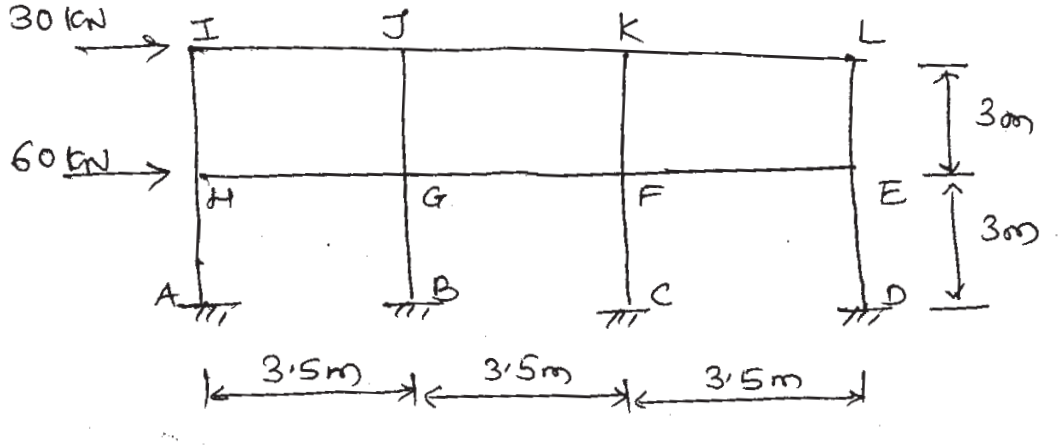
Q5) a) Analyze the frame by portal method. **[12]**



b) A simply supported beam is loaded with udl of 25 kN/m. Find maximum deflection. **[6]**

OR

Q6) a) Analyze the frame by cantilever method. **[12]**



b) A cantilever beam loaded with udl of 20 kN/m, find the maximum deflection. **[6]**

Q7) a) Explain principle of minimum potential energy. **[8]**

b) Explain constant strain traingle and linear strain triangle. **[8]**

OR

Q8) a) Explain convergance criteria for FEM. **[8]**

b) Explain shape functions for quadratic rectangular element. **[8]**

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Total No. of Questions :12]

SEAT No. :

P2540

[Total No. of Pages :3

[5153] - 505

T.E. (Civil)

FLUID MECHANICS - II

(2012 Pattern) (Semester - I) (End - Sem.)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data if necessary.***

Q1) a) A circular disc of diameter 3 m is positioned normal to the direction of flow of wind at 24 m/s. If the coefficient of drag of the disc is 1.06, find the force required to hold it at rest. **[3]**

b) What are the factors that influence the total drag on the body? **[3]**

OR

Q2) Water is flowing through an elastic pipe of diameter 45 cm, thickness 5 mm and length 3500 m with a velocity of 2.2 m/s. A valve is provided at the end of the pipe. If the valve is suddenly closed, find the rise in pressure. Assume the Poisson's ratio as 0.25, the bulk modulus of water as 2×10^9 N/m^2 and the modulus of elasticity of pipe material 2×10^9 N/m^2. **[6]**

Q3) Derive the Chezy's formula for uniform flow in an open channel. List the factors that affect the Chezy's coefficient. **[6]**

OR

Q4) Explain in detail - specific energy diagram with neat sketch. **[6]**

P.T.O.

Q5) a) A hydraulic jump occurs in a wide rectangular channel. the discharge is 13 m^3/s and the prejump depth of flow is 0. 55 m. Find the postjump depth of flow. **[3]**

b) Define: **[3]**

i) normal depth

ii) conveyance

iii) section factor

OR

Q6) Determine the efficient section of a trapezoidal channel designed to carry 4.5 m^3/s of water. The side slopes of the channel are 1 horizontal to 3 vertical and the bed slope of the channel is 1 in 2000. Determine the optimum dimensions of the channel. Assume manning's coefficient n = 0.03. **[6]**

Q7) a) A jet of water having a velocity of 25 m/s impinging on a curved vane which is moving in the same direction as that of the jet with a velocity of 8 m/s. The jet makes an angle of 20^o with the direction of motion of vane at entry and leaves the vane at an angle of 120^o. if the water enters and leaves the vane without shock, find the vane angles at inlet and outlet. Also, find the work done per second per unti weight of water striking the vane. Neglect friction. **[10]**

b) Explain the following terms related to a centrifugal pump: **[8]**

i) Minimum starting speed

ii) Hydraulic losses

iii) Cavitation

iv) N.P.S.H.

OR

Q8) a) Derive an expression for force of jet impinging on a moving plate and compare it with force of jet when it strikes on a series of moving vanes. Also compare their efficiencies. **[9]**

b) The external and internal diameters of the impeller of a centrifugal pump are 600 mm and 300 mm respectively. The inlet and outlet vane angles are 30^o and 40^o respectively. The pump delivers 150 lit/s of water. If water enters at a velocity of 2 m/s radially, find the speed of impeller and the work done by the impeller. Assume velocity of flow remains constant throughout the impeller. **[9]**

Q9) a) Sketch a layout of typical hydroelectric power generation plant and explain in brief function of each element. **[8]**

b) Pelton turbine develops 10 MW under a head of 24 m and at a speed of 180 rpm and gives an efficiency of 82%. If a model $1/5^{th}$ the size of the prototype is tested under a head of 4 m, what must be its speed, power and discharge to run under similar condition? **[8]**

OR

Q10)a) A Pelton wheel with single jet rotates at 600 rpm. The pitch circle diameter of the wheel is 1.2 m and the buckets deflect the jet through an angle of 165^o. The net head on the wheel is 400 m and the discharge through nozzle is 0.4 m^3/s. Determine the power available at the nozzle, and hydraulic efficiency of the turbine. Take coefficient of velocity as 0.97.**[8]**

b) Explain main and operating characteristics of hydraulic turbine. **[8]**

Q11)a) Derive the differential equation for gradually varied open channel flow. State the assumptions made. **[8]**

b) A Rectangular channel 15 m wide carries water with a normal depth of 3.2 m, bed slope 1 in 3550. A weir downstream rise the water depth to 5.00 m. Determine how far upstream of this section the depth of flow will be within 10% of normal depth. Use step method and take 2 steps, sketch and classify flow profile. Take Manning's N = 0.016. **[10]**

OR

Q12)a) Classify the channel bed slopes and show various zones. **[9]**

b) Explain graphical integration method of gradually varied flow computation. **[9]**

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Total No. of Questions : 10]

SEAT No. :

P2541

[Total No. of Pages : 3

[5153]-506
T.E. (Civil)
ADVANCED SURVEYING
(2012 Course) (Semester - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Define Geodetic Surveying. What factors are to be considered while selecting a best triagulation figure or system? **[5]**

b) Describe different types of error in GPS system. **[5]**

OR

Q2) a) Elevations of two triangulation stations A and B, 104 Km apart are 130 m and 434m respectively. A peak C, 75 Km from station A, has an elevation of 220 m. Ascertain if station A is visible from B or not. Also find the minimum height of scaffolding at B, so that the line of sight has a minimum 2.5 m clearance anywhere. **[6]**

b) State advantages of space based positioning systems. **[4]**

Q3) a) Explain the three point problem and method of solution of three point problem using Tracing paper method. **[5]**

b) Explain with sketch axis signal correction. **[5]**

OR

Q4) a) The following observations were taken in a trigonometric levelling survey. Angle of depression to P at Q = 1°25'22" Height of instrument at Q = 1.35 m Height of signal at P = 4.25 m Horizontal distance between P & Q = 6945 m Coefficient of refraction = 0.07 If the R.L. of Q is 455.32 m, calculate R.L. of P. **[6]**

b) While doing an underground survey describe the transferring the surface alignment through a Shaft? **[4]**

P.T.O.

Q5) a) Define **[5]**

i) Well condition triangle

ii) Strength of a figure

iii) Accuracy of triangulation

iv) Towers

v) Station marks

b) Explain stepwise procedure of computations of sides of a Spherical Tringle by Spherical Trigonometry. **[5]**

c) The following are three angles P, Q and R observed at a station 'O', closing the horizon. **[8]**

Angle P = 84° 15' 12" wt 20

Angle Q = 125° 13' 15" wt 15

Angle R = 150° 31' 18" wt 12

Determine the corrected angles. Use method of correction.

OR

Q6) a) Expalin steps by step procedure for figure adjustment for a geodetic quadrilateral without central station. **[6]**

b) What is spherical excess? Explain with sketch. **[4]**

c) Find the most probable values of the angles A, B and C of a triangle ABC from the following observations (Use method of correlates). **[8]**

Angle	Weight
Angle A = 65° 15' 30"	3
Angle B = 51° 11' 25"	2
Angle C = 63° 32' 34"	4

Q7) a) Write short notes on: **[6]**

i) Crab and Drift

ii) Flight planning

b) What are the different types of aerial photographs? **[4]**

c) A section line AB appears to be 10.16 cm on a photograph for which the focal length is 16 cm. The corresponding line measures 2.54 cm on a map which is to a scale 1.50000 The terrain has an avg, elevation of 200 m above Mean Sea Level. Calculate flying height of aircraft, above Mean sea Level, when the photograph was taken. **[6]**

OR

Q8) a) Explain the principal of stereoscopy in details with sketch and give conditions for aerial photography for stereoscopy. **[5]**

b) What are the different stereo viewing techniques in digital photogrammetry? **[5]**

c) A line AB 2000m long, lying at an elevation of 500 m measures 8.65cm on a vertical photography for which focal length is 20 cm. Determine the scale of the photograph in an area the average elevation of which is about 800m. **[6]**

Q9) a) What is GIS. State various GIS software's and expalin how remote sensing and GIS are linked. **[8]**

b) What is atmospheric window? Explain its significance. **[8]**

OR

Q10)a) Explain the advantages and disadvantages of the raster and vector data models. **[8]**

b) Write a not e on applications of remote sensing and explain the applications of GIS in Visibility analysis. **[8]**

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Total No. of Questions : 12]

SEAT No. :

P2542

[Total No. of Pages : 3

[5153]-507
T.E. (Civil)
PROJECT MANAGEMENT & ENGINEERING ECONOMICS
(2012 Pattern) (Semester - II) (End Semester) (301008)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10, Q11 or Q12.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume Suitable data if necessary.***

Q1) Enlist various types of organizational structures? Explain any one in detail. **[6]**

OR

Q2) Discuss the key feature of PMBOK. **[6]**

Q3) Following is the data for small project. Draw a network and determine critical path and expected minimum duration. **[8]**

Activity	Estimated Duration in Days		
	Optimistic	Most Likely	Pessimistic
1-2	4	10	22
2-3	2	5	8
2-4	4	7	16
2-5	4	7	10
3-5	4	7	22
4-5	5	8	17
5-6	6	9	18

OR

P.T.O.

Q4) Write short note on: **[8]**

a) Types of float

b) Project life cycle

Q5) Enlist various project management software used in construction sector. Discuss advantages of these software's. **[6]**

OR

Q6) What do you mean by EVA? Explain any one method in detail. **[6]**

Q7) a) Explain in brief law of substitution. **[6]**

b) Discuss the following in brief: **[6]**

i) Equilibrium Price

ii) Equilibrium amount

c) Define capital. Explain fixed and working capital. **[6]**

OR

Q8) a) Explain in detail Elasticity of demand. **[6]**

b) Discuss the various source of project finance. **[6]**

c) Explain the following terms: **[6]**

i) Annuity

ii) Money

Q9) a) What are the objectives of material manager. **[6]**

b) What is inventory? Explain significance of inventory. What are the different types of inventories. **[6]**

c) What do you mean by: **[4]**

i) Economic lot size

ii) Safety stock

OR

Q10)a) Carry out A-B-C - analysis for the following construction items and plot ABC curve. **[8]**

Item	Annual Expenditure (Rs.)
Cement	6,00,000
Sand	3,90,000
Bricks	1,20,000
Paint	90,000
Steel	5,00,000
Oil	4,000
Course Aggregate	1,00,000

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

i) Personal Protective Equipment

ii) Overall Equipment Effectiveness

Q11)a) Explain the concept of benefit cost Analysis. **[6]**

b) Discuss the role of Project Management consultant in construction project. **[6]**

c) Write short note on IRR method. **[4]**

OR

Q12)a) A company wishes to invest in a new project. It has two alternatives A and B. Following data pertains to the two alternatives. Which project will the company select based on NPV and IRR? **[8]**

Particulars	Project A	Project B
Investment in Rs.	1,00,000	1,50,000
Cash Inflow in Rs.		
Year 1	75,000	95,000
Year 2	45,000	80,000
Interest Rate (%)	10	10

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

i) Criteria for project selection.

ii) Detailed Project Report.

Total No. of Questions : 12]

SEAT No. :

P2543

[Total No. of Pages : 3

[5153]-508
T.E.(Civil)
FOUNDATION ENGINEERING
(2012 Pattern) (Semester-II) (End Sem.) (301009)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q5 or Q.6, Q.7 or Q.8, Q.9 or Q.10 and , Q.11 or Q.12.***
2) ***Neat diagrams must be drawn whenever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume Suitable data, if necessary and mention it clearly.***
5) ***Use of non-programmable calculator is allowed.***

Q1) Define boring. Explain in detail percussion drilling. **[7]**

OR

Q2) With neat sketch, discuss pressure meter test. **[7]**

Q3) The results of plate load test for settlement of 20 mm are as given below. **[6]**

Plate Width (m)	Load (kN)
0.3	50
0.6	190

Determine the width of square footing to carry a load of 1500 KN for permissible settlement of 20 mm.

OR

Q4) Enlist the limitations of plate load test. **[6]**

Q5) With neat sketch, explain the procedure for determination of pre consolidation pressure. **[7]**

OR

P.T.O.

Q6) a) Define: **[3]**

i) normally consolidated soil

ii) over consolidated soil

iii) under consolidated soil

b) A clay layer sandwiched between two pervious layers, reached 50% consolidation in two years. Calculate the time required for 50% consolidation of same clay layer, if it is between impervious rock at bottom and pervious layer at top. **[4]**

Q7) a) Explain cyclic pile load test in detail. **[6]**

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

i) methods for installation of piers

ii) Negative skin friction in piles

c) Explain the procedure for calculation of the capacity of single pile by static method. **[6]**

OR

Q8) a) A group of piles consists of 15 piles arranged in three rows and five columns. Compute the efficiency of pile group by Feld's rule. **[6]**

b) What is Caission disease? How it is controlled? **[6]**

c) Explain different components of well foundation with neat sketch. **[6]**

Q9) a) Explain any five methods for anchorage of sheet pile. **[5]**

b) Explain with sketches: **[8]**

i) free earth support

ii) fixed earth support

iii) cantilever sheet pile

iv) anchored sheet pile

c) Explain situation in which under reamed piles are required. **[3]**

OR

Q10)a) Explain 'vibroflotation technique' of soil improvement. **[6]**

b) What are the engineering problems associated with black cotton soil? **[4]**

c) Discuss any two tests to determine the swelling potential of black cotton soil. **[6]**

Q11)a) Define: **[6]**

i) Epicenter

ii) Focus

iii) Focal depth

iv) Epicentral distance. Draw a neat sketch.

b) Enlist the types of geosynthetics and explain any two in detail. **[6]**

c) Explain with neat sketch, the mechanism of reinforcement of soil. **[4]**

OR

Q12)a) What do you mean by 'Liquefaction'? What are its effects on built environment? **[6]**

b) Discuss the use of geosynthetics in road pavements. **[6]**

c) Differentiate between P-waves and S-waves. **[4]**

Total No. of Questions : 12]

SEAT No. :

P2544

[Total No. of Pages :6

[5153]-509
T. E. (Civil Engineering)
STRUCTURAL DESIGN - II
(2012 Course) (Semester-II)

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

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10 and Q11 or Q12.***
2) ***Figures to the right indicates full marks.***
3) ***Neat diagrams should be drawn wherever necessary.***
4) ***Use of IS 456-2000 and non programmable calculator is allowed.***
5) ***Mere reproduction from IS code as answer, will not be given full credit.***
6) ***Assume suitable data, if necessary.***

Q1) a) Draw strain and stress distribution diagrams with all parameters for the design of RCC section of flexural member using LSM. **[3]**

b) Draw stress strain curves for concrete in LSM and explain stress and strain values associated with the curves. **[3]**

OR

Q2) Explain the terms bond stress and development length. Calculate development length for 20mm diameter bar in compression and tension by both methods (WSM and LSM). Use M25 concrete and Fe 500 steel. **[6]**

Q3) A Calculate the moment of resistance by LSM for flanged beam section detailed as below **[8]**

a) Width of rib = 230mm

b) Effective flange width = 1600mm

c) Thickness of flange = 125mm

d) Effective depth = 565mm

e) Tension steel = 2- #20 through plus 2- #16 curtail at midspan.

f) Use M20 grade of concrete and Fe 500 grade of steel

OR

P.T.O.

Q4) A rectangular beam section, 230mm wide and effective depth 415mm is reinforced with 4 bars of 20mm diameter in the tensile zone and 2 bars of 20mm in the compression zone. Determine moment of resistance of the section using WSM, Use M20 grade of concrete and Fe 415 grade of steel. **[8]**

Q5) Design a cantilever slab for effective span of 1.5m subjected to floor finish of $2kN/m^2$ and live load $3kN/m^2$. Use Concrete of grade M20 and Fe 500 reinforcement. Draw details of reinforcement. Check for shear is not required. (Use LSM) **[8]**

OR

Q6) Design a simply supported slab for a room with clear inner size 3.2m x 7.8m. The slab is supported by beams of width 230mm along all the edges. The slab is subjected to floor finish of $1\ kN/m^2$ and live load $4kN/m^2$. Use Concrete of grade M20 and Fe 500 reinforcement. Draw details of reinforcement. Check for shear is not required. (Use LSM) **[8]**

Q7) Continuous RC beam ABCD of rectanglular section is simply supported at A and D and continuous over support B and C. Span AB = 5.0m, BC = 7.0m and CD = 6.0m. The beam carries dead load of 24 kN/m (including its self weight) and live load of 20 kN/m. The beam supports 120mm slab on both sides. Calculate design moment for span BC after 20% redistribution of moments by considering proper load case. Design span BC for flexure and shear. Draw the reinforcement details. Material -Concrete of grade M30, Fe 500 reinforcement. **[16]**

OR

Q8) Design a continuous beam ABCD for flexure only using IS Code coefficients. AB=BC=CD= 4.2m. The beam supports 120mm slab on both sides. The beam carries dead load of 20 kN/m (including its self weight) and live load of 10 kN/m. Take material M30 and Fe 500. Show the reinforcement detail in longitudinal section and cross-section at continuous support and at mid span. **[16]**

Q9) A rectangular RC beam of span 6m, size 300 mm x 600 mm with effective cover 40 mm is subjected to following actions: **[16]**

a) Factored BM = 100 kN.m

b) Factored SF = 70 kN

c) Factored Torsional Moment = 40kN.m

Design the beam for flexure and shear using M 25 & Fe 500 grade materials.

OR

Q10) Design an axially loaded short column to carry a working load of 800 kN.The unsupported length of column is 3.5 m. The column is held in position and not restrained against the rotation at both ends. Also design the footing for this column only for flexure and one way shear. Take SBC = 200 kN/m^2. Material M 20 and Fe 500 used. Show detailed load and design calculations and reiforcement details in plan and sectional elevation. **[16]**

Q11) Design a bi-axial rectangular short column by limit state method with material M25 and Fe 415 to carry a working load of 1100 kN. Working moment of 120 kn-m about major axis bisecting the depth of column and 40 kN-m about minor axis bisecting the width of column. The unsupported length of column about major and minor axis is 3.6m and 3.2m. The column is fixed at one end and hinged at the other. Show detailed design calculations and reinforcement details. **[16]**

OR

Q12) Design an uniaxial square short column by limit state method with material M25 and Fe 500 to carry ultimate load of 800 kN and working moment of 80 kN-m about major axis bisecting the depth of column. The unsupported length of column is 3.6m. The column is fixed at one end and hinged at the other. Also design the footing for this column only for flexure and punching shear. Take SBC = 250 kN/m^2. show detailed design calculations and reinforcement details in plan and sectional elevation. **[16]**

Chart 5 : Interaction Diagram for Combined Bending and Compression Rectangular Section-Equal Reinforcement on All Sides

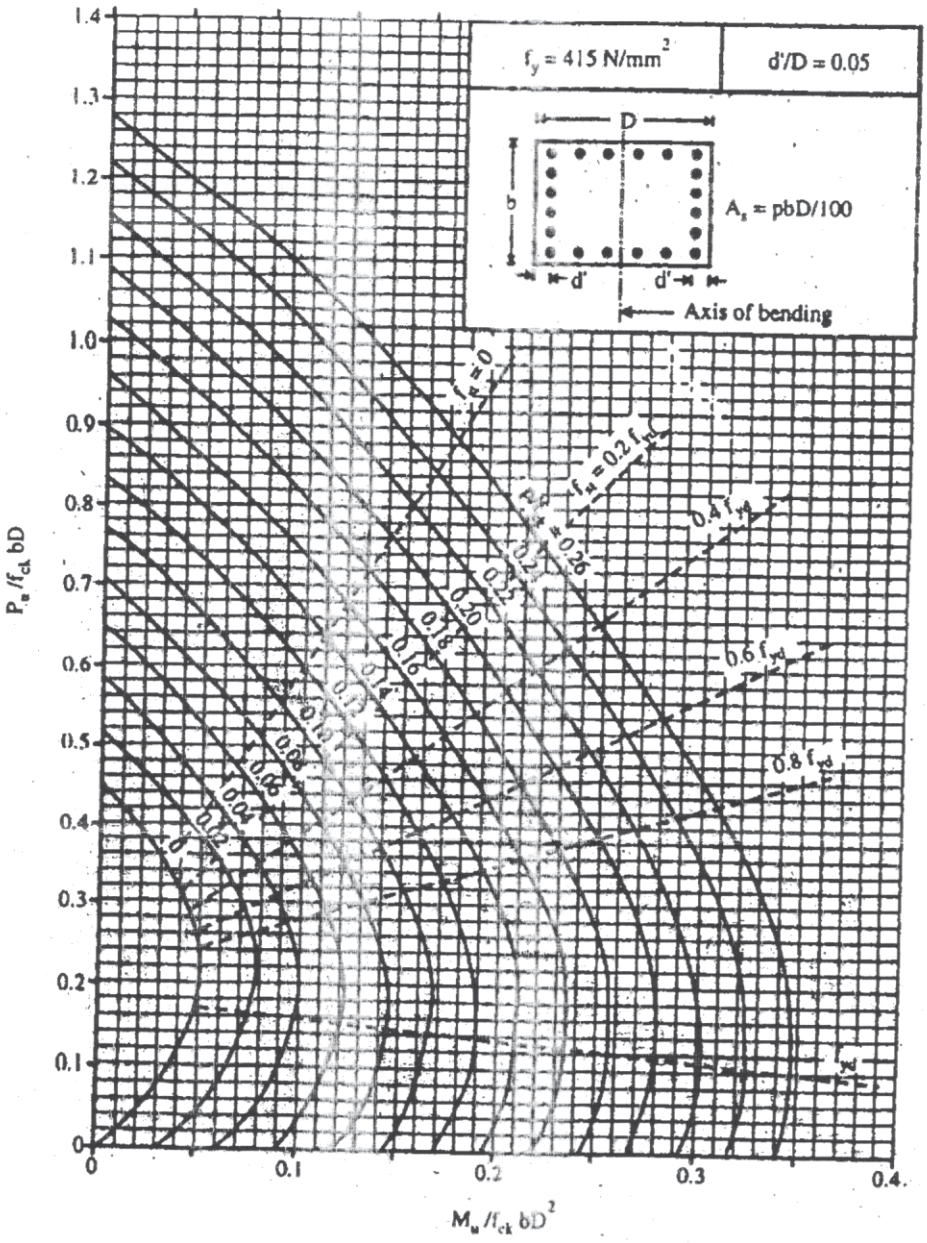


Chart 5

Chart 6 : Interaction Diagram for Combined Bending and Compression Rectangular Section-Equal Reinforcement on All Sides

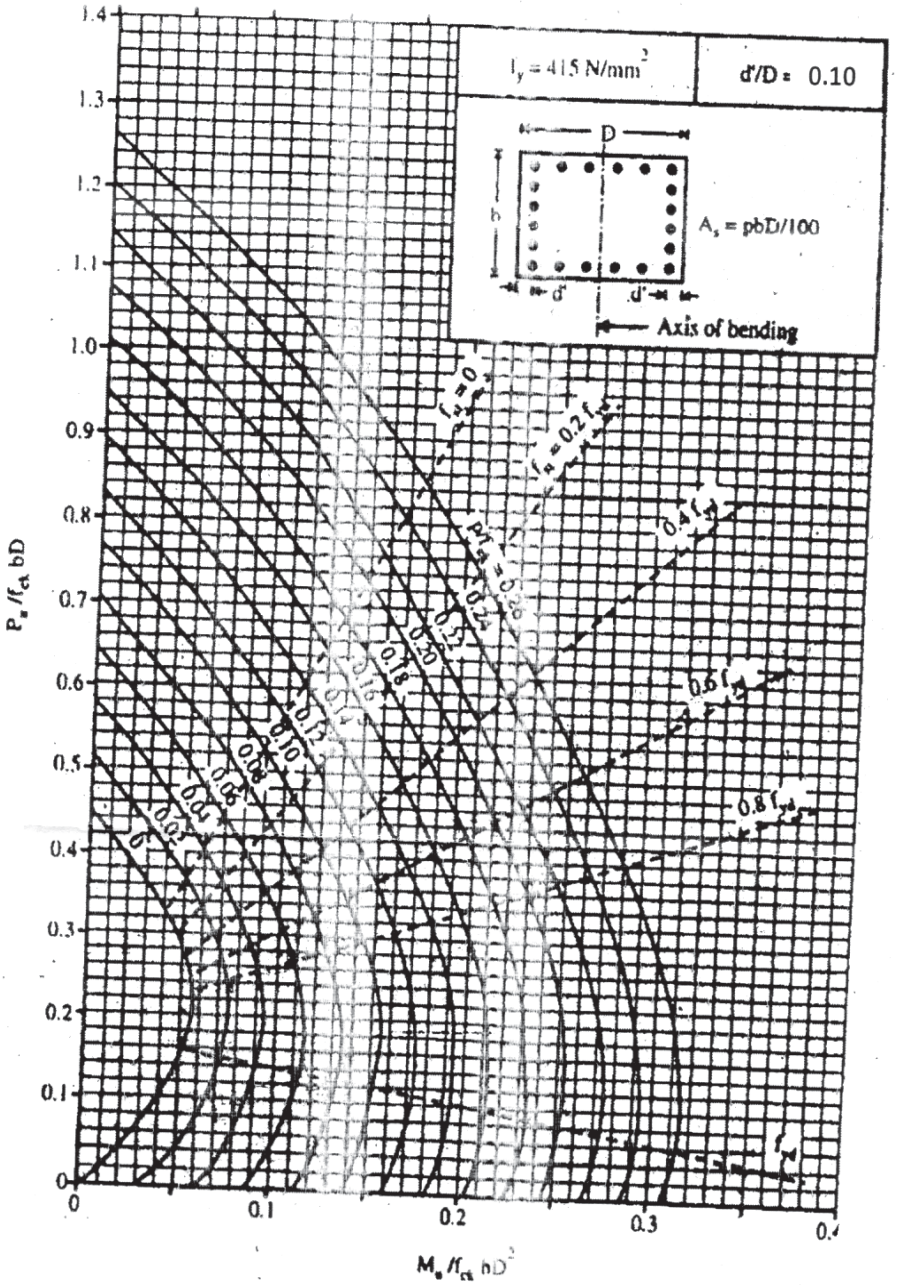
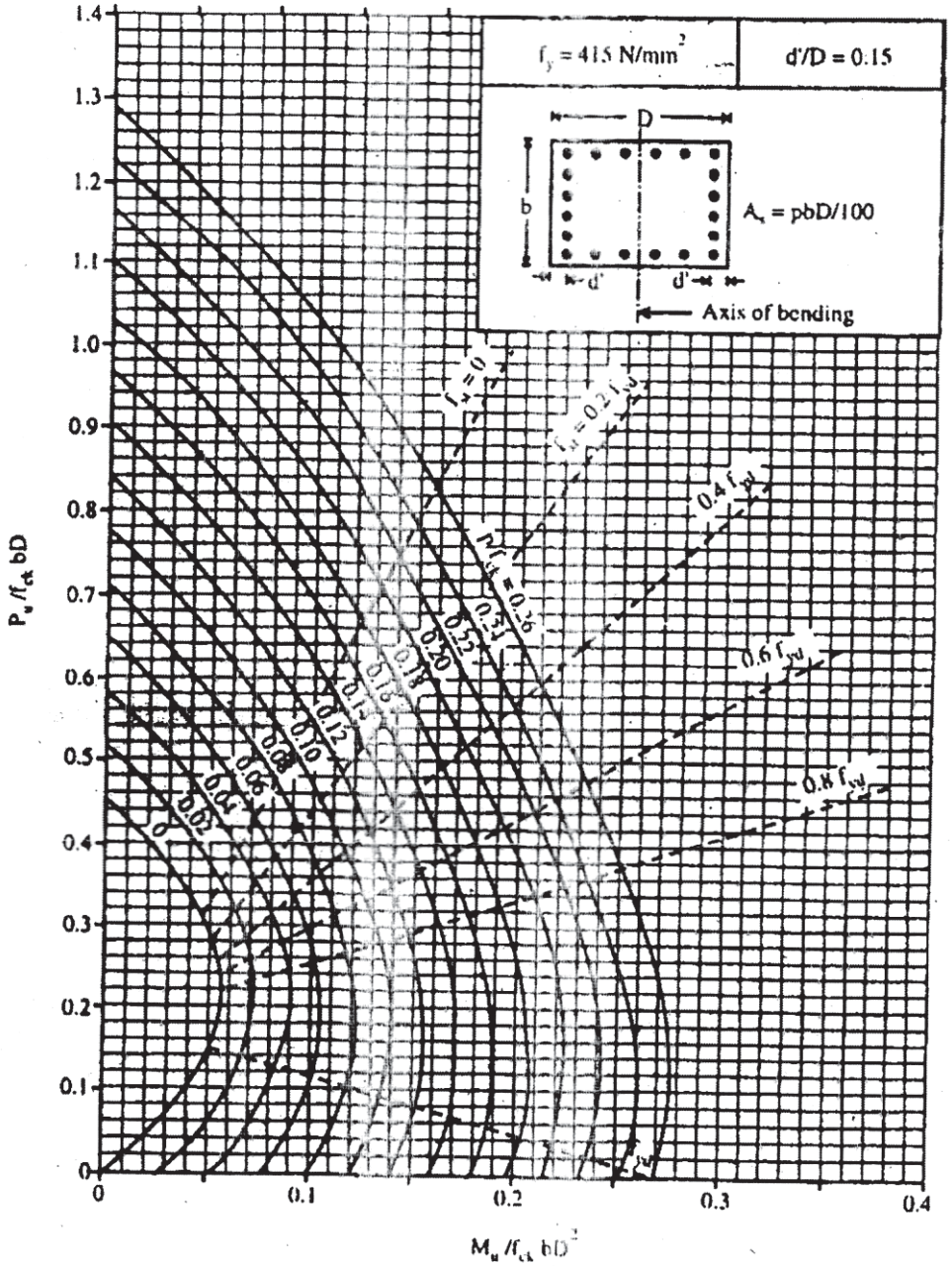


Chart 6

Chart 7 : Interaction Diagram for Combined Bending and Compression Rectangular Section-Equal Reinforcement on All Sides



Total No. of Questions : 10]

SEAT No. :

P2545

[Total No. of Pages : 3

[5153]-510
T.E.(Civil)
ENVIRONMENTAL ENGINEERING-I
(2012 Pattern) (Semester-II) (End Sem.)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables are allowed.***
5) ***Assume Suitable data, if necessary.***

Q1) a) Explain in short different methods for removing particulate matters. **[6]**

b) Discuss the sources and effects of noise pollution. **[4]**

OR

Q2) a) Convert the following sound pressure into decibel units. **[6]**

i) P = 0.0002 microbar

ii) P = 0.2 microbar

iii) P = 20,000 microbar

b) Explain the factors affecting the rate of demand. **[4]**

Q3) a) Explain with neat sketch the working, location and function of river and canal intake. **[6]**

b) Write a brief note on Aeration in water treatment. **[4]**

OR

P.T.O.

Q4) a) Explain type I and type II settling. What are the various types of plain sedimentation basins? Explain any one type of basin with a neat sketch. **[6]**

b) On what factors the dose of coagulants depends? How the optimum coagulant dose is determined? **[4]**

Q5) a) Alum dose of 20 mg/lit is applied to treat 15 MLD of water. Find **[6]**

i) Quantity of alum required per day and

ii) Amount of CO_2 released.

b) Compare slow sand and rapid sand filter with reference to **[10]**

i) Rate of filtration,

ii) Filter media- Effective size and uniformity coefficient of sand,

iii) Period and method of cleaning,

iv) Loss of head and

v) Quantity of wash water.

OR

Q6) a) Explain in detail, the working of a circular clariflocculator. Draw the typical cross-section of a circular clariflocculator, showing various components. **[8]**

b) Write a note on: **[8]**

i) Roughening filter and double filtration

ii) Multimedia and dual media filters

Q7) a) What are the functions of Elevated Service Reservoir? Draw a sketch of intze type tank. **[8]**

b) What is desalination? What are the different methods? **[8]**

OR

Q8) a) Write short note on: **[10]**

i) Chloramines

ii) Effect of pH on chlorination

iii) plain chlorination

iv) Post chlorination

v) Super chlorination

b) Write a short note on fluoridation and defluoridation. **[6]**

Q9) a) Write a short note on: **[9]**

i) Mass curve method

ii) Capacity of service reservoir.

b) Differentiate between fire reserve and break down reserve. **[9]**

OR

Q10)a) What is packaged water treatment plant? What are the advantages of packaged water treatment plant? **[9]**

b) Explain zeolite process in detail with a neat sketch. **[9]**

Total No. of Questions : 10]

SEAT No. :

P2546

[Total No. of Pages :4

[5153]-511

T.E. (Mechanical)

DESIGN OF MACHINE Elements-I

(2012 Pattern) (Semester-I) (302041) (End-Semester)

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

Instructions to the candidates:

1) ***Answer Five questions from following.***
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) ***Use of programmable calculator is not permitted.***
6) ***Assume suitable data if necessary.***

Q1) a) Explain the following. **[6]**

- Factor of safety and service factor.
- Preferred series.
- Mechanical Advantage.

b) Design a Key for muff coupling which connect two shaft of 29 mm diameter, transmits 35 KW at 1440 rpm. The maximum torque is 25% greater than average torque. Allowable shear stress and crushing stress for key material are = 65 N/mm^2 and 160 N/mm^2. **[4]**

OR

Q2) a) Classify Keys Also prove that crushing stress in key material is twice the shear stress. **[4]**

b) Draw neat labeled sketch Cotter joint. Write design steps and state their applications. **[6]**

Q3) a) A line shaft rotating at 200 rpm is to be transmitted 20 KW. The shaft is made of M.S. With allowable shear stress 42 Mpa. Determine the diameter of shaft. **[4]**

b) A forged steel made with 40 C8 of 50 mm diameter is subjected to completely reversed bending stress of 300 N/mm^2. Determine the life of bar. Use following data: **[6]**

- Sut=600N/mm^2.
- Surface Finish Factor=0.43
- Size Factor=0.85
- Reliability factor=0.897 at 90% reliability.
- Factor of safety=1.5
- Notch sensitivity=0.8
- Theoretical stress concentration=2.6

OR

P.T.O.

Q4) a) A cantilever of beam made of cold drawn steel 40C8 with Sut=600 N/mm^2 and Syt 380 N/mm^2 The maximum and minimum force at free end varies from – 50 N to + 150 N. Reliability factor is 0.897, surface finish factor and size factor are 0.77 and 0.85 respectively. Notch sensitivity at fillet is 0.9 and theoretical stress concentration factor is 1.44. If factor of safety is 2 determine diameter of beam according to Goodman's criteria. Assume effective length of beam 100 mm. **[6]**

b) Explain Design of shaft based on Tensional Rigidity. **[4]**

Q5) a) Explain with neat sketch Differential screw. **[4]**

b) A Power screw having double start square threads nominal diameter 25 mm and pitch 5 mm subjected to axial load of 1000 N. The outer and inner diameter of the screw coller is 50 and 20 mm respectively . The coefficient of friction for collar thread and screw thread are 0.15 & 0.20 respectively. The screw rotates at 12 rpm. Assume uniform wear condition, and allowable bearing pressure is 5.77 N/mm^2. Determine, **[12]**

i) Power required to rotate the screw.

ii) Stresses in screw Body & threads.

iii) No. of threads of nut in engage with screw.

OR

Q6) a) Following data refers to C-Clamp. **[13]**

- Maximum clamping force=4000N.
- Screw type – Single start trapezoidal threaded.
- Nominal Diameter = 12 mm.
- Pitch=2mm.
- Coefficient of collar friction=0.25.
- Coefficient of screw friction=0.12.
- Mean collar Diameter=12mm.
- Operator force at the end of handle=80N.
- Distance between the axis of handle and surface of nut in clamped condition=150 mm.
- Nut height = 25 mm.

  Determine,

  i) Length of handle if 50 mm additional length for gripping.

  ii) Stresses in screw body at two critical sections.

  iii) Bearing Pressure on screw thread.

b) Explain self locking and overhauling of power screw. **[3]**

Q7) a) Explain with neat sketch any two types of screw fastenings. **[6]**

b) A cylindrical head is connected to a flange by 12 bolts, The inside diameter of cylinder is 480 mm & maximum pressure inside is 1.5 N/mm^2 if bolt have permissible shear strength of 80 N/mm^2 Determine the size of bolt neglecetin initial tightening. If for the same application. M 30 bolts are used, find number of bolts required. **[12]**

OR

Q8) a) Write advantage of welded joints over thread joints. Also prove that stress acting on throat is equal to force on weld upon 0.707hl where h=leg size of weld and 1 = length of fillet weld . **[6]**

b) A welded bracket is shown in figure 1 below, carries a load of 60 KN. Calculate size of weld if shear stress in weld is 100 N/mm^2. **[12]**

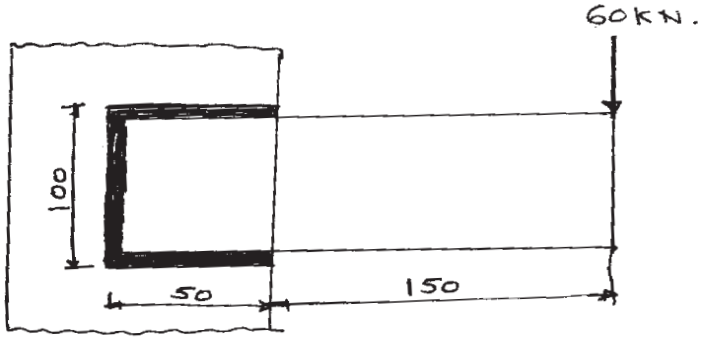


Figure – 1 (Q No- 8 b)

Q9) a) Draw a neat labeled sketch of Laminated leaf spring. State function of any two components. **[5]**

b) Following data is given for helical compression spring. **[11]**

- Axial load=8000N.
- Spring rate=72N/mm.
- Mean coil diameter=125mm.
- Tensile strength of spring material=550 Mpa.
- Modulus of rigidity = 80000 Mpa.
- Permissible shear stress for spring wire is half the tensile strength of spring material.
- Standard Spring Wire diameter = 18,19,20,21,22,23,24,25,27,29,30 mm

Determine i) Wire diameter

ii) No. of active coils.

OR

Q10)a) Explain the following terms. **[4]**

i) Wahl's factor.

ii) Active and Inactive coils.

b) A composite compression spring has two closed coil. Outer spring is of 15 mm longer than inner spring. The outer spring has 10 coils of mean diameter 36 mm & wire diameter 6 mm. The inner spring has 8 coils of mean daimeter 30 mm & wire diameter 5 mm. When spring is subjected to an axial load 1000 N, Modulus of rigidity may be taken as 81370 N/mm^2. Find. **[12]**

i) Compression of each spring

ii) Load shared by each spring.

iii) Shear stress induced in each spring.

✡ ✡ ✡

Total No. of Questions :10]

SEAT No. :

P2547

[Total No. of Pages :3

[5153] - 512
T.E. (Mechanical)
HEAT TRANSFER
(2012 Course) (Semester - I) (302042) (End-Sem.)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Draw neat diagrams wherever necessary.***
3) ***Use of scientific calculator is allowed.***
4) ***Assume suitable data, wherever necessary.***
5) ***Figures to the right indicate full marks.***

Q1) a) Explain: **[6]**

i) Mechanism of conduction.

ii) Overall heat transfer coefficient.

b) Explain physical significance of Biot number and Fourier number. **[4]**

OR

Q2) a) Write a note on temperature boundary condition and convection boundary condition. **[4]**

b) Consider a large 5 cm thick brass plate (K = 111 w/mK) in which heat is generated uniformly at the rate of 2×10^5 W/m^3. One side of plate is insulated while the other side is exposed to an environment at 25^{o}C with heat transfer coefficient of 44 W/m^{2}K. Determine the value of highest temperature in the plate. **[6]**

Q3) a) What is critical radius of insulation and economic thickness of insulation. **[4]**

b) A 5 cm diameter steel ball, initially at a uniform temp of 450^{o}C is suddenly placed in an environment at 100^{o}C with h = 10 W/m^{2}K. Steel properties: Cp = 460 J/KgK, density = 7800 kg/m^3, K = 35 W/mK. Calculate the time required for the ball to attain a temp of 150^{o}C. **[6]**

OR

P.T.O.

Q4) a) Explain electrical analogy of heat conduction. **[4]**

b) Draw temperature Vs length sketch for fin insulated at the tip, infinitely long fin and short fin. Write boundary conditions for these three types of fins. **[6]**

Q5) a) Explain physical significance of Grashoff number and Prandtl number. **[4]**

b) Explain the significance of thermal boundary layer and velocity boundary layer. **[4]**

c) 65 kg/min of water is heated from 30°C to 60°C by passing it through a rectangular duct of 3 cm × 2cm. The duct is heated by condensing the steam on its outer surface. Find the length of the duct required. **[8]**

Properties of Water: $\rho = 995\ kg/m^3$; $\mu = 7.65 \times 10^{-4}\ kg/ms$; $C_p = 4.174 kJ/kgK$;

$k = 0.623\ W/mK$; Conductivity of the Duct material = 35 W/mK

Use the following correlations:

$Nu = 0.023 Re^{0.8} Pr^{0.4}$ for turbulent flow

$Nu = 4.36$ for laminar flow

OR

Q6) a) Define and explain the physical significance of Nusselt number and Reynold's number. **[6]**

b) Find the rate of heat loss from a cubical furnace kept on a concrete floor, if the outside surface temp of the furnace is 80°C and the surrounding air is at 20°C. Sides of furnace are 1m each. Neglect heat loss due to convection and radiation from the base. **[10]**

Use the following correlations:

$Nu = 0.13 (Gr.Pr)^{0.33}$ for vertical surface

$Nu = 0.14 (Gr.Pr)^{0.33}$ for horizontal surface

Take properties of air at 50°C as follows:

$Cp = 1005 J/kgK$; $k = 0.0283\ W/mK$

$\nu = 17.95 \times 10^{-6}\ m^2/s$, $Pr = 0.698$

Q7) a) What is shape factor? Explain its reciprocity theorem, summation theorem and enclosure theorem. **[8]**

b) Find out heat transfer rate due to radiation between two infinitely long parallel planes. One plane has emissivity of 0.4 and is maintained at 200°C. Other plane has emissivity of 0.2 and maintained at 30°C. If a radiation shield (ε=0.5) is introduced between the two planes, find percentage reduction in heat transfer rate and steady state temp of the shield. **[8]**

OR

Q8) a) Write a note on: **[8]**

i) Surface resistance and space resistance.

ii) Radiation shield.

iii) Lambert's cosine rule.

iv) Kirchoff's law.

b) A gray opaque surface has an absorptivity = 0.8. It is maintained at 100°C. It receives an irradiation of 1,000 W/m^2. Its surface area is 0.1 m^2. Calculate, **[8]**

i) Radiosity of the surface,

ii) Net radiative heat transfer rate from the surface.

Recalculate the above quantities, if the surface is black.

Q9) a) Explain different regimes in pool boiling curve with neat sketch. **[8]**

b) A counter flow tube in tube heat exchanger is used to heat water from 20°C to 80°C at a rate of 1.2 kg/s using geothermal water available at 160°C. The mass flow rate of geothermal water is 2 kg/s. The inner tube is thin walled and has a diameter of 1.5 cm. If overall heat transfer coefficient of heat exchanger is 640 W/m^{2}K, determine length of the heat exchanger required to achieve desired heating. **[8]**

c) Explain effectiveness of a heat exchanger. **[2]**

OR

*Q10)*a) Draw and explain labeled temperature profiles for Condenser and Evaporator. **[4]**

b) Explain drop wise condensation and film condensation. **[6]**

c) Derive the expression for effectiveness of parallel flow heat exchanger. **[8]**

EEE

Total No. of Questions :10]

SEAT No. :

P2548

[Total No. of Pages :3

[5153] - 513

T.E. (Mechanical / Automobile Engg./ Mech.-S/W)

THEORY OF MACHINES - II

(2012 Course) (302043) (Semester - I) (End Semester)

Time : 2½Hours] *[Max. Marks :70*

Instructions to the candidates:

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

Q1) a) State and prove law of gearing. **[6]**

b) The following data relate to a pair of 20^o involute gears in mesh: Module = 6 mm, Number of teeth on pinion = 17, Number of teeth on gear = 49; Addenda on pinion and gear wheel = 1 module. Find: **[6]**

i) The number of pairs of teeth in contact;

ii) The angle turned through by the pinion and the gear wheel when one pair of teeth is in contact, and

iii) The ratio of sliding to rolling motion when the tip of a tooth on the larger wheel is just making contact.

OR

Q2) a) Derive an expression for maximum efficiency of worm and worm gears when worm is driver. **[6]**

b) A pair of bevel gears has a velocity ratio of 3:1. The pitch circle diameter of the pinion is 100 mm at the large end of the tooth. A 7.5 KW power is supplied to the pinion, which rotates at 1000 rpm. The face width is 30 mm and the pressure angle is 20^o. Calculate the tangential radial and axial components of the resultant tooth force acting on the pinion. **[6]**

Q3) In a reverted epicyclic gear train, the arm A carries two gears B and C and a compound gear D - E. The gear B meshes with gear E and the gear C meshes with gear D. The number of teethon gears B, C and D are 75, 30 and 90 respectively. Find the speed and direction of gear C when gear B is fixed and the arm A makes 100 r.p.m. clockwise. **[8]**

OR

P.T.O.

Q4) Explain tabulation method for sun and planet gear train and write speed of different elements. **[8]**

Q5) a) Explain PIV drive with neat sketch and state its applications. **[6]**

b) A four wheel vehicle of mass 2500 kg has a wheel base 2.5 m, track width 1.5 m, and height of centre of gravity 0.6 m above the ground level and lies at 1 m from the front axle. Each wheel has an effective diameter of 0.8 m and a moment of inertia of 0.8 kg.m^2. The drive shaft, engine flywheel and transmission are rotating at four times the speed of road wheels, in clockwise direction when viewed from the front, and is equivalent to a mass of 80 kg having a radius of gyration of 100 mm. If the vehicle is taking a right turn of 60 m radius at 60 km/h find the load on each wheel. **[10]**

OR

Q6) a) Explain cone variators with its different arrangements. **[6]**

b) Find the angle of inclination with respect to the vertical of a two wheelernegotiating a turn. Given: combined mass of the vehicle with its rider 250 kg; moment of inertia of the engine flywheel 0.3 kg-m^2; moment of inertia of each road wheel 1 kg-m^2; speed of engine flywheel 5 times that of road wheels and in the same direction; height of centre of gravity of riderwith vehicle 0.6m; two wheeler speed 90 km/h; wheel radius 300 mm; radius of turn 50 m. **[10]**

Q7) a) Explain following terms: **[6]**

i) Path Generation

ii) Function Generation and

iii) Motion Generation.

b) Synthesize a four-bar mechanism to generate a function $y = \sin x$ for $0 \leq x \leq 90^o$.The range of the output crank may be chosen as 60^o while that of input crank be 120^o. Assume three precision points which are to be obtained from Chebyshev spacing. Assume fixed link to be 52.5 mm long and $\theta_1 = 105^o$ and $\phi_1 = 66^o$. **[10]**

OR

Q8) a) Explain three position synthesis of single slider mechanism by using inversion method. **[8]**

b) Synthesis a four bar mechanism by the method of inversion. **[8]**

Assume the following data,

i) Length of fixed link is 80 mm and input link length is 25 mm.

ii) Initial position of input link 30^o and 2-positions of the input link from the initial position 30^o and 60^o.

iii) 2-positions of the output link from the initial position 20^o and 40^o.

And determine the length of coupler link, output link and initial position of output link.

Q9) a) Write short note on Jump phenomenon in cam system. **[4]**

b) The following data relate to a cam profile in which the follower is a flat faced follower moving with SHM during ascent and with uniform acceleration and retardation, acceleration being $2/3^{rd}$ of retardation during descents. Minimum radius of cam = 25 mm, Lift = 30 mm, Angle of ascent = 120^o, Angle of descent = 100^o, Angle of dwell between ascent and descent = 80^o, speed of cam = 200 rpm. Draw profile of the cam and determine maximum velocity and acceleration of the follower during outstroke and return stroke. **[14]**

OR

Q10)a) What do you mean by Advanced Cam Curves? Explain 2-3-4-5 Polynomial curve. **[4]**

b) The following data relate to a cam operating an oscillating roller follower: Minimum radius of cam = 30 mm, Radius of roller = 10 mm, Length of follower arm = 45 mm, Distance of fulcrum centre from cam centre = 55 mm, Angle of ascent = 90^o, Angle of descent = 120^o, Angle of dwell between ascent and descent = 60^o, Angle of oscillation of follower = 25^o. Draw profile of the cam if the follower moves with SHM and returns with uniform acceleration and retardation. **[14]**

EEE

Total No. of Questions : 9]

SEAT No. :

P2549

[Total No. of Pages : 2

[5153]-514
T.E.(Mechanical)
METROLOGY AND QUALITY CONTROL
(2012 Pattern) (Semester - I) (End Sem.)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***All questions are compulsory.ie. (Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8)***
3) ***Assume Suitable data if necessary.***
4) ***Use of Calculator is allowed.***
5) ***Figures to the right side indicate full marks.***

Q1) a) State the methods for checking External and Internal Taper, explain why sine bar is Used for lesser values of on angle. **[6]**

b) Explain difference between accuracy and precision. **[4]**

OR

Q2) a) Explain working, construction of a mechanical comparator,(Any one) What are its limitations. **[6]**

b) Explain any one method of assessing the surface finish. **[4]**

Q3) a) How to check tooth thickness of a spur gear by using gear tooth vernier caliper. **[5]**

b) Explain three wire method in thread measurement. **[5]**

OR

Q4) a) Explain Appraisal, Prevention, Failure costs with suitable examples.**[4]**

b) Identify the given fit with sketch 25H7/g6,25H7/p8 & 25H7/k10. **[6]**

Q5) a) Define quality control and give objectives of quality control. **[8]**

b) State Seven Quality control tools. Explain any three in detail. **[8]**

OR

Q6) a) Write a short note on (any.2): **[8]**

i) 5 S

ii) TPM

iii) Kaizen

b) Explain ISO- 9001, 9002, 9003 & TS 16949 quality system standards.**[8]**

P.T.O.

Q7) a) Sheet metal components were inspected for wrinkle formations and following are the observations for number of defectives per sample lot of 100 numbers.

Lot Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Defectives	6	8	7	8	9	3	6	13	7	6	8	5	6	15	3	11	5	4	6	9

Determine the process is statistically stable or otherwise. If yes, suggest control limits for defectives. **[6]**

b) Explain analysis of out of control condition referring control charts. **[4]**

c) What are the advantages of sampling inspection over 100% inspection? Explain the difference between single sampling and double sampling plan. **[8]**

OR

Q8) a) A milling operation is required to generate a dimension 25±0.5mm. The observations over 450 components were summarized as follows

Dimensions	25.7	25.9	25.0	25.8	25.6	25.7	25.5	25.4	25.3	25.2	25.1
Components	8	37	45	12	18	7	39	62	76	88	58

Determine the Average, Range, Standard Deviation and process capability. **[8]**

b) Write note on FMECA and OC curve. **[8]**

c) Explain process capability index. **[2]**

Q9) Write a short note on (any.4): **[16]**

a) Affinity diagram

b) Matrix diagram

c) Kanban

d) Process Decision Program Chart

e) QFD

f) JIT

Total No. of Questions : 8]

SEAT No. :

P3605

[Total No. of Pages : 3

[5153]-515
T.E. (Mechanical) (Semester - I)
HYDRAULICS AND PNEUMATICS
(2012 Pattern)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***AnswerQ. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 7 or Q. 8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figure to the right indicate full marks.***
4) ***Use of electronic pocket calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) Compare Characteristics of hydraulic and pneumatic systems with mechanical system. **[6]**

b) What is accumulator and explain any one application of it. **[6]**

c) The displacement of a pump operating at 1000 RPM at a pressure of 10 bar is 100cm^3. The input torque from the prime mover is 120 Nm. If it delivers 0.0015 m3/s of oil, determine: **[8]**

i) Overall efficiency of the pump.

ii) Theoretical torque required to operate through pump.

iii) Volumetric efficiency.

OR

Q2) a) List the fields of application where fluid power can be used more effectively than any power sources. Explain in short **[6]**

b) State types of filters and draw their various locations used in fluid power system in details. **[8]**

c) State and explain governing law used in fluid power system in details **[6]**

Q3) a) Draw and explain any three center position of direction control valve used in industrial circuit. **[6]**

b) What is the purpose of providing pilot operated check valve in hydraulic circuit. Explain in short a typical application of pilot operated check valve. **[6]**

c) Draw the counterbalance circuit and explain it's working **[6]**

OR

P.T.O.

Q4) a) Explain regenerative circuit for following conditions. **[6]**

i) when the speed of the extension stroke will be equal to the retraction stroke of the cylinder.

ii) When the speed of the extension stroke will be greater than the retraction stroke of the cylinder.

b) Draw the fail safe circuit and explain it's working **[6]**

c) What are the possibilities to draw synchronization circuit explain any one of the circuit in details. **[6]**

Q5) a) Explain with a neat sketch the shuttle valve and draw a typical circuit showing all parts. **[6]**

b) Explain with a neat sketch the working of a quick exhaust valve. **[6]**

c) What are various efficiencies of a hydraulic motor. **[4]**

OR

Q6) a) Draw circuit for : **[6]**

i) Controlling speed of pneumatic double acting cylinder.

ii) Speed control of a pneumatic motor

b) Craw a typical compressed air generation and distribution system **[6]**

c) Explain with a sketch a typical air motor **[4]**

Q7) A machine has two slides 'A' and 'B' which are to be operated hydraulically. The cylinder 'A' has a load of 10 KN and a stroke of 50cm to be completed in 20 sec. The cylinder 'B' has to overcome a load of 15 KN and has a stroke of 50 cm to be complete in 29 sec. The two cylinders are to be moved simultaneously. They are to be retracted as soon as they reach the end position. The loads during returns, strokes are 5 KN and 3.5 KN respectively. Individual direction control valves are provided for the two cylinders. Draw a suitable circuit to achieve this requirement. Select different components you have used in the circuit from the given data mention the rating of the components in case it is not available in the given data. Assume reasonable values of data in case if it is not provided in the problems (Discuss functional approach, strength approach and selection approach along with suitable circuit diagram) **[16]**

OR

Q8) Two identical cylinders A and B are to be operated simultaneously. The cylinder A moves against a load of 25 KN while the cylinder B has a load of 20 KN. Both the cylinders have a stroke of 1 m. The working stroke is to

be completed in about 20 seconds time. The return stroke of cylinder B is to start only after the cylinder A is completely retracted. The return speeds are to be as fast as possible. Draw a circuit which will fulfill these requirements. Select different components you have used in the circuit from the given data mention the rating of the components in case it is not available in the given data. Assume reasonable values of data in case if it is not provided in the problems (Discuss functional approach, strength approach and selection approach along with suitable circuit diagram) **[16]**

DATA

1. Suction Strainer :

Model	Flow Capacity (/pm)
S_1	38
S_2	76
S_3	152

2. Pressure Gauge :

Model	Range (bar)
PG_1	0 - 25
PG_2	0 - 40
PG_3	0 -100
PG_4	0 - 160

3. Vane Pump :

Model	Delivery in / pm		
	at 0 bar	at 35 bar	at 70 bar
P_1	8.5	7.1	5.3
P_2	12.9	11.4	9.5
P_3	17.6	15.1	14.3
P_4	26.1	23.5	22.4
P_5	39.0	37.5	35.6

4. Relief Valve :

Model	Flow capacity (/ pm)	Max Working Pressure & bar
R_1	11.4	70
R_2	19	210
R_3	30.4	70
R_4	57	105

5. Flow control Valve :

Model	Working Pressure (bar)	Flow Range (/pm)
F_1	70	0-4.1
F_2	105	0-4.9
F_3	105	0-16.8
F_4	70	0-24.6

6. Directional Control Valve :

Model	Max working Pressure (bar)	Flow Capacity (/pm)
D_1	350	19
D_2	210	38
D_3	210	76

7. Check Valve :

Model	Max working Pressure (bar)	Flow Capacity (/pm)
C_1	210	15.2
C_2	210	30.4
C_3	210	76

8. Pilot Operated Check Valve :

Model	Max working Pressure (bar)	Flow Capacity (/pm)
PO_1	210	19
PO_2	210	38
PO_3	210	76

9. Cylinder-(Max Working Pressure-210 bar)

Model	Bore dia. (mm.)	Rod dia (mm)
A_1	25	12.5
A_2	40	16
A_3	50	25
A_4	75	45
A_5	100	50

10. Oil Reservoirs :

Model	Capacity (litres)
T_1	40
T_2	100
T_3	250
T_4	400
T_5	600

Total No. of Questions : 12]

SEAT No. :

P2550

[Total No. of Pages :3

[5153]-516

T. E. (Mechanical / Automobile)

NUMERICAL METHODS & OPTIMIZATION

(2012 Course) (Semester-II) (302047)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10, Q11 or Q 12.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of programmable calculator is not permitted.***
3) ***Assume suitable data if necessary.***

Q1) Determine the maximum relative error for the function

$$F = 3x^2y^2 + 5y^2z^2 - 7x^2z^2 + 38$$

For x=y=z=1 and Δx = -0.05, Δy = 0.001 and Δz = 0.02. **[6]**

OR

Q2) Find real root of cos(x)-3(x)+5=0. Correct to four decimal places using the False Position method. **[6]**

Q3) Solve the following equations by Thomas Algorithm. **[6]**

$$3x_1 - x_2 = 5$$
$$2x_1 - 3x_2 + 2x_3 = 5$$
$$x_2 + 2x_3 + 5x_4 = 10$$
$$x_3 - x_4 = 1$$

OR

Q4) Draw a flow chart for Gauss-Seidal Method. **[6]**

Q5) Two products A and B are to be manufactured by a firm. Each of these product has to be processed on two machines M1 and M2. Product A requires 4 hours on machine M1 and 5 hours on machine M2. Product B requires 5 hours on machine M1 and 2 hours on machine M2. The available capacity per

P.T.O.

month is 100 hours and 80 hours for machine M1 and M2 respectively. The profit per unit is Rs.10 and Rs.5 on product A and B respectively. Estimate the number of units of each type to be produced per month for maximum profit by simplex Method. **[8]**

OR

Q6) a) Minimize $Z = 80x_1 + 120x_2$ **[6]**

Subject to $x_1 + x_2 \leq 9$

$x_1 \geq 2$

$x_2 \geq 3$

$20x_1 + 50x_2 \leq 300$

$x_1, x_2 \geq 0$

(Use graphical method)

b) Explain following terms used in graphical method of optimization. **[2]**

i) Constraints ii) Optimal solution

Q7) a) From the given table find the value of x for y(x) = 0.390 **[8]**

x	20	25	30	35
f(x)	0.342	0.423	0.5	0.65

b) Fit the curve $pv^{\gamma} = k$ to the following data: **[8]**

p(kg/cm^2)	0.5	1	1.5	2	2.5	3
v(litres)	1620	1000	750	620	520	460

OR

Q8) a) For the following data calculate difference and obtain forward difference polynamials. Interpolate at x= 0.25 and x= 0.35 **[8]**

x	0.1	0.2	0.3	0.4	0.5
y=f(x)	1.4	1.56	1.76	2.0	2.28

b) Fit a parabola $y = ax^2 + bx + c$ in least square sense to the data. **[8]**

x	10	12	15	23	20
y	14	17	23	25	21

Q9) a) Evaluate $\int_2^6 \log_{10} x dx$ by using trapezoidal rule, taking n=8, correct to five decimal places. **[8]**

b) Explain Simpon's 1/3 rule graphically and drive formula for integration of a function. **[8]**

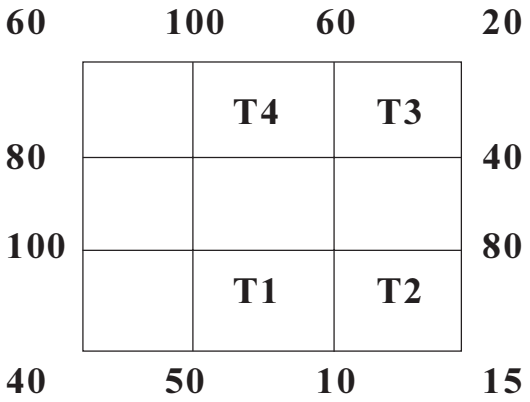
OR

Q10)a) Explain what is meant by Simpson's strip for 1/3rd and 3/8th rule. Explain why Simpson's 3/8th rule give more accuracy compared to Trapezoidal and Simpson's 1/3rd rule with same number of strips. **[8]**

b) Solve the Trapezoidal rule $\int_0^1 \int_0^1 x^2 y^2 .dx.dy$ Taking step length in x and y as 0.25. **[8]**

Q11)a) Draw flowchart for modified Euler's method. **[8]**

b) Solve the Laplace equation $\frac{\partial^2 T}{\partial x^2} + \frac{\partial^2 T}{\partial y^2} = 0$ for the square mesh as shown in diagram below. **[10]**



OR

Q12)a) Draw the flowchart for solving the Laplace equation. **[8]**

b) Use Runge- Kutta method of fourth order to obtain the numerical solution of $\frac{dy}{dx} = \sqrt{(x^2 + y)}$, Find y at x=0.4 given y(0) = 1, take h = 0.2. **[10]**

♦ ♦ ♦

Total No. of Questions : 10]

SEAT No. :

P2551

[Total No. of Pages : 4

[5153]-517
T.E. (Mechanical)
DESIGN OF MACHINE ELEMENTS - II
(2012 Course) (Semester - II) (End Semester)

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

Instructions to the candidates:

1) ***Answer five questions from the following.***
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) ***Use of programmable calculator is not permitted.***
6) ***Assume suitable data, if necessary.***

Q1) a) Explain the effective load on helical gear tooth. How to estimate the effective load of helical gear tooth. **[4]**

b) A pair of spur gear with 20° full depth involute teeth consists of 20 teeth pinion meshing with 60 teeth internal gear. The pinion shaft is coupled to 7.5 KW electric motor running at 1440 rpm. The velocity factor is 1.5 and service factor is 1.25. Both the pinion and gears are made of alloy steel having S_{ut} 1500 N/mm^2. The module and face width are 3 mm and 30 mm respectively. The gears are finish to meet the specifications of grade – 8. The dynamic load accounted by Buckingham equation is 8500 N. Calculate the factor of safety against bending failure. **[6]**

OR

Q2) a) A pair of parallel helical gear consisting of 18 teeth pinion meshing with 63 teeth gear. The pinion rotates at 1440 rpm. The normal pressure angle is 20° while the helix angle is 23°. The face width is 30 mm and the normal module is 3 mm. The pinion and gear are made of plain carbon steel 40C8 (S_{ut} = 600 N/mm^2). The service factor and factor of safety are 1.5 and 2.0 respectively. Assume that the velocity factor accounts dynamic load. Calculate the power transmitting capacity of the gears.**[6]**

$$c_v = 5.6 / 5.6 + \sqrt{v}$$

b) Obtain the expression for ratio factor used in wear strength equation of bevel gear. **[4]**

P.T.O.

Q3) a) Explain formative number of teeth in helical gear. Derive an expression for formative number of teeth for helical gear. **[4]**

b) An electric motor running at 1500 rpm is directly coupled to a shaft of 25 mm diameter, which is supported by two cylindrical roller bearings. The shaft transmits power to another line shaft through flat pulley of 200 mm diameter, which is placed midway between two bearings. The tension on tight and slack side of belt is 4980 and 1660 N respectively. The belt is horizontal. The load factor is 1.4. If the expected life of the bearing is 40000 hours. Find the dynamic load carrying capacity of the bearing, so that bearing can be selected from the manufacturer's catalog. **[6]**

OR

Q4) a) Explain force analysis of bevel gear with neat sketch. **[4]**

b) A deep groove ball bearing is to be selected for the following: It is subjected to varying cyclic load as listed in the table. The expected life of Bearing at 90% reliability is 13000 hours. Assume radial load factor as 0.56 and the axial load factor as 1.2. Find the equivalent Dynamic radial load acting on bearing. **[6]**

Fraction of Cycle	Type of load	Radial(N)	Axial(N)	Speed (RPM)	Shock and service factor
1/6	Heavy shock	3500	1300	600	2.5
2/6	Moderate shock	2800	1100	700	2
remaining	Light shock	2200	900	800	1.2

Q5) a) Write short note on thermal considerations in worm gear. **[4]**

b) A pair of worm and worm wheel is designated as 2/54/10/5. The worm is transmitting 6 kW at 1800 rpm to a wheel. The permissible bending strength is 120 N/mm^2, the wear load factor is 0.83 N/mm^2, the coefficient of friction is 0.05 and normal pressure angle is 20°. **[12]**

Find

i) Factor of safety in bending

ii) Factor of safety in wearing

iii) Factor of safety in heat dissipation. Use following data

Lewis form factor - y' = 0.484 – 2.87/z', and Barth factor $= \frac{6}{6+v}$

Input KW $= \frac{a^{1.7}}{34.5(i+5)}$ Where, a = center distance, i = Gear ratio.

OR

Q6) a) Explain overhauling and self-locking conditions for worm gearing. **[4]**

b) A pair of worm gear designated as 2/52/10/4 transmit 10 kW power at 720 rpm supplied to worm shaft. The coefficient of friction is 0.04 and pressure angle is 20. Assume worm is above the worm gear and rotates clockwise direction when viewed from left. If worm is left hand, determine and show by neat sketch. **[12]**

i) Component of tooth forces acting on worm and worm gear.

ii) Efficiency of worm gear.

Q7) a) Three V-belts are to be used to transmit a power from an electric motor running at 2800 rpm to a machine at 700 rpm. The center distance between input and output shaft is 800 mm. The groove angle is 38° and the coefficient of friction between the belt and sheave is 0.5. The density of belt material is 1100 kg/m^3 and allowable tensile stress for the belt material is 1.75 N/mm^2. If the cross sectional area of each belt is 600 mm^2, determine **[12]**

i) The Pulley pitch diameter

ii) Maximum power the belt can transmit

iii) The required initial tension in each belt

b) Expalin the procedure for the selection of flat belt from manufacture's catalog. **[4]**

OR

Q8) a) Write a note on stresses in wire rope. **[4]**

b) In chain drives the sprocket has odd number of teeth and chain has even number of links. Why? **[4]**

c) A compressor running at 750 rpm is driven by an electric motor running at 1500 rpm through the 8 mm X 225 mm flat leather belt. The center distance is 1.5 m. The coefficient of friction between the belt and pulley is 0.35 and belt mass is 900 kg per cubic meter. If the allowable tensile stress for the belt material is 2 N/mm^2 determine **[8]**

i) The tensions in belt

ii) Maximum power transmitting capacity of the belt

Q9) a) What is bearing characteristics number as applied to journal bearing and its significance. **[4]**

b) Derive Petroff's equation. **[8]**

c) Write notes on **[6]**

i) Additive for mineral oil

ii) Properties of bearing material

OR

Q10)a) Explain Raimondi and boyd Method. **[6]**

b) The following data is given for a 360° hydrodynamic bearing: **[12]**

Radial load = 9 KN

Unit bearing pressure = 900kPa

Clearance ratio = (r/c) = 800

Journal speed = 1440 rpm

Viscosity of lubricant = 30 mpas

Assume that the total heat produced in the bearing is carried by the total oil flow and 1/d is equal to 1. Calculate dimensions of the bearing, coefficient of friction, power lost in friction, total flow of oil, side leakage and temperature rise. Refer Table 1 for bearing data.

l/d	ϵ	h_0/c	S	ϕ	$(\frac{r}{c})f$	$(\frac{Q}{rcn_s l})$	$\frac{Q}{Q_s}$	$\frac{P}{P_{max}}$
1	0.1	0.9	1.33	79.5	26.4	3.37	0.150	0.540
	0.2	0.8	0.631	74.02	12.8	3.59	0.280	0.529
	0.4	0.6	0.264	63.10	5.79	3.99	0.497	0.484
	0.6	0.4	0.121	50.58	3.22	4.33	0.680	0.415
	0.8	0.2	0.0446	36.24	1.70	4.62	0.842	0.313
	0.9	0.1	0.0188	26.45	1.05	4.74	0.919	0.247
	0.97	0.03	0.00474	15.47	0.514	4.82	0.973	0.152

Table 1 : Dimensionless numbers for hydrodynamic bearings.

Total No. of Questions : 10]

SEAT No. :

P2552

[Total No. of Pages : 3

[5153]-518
T.E.(Mechanical)
TURBO MACHINES
(2012 Pattern) (Semester-II) (End Sem.)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Figures to the right indicate full marks.***
3) ***Use of scientific calculator is allowed.***
4) ***Assume data wherever necessary and mention it.***
5) ***Draw neat and suitable figures wherever necessary.***

Q1) a) Prove that the force exerted by jet of water on semi-circular curve plate is two times the force exerted by jet of water on flat vertical plate. **[4]**

b) The mean velocity of the bucket of the Pelton wheel is 10 m/s. The jet supplies the water at 0.7 m^3/s under the head of 30 m. The jet is deflected through an angle of 160^o by the bucket. Find the Power developed by the Pelton wheel and Hydraulic efficiency. Take Cv=0.98 & neglect the losses in the bucket. **[6]**

OR

Q2) a) How do you classify water turbines? What is the difference between the impulse & reaction turbine? **[4]**

b) The external and internal diameters of an inward flow reaction turbine are 100 cm and 50 cm respectively. The head available is 45 m and velocity of the flow through the runner 3.5 m/s and it is constant. The guide vane angle at inlet is 10^o and runner vanes are radial are inlet. Assuming the discharge at the outlet of the runner is radial,

Determine:-

i) Speed of the turbine

ii) Power developed

iii) Hydraulic Efficiency. **[6]**

P.T.O.

Q3) a) Explain the necessity of draft tube in reaction turbines? **[2]**

b) Steam issues from the nozzle of an impulse steam turbine with a velocity of 1200 m/s. The nozzle angle is 20^{o}. The mean blade speed is 400 m/s and inlet & outlet angles of moving blades are equal. The mass of steam flowing through the turbine is 900 kg/hr. Assume friction factor =0.8**[8]**

Determine:

i) Blade angles

ii) Power developed

iii) Blade efficiency

OR

Q4) a) Derive an expression of Specific speed of hydraulic turbines. **[6]**

b) Explain: **[4]**

i) Blade efficiency

ii) Stage efficiency

Q5) a) Explain the different types of casing used for centrifugal pump. **[6]**

b) Derive an expression of minimum starting speed of centrifugal pump.**[6]**

c) Discuss the influence of blade angle on the performance of centrifugal pump. **[6]**

OR

Q6) a) An impeller of inside diameter 15 cm and outside diameter 40 cm having a width at inlet 4 cm and width at outlet 2 cm is running at 1440 rpm. The inlet and outlet blade angles are 25^{o} and 15^{o} respectively. The whirl velocity at inlet is zero. Determine: **[10]**

i) Flow rate in LPM

ii) Power of impeller

iii) Absolute velocity at outlet.

b) Write a short note on Priming & Cavitation of Centrifugal pump. **[8]**

Q7) a) Represent and explain the process involved in a centrifugal compressor on (T-S) and Derive an expression for isentropic efficiency based on total values. **[8]**

b) Write a short note on Surging & Choking of Centrifugal compressor.**[8]**

OR

Q8) a) Discuss the dimensionless parameters used to predict the performance of centrifugal compressor. **[6]**

b) A centrifugal compressor delivers 10 m^3/s of air when running at 9000 rpm. The air is drawn in at 1 bar and 300 k and delivered at 4 bars. The isentropic efficiency is 80%. Blades are radial at outlet and constant velocity of flow is 64 m/s. The outer diameter of impeller is twice the inner diameter and slip factor may be taken as 0.9. Determine: **[10]**

i) Temperature of air at outlet

ii) Power required to drive the compressor

iii) Impeller diameter at inlet & outlet

iv) Impeller blade angle at inlet

v) Diffuser blade angle at inlet

Q9) a) Write a short note on: **[4]**

i) Fan

ii) Blower

b) Explain the construction and working of an axial flow compressor. **[6]**

c) Define slip coefficient, work factor and pressure coefficient. **[6]**

OR

Q10)a) Compare axial flow compressor & centrifugal compressor. **[4]**

b) Write a short note on losses in axial flow compressor. **[4]**

c) An axial compressor has a mean diameter of 60 cm and runs at 15000 rpm. if the actual temperature rise and pressure ratio developed are 30^oC and 1.3 respectively, **[8]**

Determine:

i) Power required to drive the compressor while delivering 57 kg/s of air, assuming mechanical efficiency 86% and initial temperature of 35^oC

ii) The degree of reaction if the temperature at rotor exit is 55^oC

iii) Stage efficiency

Total No. of Questions : 10]

SEAT No. :

P2553

[Total No. of Pages : 3

[5153]-519
T.E. (Mechanical)
MECHATRONICS
(2012 Course) (Semester - II) (End Semester) (302050)

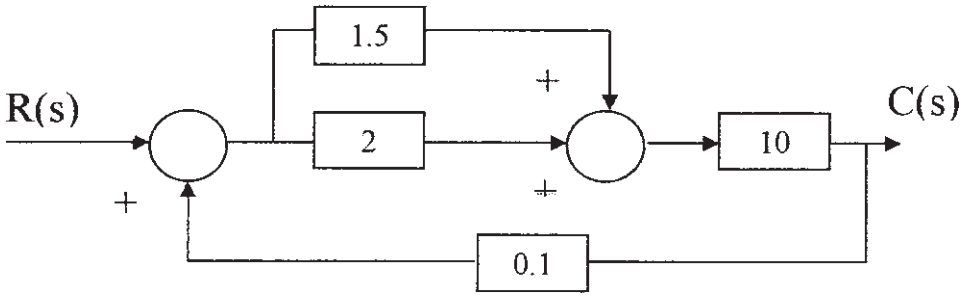
Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Using suitable diagram explain construction and working of Stepper motor. List any 2 industrial applications. **[6]**

b) Determine the transfer function of following diagram. **[4]**



OR

Q2) a) Using suitable diagram explain construction and working of sample and hold circuit. **[6]**

b) Define **[4]**

i) Resolution

ii) Hysteresis

Q3) a) Define **[6]**

i) Sampling theorem

ii) Aliasing

b) Using suitable diagram explain construction and working of voltage amplifier. **[4]**

OR

P.T.O.

Q4) a) Find the approximate change in metal wire of resistance 120 ohm that results from a stain of 1000 μm/m. **[4]**

b) Using suitable diagram explain construction and working of R-2R DAC **[6]**

Q5) a) Draw a suitable block diagram of SCADA and explain its architecture. **[8]**

b) Draw block diagram of basic structure of PLC system and explain the role played by following elements **[8]**

i) I/O unit

ii) CPU

OR

Q6) a) What is the function of timers in PLC programming? Classify time. Explain any 2 of them. **[8]**

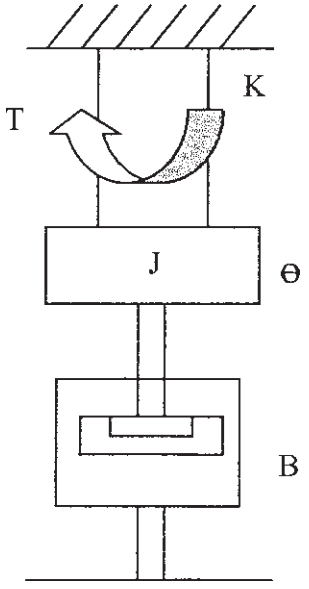
b) Draw a ladder diagram for the following sequence. **[8]**

i) Two push buttons PB1 and PB2 are used to operate Green and Red lamps.

ii) When PB1 is pushed alone, it should switch off Green lamp, and switch on the red lamp.

iii) If PB2 is pushed alone, No lamp should glow.

Q7) a) Obtain transfer function of the following system. **[8]**



b) Define following terms **[8]**

i) Steady state error

ii) Rise time

iii) Damping frequency

iv) % overshoot

OR

Q8) a) Using suitable diagram explain transient response specification. **[8]**

b) Compare Time Domain and Frequency domain techniques for analysis of systems. **[8]**

Q9) a) Draw a suitable diagram and derive transfer function of Proportional Integral and derivative (PID) controller in parallel. Compare it with PID in series as well. **[10]**

b) Discuss the role of transient specifications with respect to performance of PID **[8]**

OR

Q10)a) An integral controller is used for speed control with a set point of 12 rpm within a range of 10 to 15 rpm. The controller output is 22% initially. The constant K_1 = -0.15% controller output. per second per percentage error. If the speed jumps to 13.5 rpm Calculate the constant output after 2 sec. for a constant e_p. **[8]**

b) Explain Derivation control with neat diagram and equation. Why derivative controller can not be used alone? **[10]**

x x x

Total No. of Questions : 10]

SEAT No. :

P2554

[Total No. of Pages : 3

[5153]-520
T.E. (Mechanical)
MANUFACTURING PROCESS - II
(2012 Course) (Semester - II) (End Semester)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Figures to the right indicate full marks.***
3) ***Use of electronic pocket calculator is allowed.***
4) ***Assume suitable data, if necessary.***

Q1) a) A hole of 25mm diameter and 70mm depth is to be drilled. The suggested feed 1.3 mm/rve. and cutting speed 60m/min. Assuming tool approach and tool overtravel as 6mm, Calculate **[6]**

i) Spindle speed

ii) Feed Speed

iii) Cutting Speed.

b) Draw a neat sketch of twist drill with its nomenclature and explain various terminologies of twist drill. **[6]**

OR

Q2) a) Describe the Tool and Cutter grinder with neat sketch. **[6]**

b) Write short notes on Burnishing Process. **[6]**

Q3) a) Explain chip breakers with its function? **[4]**

b) In orthogonal cutting of a 60mm diameter MS bar on lathe, the following data was obtained: **[4]**

Rake angle = 10º, Cutting Speed = 100 m/min, Cutting force = 200N, Feed Force = 70N, Chip thickness = 0.3 mm, feed = 0.2 mm/rev.

Calculate:

i) Shear angle
ii) Coefficient of friction,
iii) Chip flow velocity
iv) Friction Angle

OR

P.T.O.

Q4) a) With the help of neat sketch explain the relation between shear velocity, cutting velocity and chip flow velocity. **[4]**

b) What is Machinability? Explain different factors affecting Machinability. **[4]**

Q5) a) Explain USM process with its adv., limitations and applications. **[8]**

b) Compare the ECM and EDM with various process parameters. **[8]**

OR

Q6) a) Draw a Schematic diagram of 'Laser Beam Machining' and Explain its working principle and process parameters. **[8]**

b) Explain AJM process with its adv., limitations and applications. **[8]**

Q7) a) Explain DNC machines with neat sketch. State its advantages and limitations. **[6]**

b) Explain with neat sketch NC motion control system. **[5]**

c) Explain the following codes **[5]**

G02, G91, G98, M03, M02

OR

Q8) a) Explain machining center with neat sketch. State its advantages, disadvantages and applications. **[6]**

b) Differentiate between open and close loop system with neat sketch. **[6]**

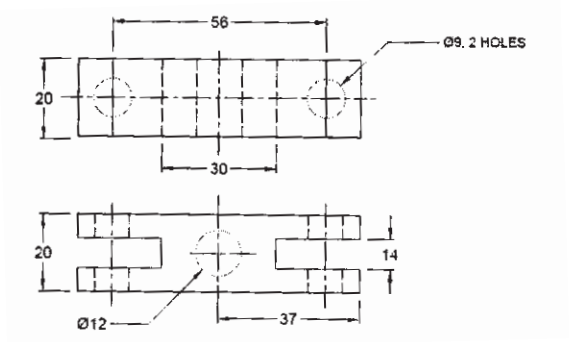
c) Explain the following codes **[4]**

G03, M00, G91, M08

Q9) a) What is 3-2-1 location principle? Explain with neat sketches. **[6]**

b) Draw and explain diamond pin locator. **[4]**

c) Design and draw drilling jig for drilling the ϕ9mm TWO holes in the component shown in figure. **[8]**

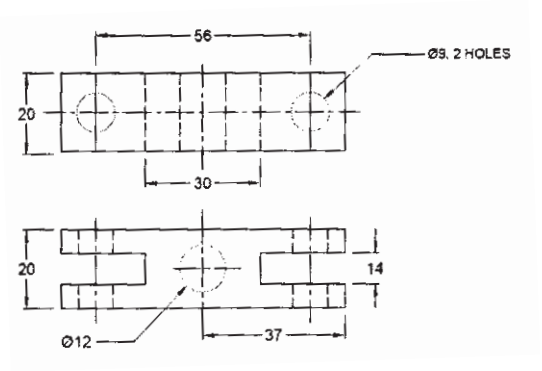


OR

Q10)a) List various types of locating devices used in jig and fixtures. Explain any one in detail. **[6]**

b) Write short notes on modular fixture. **[4]**

c) Design and draw milling fixture for milling 74mm × 20mm face **[8]**



Total No. of Questions :10]

SEAT No. :

P2555

[Total No. of Pages :3

[5153] - 523
T.E. (Mechanical S/W)
MECHATRONICS
(2012 Course) (302050) (Semester - I) (End-Semester)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

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

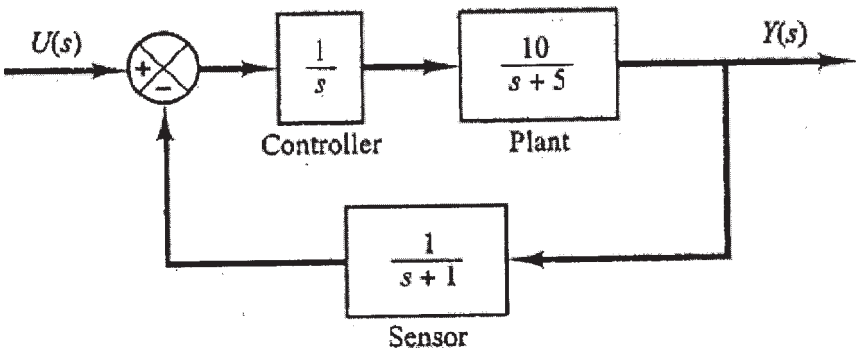
Q1) a) List four non-contact type position sensors and explain the operation of any one of this sensor in detial. **[6]**

b) Write four distinct points of comparison between Open Loop and Closed Loop system. **[4]**

OR

Q2) a) Write six distinct points of comparison between Thermocouple and Resistive Temperature Detector. **[6]**

b) Find the transfer function Y(s)/U(s) for the block diagram shown below. **[4]**



Q3) a) List the four key elements in a Mechatronic system. **[2]**

b) Using a suitable flow diagram explain the operation of a Successive Approximation type Analog to Digital Converter. **[8]**

OR

P.T.O.

Q4) a) Define "Transfer Function" and list two advantages of the transfer function based modelling approach. **[2]**

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

i) Aliasing

ii) Sample and Hold Circuit

Q5) a) Using a suitable block diagram explain the working of SCADA system. **[6]**

b) Devise a ladder program that can be used with a solenoid valve controlled double-acting cylinder, i.e. a cylinder with a piston which can be moved either way by means of solenoids for each of its two positions, and which moves the piston to the right, holds it there for 2 s and then returns it to the left. **[10]**

OR

Q6) a) Draw a suitable block diagram and explain the working of a PLC. Also, list the criterion for selection of a PLC. **[10]**

b) Devise ladder programs for systems that will carry out the following tasks: **[6]**

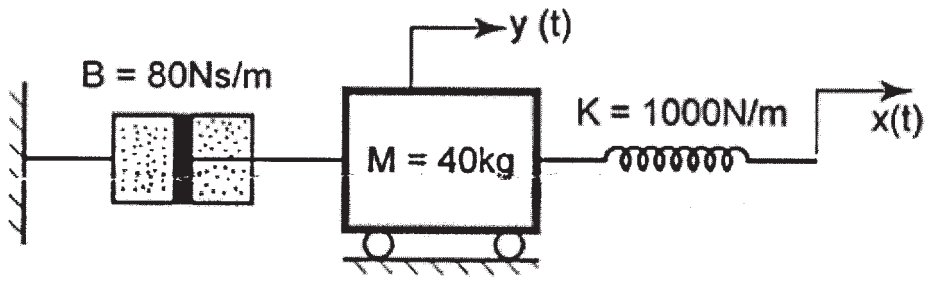
i) Switch on an output 5s after receiving an input and keep it on for the duration of that input.

ii) Switch on an output for the duration of the input and then keep it on for a further 5 s.

iii) Switch on an output for 5 s after the start of an input signal.

Q7) a) Define: % Overshoot, Rise Time, Settling Time, Steady State Error, Natural Frequency, Damping Factor. **[6]**

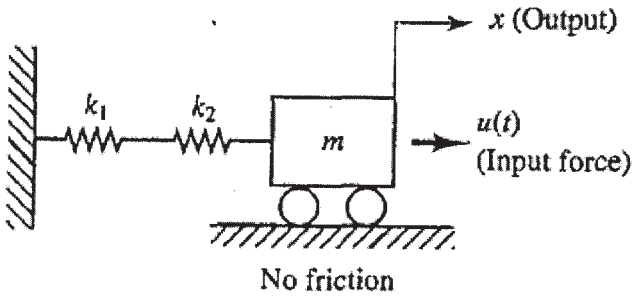
b) Determine the transfer function x(s)/y(s) for the system show in figure below. **[10]**



OR

Q8) a) Write a short note on "Time Domain Analysis" of Mechanical System. **[6]**

b) Determine the transfer function $x(s)/u(s)$ for the system shown in figure below. **[10]**



Q9) a) Draw a suitable block diagrm and derive the transfer fucntion of a PID controller. Also, discuss the significance of the integral term in the PID controller. **[10]**

b) Write the step wise procedure for the tuning of a PID control, manually. **[8]**

OR

Q10)a) A proportional controller is used to control temperature within 50°C to 130°C with a set point of 73.5°C. The set point is maintained with 50% controller output. The offset error is corresponding to load change which causes 55% controller output. If the proportional gain is 2 find the % controller output if the temperature is 61°C. **[10]**

b) Discuss the importance of Transient Response Specifications w.r.t. performance of control system. **[8]**

EEE

Total No. of Questions : 12]

SEAT No. :

P2556

[Total No. of Pages : 2

[5153]-524

T.E. (Mechanical Sandwich)

NUMERICAL METHODS & COMPUTATIONAL TECHNIQUES

(2012 Pattern) (Semester - I) (End Semester) (302061)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) Solve $x^3 - 4x + 1 = 0$ using Modified Newton Raphson method take initial point as x=3 and accuracy as 0.0001. **[6]**

OR

Q2) Evaluate using Gauss two-point formula $\int_{-1}^{1} \sqrt{1-x^2}\cos x\,dx$. **[6]**

Q3) Find the value of y at x=40 using Newton's Backward Interpolation. **[6]**

x	20	28	36	44
y	2854	3162	7088	7984

OR

Q4) Explain following terms: **[6]**

a) Inverse interpolation

b) Cubic Spline Interpolation

Q5) Solve the following set of simultaneous equations using Gauss Siedel method. Do four Iterations **[8]**

$$10x + y - 2z = 7.74$$

$$x + 12y + 3z = 39.66$$

$$3x + 4y + 15z = 54.8$$

OR

P.T.O.

Q6) Solve the following set of simultaneous equations using Gauss Elimination method. **[8]**

$$5x - 2y + 3z = 18$$
$$x + 7y - 3z = -22$$
$$2x - y + 6z = 22$$

Q7) a) Draw Flowchart to fit quadratic equation through given set of points. **[8]**

b) fit a curve $y=ax^b$ to the given data: **[8]**

X	5	6	7	8	9	10
Y	133	55	23	7	2	2

OR

Q8) a) Draw Flowchart to fit quadratic equation through given set of points. **[8]**

b) fit a straight line through the given data: **[8]**

X	0	5	10	15	20
Y	7	11	16	20	26

Q9) a) Given $\frac{dy}{dx} = x - y^2$ with y(0) = 1 find value of y at 0.2 and 0.4 using Taylor's series method. **[8]**

b) Draw Flow Chart for 'Modified Euler's Method'. **[8]**

OR

Q10)a) Draw Flow Chart for 'Predictor–Corrector Method'. **[8]**

b) Using Runge Kutta method of 4th Order find y for following equation $\frac{dy}{dx} = xy + y^2$ for x = 0.1, 0.2, when y(0) = 1. **[8]**

Q11)a) Using crank Nicolson method solve $u_{xx} = u_t$, subject to u(x,0) = 0; u(0,t) = 0 and u(1,t) = t. taking h= ¼ and k = 1/8, compute u for one time step. **[10]**

b) Draw flow chart to solve Parabolic Equation by Explicit Method. **[8]**

OR

Q12)a) Draw flow chart to solve Hyperbolic Equation. **[8]**

b) Evaluate the pivotal values of equation $u_{tt} = 16u_{xx}$, taking $\Delta x = 1$ upto t=3. The boundary conditions are u(0,t)=u(5,t) = 0 and $u(x,0)= x^2(5-x)$. List values for 3 iterations. **[10]**

Total No. of Questions : 10]

SEAT No. :

P2557

[Total No. of Pages :3

[5153]-525

T.E. (Mechanical Sandwich Engineering)
MACHINE DESIGN
(New 2012 Course) (302062) (Semester-I)

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

Instructions to the candidates:

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

Q1) a) Write in detail Standards and codes? **[6]**

b) Explain in detail Goodman approach? **[4]**

OR

Q2) a) Write in detail springs are in series? **[4]**

b) Double threaded power screw, with ISO metric trapezoidal thread, is used to raise a load of 400 kN. The nominal diameter is 80mm and the pitch is 10mm. The coefficient of friction at screw thread is 0.15. Neglect the collar friction, Calculate

i) Power required to raise the load.

ii) Power required to lower the load. **[6]**

Q3) a) Write the torque analysis to lift and lower the load? **[4]**

b) Derive an expression for Springs in series? **[6]**

OR

Q4) a) What is the concept of collar friction loss? **[4]**

b) A rectangular cross section is welded to a support by means of fillet weld as shown in fig.1. Determine size of the welds, if permissible shear stress in weld is limited to 60 N/mm^2. **[6]**

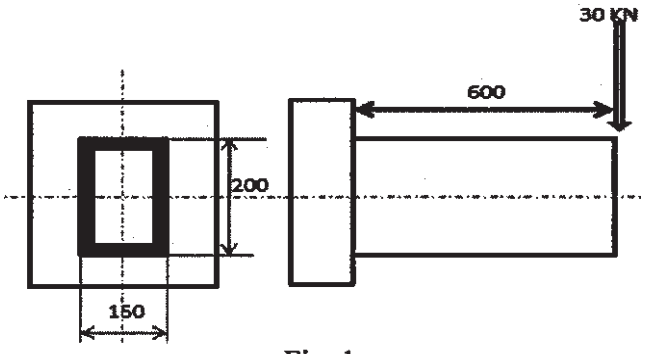


Fig. 1

P.T.O.

Q5) a) The following data is given for a pair of spur gear with 20 degree of full depth involute teeth. Number of teeth on pinion=24, Number of teeth on gear =56, Speed of pinion=1440rpm, Module=5 mm, Service factor 1.5, Face width=15mm. Both the gears made up of steel with an ultimate tensile strength =750 N/mm^2. Using the velocity factor to account for the dynamic load calculate

i) Beam strength,

ii) Velocity factor. **[12]**

b) Write causes of failure of gears. **[6]**

OR

Q6) a) A helical pinion having 14 teeth made of alloy steel (Sut = 600 N/mm^2) is mesh gear made of plain carbon steel 55 C8 (Sut = 700 N/mm^2). The gear pair is required to transmit 50 kW power from an electric motor running at 800 rpm to machine at 220 rpm. The application factor and load concentration factor are 1.2 and 1.1 respectively while the factor of safety is 1. The face width is 10 x normal module (10 M_n) and tooth system is 20° full depth involute. Deformation factor for gear pair is 13000 e, N/mm. Design the gear pair by using the velocity factor and Buckingham's equation for dynamic load. **[12]**

b) With neat sketch explain wear equation for Helical gear? **[6]**

Q7) a) Explain in design of bearing for cyclic loads and speed. **[6]**

b) A single row deep groove ball bearing has a dynamic load capacity of 50000N and operates on following work cycle.

i) Radial load 7000N at 600rpm for 25% of the time.

ii) Radial load 30000N at 700rpm for 50% of the time.

iii) Radial load 9500N at 500rpm for 25% of the time.

Determine life of bearing in hours. **[10]**

OR

Q8) a) Explain the designation of bearing? **[6]**

b) A single row deep groove ball bearing has a dynamic load capacity of 45000N and operates on following work cycle.

i) Radial load 6000N at 500rpm for 25% of the time.

ii) Radial load 11000N at 600rpm for 50% of the time.

iii) Radial load 8000N at 400rpm for 25% of the time.

Determine life of bearing in hours. **[10]**

Q9) a) Explain in detail construction of V belt? **[4]**

b) Two shafts whose centers are 1 meter apart are connected by a V -belt drive. The driving pulley is supplied with 100 kW power and has an effective diameter of 350mm. It runs at 1200 rpm, while the driven pulley runs at 375 r.p.m. The angle of groove on the pulleys is 400. Permissible tension in 400mm^2 cross-sectional area belt is 2.1 MPa. The material of the belt has density of 1200kg/ mm^3. The driven pulley is overhung, the distance of the centre from the nearest bearing being 200 mm. The coefficient of friction between belt and pulley rim is 0.28. Estimate the number of belts required. **[12]**

OR

Q10)a) Write equations for open and cross belt? **[4]**

b) A pulley of 1800mm diameter is driven by an open belt from 20 kW, 1400rpm electric motor. The pulley on motor shaft is 200mm diameter and centre distance between two shaft is 2m. The allowable tensile stress for belt material is 3 N/mm^2 and coefficient of friction between belt and pulley is 0.25. The density of material is 1000kg/m^3. If width of belt is 100mm, determine thickness of belt, length of belt, initial tension required in belt. **[12]**

✡ ✡ ✡

Total No. of Questions : 12]

SEAT No. :

P2558

[Total No. of Pages : 3

[5153]-526

T.E. (Mechanical Sandwich)

MATERIALS AND MANUFACTURING ENGINEERING

(2012 Course) (Semester - II) (End Sem.) (302066) (Self Study - I)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) Describe vulcanization of rubber with its applications? **[8]**

b) What do you mean by Fiber Reinforced composites? Explain the characteristics of Composite materials in order to improve the Mechanical puppetries? **[8]**

OR

Q2) a) Discuss applications of engineering polymers and their properties. **[8]**

b) For composite materials, what are iso-stress and iso-strain conditions? Explain with suitable example. **[8]**

Q3) a) Discuss the need and significance of advanced materials in following applications:

i) Bio-medical implants

ii) Surgical Instruments,

iii) Mobile phones **[8]**

b) What are Cryogenics materials? Explain use of modern materials for high/low temperatures and also at Cryogenic temperatures? **[8]**

OR

P.T.O.

Q4) a) What is carbon Nanotubes? Discuss the technological advantages of nano materials. **[8]**

b) What is Shape Memory Alloys and explain its applications? **[8]**

Q5) a) List some common inhibitors and their applications. **[6]**

b) Describe design changes in order to prevent or control the corrosion? **[6]**

c) What is mechanism of corrosion? Explain Anodic and catholic process of corrosion? **[6]**

OR

Q6) Differentiate between: **[18]**

a) Dry corrosion and wet corrosion.

b) Classification of corrosion.

c) Inter-granular corrosion and stress corrosion.

SECTION - II

Q7) a) What is meant by powder metallurgy? State the advantages and limitations of powder metallurgy. **[8]**

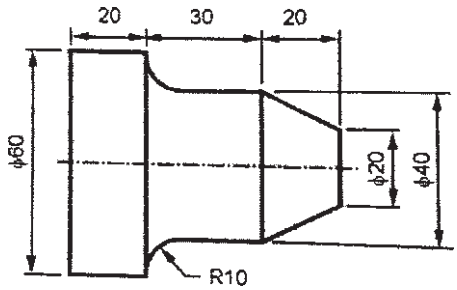
b) What is self lubricating bearing? How are they produced? Mention its advantages. **[8]**

OR

Q8) a) Explain the procedure of manufacturing parts by powder metallurgy. **[8]**

b) Discuss Tribological aspects of products formed by Powder Metallurgy process. **[8]**

Q9) a) Write a part program for a component shown in figure below. Assume that the spindle speed 300 rpm and feed is 0.5 mm/rev. **[10]**



b) Draw block diagram of NC, CNC and DNC machines and compare. **[6]**

OR

Q10)a) Explain following M codes and G codes **[8]**

i) G90,

ii) G02,

iii) G41,

iv) M05,

v) M06,

vi) G63,

vii) M11,

viii) M30

b) What is absolute and incremental programming? Explain. **[8]**

Q11)a) Describe with neat sketch the detail terminology of pull type Internal broach. **[8]**

b) Discuss various methods of Gear Finishing in detail. **[10]**

OR

Q12) Write notes on: **[18]**

a) Gear Shaping process.

b) Thread cutting.

c) Lapping and Honing.

x x x

Total No. of Questions : 12]

SEAT No. :

P2559

[Total No. of Pages : 2

[5153]-527

T.E.Mechanical (Sandwich)

INDUSTRIAL ENGINEERING AND PRODUCTION MANAGEMENT

(2012 Pattern) (302067) (Semester-II) (Self Study-II)

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

Instructions to the candidates:

1) ***Answer 3 questions from Section I and 3 questions from Section II.***
2) ***Answer to the two sections should be written in separate books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right side indicate full marks.***
5) ***Your answers will be valued as a whole.***
6) ***Assume Suitable data, if necessary.***

SECTION-I

Q1) a) Explain the functions and applications of Industrial Engineering. **[8]**

b) Write short note on Evolution of Management thoughts. **[8]**

OR

Q2) a) Explain various approaches to the management. **[8]**

b) Explain contribution of FW Taylor and Gilberth to industrial engineering. **[8]**

Q3) a) Explain importance of Ergonomics in industry. **[8]**

b) Explain process chart with example. **[8]**

OR

Q4) a) Explain techniques used in method study. **[8]**

b) Write a short note on 5W and 1H approach. **[8]**

P.T.O.

Q5) a) Explain significance of organization structure of engineering company with example. **[10]**

b) Explain responsibilities of production manager. **[8]**

OR

Q6) a) Explain procedure of selection of plant location & layout for 3 wheeler automobile plant. **[10]**

b) Explain the types of material handling equipment along with its principle. **[8]**

SECTION-II

Q7) a) Explain function of production planning and control. **[8]**

b) Explain material requirement planning. **[8]**

OR

Q8) a) Explain ABC analysis in detail. **[8]**

b) Explain VED analysis in detail. **[8]**

Q9) a) Explain general consideration in selecting machining methods. **[8]**

b) Compare CPM with PERT. **[8]**

OR

Q10)a) Explain role of product engineering department. **[8]**

b) Explain phases of process planning along with its principles. **[8]**

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

a) Kaizen

b) Poka Yoke

c) 5's

OR

Q12)Write short notes on: **[18]**

a) JIT

b) Green production.

c) Energy conservation & Energy audit.

Total No. of Questions : 10]

SEAT No. :

P2560

[Total No. of Pages : 3

[5153]-534

T.E. (Automobile Engineering)

DESIGN OF MACHINE ELEMENTS

(2012 Pattern) (Semester - I) (Endsem.)(316481)

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

Instructions to the candidates:

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

Q1) a) What are the factors to be considered while designing a machine element? **[6]**

b) How do you classify couplings? **[4]**

OR

Q2) a) Explain the general design procedure. **[6]**

b) Derive the expressions for stresses in keys. **[4]**

Q3) a) The lead screw of a lathe has single start ISO trapezoidal threads of 30mm diameter and 6 mm pitch. it drives a tool carriage and exerts an axial load of 1.5 KN on a collar of 30 mm inside diameter and 50 mm outside diameter. If the lead screw rotates 40 rpm, find the power required to drive the screw and efficiency. Take the coefficient of friction for power screw as 0.14 and for collar as 0.09. **[8]**

b) Differentiate between transmission shafts and machine shafts. **[2]**

OR

Q4) a) Derive an expression for torque required to lower the load in power screws. **[8]**

b) Determine the required length of square key if key and shaft are made up of same material. Take diameter of shaft as 40mm. **[2]**

P.T.O.

Q5) a) A simply supported beam has a concentrated load at the center. the load fluctuates from P to 4P. The span of the beam is 500mm, circular cross-section with diameter 60 mm. The yield stress is 390 Mpa and endurance limit is 260 Mpa and factor of safety is 1.5. Calculate P. Take fatigue stress concentration factor=1, correction factor=1, surface finish factor =0.85, size factor=1. **[10]**

b) What are the causes of stress concentration and what are the methods of reducing stress concentration? **[6]**

OR

Q6) a) Derive soderberg equation. **[10]**

b) A mass of 500kg is being lowered by means of steel wire rope having cross sectional area 250mm^2. The velocity of weight is 0.5m/sec. When the length of extended rope is 20m, the sheave gets stuck up. Determine the stress induced in the rope due to sudden stoppage of sheave. Take E=0.8×10^{6}Mpa. **[6]**

Q7) a) What are the materials used for sliding contact bearings? Explain. **[6]**

b) The following data is given for a 360° hydrodynamic bearing. Radial load=3.2KN, journal speed=1490rpm, journal diameter=50mm, bearing length=50mm, radial clearance=0.05mm, viscosity of lubricant=25cP. Assuming that the total heat generated in the bearing is carried by the total flow in the bearing. Calculate (i) coefficient of friction (ii) power lost in friction (iii) minimum oil film thickness (iv) flow requirement in Lit/min (v) temperature rise. **[10]**

l/d	**S**	**(r/c)f**	**(h_o/c)**	**Q/rcnl**
1	**0.121**	**3.22**	**0.4**	**4.33**
1.5	**0.134**	**3.49**	**0.6**	**4.89**

OR

Q8) a) Derive petroff's equation for bearings. **[6]**

b) The bearing of a system carries a radial load of 3000N and axial load of 1000N. The angular speed of shaft is 60 rad/sec. The bearing has to

operate 8hrs/day. Dynamic capacity of bearing is 27070N. Take radial factor as 0.56, thrust factor as 1.71 and rotating factor as 1. Wheather the design is safe for bearing? **[10]**

Q9) a) Derive Lewis equation for beam strength. **[6]**

b) Design spur gear set to transmit 20KW at 900rpm of pinion. The transmission ratio is 3. Take 20º FDI, Z_1=18, σ_d=193.2Mpa, BHN=250 for pinion and σ_d=47.1Mpa, BHN=200 for gear. Check only tangential tooth load. Form factor Y=π (0.154-0.912/Z), C_v=3.05/3.05+v. **[12]**

OR

Q10)a) Derive an expression for formative number of teeth in helical gear. **[6]**

b) A motor shaft running at 1440rpm to transmit 15KW of power to a low speed shaft with a speed reduction through helical gears having helix angle 25º, transmission ratio is 3:1. The teeth are 20ºFDI system and the pinion have 25 teeth. σ_d=193.2Mpa, BHN=250 for pinion and σ_d=138.3Mpa, BHN=180 gear. Design gear set.

Y=π(0.154-0.912/z_e), C_v=6.1/6.1+v **[12]**

Total No. of Questions :10]

SEAT No. :

P2561

[Total No. of Pages :2

[5153] - 535

T.E. (Automobile)

AUTOMOTIVE ELECTRICAL AND ELECTRONICS

(2012 Course) (316482) (Semester - I)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of logarithmic tables, slide rule, electronic pocket calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Draw the simple sketch of electrical horn and explain it in brief. **[5]**

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

i) Battery ratings

ii) Battery capacities

OR

Q2) a) Explain magneto ignition systems with the help of neat sketch. **[5]**

b) List down the types spark advance mechanism? Explain Centrifugal advance with neat sketch. **[5]**

Q3) a) Explain gas discharge light and LED Light. **[5]**

b) With neat sketch explain the balancing coil type of temperature gauge. **[5]**

OR

Q4) a) Explain the spark plug with its constructional details. **[5]**

b) What do you mean by positive and negative earth return method. **[5]**

Q5) a) With the help of neat sketch explain the air flow rate sensor. **[8]**

b) Explain the solenoid actuator with neat sketch. **[8]**

OR

P.T.O.

Q6) a) With neat sketch explain the working of idle speed rotary actuator. **[8]**

b) Explain the operation of MAP sensor with its neat sketch. **[8]**

Q7) a) Explain acceleration and full load enrichment conditions. **[8]**

b) Explain cold starting and warm start conditions. **[8]**

OR

Q8) a) Explain group and sequential injection techniques. **[8]**

b) Compare open loop and close loop control system. **[8]**

Q9) a) Draw the simple layout of antilock braking system and explain function of each component. **[10]**

b) Explain vehicle security system and vehicle tracking system. **[8]**

OR

Q10)a) Explain Supplementary Restraint System of air bag system with its layout. **[10]**

b) Explain radar warning system with simple sketch. **[8]**

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Total No. of Questions : 10]

SEAT No. :

P2562

[Total No. of Pages : 3

[5153]-536
T.E. (Automobile)
DESIGN OF ENGINE COMPONENTS
(2012 Pattern) (Semester - II) (End Semester) (316484)

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

Instructions to the candidates:

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

Q1) a) List out the desired properties of good lubricant. **[4]**

b) Estimate-bore diameter, stroke length, swept volume, engine speed for a diesel engine which develops 90 KW power with mean effective pressure of 0.6 N/mm^2 & mean piston speed is 600 m/min. **[6]**

OR

Q2) a) Write a note on Dry sump lubrication system. **[4]**

b) The 4 stroke petrol engine develops 40 KW power with mean effective pressure of 0.8 N/mm^2 & mean piston speed 820 m/min. Find Bore diameter, stroke length, swept volume, engine speed. **[6]**

Q3) a) Explain working principle of Radiator. **[2]**

b) The following data is given for the piston of a four stroke diesel engine: **[8]**

Cylinder bore = 250mm

Material of piston rings = Grey cast iron

Allowable tensile stress = 100 N/mm^2

Allowable radial pressure on cylinder wall = 0.03 MPa

Thickness of piston head = 42mm

Number of piston rings = 4

Design piston rings and piston barrel.

OR

P.T.O.

Q4) a) Define Indicated thermal efficiency & Brake thermal efficiency. **[2]**

b) Determine the dimension of small end & big end bearing of the connecting rod for a diesel engine with the following data

Cylinder bore = 100mm, maximum gas pressure = 4MPa, (l/d) ratio for piston pin bearing = 2, (l/d) ratio for crank pin bearing = 1.3, allowable bearing pressure for piston pin bearing = 12MPa, allowable bearing pressure for crank pin bearing = 7.5 MPa. **[8]**

Q5) a) Explain Dry and Wet cylinder linear with neat sketch. **[4]**

b) The cylinder of a four stroke diesel engine has the following specifications: Brake power = 7.5 KW, speed = 1400 rpm, indicated mean effective pressure = 0.35 MPa, mechanical efficiency = 80%, maximum gas pressure = 3.5 MPa. The cylinder linear and head are made of grey cast iron FG 260 (Sut = 260 N/mm^2 and μ = 0.25). The studs are made of plain carbon steel 40 C8 (Syt = 380 N/mm^2) The factor of safety for all parts is 6. **[12]**

Calculate:

- Bore and length of the cylinder liner
- Thickness of the cylinder liner
- Thickness of the cylinder head

Re-boring allowance for l.C. engine cylinder is:

D	75	100	150	200	250	300	350	400	450	500
C	1.5	2.4	4.0	6.3	8.0	9.5	11.0	12.5	12.5	12.5

OR

Q6) a) The Cylinder of four stoke diesel engine has the following specification, **[8]**

Cylinder bore = 150 mm

maximum gas pressure = 3.5 N/mm^2

Cylinder material = Grey C.I FG200 (S_{ut} = 200 MPa),

Factor of Safety = 5,

Poisson's ratio = 0.25,

Determine thickness of the wall & net circumferential stresses in the cylinder wall.

b) Design an exhaust valve for a horizontal diesel engine using the following data: Cylinder bore = 150 mm, length of stroke = 275 mm, engine speed = 500 rpm, maximum gas pressure = 3.5 MPa, seat angle = 45°. **[8]**

Calculate:

- Diameter of the valve port
- Thickness of the valve head
- Diameter of the valve stem
- Maximum lift of the valve

Assume mean velocity of the gas = 50m/s, constant k for steel valve as 0.42 and permissible bending stress as 50 N/mm^2.

Q7) a) Explain the working procedure of mechanical fuel pump with neat sketch. **[8]**

b) Explain working of exhaust gas CO and HC analyzer with neat sketch. **[8]**

OR

Q8) Write a short note on **[16]**

a) Cylinder leakage test

b) Cylinder compression test

c) Vacuum gauge test

d) Cylinder power balance

Q9) a) Write the advantages of Dual Twin Spark-ignition (DTS-i) over single spark ignition Engine. **[9]**

b) Explain the Homogenous Charge Compression lgnition (HCCI). **[9]**

OR

Q10)a) Explain the Variable valve timing (VVT) with neat sketch. **[9]**

b) Explain the working of Stratified Charged Engine with neat sketch. **[9]**

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Total No. of Questions : 10]

SEAT No. :

P2563

[Total No. of Pages : 2

[5153]-537
T.E.(Automobile Engineering)
AUTOMOTIVE TRANSMISSION
(2012 Pattern) (Semester-II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right side indicate full marks.***
3) ***Use of Logarithmic tables, slide rule, electronic pocket calculator is allowed.***

Q1) a) Give the classification of clutches used in automobile? **[4]**

b) Differentiate between fully forward, and semi forward types of chassis? **[6]**

OR

Q2) a) Compare constant mesh gearbox with synchromesh gearbox? **[4]**

b) What are the types of chassis layout with reference to power plant locations and type of drive? Explain any one? **[6]**

Q3) a) What are the Requirements of gear box? **[2]**

b) Explain the different joints used in automobile drive lines? **[8]**

OR

Q4) a) Explain the functions of gear box? **[2]**

b) What is Hotchkiss drive & torque tube drive arrangement? **[8]**

Q5) a) Compare semi-floating, full floating, and three quarter floating axles. **[8]**

b) Write note on final drive lubrications. **[8]**

OR

P.T.O.

Q6) Explain differential with its need, function construction and working? What is limited slip differential? **[16]**

Q7) a) Explain construction and working Fluid flywheel with its advantages and limitations. **[9]**

b) Compare fully Automatic transmission with manual transmission. **[9]**

OR

Q8) a) Explain use of epicyclic gear train in an Automobile? **[9]**

b) Write note on Performance characteristics of Torque convertor. **[9]**

Q9) a) Differentiate semi-automatic and fully automatic transmission. **[8]**

b) Explain construction and working of continuous variable transmission. With its advantages and disadvantages. **[8]**

OR

Q10)a) Can we use fully automatic transmission system for heavy duty vehicle? Elaborate your answer with an example? **[8]**

b) Explain any automatic transmission system used in modern car. **[8]**

Total No. of Questions : 10]

SEAT No. :

P2564

[Total No. of Pages : 2

[5153]-538

T.E. (Automobile Engineering)

AUTOMOTIVE AERODYNAMICS & BODY ENGINEERING

(2012 Course) (Semester - II) (316486)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of logarithmic tables, slide rule, electronic pocket calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) What are the various types of forces and moments acting on a body subjected to fluid flow? **[4]**

b) Explain behavior of flow around circular cylinder and aerofoil? **[6]**

OR

Q2) a) Enlist Various body optimization techniques for minimum drag? **[6]**

b) Write a short note on resistances offered to vehicle while running. **[4]**

Q3) a) Write in brief about any two flow visualization technique in wind tunnel. **[6]**

b) Discuss flow field around car? **[4]**

OR

Q4) a) As part of the continuing efforts to reduce the drag coefficient and thus to improve the fuel efficiency of cars, the design of side rearview mirrors has changed drastically from a simple circular plate to a streamlined shape. Determine the amount of fuel and money saved per year as a result of replacing a 13-cm-diameter flat mirror by one with a hemispherical back. Assume the car is driven 24,000 km a year at an average speed of 95 km/h. Take the density and price of gasoline to be 0.8 kg/L and 75 rs/L, respectively; the heating value of gasoline to be 44,000 kJ/kg; and the overall efficiency of the engine to be 30 percent. **[6]**

b) Write differences between hatck back and sedan cars? **[4]**

P.T.O.

Q5) a) Sketch and explain typical car body with its nomenclature? **[6]**

b) What are the methods for improving visibility of vehicle? **[6]**

c) Write a short note on front assembly of a car? **[6]**

OR

Q6) a) Write a types of metal section used for bus body construction? **[6]**

b) Sketch and explain in details any 4 types of bus body? **[6]**

c) Write a short note on rear assembly of a car? **[6]**

Q7) a) How chassis frame are designed? **[8]**

b) Explain the basic truck body with flat platform, drop side, fixed side layout. **[8]**

OR

Q8) a) What are various body types of light commercial vehicles? **[8]**

b) Write a short note on dimensions of driver seat in relation to control **[8]**

Q9) a) Explain the ergonomic considerations in driver seat design for bus? **[8]**

b) Discuss in detail about anthropometry? **[8]**

OR

*Q10)*a) Explain various types of load acting on vehicle? **[8]**

b) Explain different types of seats and seat belts used in Automobiles? **[8]**

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Total No. of Questions : 8]

SEAT No. :

P2565

[Total No. of Pages : 2

[5153]-541

T.E. (Electronics)

ELECTRICAL MACHINES & POWER DEVICES

(2012 Pattern) (Semester - I) (End sem.)(304201)(Theory)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain with diagram safe operating area of power semiconductor devices? **[6]**

b) Explain the two transistor analogy for SCR and derive an expression for anode current IA. **[7]**

c) Justify the need of snubber circuit. Explain with a neat circuit diagram protection of power devices using snubber circuit**.** **[7]**

OR

Q2) a) Explain V-I characteristics of TRIAC and its construction details. **[6]**

b) Explain the need for protection of power devices and State different types of protections required to ensure safety of power devices. **[7]**

c) Explain with diagram light dimmer circuit using TRIAC. **[7]**

Q3) a) Derive the EMF expression of a DC generator. **[6]**

b) Write a short note on permanent magnet DC motor. State advantages, disadvantages and applications. **[6]**

c) A 4 pole dc motor is having induced EMF 188V across armature. Find the torque and gross mechanical power developed when the motor is drawing 25 A and running at 1500 rpm. **[4]**

OR

Q4) a) Justify the need for starter for a DC motor. Explain the working of a three point starter with the help of a neat diagram. **[6]**

P.T.O.

b) Distinguish between self excited and separately excited DC generator. **[6]**

c) A 230 V dc shunt motor takes 32 A at full load. Calculate the back emf on full load if $R_a = 0.2\Omega$ and $R_{sh} = 1\Omega$ respectively. **[4]**

Q5) a) Explain with a diagram the difference between 3 phase slip ring induction motor and 3 phase squirrel cage induction motor. **[8]**

b) A 6 pole, 50 Hz, 3-phase induction motor running on full load develops a useful torque of 160 Nm when the rotor EMF makes 120 complete cycles per minute. Calculate the shaft power output. If the mechanical torque lost in friction and that for core loss is 10Nm. Compute (a) the copper loss in the rotor winding (b) the input to the motor (c) the efficiency. The total stator loss is given to be 800W. **[10]**

OR

Q6) a) Explain the complete torque-slip characteristics of a three phase induction motor including motoring, generating and breaking regions. **[8]**

b) Show that the rotor input, rotor copper losses, mechanical power developed is in the ratio of 1:s:1-s. **[10]**

Q7) a) Explain with diagram the operating principle of BLDC. **[8]**

b) Explain the principle of operation of capacitor start and capacitor run single phase induction motor along with the torque slip characteristics and the applications. **[8]**

OR

Q8) a) Write a note on AC servomotor. **[8]**

b) Explain the operation of a variable reluctance motor. **[8]**

Total No. of Questions : 8]

SEAT No. :

P2566

[Total No. of Pages : 3

[5153]-542

T.E. (Electronics)

DATA COMMUNICATION

(2012 Course) (End Sem.) (Semester-I)

Time :2:½ Hours] *[Max. Marks :70*

Instructions to the candidates:

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

Q1) a) For a given Data [1011 1010], draw following line codes. **[8]**

i) Unipolar Rz.

ii) Polar RZ.

iii) AMI.

iv) Bipolar Rz.

b) Explain DPCM in detail with the help of transmitter and receiver. **[6]**

c) Compare co-axial cable, Twisted pair and optical cable. **[6]**

OR

Q2) a) Explain DM with suitable block diagram comment on advantages and limitations. **[8]**

b) Draw layered architecture of OSI model. Explain functioning of data link layer and network layer. **[6]**

c) A rate $\frac{1}{3}$ convolution encoder has generator vectors as g1=(100), g2 = (111), g3 = (101). **[6]**

i) Sketch the encoder configuration.

ii) Draw the code tree, state diagram and trellis diagram.

P.T.O.

Q3) a) Apply shannon-fano encoding scheme for given message ensemble. **[8]**

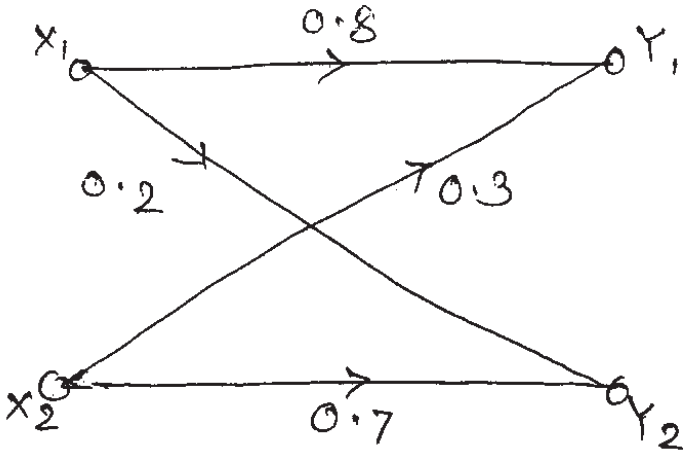
$[x] = [x_1 \ x_2 \ x_3 \ x_4 \ x_5 \ x_6 \ x_7 \ x_8]$

$[P] = \left[\frac{1}{4} \ \frac{1}{8} \ \frac{1}{16} \ \frac{1}{16} \ \frac{1}{4} \ \frac{1}{16} \ \frac{1}{8}\right]$

b) Prove that , $H(X, Y) = H\left(\frac{x}{y}\right) + H(Y)$ & $H(X,Y) = H\left(\frac{y}{x}\right) + H(x)$. **[8]**

OR

Q4) a) Find the channel capacity of channel shown in fig. **[8]**



b) Apply Huffman coding procedure to find the coding efficiency for the following symbols. **[8]**

$s_1 = \frac{1}{3}$, $s_2 = \frac{1}{27}$, $s_3 = \frac{1}{3}$, $s_4 = \frac{1}{9}$

$s_5 = \frac{1}{9}$, $s_6 = \frac{1}{27}$, $s_7 = \frac{1}{27}$.

Q5) a) Derive an expression for error probability of ASk. **[8]**

b) Explain QPSK with its transmitter and Receiver. **[8]**

OR

Q6) a) Draw block diagram of OFDM and explain working of it in detail. **[8]**

b) Describe QPSK system in detail compare its performance with that of QAM.**[8]**

Q7) a) Define.

i) Chip rate.

ii) Process gain.

Determine the processing gain and jamming margin for DSSS system with T_b=1 msec and T_c=1 μ sec. **[6]**

b) State and explain properties of PN sequence. **[6]**

c) Compare FDMA, TDMA and CDMA. **[6]**

OR

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

a) DSSS.

b) FHSS.

c) CSMA.

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Total No. of Questions :8]

SEAT No. :

P2567

[Total No. of Pages :2

[5153] - 543

T.E. (Electronics Engineering)

MICROCONTROLLER AND APPLICATIONS

(2012 Course) (End Semester - I) (304203)

Time : 2½Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Answers the Q.1 or Q.2 and Q.3 or Q.4 and Q.5 or Q.6 and Q.7 or Q.8.***
2) ***Answer any four questions.***
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.***

Q1) a) Differentiate between RS 232 and RS 485 communication protocol. **[6]**

b) Draw & explain the Internal RAM organization 8051 microcontroller. **[6]**

c) Explain the Memory structure of the PIC 18FXX Microcontroller. **[8]**

OR

Q2) a) Compare RISC and CISC. **[6]**

b) Explain the following instruction with suitable example. **[6]**

i) BZ

ii) MOVX A,65H

iii) XRL A, Rn

c) Explain the Addressing modes of the PIC 18FXX Microcontroller. **[8]**

Q3) a) Explain with diagram compare and capture mode of PIC 18FXXX. **[8]**

b) Draw an interfacing diagram and write an Embedded C Program to interface 16×2 LCD with PIC 18FXX Microcontroller to display the "PUNE" message. **[8]**

OR

P.T.O.

Q4) a) Draw and explain the interrupt structure for the PIC 18FXX microcontroller. **[8]**

b) Write a C18 Program to toggle all the bits of PORTB bit continuously every 250ms. Assume that XTAL =16MHZ. **[8]**

Q5) a) Write a PIC 18 C Program for UART Communication to send the a message "University of Pune" with a baud rate of 19200. Assume that XTAL=8MHZ. **[8]**

b) Explain the MSSP with SPI mode. **[8]**

OR

Q6) a) Design a interfacing diagram and write a C18 program for channel 0 of ADC and display the output on PORTB and PORTD Assume that XTAL = 8MHZ. **[8]**

b) Draw interfacing diagram and write a program for SPI based Memory interfacing with PIC18FXXX. **[8]**

Q7) a) Explain in detail design considerations of data acquisition system. **[12]**

b) Explain how the speed of the DC motor controlled by PWM. **[6]**

OR

Q8) a) What are design consideration to design Digital voltmeter? Design the Digital voltmeter using PIC microcontroller to measure the voltage range 0 V to 200 DC Volt. Draw the block diagram and flow chart. **[12]**

b) Design a frequency counter with the help of block diagram. **[6]**

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Total No. of Questions :8]

SEAT No. :

P2568

[Total No. of Pages :2

[5153] - 544

T.E. (Electronics Engg.)

ELECTROMAGNETIC AND WAVE PROPAGATION

(2012 Pattern) (End Semester) (Semester - I)

Time : 2½Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2,Q.3 or Q.4,Q.5 or Q.6, Q.7 or Q.8.***
2) ***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) State and prove the differential form of Gauss Law. **[6]**

b) Explain polarization in dielectrics? Derive mathematical expression for polarization. **[6]**

c) Plane z = 0 and z = 4 carry current $\bar{k} = -10\,\overline{a_x}$ A|m and $\bar{k} = 10\,\overline{a_x}$ A/m respectively Determine $\bar{H}$ at **[8]**

i) (1 1 1) b) (0 –3 10)

OR

Q2) a) Derive the expression for electric field intensity using coulomb's law of force. **[6]**

b) Given $\bar{E} = 60\overline{a_x} + 20\overline{a_y} - 30\overline{a_z}$ V/m at a point on the interface between air and conducting surface. Find $\bar{D}$ and ρ_s at that point. **[6]**

c) State and prove Ampere's circuital Law in integral and differential form. **[8]**

Q3) a) Write Maxwell's equation in point form and integral form for time varying fields and free space. **[10]**

b) A parallel plate capacitor with plate area of $5cm^2$ and plate separation of 3 mm has a voltage 50 sin 10^3t volts applied across the plates. Calculate the displacement current assuming $\in = 2\in_0$. **[8]**

OR

P.T.O.

Q4) a) What is Faraday's law? Derives expression for e.m.f. induced in conductor in motion through time varying field. **[9]**

b) State and prove poynting theorm. Interpret each term. **[9]**

Q5) a) Explain and derive the plane wave equation in free space. **[8]**

b) State and explain Maxwell's equation in phasor form. **[8]**

OR

Q6) a) An electric field in free space is given by, **[10]**

$$\bar{E} = 50\cos(10^8 t + \beta x)\overline{a_y} \text{ V|m}$$

i) Find the direction of wave propogation.

ii) Calculate β and the time it takes to travel a distance of $\lambda/2$.

iii) Sketch the wave at t = 0, T/4 and T/2.

b) Explain reflected wave, Transmitted wave, incident wave. **[6]**

Q7) a) Derive and explain the Friis Transmission equation. **[8]**

b) Explain the different types of wave propogation indetail. **[8]**

OR

Q8) a) Write short note on ground wave propagation. **[8]**

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

i) Super refraction in atmospheric duct.

ii) Tropospheric scatter propagation.

EEE

Total No. of Questions :8]

SEAT No. :

P2569

[Total No. of Pages :4

[5153] - 545
T.E. (Electronics)
NETWORK SYNTHESIS
(2012 Course) (Semester - I) (End Semester)

Time : 2.30 Hours] *[Max. Marks :70*

Instructions to the candidates:

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

Q1) a) Test given function for positive realness **[6]**

$$F(s) = \frac{2s^3 + 2s^2 + 3s + 2}{s^2 + 1}.$$

b) Synthesis following function using cauer I & II. **[6]**

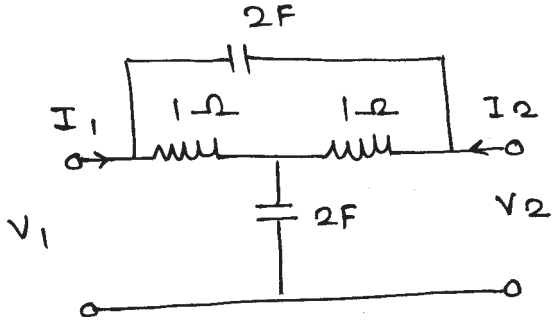
$$Z(s) = \frac{s\,(s^2+2)\,(s^2+5)}{(s^2+1)\,(s^2+3)}.$$

c) Synthesize following LC ladder network with 1Ω termination **[8]**

$$Z_{21} = \frac{s^3}{s^3 + 3s^2 + 4s + 2}.$$

OR

Q2) a) For given N/W find Z_{11} & Z_{21} **[6]**



P.T.O.

b) Realize the given addmittance function using partial fraction expansion **[6]**

$$Y(s)= \frac{(s+2)(s+3)}{(s+1)(s+4)}.$$

c) Synthesize the voltage transfer ratio $\frac{V_2}{V_1}$ **[8]**

$$\frac{V_2}{V_1} = \frac{(s+2)(s+4)}{(s+3)(3s+4)}.$$

Q3) a) Realize 3rd order Butterworth Low pass filter **[6]**

$$H(s) = \frac{1}{(s+1)(s^2+s+1)}.$$

b) Determine order of filter for given specification **[4]**

i) Pass band 0.2 M rad / s

ii) Pass band loss $\leq$ 2 dB

iii) Stop band loss $\leq$ 60 dB at 6 M rad / s

c) What is magnitude and frequency scalling? Explain the need of it. **[6]**

OR

Q4) a) Synthesize a Chebyshev low pass filter to meet the following specification. **[10]**

i) load resistance RL = 600Ω

ii) ½ dB ripple with pass band

iii) cut of frequency $= 5 \times 10^5$ rad/s

iv) at 1.5×10^6 rad/s the magnitude must be down 30 dB.

b) Compare Butterworth & Chebyshev filter. **[6]**

Q5) a) Synthesize the following function using positive feedback topology. **[6]**

$$H(s) = \frac{20{,}000}{s^2 + 100s + 10{,}000}.$$

b) Derive the transfer function equation of low pass filter using RC element for feed forward & feedback transfer function equation. **[6]**

c) Explain how to convert Low pass filter to High pass using RC-CR transformation. **[4]**

OR

Q6) a) Synthesize a 2^{nd} order band pass filter with centre frequency 1000 rod/s and pole Q = 10 using sallen & key circuit. **[6]**

b) Synthesize a 2^{nd} order low pass Butterworth filter to have a cut of frequency 159.15Hz. Using RC-CR transmission realize a high pass filter for same cut of frequency. **[6]**

c) What is biquadratic function? List important properties of it. **[4]**

Q7) a) Explain effect of op-amp parameters on filter performance. **[8]**

i) Dynamic range

ii) Slew rate

iii) Offset voltage

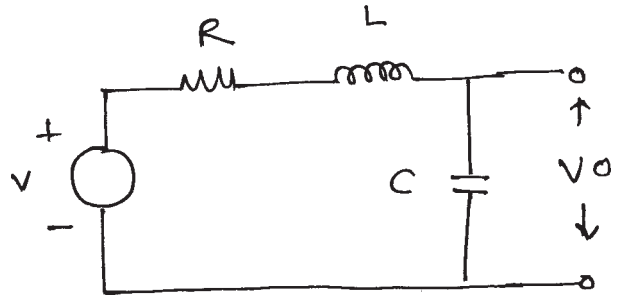
iv) CMRR

b) What is gain sensitivity? Explain factors attaching on gain sensitivity? **[6]**

c) Define sensitivity? Give some of its important properties. **[4]**

OR

Q8) a) Find transfer function of given N/W and compute the sensitivity of K, ω_p, Q_p with all elements. **[8]**



b) Explain in details Op-amp frequency characteristics & compensation techniques. **[6]**

c) Prove the following sensitivity relationships **[4]**

i) $S_x^{p^n} = n\, S_x^p$

ii) $S_{\sqrt{x}}^p = 2S_x^p$

EEE

Total No. of Questions : 8]

SEAT No. :

P2570

[Total No. of Pages : 2

[5153]-546
T.E. (Electronics)
INSTRUMENTATION SYSTEMS
(2012 Pattern) (Semester - II) (304209)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) List any eight static characteristics of instruments and define any four of them. **[6]**

b) Explain construction and working of linear absolute and incremental encoders. **[8]**

c) With the help of neat diagram explain the working of optical pyrometer. **[6]**

OR

Q2) a) Explain the concept of primary, secondary and working standards of calibration with suitable example. **[6]**

b) Explain how L.V.D.T. can be used as a secondary transducer to measure pressure. **[6]**

c) Explain the principle and working of electromagnetic flow meter with the help of neat diagram. **[8]**

Q3) a) Draw the block diagram of semiconductor temperature sensor LM 75 and explain its working. **[8]**

b) Explain construction and working of micromachined pressure sensor. **[8]**

OR

P.T.O.

Q4) a) Explain the principle of Hall effect sensor and magneto resistive sensor. Give their applications. **[8]**

b) List the steps involved in bulk micromachining and explain in brief. **[8]**

Q5) a) Draw the block diagram of multichannel data acquisition system and explain its working. **[8]**

b) Explain the working of current to pressure (I/P) converter with the help of neat diagram. **[8]**

OR

Q6) Explain the following standards in detail:

a) IEEE 488 bus. **[8]**

b) HART Protocol. **[8]**

Q7) a) What is actuator? Explain the working of hydraulic actuator. **[10]**

b) Explain how D.C. motors are used as actuator with the help of suitable example. **[8]**

OR

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

a) Pressure control valves.

b) Directional control valves.

c) Solenoid valves.

Total No. of Questions : 10]

SEAT No. :

P2571

[Total No. of Pages :3

[5153]-547

T.E. (Electronics)

DISCRETE TIME SIGNAL PROCESSING

(2012 Course) (Semester - II) (304210) (End Semester)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Neat diagram must be drawn wherever necessary.***
2) ***Figures to the right indicate full marks.***
3) ***Your answer 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) a) Determine sequence x (n) if its DFT is given by,

X (K) = {4, 1-j, -2, 1+j}. **[6]**

b) A 80 Hz sinusoid x(t) is sampled at 200 Hz. Has aliasing occurred ? Specify the Nyquist rate and Nyquist interval for the above signal. **[4]**

OR

Q2) a) A 100 Hz sinusoid is sampled at rates of 140 Hz, 90 Hz and 35 Hz. In each case doesaliasingoccur? If so, what is the aliased frequency? **[6]**

b) Compare between Digital Signal Processing and Analog Signal Processing. **[4]**

Q3) a) Use the four point DFT and IDFT to determine the circular convolution. X1 (n) = {1, 2, 3, 1} and X2 (n) = {4, 3, 2, 2}. **[6]**

b) State and explain following properties of DFT. **[4]**

i) Time reversal property.

ii) Periodicity.

OR

Q4) a) Determine Z- Transforms of **[6]**

i) $x(n) = \cos(\omega_0 n).\ u(n)$.

ii) $x(n) = \sin(\omega_0 n).\ u(n)$.

b) State and explain following properties of Z- Transform. **[4]**

i) Convolution in time domain.

ii) Differentiation in Z-Domain.

P.T.O.

Q5) a) If

$$H(s) = \frac{1}{(s+1)(s+2)}$$

find the corresponding H (z) using impulse invariance method forsampling frequency of 5 samples per sec. **[9]**

b) Draw the direct form-I and II structures for the following systems. **[8]**

$$3y(n) - 2y(n-1) + y(n-2) = 4x(n) - 3x(n-1) + 2x(n-2)$$

OR

Q6) a) The transfer function of discrete causal system is given as follow. **[9]**

$$H(z) = \frac{1 - z^{-1}}{1 - 0.2z^{-1} + 0.3z^{-2}}$$

i) Find the difference equation.

ii) Draw cascade and parallel realization.

b) What are the effects of finite word length in digital filter IIR filter? **[8]**

Q7) a) Determine the impulse response h (n) of a filter having desired frequency response. **[8]**

$$H_d(e^{j\omega}) = e^{-j(N-1)\omega/2} \quad 0 \le |\omega| \le \frac{\pi}{2}$$

$$0 \quad \frac{\pi}{2} \le |\omega| \le \pi$$

M=7, use frequency sampling approach.

b) Compare various windows for design of FIR filters. **[8]**

OR

Q8) a) Design a bandpass linear phase FIR filter having cutoff frequencies of ω_{c1}=1 rad/sample.and ω_{c2}= 2 rad/sample, use rectangular windows function. **[8]**

b) Give comparison of FIR and IIR filter. **[8]**

Q9) a) Explain methods of reducing and increasing the sampling rate of a digital signal processing system. **[8]**

b) With the help of block diagram explain architecture of TMS320C28XX processor. **[9]**

OR

Q10)a) An audio signal is to be decimated by a factor of 30. Design a two stage decimator with factors 15 and 2, that satisfy the following specifications.

Sampling Freqency: 240 kHz

Highest frequency of interest : 3.4 kHz

$\delta p = 0.05$ $\delta s = 0.01$ **[8]**

b) Explain implementation of triggering for converter with DSP processor. **[9]**

★ ★ ★

Total No. of Questions : 10]

SEAT No. :

P2572

[Total No. of Pages : 2

[5153]-548
T.E. (Electronics)
EMBEDDED PROCESSORS
(2012 Pattern) (Semester - II) (End Sem.)(304211)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain how ARM microcontroller is suitable for Embedded application. **[4]**

b) Draw and explain architecture of ARM 7. **[6]**

OR

Q2) a) Draw and explain Memory map of LPC 2148. **[6]**

b) Describe PLL and VPB divider blocks in LPC 2148. **[4]**

Q3) a) Explain the following instruction for ARM 7. **[6]**

i) MLA Ro, R1, R2, R3

ii) SWPB R2, R1, [R4]

iii) AND

b) Draw and explain Data flow model of ARM 7. **[4]**

OR

P.T.O.

Q4) a) Draw interfacing diagram of GLCD with LPC 2148 and write algorithm /flowchart for the same. **[6]**

b) Explain UART block in LPC 2148. **4]**

Q5) a) Write a feature and application of Cortex A, Cortex R, CortexM processor. **[8]**

b) Compare the Cortex M3 with ARM7 TDMI. **[8]**

OR

Q6) a) Explain CMSIS standard with structure in detail. **[8]**

b) Explain the need of operating system in complex embedded system. **[8]**

Q7) a) Draw and explain architectural diagram of LPC 1768 microcontroller. **[8]**

b) Draw and explain interfacing diagram of RGB LED with LPC 1768 and write program for the same. **[8]**

OR

Q8) a) Explain in detail TFT LCD interfacing with LPC 1768. **[8]**

b) What are the different clock sources available in LPC 1768. **[8]**

Q9) a) Explain Ethernet interfacing in LPC 1768 also write application. **[9]**

b) Explain features of CAN Bus of LPC 1768. **[9]**

OR

Q10) Write a short note (any three): **[18]**

a) CAN interfacing and frame format.

b) USB frame format.

c) Ethernet.

d) Compare CAN Bus with Ethernet.

Total No. of Questions : 8]

SEAT No. :

P2573

[Total No. of Pages : 2

[5153]-549
T.E. (Electronics)
POWER ELECTRONICS & APPLICATIONS
(2012 Pattern) (Semester-II)(End Semester) (304212)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) *Anwer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.*
2) *Draw neat diagrams must be drawn wherever necessary.*
3) *Figures to right indicates full marks.*
4) *Use of nonprogrammable calculator is allowed.*
5) *Assume suitable data wherever necessary.*

Q1) a) Draw the circuit of a 3φ semi controlled full wave rectifier and describe its working with suitable waveforms. **[7]**

b) Explain with the help of block diagram and waveform, working of 1φ sinusoidal pulse width modulation inverter. **[7]**

c) Explain class E chopper with circuit diagram and graphical represent -ation of four quadrant operation and a typical application. **[6]**

OR

Q2) a) With the help of circuit diagram and output waveforms explain the working of 3φ LCC for inductive load. What is meant by inversion operation of LCC. **[6]**

b) With the help of neat diagram and waveforms explain operation of 180° mode of 3φ inverters for star load. **[7]**

c) Compare different control strategies of a chopper. **[7]**

Q3) a) With the help of circuit diagram and waveforms, explain the operation of SLR DC-DC converter. **[6]**

b) With the help of neat diagram and waveforms, explain the operation of ZVS quasi resonant converter. **[6]**

c) Compare ZCS and ZVS. **[4]**

OR

P.T.O.

Q4) a) Compare switched, linear and resonant converter. **[4]**

b) Explain with circuit diagram and waveform ZCS quasi resonant converter. **[6]**

c) Define power quality. State various power line disturbances and their sources. **[6]**

Q5) a) Draw the block diagram of an line interactive UPS and explain the function of each block. **[8]**

b) Draw the waveforms and circuit diagram of 12 pulse converter. Explain its operation. **[8]**

OR

Q6) a) Explain the operation of electronic ballast with the help of block diagram. **[9]**

b) Compare HVDC and HVAC transmission. **[7]**

Q7) a) Explain with block diagram hybrid PV system. **[6]**

b) Explain the need of battery in PV system. State factors involved in selection of battery. **[6]**

c) Explain different techniques of digital control methods for MPPT and explain any one method in detail. **[6]**

OR

Q8) a) Classify different methods of PV system configurations. Explain with block diagram central power inverter configuration of PV system. **[6]**

b) Explain with block diagram isolated grid supply system with multiple wind turbines. **[6]**

c) Briefly explain vertical axis wind turbine generator. **[6]**

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Total No. of Questions : 8]

SEAT No. :

P2574

[Total No. of Pages :2

[5153]-550
T. E. (Electronics Engineering)
INDUSTRIAL MANAGEMENT
(2012 Pattern) (Semester-II) (End Sem.)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume suitable data if necessary.***

Q1) a) Explain functions of management (any six). **[6]**

b) What is ISO 9001-2008? **[6]**

c) Write a short note on **[8]**

i) Project crashing

ii)Resource leveling

OR

Q2) a) Explain how management accelerates organizational growth. **[7]**

b) State the different quality management assistance tool and explain any one in detail. **[7]**

c) Explain the term Globalization. **[6]**

Q3) a) Explain responsibility of HRM to increase the profit-ability of organisation. **[6]**

b) What are benefits of tanning? **[6]**

c) Short note on Talent Acquistion. **[5]**

OR

Q4) a) State the challenges to HR professionals. **[6]**

b) Explain the term "Talent Acquistion". **[6]**

c) Short note on Human Resource planning. **[5]**

Q5) a) What is difference between shares & debentures. **[5]**

b) Explain different types of businesses?(any three) **[6]**

c) Write a short note on Private Limited Company. **[6]**

OR

P.T.O.

Q6) a) State & explain the different government and non-government sources of finance. **[5]**

b) Explain the term Woman Entrepreneurship. **[6]**

c) Explain Cooperative society with suitable example. **[6]**

Q7) a) What is e-commerce. Explain the types of e commerce. **[6]**

b) Write a short note on **[10]**

i) ERP

ii) BPR

OR

Q8) a) Explain the term MIS. What is the need of MIS. What are the objectives of MIS. **[10]**

b) Explain decision support system in detail. **[6]**

♦ ♦ ♦

Total No. of Questions : 8]

SEAT No. :

P2575

[Total No. of Pages :2

[5153]-551

T.E. (E & TC Engg.)

DIGITAL COMMUNICATION

(2012 Pattern) (End Sem) (Semester-I)

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

Instructions to the candidates:

1) ***Solve Q1 OR Q2, Q3 OR Q4, Q5, OR Q6, Q7 OR Q8.***
2) ***Assume suitable data if necessary.***
3) ***Neat diagrams must be drawn wherever necessary.***

Q1) a) Derive the expression for quantization error and signal to quantization noise ratio for a non-sinusoidal PCM system. **[6]**

b) Draw AT and T hierarchy multiplexing system and explain. **[8]**

c) Explain narrowband noise and represent a narrowband noise in terms of inphase and quadrature components. **[6]**

OR

Q2) a) A delta modulator system is designed to operate 5 times the Nyquist rate for a signal with $3KH_z$ bandwidth. Determine the maximum amplitude of 1.2KHz input sinusoid for which a delta modulator does not have slope overload. Quantizing step size is 250 mV. Derive the expression used.**[6]**

b) A scrambler is shown in figure 1. design the corresponding scrambles. If a sequence.

S=101010100000111 is applied to the input of his scrambles, determine the output sequence T. Verify that if this T is applied to the input of the descrambles, the output is the sequence S. **[8]**

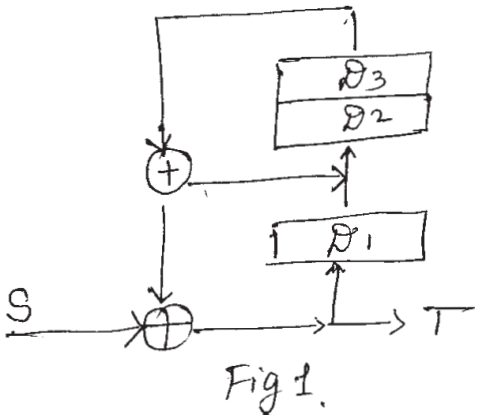


Fig 1.

c) Explain classification of random process with mathematical expressions.**[6]**

P.T.O.

Q3) a) Derive the expression of signal to noise ratio (S/N) of integrator and dump filter, explain its operation. **[8]**

b) A polar NRZ signal is applied at the input of matched filter. The binary 1 is represented by rectangular pulses of amplitude A and duration T and the binary 0 is represented by a rectangular pulse of amplitude -A and duration T. Obtain the impulse response of the matched filter and sketch it. **[8]**

OR

Q4) a) Derive the expression for signal to noise ratio and error porbability of a matched filter is the presence of white Gaussian noise. **[8]**

b) Explain Geometrical representation of signal and Gram-Schmitt procedure. **[8]**

Q5) a) Derive the expression for error probability of BPSK receiver. **[8]**

b) Give the mathematical representation of QPSK signal. Draw the signal space diagram of QPSK signal. Write the expression of all the message points in the diagram and explain. **[8]**

OR

Q6) a) Explain M-ary PSK transmitter and receiver with suitable block diagram. What are the advantages of M-ary PSK over M-ary FSk? **[8]**

b) Binary data is transmitted using BPSK at a rate 2 Mbps over RF link having bandewidth 2 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. ($Q(3.71)=10^{-4}$). **[8]**

Q7) a) What is PN sequence ? Explain the three properties of PN sequence with the help of 4 stage shift register. **[6]**

b) Draw the block diagram of DSSS system transmitter and receives. Write functional names inside the block and input signal for each block & explain. **[6]**

c) What are multiple access techniques? Explain WODMA in detail. **[6]**

OR

Q8) a) Explain DS-SS BPSK transmittes and receiver with suitable block diagram and derive the power spectral density of the same. **[6]**

b) Explain the following frequency hop spread spectrum with the help of relevant diagram. **[6]**

i) Slow frequeny hopping.

ii) Fast frequeny hopping.

c) Design a three stage feedback shift register with proper taps to generate N=7 PN sequence. Draw the generator block and if the initial state of shift register is 100 (fromleft to right). Find the output sequence. **[6]**

✡ ✡ ✡

Total No. of Questions :10]

SEAT No. :

P2576

[Total No. of Pages :4

[5153] - 552

T.E. (E & TC)

DIGITAL SIGNAL PROCESSING

(2012 Pattern) (Semester - I) (End Sem.) (304182)

Time : 2½Hours] *[Max. Marks :70*

Instructions to the candidates:

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

Q1) a) Draw the block diagram of Digital Signal Processing System and explain the Operation of each block, which additional component is needed to prevent aliasing. **[4]**

b) Consider the analog signal $X_a(t) = 3\cos 2000\Pi t + 5\sin 6000\Pi t + 10\cos 12000\Pi t$ **[6]**

i) What is the Nyquist rate for this signal?

ii) If Sampling rate $F_s = 5000$ samples/s. What is the discrete - time signal obtained after sampling?

iii) What is the analog signal $y_a(t)$ that we can reconstruct from the samples. If we use ideal interpolation?

OR

Q2) a) Compute 4 point DFT of a sequence $x(n) = \{\underset{\uparrow}{0},1\ 2\ 3\}$ using Decimation In Time FFT Algorithm. **[5]**

b) Compute the DFT of the following sequence $x(n) = \{\underset{\uparrow}{1}\ 2\ 3\ 4\}$ and verify your answer using IDFT. **[5]**

P.T.O.

Q3) a) What is the relationship between Z transform and Fourier transform. **[3]**

b) Perform the circular convolution of the following sequence **[4]**

$$x_1(n) = \{\underset{\uparrow}{1}\,2\,3\,4\} \quad x_2(n) = \{\underset{\uparrow}{2}\,1\,2\,1\}$$

c) By using partial fraction method find the Inverse Z transform of **[3]**

$$X(z) = \frac{z^3}{(z+1)(z-1)^2}.$$

OR

Q4) a) Show that the computational complexity is reduced if 32 point DFT is computed using Radix - 2 DIT FFT algorithm. **[3]**

b) Compute the z transform and draw ROC of the following sequences **[3]**

i) $x(n) = n^2 u(n)$ for $n \geq 0$

ii) $x(n) = 2^{(n)} u(n-2)$

c) Compute the Discrete Cosine Transform of the following sequence **[4]**

$$f(x) = \{\underset{\uparrow}{1}\,2\,4\,7\}$$

Q5) a) The system transfer function of an analog filter is given by **[8]**

$$H(S) = \frac{s+0.1}{(s+0.1)^2+9}$$

Using bilinear transformation method , determine the transfer function of digital filter H(z), the resonant frequency is $W_r = \frac{\pi}{4}$.

b) Explain the steps used for designing an IIR filter using bilinear transformation method (BLT). What is Warping effect in BLT? **[8]**

c) Describe Butterworth Filters? **[2]**

OR

Q6) a) Obtain direct form I and II realization of a system described by **[8]**

$y(n) = b_1 x(n-1) + b_2 x(n-2) + b_3 x(n-3) - a_1 y(n-1) - a_2 y(n-2) - a_3 y(n-3)$

b) A digital filter has specifications as: **[6]**

Passband frequency= $w_p = 0.4\Pi$,

Stopband frequency = $w_s = 0.6\Pi$

What are the corresponding specifications for passband and stopband frequencies in analog domain if

i) Impulse Invariance Technique is used for designing.

ii) Bilinear Transformation Method is used for designing.

c) Write a note on, "finite word length effect in IIR filter design". **[4]**

Q7) a) Justify, FIR filters are linear phase filters. Define Phase delay and Group delay in linear phase filters. **[8]**

b) Design FIR digital filter to approximate an ideal low pass filter with passband gain of unity, cut off frequency 850 HZ and sampling frquency 5000 HZ. The length of impulse response should be 5. Use rectangular window. **[8]**

OR

Q8) a) Compare the frequency domain characteristics of the different types of window Functions. **[6]**

b) A low pass filter is to be designed the following desired frequency response **[10]**

$$H_d(e^{jw}) = e^{-j2w} \quad \text{For } -\frac{\pi}{4} \le w \le \frac{\pi}{4}$$

$$= 0 \qquad \frac{\pi}{4} < |w| < \pi$$

Determine the filter coefficient $h_d(n)$ if the window function is defined as

$$w(n) = 1, \quad 0 \le n \le 4$$

$$= 0 \quad \text{otherwise}$$

Also determine the frequency response H (e^{jw}) of the designed filter.

Q9) a) Design a two stage decimator for the following specifications: **[10]**

Sampling rate of an input signal = 20 KHZ

Down sampler D = 100

Passband = 0 to 40 Hz

Transition band = 40 to 50 HZ

Passband ripple = 0.01

Stopband ripple = 0.002

b) Explain the application of DSP to voice processing. **[6]**

OR

Q10)a) Draw and explain the architectural block diagram TMS 320C 67XX series DSP Processor. **[8]**

b) Explain the necessity of **[8]**

i) MAC

ii) Barrel Shifter in Digital Signal Processors.

EEE

Total No. of Questions :8]

SEAT No. :

P2577

[Total No. of Pages :2

[5153] - 553

T.E. (E & TC)

MICROCONTROLLER AND APPLICATIONS

(2012 Pattern) (Semester - I) (End Sem.) (304183)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

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

Q1) a) Differentiate RS232 and RS485 Serial Communication Protocol. **[6]**

b) Explain the programming model of 8051. **[6]**

c) Explain with example function of ALU in PIC for transfer of data. **[8]**

OR

Q2) a) Explain in depth use of 12C protocol and state any two difference between 12C and SPI. **[6]**

b) Explain different addressing modes with example. **[6]**

c) State features of PIC, draw and explain the data memory organization. **[8]**

Q3) a) Draw and explain the port structure of PIC with different registers used in programming. **[8]**

b) Explain in detail PWM mode in PIC. **[8]**

OR

Q4) a) Differentiate between operating functions of Timer 0, 1 and 2 of PIC. Draw and explain functional diagram of Timer 0 of PIC. **[8]**

b) Draw an interfacing diagram to display 'GANESH' on 4^{th} position in line one and 'SPPU' at 5^{th} position on second line, write an embedded C program. **[8]**

P.T.O.

Q5) a) Explain the SPI mode of MSSP structure used for serial communication. **[8]**

b) Explain the use of PIC ADC to interface the motion sensors used for accepting the location and display on LCD. **[8]**

OR

Q6) a) Explain the use of BRG register for calculation of baud rate with USART block diagram. **[8]**

b) State fetures of RTC and draw an interfacing diagram with PIC, write an initialization program. **[8]**

Q7) a) Draw Generalized block diagram of DAS and state its features. **[8]**

b) Design a dC Motor controller circuit using PWM for motion control. **[10]**

OR

Q8) a) Design a frequency counter to display the pulses received from the tachometer. **[8]**

b) Design a DMM Using PIC controller to display AC and DC values of Electrical signals. **[10]**

EEE

Total No. of Questions :8]

SEAT No. :

P2578

[Total No. of Pages :3

[5153] - 554

T.E. (Electronics & Telecommunication)

ELECTROMAGNETICS & TRANSMISSION LINES

(2012 Course) (Semester - I)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Answer Q.No.1 or Q.No.2, Q.No.3 or Q.No.4, Q.No.5 or Q.No.6, Q.No.7 or Q.No.8.***
2) ***Figure to right indicate full marks.***
3) ***Neat diagram must be drawn wherever required.***
4) ***Use Electronic pocket calculator and smith chart is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) Derive the expression for electric field intensity $\bar{E}$ at a point 'P' due to infinite line charge with uniform line charge density 'ρ_L'. **[6]**

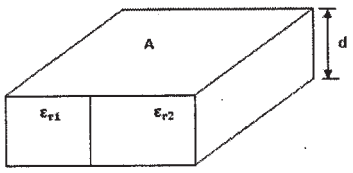
b) Derive the electrostatic boundary condition between two dielectric media. **[8]**

c) Find $\bar{H}$ at point P(2, 3, 4) caused by a current filament of 12A in $\hat{a}_y$ direction on *y* axis and extending from *y*=0 to *y*=8. **[6]**

OR

Q2) a) Derive relation between $\bar{E}$ and V. Also state significance of potential gradient. **[8]**

b) Find the capacitance of parallel plate capacitor containing two dielectrics, $\varepsilon_{r1} = 1.5$ and $\varepsilon_{r2} = 3.5$, each comprising one half the volumes as shown in figure. Here area of plates A = $2m^2$ and d = 10^{-3} m. **[6]**



c) State and prove Ampere's Law and apply the same for infinite sheet of current. **[6]**

P.T.O.

Q3) a) Write Maxwell's equations for static and time varying fields in point and integral forms. **[8]**

b) State and prove Poynting theorem. Interpret each term. **[8]**

OR

Q4) a) What do you mean by uniform plane wave? Obtain equation of wave travelling in free space in terms of $\bar{E}$. **[8]**

b) The magnetic field of an EM wave in free space is given by

$\vec{H} = 0.5 \in_0 \cos(\omega t - 100z)\hat{a}_y \frac{A}{m}$. Find the electric field intensity and displacement current density. **[8]**

Q5) a) State primary and secondary constants of transmission lines. Derive the relationship between primary and secondary constants of transmission line. **[8]**

b) The characteristic impedance of the uniform transmission line is 2040 Ω at a frequency of 800 Hz. At this frequency, the propagation constant is $0.054 \angle\ 87.9^{o}$. Determine R, L. G, C, α and β. **[8]**

OR

Q6) a) Explain the phenomenon of reflection of transmission line and hence define reflection coefficient. **[8]**

b) Derive the expression for characteristic impedance (Z_0) and propagation constant in terms of primary constants of transmission lines. **[8]**

Q7) a) What is impedance matching? Explain necessity of it. What is stub matching? Explain single stub matching with merits and demerits. **[10]**

b) A 50 Ω line is terminated by a load impedance of (75 – j 69) Ω. The line is 3.5 meter long and is excited by 50 MHz source. Propagation velocity is 3×10^8 m/sec. Find the input impedance, reflection coefficient, VSWR, position of minimum voltage. **[8]**

OR

Q8) a) What is mean by distortionless line? Derive the expression for characteristic impedance and propagation constant for it. **[10]**

b) A transmission line has a characteristic impedance of 300 Ω and terminated in a load Z_L = 150+j150 Ω. Find the following using smith chart. **[8]**

i) VSWR

ii) Reflection Coefficient.

iii) Input impedance at a distance 0.1λ from load.

iv) Input admittance from 0.1λ from load.

EEE

Total No. of Questions : 8]

SEAT No. :

P2579

[Total No. of Pages : 2

[5153]-555
T.E. (E & T.C.)
SYSTEM PROGRAMMING AND OPERATING SYSTEM
(2012 Pattern) (Semester - I) (Endsem.)(304185)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain in brief imperative statements, declaration statements and assembler directives with examples for assembly language programming. **[9]**

b) Explain advanced macros facilities with examples. **[6]**

c) Explain phases of compiler with examples. **[5]**

OR

Q2) a) Explain translated origin,link origin, and load origin. **[6]**

b) Explain lexical analysis, syntax analysis, and semantic analysis for Language processor. **[9]**

c) What is difference between compiler and Interpreter? **[5]**

Q3) a) Explain following CPU scheduling techniques with examples. **[6]**

i) FCFS ii) SJF

b) What is difference between starvation and deadlock? Explain it with the help of 'Dining Philosophers Problem'. **[6]**

c) What is Bankers algorithm? Explain it with suitable examples. **[6]**

OR

Q4) a) What is Producer–Consumer Problem? How to solve it using SemaPhore and Mutex? **[6]**

b) What are the various states of a processes and how it is managed by operating system? **[6]**

P.T.O.

c) Consider the following processes where Arrival and Burst time (in seconds) are as shown below.

process	Burst Time	Arrival Time
P1	13	3
P2	15	3
P3	08	1
P4	12	1

Calculate the Average Waiting Time and Average turn-around Time if the processes are scheduled using SJF. **[6]**

Q5) a) Explain memory management with Bit Map method and with Linked Lists method. **[5]**

b) What do you mean by page replacement algorithm? Enlist different page replacement algorithms. **[5]**

c) Consider the following page reference string: 7, 1, 2, 1, 2, 5, 4, 5, 9, 4, 9, 8, 1, 3. The number of page frames = 3, calculate the page faults and the hit ratio for First In First Out Page replacement algorithm. **[6]**

OR

Q6) a) How logical address is converted into physical address by memory management unit? Explain it with example. **[5]**

b) What is structure of typical page table entry? What is significance of modified bit, referenced bit, protection bits, and present/absent bit in page table entry? **[6]**

c) Explain how LRU page replacement algorithm is simulated in software? **[5]**

Q7) a) What are different file types and how to access it. **[6]**

b) What is difference between programmed I/O and I/O mapped I/O. **[4]**

c) Explain input output software layers. **[6]**

OR

Q8) a) Explain Programmed I/O, Interrupt driven I/O, and I/O using DMA with examples. **[9]**

b) Explain in detail file systems and its implementation. **[7]**

Total No. of Questions :8]

SEAT No. :

P2580

[Total No. of Pages :4

[5153] - 556

T.E. (Electronics & Telecommunication Engineering)

INFORMATION THEORY AND CODING TECHNIQUES

(2012 Course) (Semester - II) (304189) (End Sem.)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Figure to the right side indicate full marks.***
3) ***Use of calculator is allowed.***
4) ***Assume suitable data if necessary.***

Q1) a) The joint probability matrix representing transmitter and receiver is given below. Find all entropies and mutual information of the communication system **[6]**

$$P(X,Y) = \begin{bmatrix} 0.3 & 0.05 & 0 \\ 0 & 0.25 & 0 \\ 0 & 0.15 & 0.05 \\ 0 & 0.05 & 0.15 \end{bmatrix}$$

b) Obtain the coding efficiency of a Shannon Fano for a zero memory sources that emits eight messages with respective probabilities as given below. Use 3 letters for encoding such as -1, 0, 1. **[6]**

$$P = [0.3 \quad 0.12 \quad 0.12 \quad 0.12 \quad 0.12 \quad 0.08 \quad 0.07 \quad 0.07]$$

$$X = [\, x_1 \quad x_2 \quad x_3 \quad x_4 \quad x_5 \quad x_6 \quad x_7 \quad x_8 \,]$$

c) Explain the case study related to application of Huffman's coding and JPEG in image compression. **[8]**

OR

P.T.O.

Q2) a) The Party check matrix of a (7, 4) Hamming Code is given as below: **[7]**

$$\begin{bmatrix} 1 & 1 & 1 & 0 & 1 & 0 & 0 \\ 0 & 1 & 1 & 1 & 0 & 1 & 0 \\ 1 & 1 & 0 & 1 & 0 & 0 & 1 \end{bmatrix}$$

i) Find Generator Matrix.

ii) Find out all possible codewords.

iii) Determine error correcting capability of the code.

b) Consider (7, 4) cyclic code: with $g(x) = x^3 + x + 1$. **[7]**

i) Draw the hardware arrangement of cyclic encoder and verify the encoder by considering one message.

ii) If received code vector is 1001101, find out transmitted or corrected codeword.

c) Explain any two properties of mutual information and show that Shannon's limit for AWGN Channel is -1.6dB. **[6]**

Q3) a) Find generator polynomial for BCH code over GF(16) using primitive polynomial $P(x) = x^2 + x + 2$ over GF(4) codeword. The code should correct t_c=1, 2 errors. The addition and multiplication tables are as given below: **[8]**

+	0	1	2	3
0	0	1	2	3
1	1	0	3	2
2	2	3	0	1
3	3	2	1	0

•	0	1	2	3
0	0	0	0	0
1	0	1	2	3
2	0	2	3	1
3	0	3	1	2

b) Write short notes on **[6]**

i) CRC codes

ii) Golay Codes

c) Explain FEC technique for Error Control. **[4]**

OR

Q4) a) Explain the steps of BCH decoding with Goreinsein Zierler Algorithm. **[6]**

b) Explain the applications of RS codes and CRC code. **[6]**

c) Distinguish between BCH and RS codes. **[6]**

Q5) a) Explain the following: **[12]**

i) Code Rate

ii) Constraint Length

iii) Word Length

iv) Block Length

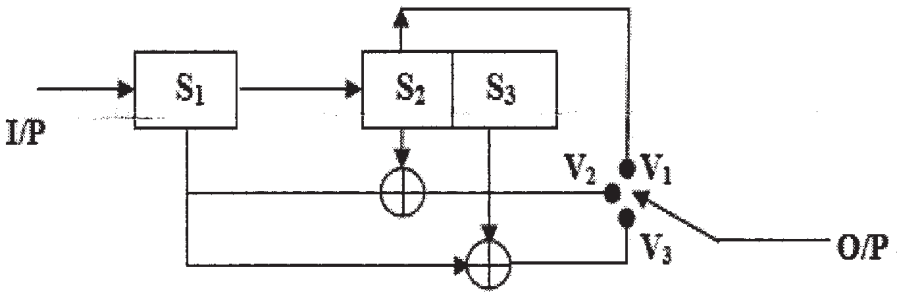
v) Free Distance

vi) Hamming Distance

b) What are Turbo Codes? Explain the coding and decoding of Turbo codes. **[4]**

OR

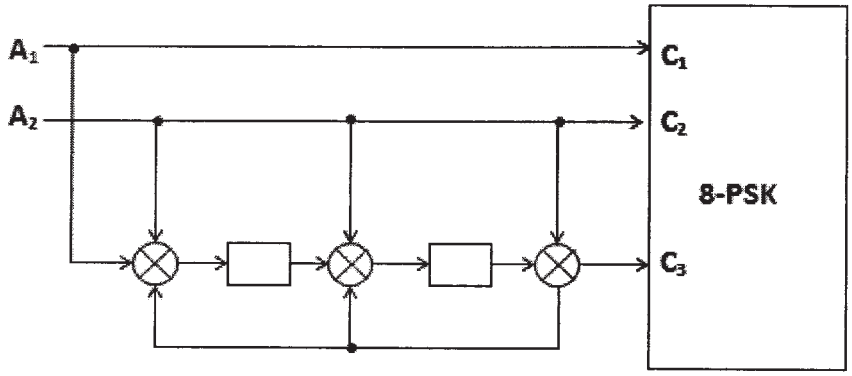
Q6) a) For the convolution encoder shown in fig below, construct the Code tree and trellis diagram, find out the out of the encoder corresponding to message sequence 10110 using trellis. **[10]**



b) Explain Sequential decoding and Viterbi decoding. **[6]**

Q7) a) What are the Ungerboek's TCM design rules. Explain asymptotic coding gain. **[6]**

b) Consider the 8 state, 8 PSK TCM scheme as shown below. **[10]**



i) Draw trellis diagram

ii) Find d_{free} and Asymptotic coding gain and comment on it.

OR

Q8) a) Discuss Mapping by Set partitioning. **[6]**

b) Explain Euclidean distance, Asymptotic coding gain of trellis coded Modulation. **[4]**

c) Draw and explain the band limited and power limited coding system. **[6]**

EEE

Total No. of Questions : 8]

SEAT No :

P2581

[Total No. of Pages :2

[5153]-557
T.E. (E & TC)
ANTENNA & WAVE PROPAGATION
(2012 Pattern) (End-Semester) (Semester-II)

Time : 2½ Hours *Max. Marks :70*

Instructions to 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.***
5) ***Use of calculator is allowed.***

Q1) a) A uniform plane wave of frequency 5MHz has average poynting vector 1.5W/m^2. If the medium is lossless with relative permeability $\mu r=2$ and relative permittivity $\varepsilon r=3$. Determine velocity of propagation, wavelength, intrinsic impedance of a medium and r.m.s. value of electric field. **[8]**

b) Explain the following characteristics of wireless channel **[6]**
   i) Coherence band width.
   ii) Coherence time and.
   iii) Fading.

c) Derive vector potential A for an magnetic current source J. **[6]**

OR

Q2) a) What is polarization of wave? Explain linear and circular polarization of wave. **[6]**

b) Write a short note on **[6]**
   i) Virtual height.
   ii) Multihope Propagation.

c) The power radiated by a lossless antenna is 10 watts. The radiation intensity of this antenna is $U = Bo\cos^3\theta$ (W/Sr) $0 \le \theta \le \pi/2$ $0 \le \Phi \le 2\pi$. Find. **[8]**
   i) The maximum power density in (W/m^2) at a distance of 1000 meter (assume for field distance) specify the angle where this occurs.
   ii) Directivity
   iii) Gain of the antenna.

P.T.O.

Q3) a) Derive the equation for input impendance and directivity of half wave dipole. **[8]**

b) Show the current distribution on small dipole and derive the equation for its input impedance. **[8]**

OR

Q4) a) Find the radiation efficiency of a single turn and eight -turn small circular loop at f=100MHz. the radius of the loop is $\lambda/25$, the radius of the wire is $10^{-4}\lambda$ and the turns are spaced $4x10^{-4}\lambda$ apart. Assume the wire is copper with a conductivity of $5.7x10^{7}$ (S/m) and antenna is radiating into free space.(Where ohmic resistance per unit length/ohmic skin effect resistance per unit length=0.38). **[10]**

b) Give the comparison of far fields of small loop and short dipole. **[6]**

Q5) a) For two element array consisting identical radiators carrying equal curents in phase, obtain positions of maxima and minima of the radiation pattern if the distance of separation $d=\lambda$ **[8]**

b) Derive antenna array factor for N-element linear array taking the centre element as reference for N is odd and even. **[8]**

OR

Q6) a) Draw and explain the radiation pattern of an endfire array. **[8]**

b) Explain in brief Dolph - Tchbyscheff distribution. What is the need for Tchbyscheff distribution?. **[8]**

Q7) Explain the following antennas with its structural details dimensions, radiation pattern, diagram, specifications, features and applications. **[18]**

a) Micro strip antenna

b) Lens antenna.

c) Biconical antenna

OR

Q8) a) Explain the working of Rhombic antenna in detail. **[8]**

b) With the help of suitable diagram explain the operating principle of **[10]**

i) Super turnstile

ii) Slot antenna.

♦ ♦ ♦

Total No. of Questions : 10]

SEAT No. :

P2582

[Total No. of Pages : 2

[5153]-558
T.E. (E & TC)
EMBEDDED PROCESSORS
(2012 Pattern) (Semester - II) (End Sem.)(304191)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Neat diagrams must be drawn whenever necessary.***
2) ***Figures to the right side indicate full marks.***
3) ***Assume Suitable data, if necessary.***
4) ***Use of logarithmic tables, slide table, Electronic pocket calculator is allowed.***

Q1) a) Compare various versions of ARM with respect to features, advantages, power disipation. **[5]**

b) Explain 'ARM7 Programmer's model. **[3]**

c) Explain the term ARM 7TDMI. **[2]**

OR

Q2) a) Draw and explain CPSR register's structure for LPC 2148. **[6]**

b) Explain the following instructions with examples (Any two). **[4]**

i) MUL R1, R2, R3

ii) SWP R0, R1

iii) LDR R2, [R3]!

Q3) a) Explain LPC 2148's PLL and VPB divider blocks with diagrams. **[6]**

b) Write program for displaying 'UNIPUNE' on the LCD for LPC 2148. **[4]**

OR

P.T.O.

Q4) a) List features of UARTO, Compare it with UART1. **[4]**

b) Draw DAC interfacing diagram with LPC 2148. Also write program for triangular waveform generation. **[6]**

Q5) a) Compare Cortex A, Cortex R and Cortex M processors **[8]**

b) Explain in detail structure of CMSIS standard of ARM Cortex. **[8]**

OR

Q6) a) Explain any one cortex M3 based controller in detail. **[8]**

b) Explain need of operating system with desired features in development of complex application in Embedded System. **[8]**

Q7) a) Explain features of LPC 1768. **[6]**

b) Explain interfacing of RGB LED with LPC 2148 with suitable diagram. Draw flowchart also. **[6]**

c) Explain power control section of LPC 1768. **[4]**

OR

Q8) a) Explain Block diagram of LPC 1768 with neat diagram. **[8]**

b) Draw and explain interfacing of Motor control using PWM technique with respect LPC 1768. Also include flowchart. **[8]**

Q9) Write notes on: **[18]**

a) CAN protocol (Features, applications and Block diagram)

b) USB (Frame structures, Features)

c) Ethernet (Frame structures, Features)

Q10)a) Explain USB port structure. Explain USB protocol. **[9]**

b) Write Embedded 'C' program for USB interfacing with respect to LPC 2148 for any one application. **[9]**

Total No. of Questions : 8]

SEAT No. :

P2583

[Total No. of Pages :2

[5153]-559
T. E. (E & TC)
INDUSTRIAL MANAGEMENT
(2012 Pattern) (Semester-II) (End Sem.) (304192)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Assume suitable data if necessary.***

Q1) a) Distinct between Traditional organisation and Modern organisation. **[6]**

b) Discuss in detail Quality Management assistance tools. **[6]**

c) Explain the Capital Structure. What are different factors which influences the capital structure decision? **[8]**

OR

Q2) a) Define Forms of Organisation-Line, Line-staff, committee. **[6]**

b) Explain 5S Quality management standard. **[6]**

c) What do you mean by Project crashing and resource Leveling explain in detail. **[8]**

Q3) a) Give the strategic importance of HRM. **[6]**

b) Discuss in detail - Challenges to HR professionals. **[6]**

c) What are the objectives and process for human resource planning. **[6]**

OR

Q4) a) What are the key parameter for talent acquistion. **[6]**

b) Comment on carrier planning and management. **[6]**

c) Discuss recent trends in Human resource development. **[6]**

Q5) a) Write a note on Entrepreneurship. **[6]**

b) How to identify the business opportunity. **[6]**

c) Discuss different sources of finance. **[4]**

OR

P.T.O.

Q6) a) Give different type of business. **[6]**

b) What are the government policies for business. **[6]**

c) Write a note on Women Entrepreneurship. **[4]**

Q7) a) What is management information system. **[6]**

b) Give the characteristics of information system. **[6]**

c) Comment on Contemporary approach to MIS. **[4]**

OR

Q8) a) What is decision support system. **[8]**

b) Write on B2B, B2C, C2B and C2C. **[8]**

♦ ♦ ♦

Total No. of Questions : 8]

SEAT No. :

P2584

[Total No. of Pages : 2

[5153]-560
T.E. (E & TC Engineering)
POWER ELECTRONICS
(2012 Pattern) (Semester-II)(End Semester)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Draw neat diagrams & must be drawn wherever necessary.***
3) ***Figures to right indicates full marks.***
4) ***Use of nonprogrammable calculators is allowed.***
5) ***Assume suitable data wherever necessary.***

Q1) a) Draw steady state characteristics of SCR. Explain IL, I_H V_{BO}, V_{BR}, & show them on the characteristics. **[7]**

b) Explain two transistor analogy of an SCR. Drive anode current equation of SCR. **[7]**

c) Draw the circuit diagram of Gate Drive circuit for IGBT. Explain its operation. **[6]**

OR

Q2) a) Draw the construction of Power MOSFET and explain steady state characteristics of Power MOSFET. Compare it with SCR and IGBT. **[7]**

b) Explain 180 degree conduction method of three phase Voltage Source Inverter for balanced star connected resistive load. **[6]**

c) Draw the circuit diagram of single phase Full Controlled Bridge rectifier with R-L load. Explain its operation. Draw the waveform of output voltage and Current. **[7]**

Q3) a) What is DC to DC converter? Explain different methods for controlling the output voltage of Chopper. **[9]**

b) Draw the circuit diagram of single phase AC Voltage controller with R load.Explain its operation. Draw the waveform of output voltage. **[9]**

OR

Q4) a) In a dc chopper, the average load current is 30 Amps, chopping frequency is 250 Hz, supply voltage is 110 volts. Calculate the ON and OFF periods of the chopper if the load resistance is 2 ohms. **[9]**

P.T.O.

b) Draw the block schematic of SMPS and explain its advantages over Linear Power Supply. **[9]**

Q5) a) Explain On-line UPS with neat block-diagram. State its specifications and applications. **[6]**

b) Explain with circuit diagram working of single phase seperately excited DC motor drive. Draw neat waveforms across load. **[10]**

OR

Q6) a) Compare ON-Line & OFF-Line UPS. Justify why ON-Line UPS is better. **[8]**

b) Explain electronic ballast. What are the advantages of fluorescent lamp over conventional lamp? **[8]**

Q7) a) Explain SLR half bridge DC/DC converter with neat circuit diagram and Waveforms. **[8]**

b) Explain dv/dt, di/dt and snubber circuit in detail. **[8]**

OR

Q8) a) Explain with circuit diagram and neat waveforms ZCS resonant converters. **[10]**

b) Explain overvoltage and over current protection circuits. **[6]**

♦ ♦ ♦

Total No. of Questions : 10]

SEAT No. :

P2585

[Total No. of Pages : 2

[5153]-561

T.E. (Electrical)

ADVANCED MICROCONTROLLER AND ITS APPLICATIONS

(2012 Pattern) (Semester - I) (End sem.)(303141)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain with a diagram explain the stack Pointer register (STKPTR). **[4]**

b) Explain the functions of following SFR's related to the ports of PIC 18 microcontroller PORTx, TRISx and LATx. **[6]**

OR

Q2) a) Write an instruction sequence in assembly language to add a data 0×0A to contents of memory location 0×200 and store the result in WREG. **[6]**

b) Explain the status register of PIC 18 microcontroller. **[4]**

Q3) a) Explain the instruction: **[6]**

BCF TRISC,3

NEGF 0X04,1

b) Write a program in C to configure PORT B as input port and PORT C as output port. **[4]**

OR

Q4) a) Write a program in C to copy lower nibble of PORT B to higher nibble of PORTB. **[6]**

b) Write a program in C language to load Timer 0 by a data FF30 H. **[4]**

Q5) a) Explain the steps to be followed while sending commands to LCD. **[8]**

b) Write short note on SPI protocol. **[8]**

OR

P.T.O.

Q6) a) Write a program for PIC 18 microcontroller in C to transfer a letter 'T' serially and continuously at a baud rate of 9600. Use BRGH in TXSTA register = 0 and XTAL=10 MHz. **[8]**

b) With a neat diagram of interfacing of 4×4 keypad with PIC18F458. Using a flow chart explain the method of key press detection. **[8]**

Q7) a) Write a note on Compare mode. List the steps for programming of Compare mode of CCP module in PIC 18 microcontroller. **[9]**

b) With a flow chart explain speed control of DC motor using PIC microcontroller. **[8]**

OR

Q8) a) A stepper motor is interfaced with PIC 18 microcontroller through lower nibble of Port B (RD0-RD3). Write program in C language to rotate the stepper motor in anticlockwise direction continuously. Assume the step angle of 1.8 degree's. Assume crystal frequency =10 MHz. **[9]**

b) Explain how time period and duty cycle is set for generation of a waveform using PWM mode in CCP module in PIC 18 microcontroller. **[8]**

Q9) a) Explain with a neat diagram, interfacing of DAC 0808 with PIC microcontroller and write a program for RAMP waveform generation using DAC interfaced with PIC microcontroller through Port B. Assume the crystal frequency to be 10MHz. **[8]**

b) Explain in detail the functions of following flags related to on board ADC of PIC microcontroller. **[9]**

1) ADIF 2) Go/Done 3) ADFM 4) ADON

OR

Q10)a) Write a neat diagram and flowchart explain AC voltage measurement using PIC microcontroller. **[8]**

b) With a neat connection diagram and flow chart explain interfacing of LM35 with PIC 18F458. **[9]**

Total No. of Questions : 10]

SEAT No. :

P2586

[Total No. of Pages : 3

[5153]-562
T.E. (Electrical)
ELECTRICAL MACHINES - II
(2012 Pattern) (Semester-I)(EndSem.)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Answer Q1 or 2, Q3 or 4, Q5 or 6, Q7 or 8, Q9 or10.***
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) Draw and explain power - power angle curve of synchronous generator. **[4]**

b) Slip test is conducted on 3 phase, 3kVA, 415V star connected alternator with following observations.

V_{max} (line) Volts	V_{min} (line) Volts	I_{max} (Amp)	I_{min} (Amp)
44.3	39.9	1.1	0.8

The armature resistance per phase is 5 ohms. Calculate regulation of alternator at 0.8 p.f lagging. **[6]**

OR

Q2) a) Compare emt method & mmt method of finding voltage regulation of alternator. **[4]**

b) With neat diagram explain bright lamp method of synchronization of 3 phase alternators. **[6]**

Q3) a) A 10 MVA, 6.6 KV, 3 phase star connected alternator has provided OCC & SCC test data as under- **[8]**

I_f(Amp)	25	50	75	100	125	150	175	200	225
V_L(kv)	2.4	4.8	6.1	7.1	7.6	7.9	8.3	8.5	8.7
I_{asc}(Amp)	288	582	875	-	-	-	-	-	-

P.T.O.

Calculate using ampere turns method the full load voltage regulation at 0.8 p.f lagging. The armature resistance $R_a = 0.13\,\Omega$/phase

b) Define Short Circuit Ratio (SCR) in case of synchronous generator. **[2]**

OR

Q4) a) A 3980V, 50Hz, 4 pole star connected synchronous motor generates back emt of 1790V per phase. The armature resistance & synchronous reactance per phase are $2.2\,\Omega$ and $22\,\Omega$ respectively. The torque angle is 30° electrical. Calculate (i) the resultant armature voltage/phase (ii) armature current / phase (iii)power factor of the motor. **[8]**

b) State applications of 3 phase synchronous motor. **[2]**

Q5) a) With neat diagram, explain operation of 3 phase Induction generator state its applications. **[8]**

b) With neat diagram, explain construction & working of permanent magnet stepper motor. **[8]**

OR

Q6) a) What are different methods of controlling speed of 3 phase induction motor. Explain V/f method. **[8]**

b) Write a short note on single phase induction voltage regulator. **[8]**

Q7) a) Explain the operation of DC series motor on A.C supply. Explain the problems associated with AC operation. **[8]**

b) A universal motor has resistance of 30 Ω and an inductance of 0.5H. When connected to a 250V dc supply and loaded to take 0.8 Amp, it runs at 2000 rpm. Estimate its speed & power factor when connected to 250V 50Hz a.c supply & loaded to take the same current. **[8]**

OR

Q8) a) Explain the procedure to plot circle diagram of a.c series motor. How efficiency can be determined from it? **[8]**

b) Compare the performance of universal motor on A.C & D.C supply. State applications of universal motor. Specify ratings of universal motor. **[8]**

Q9) a) With neat diagram, explain construction & working of capacitor start induction motor. Draw its phasor diagram & torque - speed characteristics. **[10]**

b) A 2 pole 240V 50Hz style phase induction motor has following constants referred to the stator. **[8]**

$R_1=2.2\,\Omega$, $X_1=3.0\,\Omega$, $R_2^1=3.8\,\Omega$, $X^1{}_2=2.1\,\Omega$, $X_m=86\,\Omega$. Calculate the stator current & input power when the motor is operating at full load speed of 2820 rpm neglect case losses.

OR

Q10)a) Explain double field revolving theory for single phase induction motor. Hence draw its torque-speed curve. **[10]**

b) With suitable diagram explain no load & blocked rotor test on single phase split phase induction motor. Hence obtain the equivalent circuit for no load & blocked rotor test. **[8]**

Total No. of Questions : 10]

SEAT No. :

P2587

[Total No. of Pages : 2

[5153]-563
T.E. (Electrical)
POWER ELECTRONICS
(2012 Pattern) (Semester-I)(EndSem.)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to candidates:

1) ***Solve Questions 1 or 2, Question 3 or 4, Question 5 or 6, Question 7 or 8, Question 9 or 10.***
2) ***Assume Suitable data, if necessary.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***

Q1) a) Draw neat circuit diagram and explain working of single phase fully controlled bridge converter feeding RL load with Free Wheeling Diode. Draw waveforms of load voltage, load current. **[6]**

b) Explain the difference between SCR and GTO. **[4]**

OR

Q2) a) Draw neat circuit diagram for a 1 phase semi controlled converter feeding R-L load at α=60º. Draw output voltage waveform showing devices conducting during one cycle of input ac voltage. **[6]**

b) Draw a neat circuit diagram of a simple light dimmer circuit using Triac and draw the waveforms of voltage across the bulb and current passing through it for α=90º. **[4]**

Q3) For a 3 phase fully controlled Bridge converter feeding resistive load. **[10]**

a) Draw neat circuit diagram and explain working

b) Draw output voltage and current waveforms at α=60º

c) Write the switching sequence of SCRS clearly

d) Derive expression for average output voltage.

OR

Q4) a) Describe the RC full wave trigger circuit for one SCR when the load is AC. Draw related voltage waveforms. **[4]**

b) Explain with circuit diagram and waveforms working of 2 stage sequence control of AC regulator. **[6]**

P.T.O.

Q5) a) What is time ratio control in D.C. choppers? Explain the use of TRC for controlling the output voltage in choppers. **[8]**

b) Give comparison between MOSFET and IGBT **[8]**

OR

Q6) a) Explain with a diagram step-up chopper and derive the expression for the output voltage. A step up chopper with a pulse width of 150 μs is operating on 220 V dc supply. Compute the load voltage if the blocking period of the device is 40 μs. **[8]**

b) Explain output and Transfer characteristics of IGBT **[8]**

Q7) a) With a neat circuit diagram and necessary waveforms explain working of single phase full bridge voltage source inverter with inductive load. **[8]**

b) Why voltage control is needed in inverter circuits? State the various methods of voltage control in inverters circuits and explain any two methods. **[8]**

OR

Q8) a) With a neat circuit diagram explain the working of single phase capacitor commutated current source inverter with resistive load. Draw also the related voltage and current waveforms. **[8]**

b) Explain single pulse width modulation with diagrams. Derive an expression for output voltage. **[8]**

Q9) a) Explain working of three phase inverter in 120° mode of operation. For star connected load draw output voltage waveforms. Show devices conducting in each step. **[12]**

b) Compare Current Source Inverter and Voltage Source Inverter. **[6]**

OR

Q10)a) State the need of multilevel inverters. Explain the cascaded multilevel inverters with the help of neat circuit diagram and necessary waveform. **[12]**

b) Compare multilevel inverter with multi pulse inverter. **[6]**

Total No. of Questions :8]

SEAT No. :

P2588

[Total No. of Pages :2

[5153] - 564

T.E. (Electrical)

ELECTRICAL INSTALLATION MAINTENANCE & TESTING

(2012 Course) (Semester - I) (303144) (End Semester)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

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

Q1) a) Explain different maintenance strategies. **[6]**

b) Explain dc test for measurement of insulation resistance. **[7]**

c) Discuss in detail different failure modes fo induction motor. **[7]**

OR

Q2) a) Explain contamination process in transformer oil. **[6]**

b) Discuss in detail various failure modes of transformer. **[7]**

c) Explain the process of condition monitoring of induction motor. **[7]**

Q3) a) Describe the various failure modes of power cables. Also explain various tests conducted on power cables. **[8]**

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

i) Signature Analysis,

ii) Tan delta measurement.

OR

Q4) a) Write a short note on condition monitoring of power cables. **[8]**

b) What are the various abnormal operating conditions in induction motor and their causes? **[8]**

P.T.O.

Q5) a) What are different types of feeders & distributors? Bring out their relative advantages & disadvantages. **[8]**

b) The cost of single phase overhead feeder is Rs.15A/km ('A' is area of cross section in mm^2) & interest and depreciation charges on feeder are 10%. Determine the most economical current density to use for transmission requiring full load current for 50% of the year. The cost of generating electrical energy is 5 paisa per unit. Assume resistance of 1 km length & $1mm^2$ section of conductor as $(1/58)\Omega$. **[10]**

OR

Q6) a) Compare a 3 phase 3 wire overhead system with a 3 phase 4 wire overhead system for volume of conductor material required. Clearly state the assumptions made. **[8]**

b) A two conductor cable 1 km long is required to supply a constant current of 200A throughout the year. The cost of cable including installation is Rs. (20a+20) per meter where 'a' is the area of cross section of conductor in cm^2. The cost of energy is 5 paisa per unit & interest & depreciation charges are 10%. Calculate the most economical conductor size. Assume resistivity of conductor to be 1.73 $\mu\Omega$-cm. **[10]**

Q7) a) State the various bus bar systems and with neat sketch explain the single bus bar arrangement with sectionalization. **[6]**

b) Explain in detail classification of substation. **[4]**

c) Define estimating & costing. **[6]**

OR

Q8) a) Draw the single line diagram of typical 11 KV outdoor substation. State and explain the various equipments used in the substation. **[6]**

b) Explain the terms: **[4]**

i) Touch potential,

ii) Step potential.

c) How is price list of material is prepared? **[6]**

EEE

Total No. of Questions :10]

SEAT No. :

P2589

[Total No. of Pages :2

[5153] - 565
T.E. (Electrical)
INDUSTRIAL & TECHNOLOGY MANAGEMENT
(2012 Pattern) (311121) (Semester - I) (End sem.)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

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

Q1) a) Define MOA and ADA compare MOA and ADA. **[5]**

b) What is DST and TDB write the function of DST and TDB. **[5]**

OR

Q2) a) In moving from point A to point B on the demand curve the price has fallen from Rs.500/- to Rs.250/- and quantity sold is increased from 100 to 2000 units. Calculate coefficient fo elasticity mathematically. **[5]**

b) Explain the scope of Marketing Research. **[5]**

Q3) a) What is PDCA cycle? What are the steps involved in PDCA cycle. **[5]**

b) Give comparison between Balance Sheet and Tiral Balance. **[5]**

OR

Q4) a) Compare management. Administration and organization. **[5]**

b) What are different types of financial needs in a Business. **[5]**

P.T.O.

Q5) a) Define Motivation? What are the significance of motivation. **[6]**

b) Compare McGreger's Theory X and Theory Y. **[4]**

c) Write a short note on Leader's skills. **[6]**

OR

Q6) a) What are the different stages of team development and associated management challenges. **[6]**

b) Explain Herzberg's two factor theory in detail. **[6]**

c) Explain different functions of Entrepreneur. **[4]**

Q7) a) Define HRM. On which principle HRM works. **[6]**

b) What are the factors considered interview? Explain in details. **[6]**

c) Explain staffing process in details with block diagram. **[6]**

OR

Q8) a) Draw the systematic training cycle & explain each block in details. **[6]**

b) What are the different tests used for selection? **[6]**

c) Draw block diagram and explain determinants of job satisfaction. **[6]**

Q9) a) What is copyright. Draw symbol of copyright. Explain its importance in details. **[6]**

b) Explain IPR laws. **[4]**

c) What is Trade marks? Explain the function of trademarks. **[6]**

OR

Q10)a) What are the criteria for securing patent? **[8]**

b) Explain patient format & structure in details. **[8]**

EEE

Total No. of Questions : 10]

SEAT No. :

P2590

[Total No. of Pages : 3

[5153]- 566
T.E. (Electrical)
POWER SYSTEM - II
(2012 Pattern) (Semester - II) (End Sem.)

Time :2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

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

Q1) a) Explain surge impedance loading and methods to improve it. **[4]**

b) Compare HVDC system with HVAC system. **[6]**

OR

Q2) a) Explain the concept of complex power. **[5]**

b) A 132 kV line with 2 cm diameter conductors is built so that corona takes place if the line voltage exceeds 210 kV(rms). If the value of potential gradient at which ionization occurs can be taken as 30 KV/cm. Find spacing between conductors. **[5]**

Q3) a) A three phase 132 kV overhead line delivers a load of 50 MVA at 132 KV and 0.8 p.f. lagging at its receiving end. The constants of the transmission line are: $A=D=0.98\angle 3^\circ$, $B=110\angle 75^\circ \Omega$/ph, Determine:

i) Sending end voltage and power angle.

ii) Sending end active and reactive power. **[6]**

b) Write short note on **[4]**

i) Back to Back HVDC system.

ii) Two terminal HVDC system.

OR

P.T.O.

Q4) a) Explain the concept of disruption critical voltage. **[6]**

b) State the factors and conditions affecting the corona. **[4]**

Q5) a) Define per unit system. Prove that the per unit impedance applied to three phase system and single phase system is same. **[8]**

b) Give in detail classification of bus for load flow analysis. Also explain the necessity of slack bus. **[8]**

OR

Q6) a) Explain with flow chart Gauss Seidel method of load flow analysis. **[8]**

b) Form Y bus for the 4 bus system if the line series impedances are as under **[8]**

Line (bus to bus)	Impedances
1-2	0.025+j0.1 pu
2-3	0.02+j0.08 pu
3-4	0.05+j0.20 pu
1-4	0.04+j0.16 pu

Neglect the shunt capacitance of the line

Q7) a) Write a short note on current limiting reactor. **[8]**

b) Explain the procedure of selection of circuit breaker. **[8]**

OR

Q8) a) Explain in detail the sub-transient, transient and steady states of unloaded alternator under symmetrical fault condition. **[8]**

b) What do you mean by dc Offset current? What is the effect of the instant of short circuit on the waveform of short circuit short current (consists of dc Offset) R-L circuit. **[8]**

Q9) a) Derive the expression for fault current in case of L-G fault through a fault impedance of Z_f in terms of sequence. Draw the sequence network for this type of fault. **[9]**

b) Show that power in three phase circuit can be computed from symmetrical components of voltages and currents. **[9]**

OR

Q10)a) A 50 MVA, 11kV,3 phase synchronous generator was subjected to different types of faults. The fault currents are as follows, **[9]**

LG fault - 4130 amp

LL fault - 2590 amp

LLL fault - 1870 amp

The generator neutral is solidly grounded. Find per unit values of 3 sequence reactance's of generator.

b) Explain sequence network of synchronous machines. **[9]**

Total No. of Questions : 8]

SEAT No. :

P2591

[Total No. of Pages :3

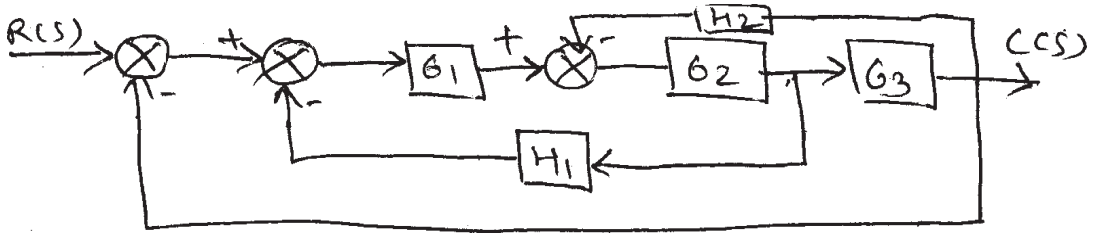
[5153]-567
T. E. (Electrical)
CONTROL SYSTEM-I
(2012 Course) (Semester-II) (303147)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Derive transfer function using block diagram reduction. **[6]**



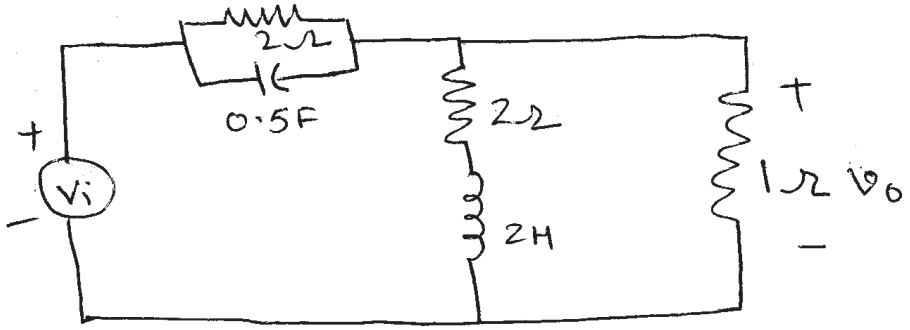
b) Derive transfer function of DC servomotor(armature control). **[7]**

c) Derive time response of unit step input to first order system. Sketch the response. **[7]**

OR

Q2) a) Explain F-V analogy and F-I analogy. **[6]**

b) Determine transfer function of following electrical network **[7]**



c) What is type and order of system. Explain effect of type of system on steady state error. **[7]**

P.T.O.

Q3) a) Define stability and give necessary condition for stability. **[4]**

b) Explain For unity feedback system with open loop transfer function given as $G(s)=\frac{K}{s(s+1)(s^2+4s+13)}$. Draw root locus when K is varied from 0 to ∞. Also find range of values of K for which system is stable. **[12]**

OR

Q4) a) Using Routh Hurwitz criterion for the unity feedback control system with open loop transfer function $G(s)=\frac{K(s+13)}{s(s+3)(s+7)}$ **[8]**

i) Find range of values of K for the system to be stable

ii) Find the value of K for marginally stable system and corresponding close loop poles and frequency of sustained oscillations.

b) Explain any four rules for root locus. **[8]**

Q5) a) Draw bode plot for following system $G(s)=\frac{20(s+2)}{s(s+10)}$ Find gain margin and phase margin comment on stability. **[12]**

b) Explain different frequency domain specifications. **[6]**

OR

Q6) a) Explain how gain margin and phase margin are determined in bode plot and stability from that. **[6]**

b) Explain nyquist stability criterion. Sketch nyquist plot for the system with open loop transfer function given by $GH(s)=\frac{20}{(s+2)(s+3)}$ comment on stability of system. **[12]**

Q7) a) Explain P, PI, PID controller and their features. **[8]**

b) A unity feedback system has the plant transfer function $G(s)=\frac{C(s)}{M(s)}=\frac{10}{s(s+2)}$. A proportional plus derivative control is employed to control the dynamics of the system. Determine

i) The damping factor and undamped natural frequency when Kd = 0

ii) The value of Kd such that damping factor is 0.6 **[8]**

OR

Q8) a) Explain Ziegler Nichols method of tuning PID controller. **[8]**

b) Using Ziegler Nichols method design a PID controller for system with open loop transfer function $H(s) = \frac{15}{s(s+1)(s+3)}$. Write close loop transfer function of plant including PID controller. **[8]**

♦ ♦ ♦

Total No. of Questions : 8]

SEAT No :

P 2592

[Total No. of Pages :3

[5153]-568
T.E. (Electrical)
UTILIZATION OF ELECTRICAL ENERGY
(2012 Pattern) (Semester-II) (End Sem.)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume suitable data, if necessary.***
4) ***Use of logarithmic tables, slide rule, Mollier charts, electronics pocket calculator and steam table is allowed.***
5) ***Figures to the right indicate full marks.***

Q1) a) Explain construction, working of electromagnetic relay & pressure switch. **[6]**

b) What is pinch effect? Explain construction, working of core type induction furnace. **[8]**

c) A room of size 15x8 met. is to be illuminated by 22 no's of (200 W each) lamps. The MSCP of each lamp is 250. Take depreciation & utilization factor as 1.2 & 0.6 respectively. Find average illumination produced on the floor. **[6]**

OR

Q2) a) Explain briefly vapour compression refrigeration cycle. **[6]**

b) Explain Sodium vapour lamp with neat diagram, construction working. **[6]**

c) A low frequency induction furnace operating at 10 volts in secondary circuit, takes 500kW at 0.5 p.f. when hearth is full. If the secondary voltage be maintained at 10 volts, estimate the power absorbed & the p.f. when the hearth is half full. Assume the resitance of secondary circuit to be thereby doubled & the reactance to remain same. **[8]**

P.T.O.

Q3) a) Explain block diagram of electric locomotive showing various components. **[8]**

b) Explain diesel electric drive with its merits & demerits. **[8]**

OR

Q4) a) Explain function of transformer & circuit breaker used in traction substation. **[8]**

b) Describe composite system & its types. **[8]**

Q5) a) Derive the expression for specific energy output on level track using simplified speed time curve. **[8]**

b) A 203 tone motor coach train has 4 motors. Each develops shaft torque of 5130 N-m, during the acceleration period. Calculate the time taken by a train to attain a speed of 42 kmph starting from rest on a gradient of 0.4. The motor has gear ratio of 3.5 to 1 & gear efficiency is 93%. The wheel diameter is 91.5 cm. Assume train resistance as 45 N/T & allow 10% for the effect of rotational inertia. **[8]**

OR

Q6) a) Define with units: **[8]**

i) Specific energy consumption,

ii) Coefficient of adhesion

iii) Tractive effort,

iv) Dead weight

b) Draw quadrilateral speed time curve & derive equation for total distance 'D'. **[8]**

Q7) a) Explain following systems of colour light signaling: **[6]**

i) Two aspect colour light signaling

ii) Three aspect colour light signaling

iii) Four aspect colour light signaling

b) An electric train has quadrilateral speed time curve as follows: **[8]**

i) Uniform acceleration from rest at 2 kmphps for 30 sec.

ii) Coasting for 50 sec.

iii) Breaking for period of 20 sec.

The train is moving a uniform up gradient of 1% , tractive resistance is 40 N/T, rotational inertia effect is 10% of dead weight, duration of station stop is 15 sec, overall efficiency of motor & transmission gear is 80%. Calculate the value of scheduled speed & specific energy consumption of run, if total distance travelled is 1.03KM.

c) What are desirable characteristics of motor for traction purpose. **[4]**

OR

Q8) a) Explain shunt & bridge transition with diagrams. **[6]**

b) Explain self relieving property of DC series motor. **[4]**

c) Two 600 volts motors are started by series parallel control. Each motor takes 400A during starting time of 20 sec. & has 0.1ohm resistance. Calculate

i) Efficiency at starting,

ii) Energy lost in controller & motor,

iii) Motor output,

iv) Total energy input from line. **[8]**

✈ ✈ ✈

Total No. of Questions : 8]

SEAT No. :

P2593 **[5153]-569** [Total No. of Pages : 4

T.E. (Electrical)

DESIGN OF ELECTRICAL MACHINES

(2012 Pattern) (Semester - II) (End Semester) (303149)

Time : 2 Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) What are the various specifications of distribution transformer as per IS 2026. **[4]**

b) Explain the prodecure to determine the total resistance of a designed transformer. **[4]**

c) Write short note on Cross over winding and Disc winding. **[6]**

d) A three phase slipring induction motor has a final steady temperature rise of 40°c when running at its output. Calculate its half hour rating for the same temperature rise if the copper loss at rated output is 1.25 times its constant loss. The heating time constant is 90 minutes. **[6]**

OR

Q2) a) Explain use of tap changer, breather, conservator and pressure release valve. **[8]**

b) Determine the main dimensions of the core, the number of turns and the area of conductors for a 5 kVA, 50Hz, 1100/400 V, single phase core type transformer. The net conductor area in window is 60% of the net square cross section of the iron core. Assume maximum flux density of 1 Wb/m^2, current density of 1.4 A/mm^2, window space factor of 0.2 and stacking factor of 0.9. The window height is 3 times its width. **[12]**

Q3) a) Explain briefly how the number of slots in a cage rotor is decided to avoid crawling and cogging. **[6]**

P.T.O.

b) Design the stator of 10H.P., 415V, 50Hz, delta connected three phase, 4 Pole, squirrel cage induction motor. The motor has an efficiency of 0.88, power factor of 0.865 lag and winding factor of 0.955. Assume specific magnetic and electrical loading of 0.45 Wb/m^2 and 23000 A/m. Frame size of 160M is to be used for stator core. Assume slot/pole / phase of 3 and current density of 4.1 A/mm^2. **[10]**

OR

Q4) a) Discuss the various factors to be considered for selection of specific magnetic loading(Bav) while designing three phase induction motor. **[5]**

b) Determine the stator core dimensions, number of stator slots and number of stator conductors per slot for a 125kW, 3300 V, 50Hz, 12 pole star connected induction motor while following data: **[11]**

i) Average flux density = 0.4 Wb/m^2
ii) Conductor/meter = 27000 A/m
iii) Full load efficiency = 0.9
iv) Power factor = 0.9
v) Winding factor = 0.955
vi) Slot/pole/phase = 3

Choose main dimension to give best power factor.

Q5) a) What are the factors considered when estimating the length of the air gap of Induction motor? Why the length of the air gap should be as small as possible. **[6]**

b) A 20 kW, three phase, 6 pole, 50 Hz squirrel cage induction motor has following data: **[12]**

i) Stator bore diameter = 0.32m
ii) Axial length of stator core = 0.125m
iii) Number of stator slots = 54
iv) Number of conductors / slot = 24
v) Current in each stator conductor = 17.5 A
vi) Full load power factor = 0.862

Calculate:

1) Number of rotor slots
2) Rotor bar current
3) Area of copper rotor Bar
4) Length of rotor bar
5) Current in each end ring
6) Area of copper end ring
7) Full load slip.

Assume current density of $7A/mm^2$ for rotor bar and end ring and resistivity of copper as 0.02 Ohm-m.

OR

Q6) a) What is unbalanced magnetic pull (UMP)? Explain the procedure to calculate UMP. **[8]**

b) A 15kW three phase, 6 pole, 50Hz, 415v, star connected squirrel cage induction motor has 54 stator slots each containing 18 conductors. Calculate the value of bar and end ring currents. The numbers of rotor bars are 64. The motor has an efficiency of 0.9 and a power factor of 0.85. The rotor mmf may be assumed as 90% of stator mmf. Also find the bar and end ring section if current density is $6A/mm^2$. **[10]**

Q7) a) Explain the procedure to calculate the Zig-zag leakage reactance and tooth top leakage reactance of three phase induction motor. **[8]**

b) Explain the procedure to calculate the magnetizing current of an induction motor. **[8]**

OR

Q8) a) Sketch the paths of the following leakage fluxes of three phase induction motor: **[8]**

i) Slot leakage flux
ii) Zig-zag leakage flux
iii) Tooth top leakage flux
iv) Overhang leakage flux.

b) Calculate overhang and slot leakage reactance for a 75kW, 3000V, 8 pole, 50Hz three phase star connected slip ring induction motor having following data: **[8]**

stator bore = 0.66m,stator core length = 0.5m,number of stator turns/ phase = 286,total specific permanence due to stator slot = 4.9 μ.

The stator has full pitch winding.

♦ ♦ ♦

Total No. of Questions : 10]

SEAT No. :

P2594

[Total No. of Pages : 2

[5153]-570
T.E. (Electrical)
ENERGY AUDIT AND MANAGEMENT
(2012 Pattern) (Semester - II) (End Semester) (303150)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) With suitable examples classify various energy resources. **[6]**

b) What are the objectives of Kyoto Protocol? **[4]**

OR

Q2) a) Explain concept of Green Building. **[4]**

b) Explain Indian and Global Energy scenario? **[6]**

Q3) a) Explain force field analysis in Energy Management. **[6]**

b) Discuss principles of successful energy management. **[4]**

OR

Q4) a) Explain DSM through power factor penalties. **[6]**

b) Explain role of renewable energy sources in energy management. **[4]**

Q5) a) Explain various steps in short term and long term energy audit. **[10]**

b) Explain Energy audit case study in steel industries. **[8]**

OR

P.T.O.

Q6) a) Explain various instruments used in energy audit. **[10]**

b) Explain procedure involved in energy audit report writing. **[8]**

Q7) a) Explain energy conservation techniques in ventilation systems. **[8]**

b) Explain energy conservation techniques in Diesel Generators. **[8]**

OR

Q8) a) Explain energy conservation potential in electric motor and drive system. **[8]**

b) Explain energy conservation techniques in Utility industries. **[8]**

Q9) a) Explain various financial appraisal method used in economic analysis of energy conservation project. **[8]**

b) Explain energy audit case study in I. T. sector. **[8]**

OR

Q10)a) Explain various costing techniques. **[8]**

b) Explain energy audit case study in municipal corporations. **[8]**

Total No. of Questions : 10]

SEAT No. :

P2595

[Total No. of Pages : 2

[5153]-571

T.E. (Instrumentation & Control)

EMBEDDED SYSTEM DESIGN

(2012 Pattern) (Semester-I) (306261)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Draw neat diagram wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) What is the functions of following pins of 8051 microcontroller? **[6]**

i) ALE ii) EA iii) RESET

b) If 12MHz crystal is used for 8051 microcontroller and the then what minimum and maximum pulse width can be measured by using Timer-0. **[4]**

OR

Q2) a) What is the functions of following pins of 8051 microcontroller? **[6]**

i) TX ii) RX iii) INT0

b) If 12MHz crystal and 1 second getting time is used for 8051 microcontroller, then what minimum and maximum frequency can be measured by using Timer-0 **[4]**

Q3) a) Draw internal block diagram for mode - setting of Timer0 of 8051 Microcontroller. **[2]**

b) Explain with circuit diagram and flow chart, interfacing of 4×4 matrix keyboard with 8051 microcontroller. **[8]**

OR

Q4) a) Why 12MHz crystal is not used for 8051 microcontroller for generating Standard baud rates? Justify with an example. **[2]**

b) Explain with circuit diagram and flow chart, interfacing of 16×2 LCD with 8051 microcontroller. **[8]**

P.T.O.

Q5) Explain with circuit diagram and flowchart, interfacing of stepper motor with 8051 microcontroller. Also explain how speed and direction of the stepper motor is changed. **[16]**

OR

Q6) a) Explain with timing diagram START, STOP and ACK functions for Serial EEPROM. Also draw circuit for interfacing serial EEPROM with 8051 microcontroller. **[8]**

b) Explain with circuit diagram, interfacing of relay with 8051 microcontroller. The relay coil rating is 12Vdc and coil resistance is 150 ohms. **[8]**

Q7) a) Explain stack operation of ATmega 8535 microcontroller and write program code in assembly language for initialisation of stack. **[8]**

b) What is the alternative function of R30 and R31 registers in AVR ATmega 8535 microcontroller? Explain with a program code example. Enlist 5 instructions which can be used with these registers. **[10]**

OR

Q8) a) Explain following instructions of ATmega 8535 microcontroller. **[8]**

i) CLC ii) SBI iii) BRNE iv) OUT

b) What is the function of watch dog timer in ATmega 8535 microcontroller? Also explain 'brown-out detection' facility. **[10]**

Q9) Explain CTC (Clear Timer on Compare match) mode of Timer-0 of ATmega 8535 microcontroller with the timing diagram. What is the Function of CS02, CS01 and CS00 bits of TCCR0 registers. **[16]**

OR

Q10) Explain the function of ADCSRA and ADMUX registers of ATmega 8535 Microcontroller. **[16]**

Total No. of Questions : 10]

SEAT No. :

P2596

[Total No. of Pages : 2

[5153]-572

T.E. (Instrumentation & Control)

INSTRUMENTAL METHODS FOR CHEMICAL ANALYSIS

(2012 Pattern) (Semester - I) (EndSem.)(306262)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) With the help of neat diagram, explain the components of Analytical Instruments. **[4]**

b) Explain the working of Microprocessor based controlled Spectrophotometer with neat diagram. **[6]**

OR

Q2) a) Distinguish between Dispersive & FTIR Spectroscopy. **[4]**

b) Explain with a neat diagram Sputtering in Hollow Cathode Lamp. **[6]**

Q3) a) With a neat sketch, explain the working of Flame Photometer. **[6]**

b) Distinguish between Atomic Absorption Spectroscopy & Atomic Emission Spectroscopy. **[4]**

OR

Q4) a) Explain the principle & experimental setup for Potentiometry. **[6]**

b) State the Classification of Instrumental methods of analysis. **[4]**

P.T.O.

Q5) a) Derive the relationship between sample concentration & Flourescence yield? State the factors affecting the fluorescence yield. **[10]**

b) Explain the working of Hydrocarbon Analyser with a neat sketch. **[8]**

OR

Q6) a) What is Chemical Shift, Explain the workingof NMR Spectrometer with neat sketch. **[10]**

b) With the help of Block Diagram, explain the working of Laser based Raman Spectrometer. **[8]**

Q7) a) Explain the time of flight type mass Spectrometer with the help of neat sketch. **[8]**

b) With the help of neat diagram, explain the working of any one type of Gas Chromatography Detector. **[8]**

OR

Q8) a) State the Principle of Operation of Mass Spectrometer with neat sketch. List out the applications of Mass Spectrometry. **[8]**

b) Explain the working of High Performance Liquid Chromatography with neat sketch. **[8]**

Q9) a) Explain Auger Emission Spectroscopy with reference to following points: Principle Instrumentation Diagram,Operation. **[8]**

b) Explain Proportional Counter with neat diagram. **[8]**

OR

Q10)a) What is ESCA? Explain Auger Emission Spectroscopy. **[8]**

b) Write short note on Gieger Muller Tube. **[8]**

Total No. of Questions : 10]

SEAT No. :

P2597

[Total No. of Pages : 2

[5153]-573

T.E. (Instrumentation & Control)

CONTROL SYSTEM COMPONENTS

(2012 Pattern)(Semester - I)(EndSemester)(306263)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Draw neat sketches wherever necessary.***
2) ***Answer 05 questions.***
3) ***Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7or Q8, Q9 or Q10.***
4) ***Assume Suitable data.***

Q1) a) Draw & explain construction & working of Temperature Switch. State its application **[6]**

b) Compare pneumatic and hydraulic system. **[4]**

OR

Q2) a) State the selection criteria for electromechanical relay. Draw and explain one application of electromechanical relay. **[6]**

b) Explain with diagram construction & working of a Thumbwheel switch. **[4]**

Q3) a) Explain with diagram the short circuit protection and over load protection of motors. **[6]**

b) Give comparison between relay and contactor. **[4]**

OR

Q4) a) Draw and explain the pneumatic circuit for speed control of a double acting cylinder. **[6]**

b) What purpose does following serve in pneumatic supply. **[4]**

i) Air receiver

ii) FRL

P.T.O.

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

i) Hydraulic supply

ii) Hydraulic valves

b) Explain various properties of oil to be used in hydraulic system. **[8]**

OR

Q6) a) For a hydraulic system implement a sequencing circuit for two double acting cylinders using standard hydraulic circuit symbols. **[10]**

b) Give the classification of hydraulic pumps. Explain construction & working of any one type in detail. **[8]**

Q7) a) State the use of damper. Explain any one type. **[8]**

b) Define Flow Totalizer. Explain any one type. **[8]**

OR

Q8) a) Write 4 technical specifications of Fuse & Circuit breaker. **[8]**

b) State the need of a circuit breaker. Explain Types & operating principle of circuit breaker. **[8]**

Q9) a) Write a short note on fluidic control devices. Give Applications. **[8]**

b) Explain various methods to make an instrument safe in hazardous area. Explain the concept of any one method. **[8]**

OR

Q10)a) Explain hazardous area and material classification as per NEC standards. **[8]**

b) Design & Explain Intrinsic safety circuit by using zener barrier in hazardous area. **[8]**

Total No. of Questions :10]

SEAT No. :

P2598

[Total No. of Pages :3

[5153] - 574

T.E. (Instrumentation and Control)

CONTROL SYSTEM DESIGN

(2012 Course) (Semester - I)

Time : 2½Hours] *[Max. Marks :70*

Instructions to the candidates:

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

Q1) a) Compare the features of Lead & Lag Compensator. **[6]**

b) Explain effect of addition of poles on stability of system using root locus approach. **[4]**

OR

Q2) a) Find out damping ratio, frequency of natural oscillation, velocity error constant if system with transfer function $G(s) = \frac{4}{s(s+2)}$ is compensated using lead compensator with transfer function $G_c(s) = 4.7\frac{s+2.9}{s+5.4}$. **[6]**

b) Explain effect of addition of zeros on stability of system using root locus approach. **[4]**

Q3) a) Explain P, I and D control action with controller settings and their effect on stability of system. **[6]**

b) Explain direct synthesis method of controlled design in breif. **[4]**

OR

P.T.O.

Q4) The forward path transfer function of unity feedback control systems is given as $G(s)=\dfrac{100}{(s+1.5)(s+4)(s+8)}$ if $e_{ss} = 0.1$ for unit ramp input, the dominant closed loop pole located at $-1\pm 2.5j$. Design a PID controller. **[10]**

Q5) a) Obtain state model in three different canonical form for system with transfer function **[12]**

$$\frac{Y(s)}{U(s)}=\frac{8s^2+17s+8}{s^3+9s^2+23s+15}.$$

b) Explain advantages of state space representation over classical representation. **[6]**

OR

Q6) a) Find out transfer function of system from state model **[12]**

$$\dot{x}=\begin{bmatrix}-1 & 0 & 0\\ 0 & -2 & 0\\ 0 & 0 & -3\end{bmatrix}x+\begin{bmatrix}1\\1\\1\end{bmatrix}u \text{ and } y=\begin{bmatrix}3 & -6 & 3\end{bmatrix}x$$

b) Explain the terms state, state variable, state vector and state space. **[6]**

Q7) a) Determine state transition matrix using Laplace transform approach for following plant matrix $A=\begin{bmatrix}0 & 1\\ -4 & -5\end{bmatrix}$. **[8]**

b) Determine controllability and observability of system of following state model **[8]**

$$\dot{x}=\begin{bmatrix}0 & 1 & 0\\ 0 & 0 & 1\\ -6 & -11 & -6\end{bmatrix}x+\begin{bmatrix}1\\0\\1\end{bmatrix}u \text{ and } y=\begin{bmatrix}10 & 5 & 1\end{bmatrix}x.$$

OR

Q8) a) Obtain time response of following system with zero initial condition and with unit step input. **[10]**

$$\dot{x} = \begin{bmatrix} 0 & 1 \\ -6 & -5 \end{bmatrix} x + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u \text{ and } y = \begin{bmatrix} 1 & 0 \end{bmatrix} x .$$

b) Determine whether following system is state controllable and state observable or not? **[6]**

$$\dot{x} = \begin{bmatrix} -2 & 0 \\ 0 & -1 \end{bmatrix} x + \begin{bmatrix} 3 \\ 1 \end{bmatrix} u \text{ and } y = \begin{bmatrix} 1 & 0 \end{bmatrix} x .$$

Q9) Find state feedback gain matrix for the system to place the desired closed loop poles at location s = –3, –4. **[16]**

$$\dot{x} = \begin{bmatrix} 0 & 1 \\ -1 & -3 \end{bmatrix} x + \begin{bmatrix} 0 \\ 2 \end{bmatrix} u \text{ and } y = \begin{bmatrix} 1 & 0 \end{bmatrix} x .$$

OR

Q10)Design a Full order observer for the system defined by following state equation **[16]**

$$\dot{x} = \begin{bmatrix} -1 & 1 \\ 1 & 2 \end{bmatrix} x + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u \text{ and } y = \begin{bmatrix} 1 & 0 \end{bmatrix} x$$

set of desired poles for the observer to be S = –5, –5.

EEE

Total No. of Questions :10]

SEAT No. :

P2599

[Total No. of Pages :2

[5153] - 575

T.E. (Instrumentation and Control Engineering)

INDUSTRIAL ORGANIZATION AND MANAGEMENT

(2012 Pattern) (306265) (Semester - I) (End Semester)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

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

Q1) a) Draw and explain BCG Matrix. **[6]**

b) What is the role of purchase manager? **[4]**

OR

Q2) a) A certain industry consumes an item at a rate of 100 units per day. Cost fo each unit Rs.24. Cost of placing an order is Rs. 35. Inventory carrying cost is 10%. Calculate EOQ and number of orders in a year. **[4]**

b) What is SPC? State its use for a certain manufacturing process. **[6]**

Q3) a) Explain briefly Porter's 5 forces of competition. **[5]**

b) Define pollution. Give the factors causing pollution. Explain air pollution in brief. **[5]**

OR

Q4) a) State various functions of management. Explain any two of them. **[4]**

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

i) Outsourcing and

ii) SWOT analysis.

P.T.O.

Q5) a) What is the need of training the Manpower? What are the different methods? What may be the advvantags of training? **[10]**

b) Write a note on Job description and its need. **[8]**

OR

Q6) a) What is Leadership? What are the characteristics possessed by a leader? What are different leadership styles? **[9]**

b) Define motivation and explain Herzberg's theory of motivation. **[9]**

Q7) a) Classify capital. What is the need of working capital? Enlist the different sources of finance. **[8]**

b) Explain concept of budget, its objectives and types. **[8]**

OR

Q8) a) Write a note on "Capital budgeting". **[8]**

b) What are the functions of capital market and money market? **[8]**

Q9) Write notes on: **[16]**

a) Ethics and its need in changing business environment.

b) E-business and business strategies.

OR

Q10)a) Explain MIS. How it is useful to modern business organizations? **[8]**

b) Explain ERP as a modern tool for development of an industry. **[8]**

EEE

Total No. of Questions : 10]

SEAT No. :

P2600

[Total No. of Pages : 3

[5153]-576
T.E. (Instrumentation & Control)
DIGITAL SIGNAL PROCESSING
(2012 Course) (Semester - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Use of electronic pocket calculator is allowed.***
4) ***Assume suitable data, if necessary.***

Q1) a) Compute the linear convolution for the following sequences: **[7]**

$x(n) = \{12, 17, 20, 3\}$ and $h(n) = \{1, 4, 1, 7\}$

b) The discrete-time system is described by following difference equation:

$y(n) = 0.25y\,(n–1) – 0.5y\,(n–2) + x(n) + 2x\,(n–1)$

Determine and sketch the pole-zero plot. **[3]**

OR

Q2) a) Determine the autocorrelation of the following sequence:

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

Also, sketch the autocorrelation sequence. **[7]**

b) Determine the magnitude and phase response at $\omega = \frac{\pi}{4}$ rad/sec for impulse response $h(n) = \{1, 2, 1\}$. **[3]**

Q3) a) Determine inverse z-transform of

$$H(z) = \frac{1 - \frac{1}{4}z^{-1}}{1 - \frac{1}{6}z^{-1} - \frac{1}{6}z^{-2}}$$ **[4]**

b) Determine the circular convolution for the sequences: **[6]**

$x_1(n) = \{4, 1, 0, 3\}$ and $x_2(n) = \{4, 8, 9, 3\}$

OR

P.T.O.

Q4) a) Determine the impulse response of the system described by the following difference equation: **[4]**

$y(n) - 1.5y\,(n-1) + 0.5y\,(n-2) = x(n)$

b) Compute the circular convolution of the following sequences using DFT-IDFT method: **[6]**

$x_1(n) = \{2, 3, 1, 1\}$ and $x_2(n) = \{1, 1, 2, 4\}$

Q5) Compute the 8-point DFT of the sequence $x(n)=\left\{\frac{1}{4},\frac{1}{4},\frac{1}{4},\frac{1}{4}\right\}$ using

a) Radix-2 decimation-in-time algorithm. **[8]**

b) Radix-2 decimation-in-frequency algorithm. **[8]**

OR

Q6) Compute the DFT of the sequence $x(n)=\left\{\frac{1}{8},\frac{1}{8},\frac{1}{8},\frac{1}{8},0,0,0,0\right\}$ using

a) Radix-2 decimation-in-time algorithm. **[8]**

b) Radix-2 decimation-in-frequency algorithm. **[8]**

Q7) Design a FIR linear-phase, digital filter approximating the ideal frequency response

$$\mathrm{H}_d(\omega)=\begin{cases} e^{-j\alpha w} \text{ for } |\omega| \le 0.35\pi \\ 0 \quad \text{for } 0.35\pi < |\omega| \le \pi \end{cases}$$

a) Determine the desired impulse response $h_d(n)$ for M = 11. **[6]**

b) Design the filter using Hamming window. **[6]**

c) Design the filter using Hanning window. **[6]**

OR

Q8) Design a FIR high-pass filter with cut-off frequency $\omega_c = 0.5\pi$ rad/sec and length M = 11.

a) Determine the coefficients the filter using a rectangular window. **[6]**

b) Determine the filter coefficients using Blackman window. **[6]**

c) Determine the filter coefficients using Bartlett window. **[6]**

Q9) Design a digital low-pass filter to meet the following specifications: **[16]**

Passband ripple: ≤ - 1 dB

Passband edge: 0.45π rad/sample

Stopband attenuation: ≥ - 20 dB

Stopband edge: 0.65π rad/sample

This filter is to be designed by performing a bilinear transformation on Butterworth analog design. Assume sampling period as 1 sec.

OR

Q10) A digital low-pass filter have the following specifications:

Passband ripple: ≤ - 0.5 dB

Passband edge: 1200 Hz

stopband attenuation: ≥ -40 dB

Stopband edge: 2000 Hz

Sample rate: 8 kHz

Design a digital Chebyshev Type I filter with above specifications using bilinear transformation method. **[16]**

Total No. of Questions : 10]

SEAT No. :

P2601

[Total No. of Pages : 2

[5153]-577

T.E. (Instrumentation & Control)

PROCESS LOOP COMPONENTS

(2012 Course) (End Semester) (Semester - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right indicate full marks.***
3) ***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 the help neat block diagram a typical Process Control Loop. **[8]**

b) "Zero is shifted in standard transmission signals" Justify. **[2]**

OR

Q2) a) Compare SMART with Conventional transmitter. **[6]**

b) Give application of the following: **[4]**

i) Square root extractor.

ii) Converter

Q3) a) List various process characteristics and explain any two of them. **[8]**

b) How offset is eliminated by integral action in a Proportional Integral Controller. **[2]**

OR

Q4) a) Explain the concept of Bumpless transfer. **[6]**

b) Explain the brief the following: **[4]**

i) Proportional bias.

ii) Tuning of controller.

P.T.O.

Q5) a) Explain the block diagram of Programmable Logic Controller. **[8]**

b) Develop using proper symbols ladder diagram for single tank level system. Assume suitable sequence. **[10]**

OR

Q6) a) Explain the following terms with respect to Programmable Logic Controller. **[6]**

i) Scan time

ii) Hand Held Terminal

iii) Rack and Slot

b) List different manufacturers and programming languages of Programmable Logic Controller. **[4]**

c) Momentary push buttons (PB1 and PB2) must be depressed, one hand for each push button, and a part to be drilled should be is in place, centered below the drill, before the drill motor starts. Develop using proper symbols ladder diagram for the given application. **[8]**

Q7) a) Compare single seated globe valve with double seated valve. **[8]**

b) Explain the following parts of control valve. **[8]**

i) Valve seat

ii) Diaphragm plate

iii) Bonnet

iv) Spring

OR

Q8) a) Compare spring diaphragm actuator with piston cylinder actuator. **[8]**

b) "Valve positioners enhance the performance of Control valve" explain. **[8]**

Q9) a) What do you mean by cavitation. Suggest any two methods to take care of cavitation. **[8]**

b) List different control valve noises. Explain any one type. **[8]**

OR

Q10)a) Define valve coefficient. Write standard formulae for finding valve coefficient. **[8]**

b) What are the factors considered while selecting a type of control valve. **[8]**

Total No. of Questions : 10]

SEAT No. :

P2602

[Total No. of Pages : 2

[5153]-578

T.E. (Instrumentation & Control)

UNIT OPERATIONS & POWER PLANT INSTRUMENTATION

(2012 Pattern) (Semester - II) (306269)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer: Q.No.1 or Q.No.2, Q.No.3 or Q.No.4, Q.No.5 or Q.No.6, Q.No.7 or Q.No.8, Q.No.9 or Q.No.10.***
2) ***Neat Diagrams must be drawn wherever necessary.***
3) ***Figure to the right indicate full marks.***
4) ***Assume Suitable data, if necessary.***

Q1) a) Explain principle of working of industrial dyer with suitable example. **[5]**

b) Explain principle of working of pulverization unit operation. **[5]**

OR

Q2) a) Enlist types of evaporation operation. Explain any one in details. **[5]**

b) Explain working of multi component fractionating column. **[5]**

Q3) a) Explain importance of control station in nuclear power plants. **[5]**

b) Explain with neat sketch of nuclear power plant. **[5]**

OR

Q4) Explain following terms. (Any two): **[10]**

a) Geothermal and bio-fuels

b) Solar power

c) Wind pumps

P.T.O.

Q5) a) Explain working of electrostatic precipitator and soot blower in Boilers. **[8]**

b) Explain working of burner management system used in Boilers. **[8]**

OR

Q6) a) Explain with neat sketch of furnace control system of Boilers. **[6]**

b) Why super heater and de-super heater are required in Boilers. Explain any one in detail. **[10]**

Q7) a) Explain power distribution instrumentation of turbine. **[10]**

b) Explain role of Instrumentation in turbine. **[8]**

OR

Q8) Write a note on (any three): **[18]**

a) Excess Air in Boilers

b) Thermal stress control

c) Heat Loss Method for Boiler efficiency

d) Lubricant oil control

Q9) a) Explain importance of control of pollution monitoring, Sound, Air, smoke, dust, etc of various power plants. **[8]**

b) Compare wind and nuclear power plant. **[8]**

OR

Q10) Write note on following aspects of solar power plant. (Any three): **[16]**

a) Site Selection

b) Performance

c) Efficiency

d) Economic-capital and running

Total No. of Questions : 10]

SEAT No. :

P2603

[Total No. of Pages : 2

[5153]-579

T.E. (Instrumentation and Control Engineering)
INSTRUMENT & SYSTEM DESIGN
(2012 Pattern) (Semester - II) (End Sem.)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain the significance of EMI and EMC in instrumentation system design. **[4]**

b) Draw the internal constructional diagram of IC AD 595. Explain how the ice point compensation block works? **[6]**

OR

Q2) a) What is grounding? Explain hybrid ground. **[5]**

b) Write the features and applications of IC XTR 110. **[5]**

Q3) a) Write a note on phases of product life cycle. **[5]**

b) Enlist the various mechanisms for protection against ESD. **[5]**

OR

Q4) a) Explain Johnson noise and also draw the equivalent models for it. **[5]**

b) Draw the internal circuit of IC HCNR 201 and explain its operation for positive input positive output. **[5]**

P.T.O.

Q5) a) A 12V, 100mA lamp is to be driven with isolation facility. Suggest suitable IC. Design and draw interfacing diagram. **[9]**

b) What are the salient features of IC 7107? What is the function of test pin? Explain the operation of analog section consisiting of three phases. **[9]**

OR

Q6) a) Enlist features and applications of PLL IC CD 4046. Compare PC I and PC II. Explain the functions of the pins-phase pulse output, VCO in and R2 to Vss. **[9]**

b) In a certain food industry, bottle filling process requires number of filled bottles to be counted. Maximum number of bottles per batch is 6000. Suggest suitable IC and draw the application diagram. **[9]**

Q7) a) Differentiate between dip soldering and wave soldering. **[8]**

b) Explain four problems occurring in design of digital circuit PCBs. **[8]**

OR

Q8) a) What are the different rules to be followed for component placement on PCB? **[8]**

b) Write short notes on solder flux and solder mask. **[8]**

Q9) a) With hypothetical timing diagram explain the terms MTTR, MTBF and MTTF. **[6]**

b) Differentiate between reliability and quality. **[6]**

c) What are the causes of unreliability? **[4]**

Q10)a) Write a detailed note on documentation and its importance. **[8]**

b) Draw and explain failure rate curve for two levels of work pressure. **[8]**

Total No. of Questions : 10]

SEAT No. :

P2604

[Total No. of Pages :2

[5153]-580

T. E. (Instrumentation & Control)

BIOMEDICAL INSTRUMENTATION

(2012 Course) (Semester-II) (End Sem.) (306271)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right indicates full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Define the Electrode offset potential, Action potential, Evoked potential. **[6]**

b) Define bio electrode. Explain Micropipate electrode. **[4]**

OR

Q2) a) Elaborate on properties of Bioelectrodes. **[6]**

b) Define Tachy cardia and Bradycardia state of Heart rhythm. **[4]**

Q3) a) Draw and explain phygmomanometer type method of Blood pressure measurement and enlist its advantage and disadvantages. **[6]**

b) Enlist various transducers used in Phono-cardiogram? List out the various heart sound frequencies in Phonocardiograph. **[4]**

OR

Q4) a) Draw and explain the principle of plethesmography. **[5]**

b) What are the problem in Electromagnetic Blood flowmeter if sinusoidal wave excitation is used. How it is minimized. **[5]**

Q5) a) Define efferent and afferent nerves. Enlist the various cerebral lobes and state that which lobe is responsible for visual pattern recognition and analysis. **[10]**

b) Draw and explain brain stem. **[8]**

OR

P.T.O.

Q6) a) What is an EEG? Explain the evoked potential measurement. **[10]**

b) Explain the EEG Electrodes Montage system. **[8]**

Q7) a) Draw and explain Electromyograph. **[8]**

b) Explain various errors in vision with its ways of correction. **[8]**

OR

Q8) a) Differentiate between Pure tone audiometer and Speech Audiometer. **[8]**

b) Explain the function of middle ear. **[8]**

Q9) a) Explain the mechanism of respiration process. **[8]**

b) Draw and explain spirogram with various lung capacities. **[8]**

OR

Q10)a) Draw & explain below type Spiro meter for respiratory measurement. **[8]**

b) Draw and explain Oxygen gas analyzer. **[8]**

♦ ♦ ♦

Total No. of Questions :8]

SEAT No. :

P2605

[Total No. of Pages :3

[5153] - 581

T.E. (Computer)

THEORY OF COMPUTATION

(2012 Course) (Semester - I) (310241)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

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

Q1) a) Prove or disprove the given regular expression **[6]**

i) $(r^*s^*) = (r + s)^*$

ii) $s(rs + s)^* r = rr^*s(rr^*s)^*r$

b) Define Pumping Lemma and apply it to prove the following **[6]**

$L = \{0^m 1^n 0^{m+n} \mid m>=1 \text{ and } n >=1\}$ is not regular

c) What is the ambiguous grammar? Show that the grammar below is ambiguous, & find the equivalent un ambiguous grammar. **[8]**

i) $s \rightarrow ss \mid a \mid b$

ii) $s \rightarrow ABA, A \rightarrow aAb \mid \in, B \rightarrow bB$

OR

Q2) a) State Principle of Mathematical Induction and apply it to Show that **[6]**

$1+4+7+....(3n-2) = n(3n-1) / 2$ for $n>0$

b) Construct a NFA that accepts the set of strings in (0+1)* such that some two 0's are Separated by string whose length is 4i, for some i > = 0. **[6]**

c) Find an equivalent left linear grammar for the given right linear grammar **[8]**

i) $S \rightarrow bB|b, B \rightarrow bC|aB|b, C \rightarrow a$

ii) $S \rightarrow 0A|1B, A \rightarrow 0C|1A|0, B \rightarrow 1B|1A|1, C \rightarrow 0|0A$

P.T.O.

Q3) a) What is a Turing Machine? Give the formal definition of TM. Design a TM to compute multiplication of two unary numbers. **[9]**

b) What are the different ways for extension of TM? Explain. Construct a two tape TM to convert an input W into WW^R. **[9]**

OR

Q4) a) Write short note on: **[8]**

i) Recursively Enumerable Languages.

ii) Halting Problem of Turing Machine.

b) What is a post machine? Give formal definition of Post machine. Construct a Post Machine for Accepting strings having odd length and a or b as centre element. **[10]**

Q5) a) Construct a PDA that accepts the language generated by grammar. **[8]**

i) $S \rightarrow 0S1|A, A \rightarrow 1A0|S|\varepsilon$

ii) $S \rightarrow aABB|aAA, A \rightarrow aBB|a, B \rightarrow bAA|A$

b) Obtain the CFG equivalent to PDA given by the transition function. **[8]**

$\delta(q_0, a, z_0) = \{q_0 a z_0\}$ $\delta(q_0, a, a) = \{q_0 aa\}$

$\delta(q_0, b, a) = \{q_1 \varepsilon\}$ $\delta(q_1 b, a) = \{q_1 \varepsilon\}$

$\delta(q_1, \varepsilon, z_0) = \{q_0 z_0\}$

OR

Q6) a) What is a PDA? Construct a PDA that accept $L = \{a^n b^n \mid n \geq 1\}$ through Final State. **[8]**

b) What is NPDA? Construct a NPDA for the set of all strings over {a, b}with odd length palindrome. **[8]**

Q7) a) What is Kruskal's Algorithm? How can we solve this problem using Turing Machine? **[8]**

b) What do you mean by Polynomial Time Reduction? Explain with suitable example. **[8]**

OR

Q8) a) What do you mean by NP-Problems? Justify why the Travelling Salesman problem is a NP-Problem. **[8]**

b) What is Clique Problem? Show that it is a NP-Complete problem. **[8]**

EEE

Total No. of Questions : 10]

SEAT No. :

P2606

[Total No. of Pages : 2

[5153]-582
T.E. (Computer Engineering)
OPERATING SYSTEMS DESIGN
(2012 Course) (Semester-I) (310242) (End Semester)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answers the Q.1 or Q.2 and Q.3 or Q.4 and Q.5 or Q.6 and Q.7 or Q.8 and Q.9 or Q.10***
2) ***Figures to the right indicates full marks.***

Q1) a) How to convert a pathname into a inode number? **[5]**

b) What are scenarios to allocate a buffer for disk block using getblk( ) algorithm? **[5]**

OR

Q2) a) Explain following algorithms of Buffer cache. **[6]**

i) getblk( )

ii) Brelease( )

b) Explain in details six steps of Android boot process. **[4]**

Q3) a) Explain with neat diagram Linux memory management. **[5]**

b) Write short note on "Hybrid system with swapping and demand paging". **[5]**

OR

Q4) a) Explain with neat diagram address translation in paging. **[5]**

b) Write in short-allocating and freeing swap space. **[5]**

Q5) a) Explain working of Sockets and related system calls. **[6]**

b) What is problem of Multiprocessor systems and explain its solution with

i) Master Slave processors and

ii) Semaphores. **[10]**

OR

P.T.O.

Q6) a) What do you mean by pipe? Explain anonymous and named/FIFO pipe. **[10]**

b) How process is traced with ptrace system call? **[6]**

Q7) a) How to make a USB bootable with any open source tool? **[9]**

b) What is make utility? Explain it with example. Consider your own makefile. **[7]**

OR

Q8) a) What are the EFI and UEFI? Explain with an application. **[8]**

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

i) Mork Manager.

ii) Shim manager.

Q9) a) Draw and explain the android os architecture. **[8]**

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

i) Real time scheduling

ii) Multiprocessor scheduling.

OR

Q10)a) Enlist different characteristics of real time system and explain it. **[9]**

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

i) Palm OS

ii) Master/Slave Architecture

iii) Frame of Reference.

❄ ❄ ❄

Total No. of Questions : 10]

SEAT No. :

P2607

[Total No. of Pages : 2

[5153]-583

T.E.(Computer Engineering)

DATA COMMUNICATION AND WIRELESS SENSOR NETWORK

(2012 Pattern) (Semester - I) (End Sem.) (310243)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q.1 OR Q.2, Q3 OR Q.4 10 Marks each.***
2) ***Attempt Q.5 OR Q.6 16 Marks each.***
3) ***Attempt Q.7 OR Q.8 18 Marks each.***
4) ***Attempt Q.9 OR Q.10 16 Marks each.***
5) ***Neat diagrams must be drawn wherever necessary.***
6) ***Assume Suitable data if necessary.***
7) ***Figures to the right indicate full marks.***

Q1) a) "In Adaptive delta modulation quantization error increases as slope error reduces" State true or false with proper justification. **[6]**

b) How does Virtual Private Network work? Write applications of VPN. **[4]**

OR

Q2) a) Draw and Explain B8ZS, AMI line coding techniques in detail. **[6]**

b) Explain necessity of flow and error control protocols in Wireless Sensor Network. **[4]**

Q3) a) Three thousand six hundred reservation stations are available for use of single slotted ALOHA channel.The average station have 10 reservation request per hour. A slot has 125μs. What is approximate channel load? **[6]**

b) "CSMA CD minimizes the recovery time post collision while CSMA CA reduces possibility of a collision" State true or false with justification. **[4]**

OR

Q4) a) Identify the difference between Ad hoc and cellular network. **[6]**

b) Write in detail applications of Wireless body Sensor Network in health domain. **[4]**

P.T.O.

Q5) a) Design suitable criteria that decides selection of schedule or contention based protocols in MAC layer. **[8]**

b) Explain with neat diagram Sensor Medium Access Control Protocol in Wireless Sensor Network. **[8]**

OR

Q6) a) Discuss in detail design issues related to address and name management in Wireless Sensor Network. **[8]**

b) Describe the necessity of low duty cycle protocols and wakeup concept in Wireless Sensor Network. **[8]**

Q7) a) Explain the concept of "Information via Negotiation" in SPIN. **[8]**

b) Explain in detail data centric or attribute based routing protocol with example. **[5]**

c) Describe role of network layer in data dissemination and gathering. **[5]**

OR

Q8) a) "Low Energy Adaptive Clustering Hierarchy protocol improves lifetime of the Wireless Sensor Network" State True or False with justification. **[8]**

b) With neat diagram explain working of Power Efficient Gathering in Sensor information System protocol in Wireless Sensor Network. **[5]**

c) Compare proactive and reactive routing protocol design issues in Wireless Sensor Network. **[5]**

Q9) a) "Tiny OS is application specific operating system for Wireless Sensor Network" Justify the statement with respective to architecture, design, issues, functions. **[8]**

b) Design role of Wireless Sensor Network in Internet of Things. **[8]**

OR

Q10)a) "Designing algorithms for Localization and positioning of Wireless Sensor Network in remote, disastrous region is challenging" Justify with example. **[8]**

b) Discuss necessity of big data solutions for Wireless Sensor Network. **[4]**

c) Explain significance of anchor placement in Wireless Sensor Network. **[4]**

Total No. of Questions : 10]

SEAT No. :

P2608

[Total No. of Pages : 3

[5153]-584

T.E. (Computer Engg.)

DATABASE MANAGEMENT SYSTEM APPLICATIONS

(2012 Pattern) (Semester - I) (310244)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Construct an E-R diagram for a hospital with a set of patients and a set of medical doctors. associate with each patient a log of the various tests and examinations conducted. Properly identify primary keys and different types of attributes. **[5]**

b) Explain how the use of Database Management System is better than File Processing System. **[5]**

OR

Q2) a) Consider following structure for MongoDB collection and write a query for following requirements in MongoDB (any 2) **[5]**

Student (Roll_No, Class, Marks_obtained).

i) Create above collections and insert minimum 2 documents into collection

ii) Find all students who belongs to Class SE_Comp and Obtained more than 60 Marks. Display only Roll_no.

iii) Use Save Method to insert document.

b) Explain aggregation in MongoDB using suitable example. **[5]**

Q3) a) Consider relational schema **[5]**

Loan (l_no, branch_name, amount)

P.T.O.

Borrower (c_name, l_no)

Account (acc_no, br_name, balance)

Write SQL queries for following requirements: (Any two)

i) List all customers in alphabetical order who have a loan at 'Pune' branch

ii) Calculate total loan amount given by bank.

iii) Find average account balance at 'Mumbai' branch.

b) What is serializability? Explain view serializability in brief. **[5]**

OR

Q4) a) Explain CAP theorem in NOSQL Databases. **[5]**

b) Explain ACID properties of relational database with suitable example. **[5]**

Q5) a) Explain Cassandra database system. **[8]**

b) There are different reasons of building distributed database system, including sharing of data, autonomy and availability. Explain these advantages of distributed database systems in detail. **[8]**

OR

Q6) a) Explain different steps required for JAVA to MongoDB database connection using JDBC. **[8]**

b) List and explain different factors affecting the speed up and scaleup of parallel systems. **[8]**

Q7) a) Consider the requirements of bank having following fields to store. **[7]**

account (account-number, branch-name, balance)

customer (customer-name, customer-street, customer-city)

depositor (account-number, customer-name)

Write a XML DTD for above elements.

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

i) Building blocks of HADOOP

ii) R programming

OR

Q8) a) Explain the different methods for XML querying like Xpath & Xquery. **[7]**

b) Explain HBASE and HIVE **[5]**

c) Explain Mapreduce in HADOOP. **[5]**

Q9) a) Explain with neat diagram different components of data warehouse. **[5]**

b) What is data Mining classification? How Data Mining Classification is used to extract knowledge from database? **[7]**

c) Explain the different types of machine learning algorithms like supervised & unsupervised learning algorithms. **[5]**

OR

Q10)a) Explain in brief different BIS components. **[5]**

b) In organizations, operational database systems are available to handle the daily transactions then why separately Data warehouse systems are installed? **[7]**

c) Write short note on Data-mining regression analysis. **[5]**

Total No. of Questions :8]

SEAT No. :

P2609

[Total No. of Pages :2

[5153] - 585

T.E. (Computer)

COMPUTER FORENSIC AND CYBER APPLICATIONS

(2012 Course) (Semester - I) (End-Semester)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

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

Q1) a) Explain in brief Indian IT Act. **[8]**

b) What are different digital investigation process models? Describe any one. **[6]**

c) Enlist the differences between switch and router. **[6]**

OR

Q2) a) Describe transmission media with example. **[8]**

b) What is victimology? Explain with example. **[6]**

c) How intruders make use of social engineering and reverse social engineering to achieve their motive? **[6]**

Q3) a) Explain different types of cyber stalker with example cases. **[8]**

b) Explain different steps used in examining the computer crime and prepare a investigation case for"Mouse theft from college lab". **[8]**

OR

P.T.O.

Q4) a) What is cyber stalking? Explain how cyber stalker operates. **[8]**

b) Explain the process of investigative reconstruction in case of violent crime. **[8]**

Q5) a) Describe NTFS file system. **[8]**

b) How to handle mobile devices as source of evidence? **[8]**

OR

Q6) a) Compare digital evidence on windows system & Unix systems. **[8]**

b) Explain in brief Intellectual Property Rights (IPR). **[8]**

Q7) a) What are the services provided by internet? Differentiate between static IP address and dynamic IP address. **[9]**

b) Write short note on fraud detection in mobile and wireless network. **[9]**

OR

Q8) a) Explain E-mail forgery and tracking in detail. **[9]**

b) Enlist the steps applied in forensic science to the Networks. **[9]**

EEE

Total No. of Questions : 10]

SEAT No. :

P2610

[Total No. of Pages : 2

[5153]-586

T.E. (Computer Engineering)

PRINCIPLES OF CONCURRENT AND DISTRIBUTED PROGRAMMING

(2012 Course) (Semester - II) (End Semester)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain Distribution Model. **[4]**

b) Write a program in LISP to find factorial of a given number. **[6]**

OR

Q2) a) Explain inter process communication. **[6]**

b) What is the structure of a YACC file? **[4]**

Q3) a) Write a note on Flynn's classification. **[6]**

b) Compare GPU and CPU. **[4]**

OR

Q4) a) Write a note on Shore's classification. **[6]**

b) Define Speed up with respect to parallel algorithms. **[4]**

Q5) a) What are the major issues of designing a Distributed OS? **[10]**

b) Explain various transparencies of a distributed system and how they are different from each other? Explain with example. **[8]**

OR

Q6) a) What are various models used in distributed computing environment? **[10]**

b) What is DCE cell? Explain the factors that need to be considered while deciding the cell boundaries. **[8]**

P.T.O.

Q7) a) What is Xen domain? Also explain hypervisor. **[8]**

b) What is para-virtualization? **[4]**

c) What is Hardware virtualization? **[4]**

OR

Q8) a) What is need of virtualization? Explain types of virtualization. **[8]**

b) What is Kernel-level virtualization? **[4]**

c) Explain Parallel virtual Machine? **[4]**

Q9) a) Explain how memory handling is done in CUDA. **[6]**

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

- CUDA grids
- CUDA Kernels

c) Write a CUDA program for addition of two matrices. **[4]**

OR

Q10)a) Explain threads in CUDA. Also explain problem decomposition. **[6]**

b) Explain Block mapping to address in CUDA with an example. **[6]**

c) Explain CUDA Task Execution Model. **[4]**

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Total No. of Questions : 10]

SEAT No. :

P2611

[Total No. of Pages : 2

[5153]-587

T.E. (Computer Engineering)

EMBEDDED OPERATING SYSTEMS

(2012 Pattern) (Semester - II) (End Sem.) (310250)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer: Q.No.1 or Q.No.2, Q.No.3 or Q.No.4, Q.No.5 or Q.No.6, Q.No.7 or Q.No.8, Q.No.9 or Q.No.10.***
2) ***Neat Diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume Suitable data, if necessary.***

Q1) a) How the selection of a scheduling algorithm made? **[6]**

b) When IPC needed? Name two methods? **[4]**

OR

Q2) a) What is BBB? Explain its important characteristics. **[4]**

b) What are the different operating modes of ARM? Explain. **[6]**

Q3) a) Explain the reasons for the growth of Embedded Linux. **[4]**

b) List different executables or binaries of Embedded Linux? **[4]**

c) What is NAND flash memory? **[2]**

OR

Q4) a) With the help of neat diagram, explain embedded Linux development setup. Comment on communication protocols used in the setup. **[7]**

b) What is Busy Box? **[3]**

Q5) a) What do you mean by cross development using embedded Linux? **[6]**

b) Explain the architectural features of flash memory. How it is useful in embedded systems? **[5]**

c) What are the different types of device drivers? Explain Ismod and modprobe. **[6]**

OR

P.T.O.

Q6) a) What are the features of bootloader used for embedded systems? Also mention the challenges faced by bootloader. **[6]**

b) What is the use of flash memory found on the embedded/target board? What are the limitations of flash memory? **[5]**

c) How to build device drivers in Embedded Linux? **[6]**

Q7) a) What are tracing and profiling tools? Name and explain 3 such tools. **[7]**

b) What is GDB debugger? Explain its role in Linux kernel debugging. **[6]**

c) How to debug the kernel using 'printk'? **[4]**

OR

Q8) a) Name and explain two popular methods of source -level Linux kernel debugging. **[8]**

b) What is remote debugging? How it is done? **[6]**

c) What is DDD? **[3]**

Q9) a) What are the issues involved in Linux kernel preemption? **[6]**

b) Explain different assumptions and requirements involved while porting Linux on target board. **[6]**

c) Explain bootloader in Android. **[4]**

OR

Q10)a) Explain the following with respect to embedded android: **[6]**

i) Init

ii) Launcher

iii) Activity manager

b) Which Linux version supports real-time features? What are the real-time features of this Linux kernel? **[6]**

c) What do you mean by porting Linux? **[4]**

Total No. of Questions : 8]

SEAT No. :

P2612

[Total No. of Pages : 2

[5153]-588
T.E. (Computer Engineering)
COMPUTER NETWORKS
(2012 Pattern) (Semester - II) (End Sem.) (310251)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Neat Diagrams must be drawn wherever necessary.***
2) ***Assume Suitable data, if necessary.***
3) ***Draw neat diagrams whenever necessary.***

Q1) a) Explain DHCP in detail. **[8]**

b) What is the difference between persistent and non persistent HTTP? Explain HTTP message format. **[8]**

c) Differentiate between TCP and UDP protocol. **[4]**

OR

Q2) a) Explain Link State Routing with example. **[8]**

b) Why TCP need four different timers? Explain function of each. **[8]**

c) Differentiate between IPv4 and IPv6. **[4]**

Q3) a) Explain MAC Sublayer: Distributed Coordination Function (DCF) & Point Coordination Function (PCF) of 802.11 standard. **[8]**

b) Write short note on following (any 2): **[8]**

i) WML Script

ii) WAP 2.0

iii) SONET Frame Format.

OR

P.T.O.

Q4) a) Explain WLAN Architecture. **[8]**

b) Draw and explain diagram of Frequency Hopping Spread Spectrum (FHSS) and Direct Sequence Spread Spectrum (DSSS). **[8]**

Q5) a) Explain DTN architecture in wired network. **[8]**

b) What are the components of VANET? What do you mean by dedicated short range communication in VANET? **[8]**

OR

Q6) a) Draw and explain VOIP network architecture. **[8]**

b) Explain an application of VOIP in real environment. **[8]**

Q7) a) What is the role of client layers in optical fiber? **[8]**

b) Write short note on (any 2): **[10]**

i) Role of Ethernet in Optical Network

ii) GMPLS

iii) Virtualization and its types

OR

Q8) a) Explain ATM architecture with diagram. **[8]**

b) Explain working of SDN in detail with diagram. **[10]**

Total No. of Questions : 10]

SEAT No. :

P2613

[Total No. of Pages : 2

[5153]-589

T.E. (Computer Engineering)

SOFTWARE ENGINEERING

(2012 Pattern) (Semester - II) (310252) (End Sem.)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Describe the different box specification in Cleanroom engineering? **[5]**

b) Provide an overview of the evolutionary development approach and identify key areas of advantage over more traditional development approaches. **[5]**

OR

Q2) a) The concurrent process model defines a set of "states". Describe what these states represents in your own words, and then indicate how they come in to play within the concurrent process model. **[5]**

b) Describe the term "Requirement Elicitation". **[5]**

Q3) a) Discuss the importance of data abstraction in the software design. **[5]**

b) Illustrate the term cohesion and coupling in the context of software design? How are these concepts useful in arriving at a good design of a system? **[5]**

OR

Q4) a) Compare structured analysis and object oriented strategies for requirements analysis. **[5]**

b) Explain the quality attributes, considered in software design. **[5]**

P.T.O.

Q5) a) Discuss testing. Explain unit testing process. **[5]**

b) Compare software testing with debugging. **[5]**

c) Draw the flow graph for finding maximum of three numbers and derive the test case using cyclomatic complexity. **[7]**

OR

Q6) a) Explain Boundary value analysis testing and orthogonal Array testing. **[5]**

b) Explain regression testing. **[5]**

c) Analyze the objectives of testing? What are Testing strategies for conventional and object oriented software? **[7]**

Q7) a) Explain COCOMO II model. **[5]**

b) Differentiate between Measure and Metric? Identify the attributes of effective Software Metric? **[5]**

c) Explain Earned Value Analysis in project scheduling. **[7]**

OR

Q8) a) Explain time line chart. Explain with suitable examples. **[5]**

b) Describe project scheduling? What are the basic principles of project scheduling? **[5]**

c) Illustrate process decomposition? What are the work tasks for communication process using process decomposition? **[7]**

Q9) a) Explain Aspect oriented software engineering. **[5]**

b) Describe Z specification Language? **[5]**

c) Discuss architectural patterns in details. **[6]**

OR

Q10)a) Illustrate the client server computing. **[5]**

b) Interpret the benefits and problems of reusing software when developing new systems? **[5]**

c) Explain Distributed software engineering? **[6]**

Total No. of Questions : 10]

SEAT No. :

P2614

[Total No. of Pages :2

[5153]-590

T. E. (Computer Engineering)

DIGITAL SIGNAL PROCESSING APPLICATIONS

(2012 Course) (Semester-II) (End Sem.) (310253)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Assume suitable data, if necessary.***

Q1) a) State the sampling theorem and explain in brief the coding process of ADC. **[5]**

b) Obtain the Z Transform(ZT) of a DT signal

$x(n) = a^n u(-n-1)$ Sketch the ROC. **[5]**

OR

Q2) a) A CT signal having frequency 50 Hz is sampled at a rate of 1200 samples /sec. Obtain

i) Number of samples per cycle.
ii) Digital/Discrete frequency f and ω.
iii) Minimum sampling rate to avoid aliasing effect.
iv) Period of a DT signal. **[5]**

b) State and prove the time shifting property of Fourier Transform(FT). Define it for DFT. **[5]**

Q3) a) Compare Linear Convolution with Circular Convolution. **[5]**

b) Define N point DFT by means of twiddle factor and obtain the twiddle factors for 4 point DFT. **[5]**

OR

Q4) a) Obtain the computational complexity of Radix-2 DIF FFT Algorithm. **[5]**

b) Define the system, function and obtain it for the given system described as- $y(n) - \frac{5}{6}y(n-1) + \frac{1}{6}y(n-2) = x(n) - \frac{1}{2}x(n-1)$ **[5]**

P.T.O.

Q5) a) Derive the Direct Form-II IIR filter structure from the system function H(Z) and realize it using multipliers, adders and delay elements. **[9]**

b) Obtain and realize linear phase FIR filter structure having impulse response

$$h(n) = \delta(n) + \frac{1}{2}\delta(n-1) - \frac{1}{4}\delta(n-2) + \frac{1}{2}\delta(n-3) + \delta(n-4)$$ **[9]**

OR

Q6) a) Obtain and draw the cascade form realization for IIR filter having transfer function $H(Z) = \frac{5Z(Z+0.4)}{(Z-0.2)(Z-0.6)}$ **[9]**

b) Represent the mathematical form of Nth order FIR filter by means of system function H(Z). Draw the Direct Form filter structure and determine the number of multipliers, adders and delay elements required to realize the filter. **[9]**

Q7) a) Compare conventional Microprocessor with DSP Processor architecture. Draw and expain basic building blocks of DSP processor. **[8]**

b) Drarw and explain the SIMD(Single Instruction Multiple Data) architecture of SHARC DSP processor. **[8]**

OR

Q8) a) Explain the features of SHARC DSP processor. List the number of DAGs with its capabilities and memory pointer registers supported by DAG. **[8]**

b) What is OMAP? Explain the features and applications of OMAP in brief. **[8]**

Q9) a) What is Companding? What is its significance in audio processing? What is the impact of data rate on sound quality? **[8]**

b) With mathamatical form, explain any two gray level transforms used for image enhancement. **[8]**

OR

Q10)a) Draw and explain Human Speech Model in speech synthesis and recognition. **[8]**

b) How digital image is represented by means of digital computer? How gray scale image is different than colour image? What is Histogram of an image? **[8]**

♦ ♦ ♦

Total No. of Questions :10]

SEAT No. :

P2615

[Total No. of Pages :2

[5153] - 591

T.E. (Information Technology)

COMPUTER NETWORK TECHNOLOGY

(2012 Pattern) (Semester - I) (End-Sem.)

Time : 2½Hours] *[Max. Marks :70*

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

Q1) a) Differentiate among circuit switching, packet switching and message switching with one example. **[6]**

b) Explain various transport layer services. **[4]**

OR

Q2) a) What is socket? Explain various client and server socket primitives. **[6]**

b) Write a short note on Quality of service. Parameters in Transport layer. **[4]**

Q3) a) A company is granted a site address 201.70.64.0. The company needs six subnets. Design the subnets. **[6]**

b) Lists the areas of network management and explain the necessity of any three. **[4]**

OR

Q4) a) What is DNS? What is server hierarchy? Explain domain name resolution process. **[6]**

b) Explain in detail how TCP provides flow control. **[4]**

P.T.O.

Q5) a) Explain the basic architecture of WLAN and discuss various components in it. **[10]**

b) Compare: Bluetooth and wireless LAN. **[8]**

OR

Q6) a) Explain Bluetooth features and architecture with suitable diagram. **[10]**

b) Explain frame format of 802.16. **[8]**

Q7) a) Explain following terms w.r.t. WSN: **[8]**

i) Data aggregation.

ii) Data diffusion.

iii) Data dissemination.

iv) Multicast.

b) What are different design issues of MAC protocol for WSN? **[8]**

OR

Q8) a) List different routing protocols used by WSN. Explain any one in detail. **[8]**

b) Explain Set up phase and steady state phase of LEACH protocol. **[8]**

Q9) a) Explain the tasks of address management in WSN. **[8]**

b) Describe DSDV Routing protocols. **[8]**

OR

Q10) Write short note on (any two): **[16]**

a) Internet of Things (IoT).

b) Software Defined Networking (SDN).

c) BYOD.

EEE

Total No. of Questions :10]

SEAT No. :

P2616

[Total No. of Pages :3

[5153] - 592

T.E. (I.T.)

THEORY OF COMPUTATION

(2012 Pattern) (Semester - I) (End-Semester) (314442)

Time : 2½Hours] *[Max. Marks :70*

Instructions to the candidates:

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

Q1) a) Construct FA that accepts even number of zeros & odd number of ones. **[6]**

b) Write formal definition of regular expression with suitable example. State Arden's theorem and its use. **[4]**

OR

Q2) a) Construct a Moore machine to find out the residue-modulo-3 for binary number. **[6]**

b) Define regular sets. List out closure properties of regular sets. **[4]**

Q3) a) Define the following and give appropriate examples **[4]**

i) Derivation tree

ii) Context free grammar

b) Convert right linear grammar to its equivalent left linear grammar. **[6]**

S→bB

B→bC

B→aB

B→b

C→a

OR

P.T.O.

Q4) a) Construct a DFA equivalent to the following grammar **[6]**

$S \rightarrow S10|0$

b) Write a short note on the applications of CFG. **[4]**

Q5) a) Design a PDA that checks wellformedness of parentheses. Simulate PDA for (( ) (( ))). **[8]**

b) Define and compare DPDA and NPDA. Justify that NPDA is more powerful than DPDA. **[8]**

OR

Q6) a) Construct a PDA for the language generated by the following grammar **[8]**

$S \rightarrow aB \mid bA$

$A \rightarrow bAA \mid a \mid aS$

$B \rightarrow b \mid bS \mid aBB$

b) Define post machine. Compare FA, PDA and post machines. **[8]**

Q7) a) Write a short note on: **[8]**

i) Church Turing Hypothesis

ii) Post correpondence problem

b) Design a Turing Machine to recognize the language $L = \{1^n2^n3^n \mid n>=1\}$. Simulate TM for "112233". **[10]**

OR

Q8) a) Design a Turing machine that accepts $L = \{0^n1^n \mid n<=1\}$. Simulate TM for "000111". **[10]**

b) Explain the following for a TM **[8]**

i) Power of TM over finite state machine

ii) Universal TM

Q9) a) Write a short note on decidable problems concerning **[8]**

i) Context free languages

ii) Turing machines

b) What is reducibility? What are undecidable problems? Describe at least four undecidable problems in case of CFGs. **[8]**

OR

Q10)a) Describe post correspondence problem. PCP is an unsolvable problem. Justify. **[8]**

b) What are recursive and recursively enumerable languages? What is the relation between them? **[8]**

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Total No. of Questions : 10]

SEAT No. :

P2617

[Total No. of Pages : 2

[5153]-593

T.E. (Information Technology)

DATABASE MANAGEMENT SYSTEMS

(2012 Pattern) (Semester - I) (Endsem)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain the distinctions among the terms primary key, candidate key and super key with example. **[4]**

b) List different components used in E-R diagram with their meaning and construct an E-R diagram for a car insurance company whose customers own one or more cars each. Each car has associated with it zero to any number of recorded accidents. Each insurance policy covers one or more cars, and has one or more premium payments associated with it. Each payment is for a particular period of time, and has an associated due date, and the date when the payment was received. **[6]**

OR

Q2) a) What is deadlock? List the different deadlock prevention schemes. Is starvation still possible? Explain your answer. **[4]**

b) State the need of normalization? Explain 1NF, 2NF and 3NF with example. **[6]**

Q3) a) Explain different DDL and DML commands with example. **[6]**

b) Explain Transaction Control Commands in SQL with example. **[4]**

OR

P.T.O.

Q4) a) What is serializable schedule? Explain with suitable example the types of serializable schedules. Also explain the significance of precedence graph. **[5]**

b) What is Transaction? Explain ACID properties of transaction. **[5]**

Q5) a) Draw and explain distributed system architecture. **[8]**

b) Draw and explain Internet database systems. **[8]**

OR

Q6) a) Explain two-tier and three-tier architecture. **[8]**

b) Explain Data fragmentation and data replication with suitable example with respect to distributed database systems. **[8]**

Q7) a) What is big data? Explain properties of big data. **[8]**

b) What is XML? Explain structure of XML data. **[8]**

OR

Q8) a) What is the significance of Hadoop system? Explain characteristics of hadoop. **[8]**

b) Explain Hbase data model with its architecture. **[8]**

Q9) a) Define Teradata and explain architecture of Teradata. **[9]**

b) Explain: **[9]**

i) Mobile Database and ii) SQLite

OR

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

a) Data mining.

b) Cloud computing

c) Machine Learning System Model

d) Data Warehouse.

Total No. of Questions : 10]

SEAT No :

P2618

[Total No. of Pages :2

[5153]-594
T.E.(Information Technology)
SOFTWARE ENGINEERING
(2012 Pattern) (Semester-I)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Draw neat diagrams whenever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Write short note on Generic process model. **[5]**

b) What is software process assessment and approaches for software assessments? **[5]**

OR

Q2) a) What are the principles of Agile development? **[5]**

b) Explain Spiral model with the help of diagram. **[5]**

Q3) a) Explain in brief different SCRUM roles. **[5]**

b) What is Continuous integration? Explain benefits of continuous integration. **[5]**

OR

Q4) a) Explain Requirement Engineering Tasks. **[5]**

b) Draw and explain data flow diagram for Library Management System. **[5]**

Q5) a) Explain data centered and data flow architecture with neat diagrams. **[8]**

b) i) Write short note on Design Trade-offs. **[8]**

ii) Difference between structured analysis and object oriented analysis.

OR

Q6) a) What is software architecture? Compare horizontal and vertical partitioning. **[8]**

b) Explain architectural trade-off analysis method (A TAM). **[8]**

Q7) a) Define Usability. Explain different characteristics of Usability and ISO characteristics. **[8]**

b) Write short note on Interface Designs Principles. **[8]**

OR

P.T.O.

Q8) a) Explain the Seeheim model of human-computer dialog management? **[8]**

b) Explain mechanisms applied in user interface design for fulfilling Theo Mandel's three golden rules. **[8]**

Q9) a) Write the Black box, state-box and clear-box specification. **[8]**

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

i) Integrated Case Environment.

ii) Technology evolution.

OR

Q10)a) Write short notes on Elements of a Configuration Management System. **[8]**

b) What is cleanroom software development? Explain major task conducted during cleanroom approach. **[10]**

Total No. of Questions : 10]

SEAT No. :

P2619

[Total No. of Pages : 2

[5153]-595
T.E. (I.T.)
WEB ENGINEERING AND TECHNOLOGY
(2012 Course) (Semester - I) (314445) (End Semester)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Differentiate between software engineering and web engineering. **[5]**

b) Differentiate between HTTP and FTP. **[5]**

OR

Q2) a) What are signs of good and bad web design? **[5]**

b) Explain major web security issues. **[5]**

Q3) a) What are types of CSS? Explain with example. **[5]**

b) Write short note on DHTML. **[5]**

OR

Q4) a) Describe features and working of web server. **[5]**

b) How to create a frame in HTML? Explain with example. **[5]**

Q5) a) Explain characteristics of JavaScript and explain various data types in JavaScript. **[8]**

b) What is session? Explain session management in PHP. **[8]**

OR

Q6) a) Explain the benefits of using PHP & My SQL. Explain PHP module to insert a record in My SQL database. **[8]**

b) Explain creation of array in PHP and describe in brief string functions used in PHP. **[8]**

P.T.O.

Q7) a) What is the difference between doGet( ) and doPost( ) in servlet? **[8]**

b) What is XML? Why we need XML? **[8]**

OR

Q8) a) How can we read client data using servlet? **[8]**

b) Write a short note on web personalization and ontology. **[8]**

Q9) a) Explain directory & file structure of word press. **[9]**

b) Explain different components of AJAX. **[9]**

OR

Q10)a) What is the difference between Drupal, Joomla and Wordpress. **[9]**

b) What is the process of email configuration in web development? **[9]**

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Total No. of Questions : 10]

SEAT No. :

P2620

[Total No. of Pages : 3

[5153]-596

T.E. (Information Technology)

DESIGN AND ANALYSIS OF ALGORITHMS

(2012 Course) (Semester - II) (End Semester) (314449)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Prove by method of contradiction that "There is no greatest even integer". **[5]**

b) Write an Algorithm for binary search and find the worst case efficiency. **[5]**

OR

Q2) a) Set up a recurrence relation to compute n! and solve it. **[5]**

b) Consider the following letters with their probability. **[5]**

Character	a	b	c	d	e
Probability	0.5	0.25	0.125	0.0625	0.031

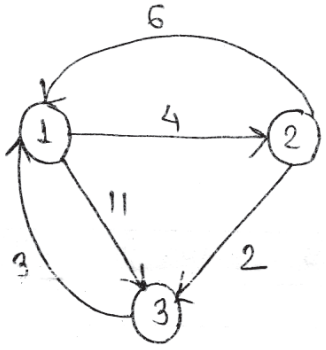
Find out Huffman coding for a, b, c, d, e.

Q3) a) Show the steps in multiplying the following two integers using efficiency integer multiplication method 2101 × 1130. **[5]**

b) Write Warshall's algorithm to find transitive closure. **[5]**

OR

Q4) a) Solve the all pairs shortest path problem for the given graph: **[5]**



P.T.O.

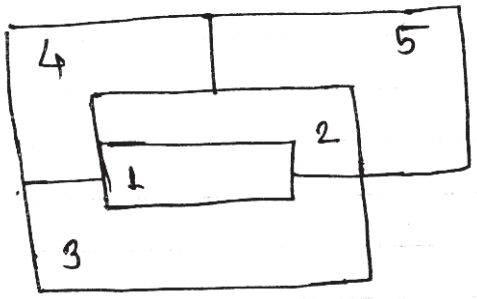
b) Explain the concept of divide and conquer technique. Write Master theorem. **[5]**

Q5) a) Let W = {5, 10, 12, 13, 15, 18}, M = 30. Find all possible subsets of W that sum to M. Draw the portion of state space tree that is generated.**[8]**

b) Write a recursive backing algorithm for M-coloring of the graph. **[8]**

OR

Q6) a) Construct planar graph for following map. Explain how to find M-colorings of this planar graph by using M-colorings backtracking algorithm. **[8]**



b) Write a recursive backtracking algorithm for sum of subset problem.**[8]**

Q7) What is travelling salesman problem? Find the solution of following travelling salesman problem using branch and bound method. **[18]**

∞	20	30	10	11
15	∞	16	4	2
3	5	∞	2	4
19	6	18	∞	3
16	4	7	16	∞

Cost Matrix

OR

Q8) a) What is LC search? Explain in detail control abstraction for LC search. **[8]**

b) Solve the following instance of 0/1 knapsack problem by FIFO branch and bound approach : n = 4, M = 15 and $(P_1, P_2, P_3, P_4) = (10, 10, 12, 18)$; $(W_1, W_2, W_3, W_4) = (2, 4, 6, 9)$ **[10]**

Q9) a) Specify one example of NP-complete problem. Also justify that why it is NP-complete. **[8]**

b) Explain pointer doubling algorithm. **[8]**

OR

Q10)a) Explain the need and significance of parallel algorithms. Define the speedup of parallel algorithm. **[8]**

b) Prove that Vertex Cover problem is NP complete. **[8]**

Total No. of Questions : 10]

SEAT No. :

P2621

[Total No. of Pages : 4

[5153]-597
T.E. (I.T.)
SYSTEMS PROGRAMMING
(2012 Course) (Semester - II) (314450)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Give the various data structures in the design of pass-1 of a Two-pass direct linking loader. **[4]**

b) What are the assembler directives? Explain how assembler directives LTORG, ORIGIN and EQU are processed in first pass. **[6]**

OR

Q2) a) For the 'C' code given below, give the different tables that would be generated as output of lexical analysis. **[8]**

```
main ( )
{    Float average ;
     int i, sum , n = 10;
     sum = 0;
     clrscr();
     printf("Average of 10 nos. : %f",avg);
     for (i = 1; i < = 10; i++)
          Sum = sum +i;
     avg = sum / (float) n;
}
```

b) Define macroprocessor and assembler. **[2]**

P.T.O.

Q3) a) For the following piece of assembly language code, show the contents of MDT, MNT, IC and EC, **[5]**

```
        MACRO
        INCR & ARG
        LOAD 1,&ARG
        ADD 1, = F'1'
        STORE 1,&ARG
        MEND
        MACRO
        DECR & NUM
        LOAD 2, &NUM
        SUB 2, = F'1'
        STORE 2, & NUM
        MEND
        START
        DECR D1
        STORE AREG, D1
        INCR D2
D1      DC '50'
D2      DC '100'
        END
```

b) Define loader and enlist the basic functions of loader. **[5]**

OR

Q4) a) Using the algorithm convert the following regular expressions to DFA: (a.b)*.a.# **[6]**

b) Explain different parameter passing mechanisms in macro-processor. **[4]**

Q5) a) Consider the grammar **[6]**

$$E \rightarrow E\text{-}E$$
$$E \rightarrow E/E$$
$$E \rightarrow id$$

Perform shift Reduce parsing of i/p string "id – id/id"

b) Explain recursive descent parser for the given grammar to derive the string cad

$$S \rightarrow cAd$$
$$A \rightarrow ab/a$$

[6]

c) Compare bottom UP and top down parser. **[6]**

OR

Q6) a) Consider the following grammar **[10]**

$$S \rightarrow S(S)S/\varepsilon$$

Construct SLR parser and parse for the string (a,(a,a))

b) Explain YACC file structure. **[4]**

c) Compare SLR, CLR and LALR parsers. **[4]**

Q7) a) Write down Syntax Directed Translation for assignment statement. **[6]**

b) For the grammar **[6]**

$$D \rightarrow TL$$
$$T \rightarrow int/real$$
$$L \rightarrow L,id/id$$

Draw an annotated parse tree for the statement real x_1, x_2;

c) Write the method of generating intermediate code for the expression

If (condition) then p = q Else x = y + z **[4]**

OR

Q8) a) Define Syntax directed definition and syntax directed translation. **[4]**

b) Design dependency graph for the following grammar **[6]**

$E \rightarrow E+T/T$

$T \rightarrow T*F/F$

$F \rightarrow id$

The expression given is : 5*8-10

c) For the following expression write its postfix expression, draw DAG and write three address code: **[6]**

$$\left((x+y)-\left((x+y)*(x-y)\right)\right)+\left((x+y)*(x-y)\right)$$

Q9) a) Compare between static, stack & heap allocation. **[4]**

b) With examples explain code generation issues. **[6]**

c) What are the different techniques of storage allocation. **[6]**

OR

Q10)a) With examples explain at least four machine independent code optimization techniques. **[8]**

b) Which are the machine dependent code optimization issues. **[8]**

Total No. of Questions : 10]

SEAT No. :

P2622

[Total No. of Pages :3

[5153]-598

T.E. (Information Technology)

OPERATING SYSTEM

(2012 Pattern) (Semester - II) (314451)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answers Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Figures to the right indicate full marks.***

Q1) a) Discuss batch and real time operating system with respect to process scheduling, memory management. **[4]**

b) Explain the concept of virtual machine with its implementation and benefits. Also explain examples of virtual machine. **[6]**

OR

Q2) Consider the following set of processes, with length of CPU burst time given in milliseconds.

Process	Arrival time	Burst time	Priority
P1	0	8	3
P2	1	1	1
P3	2	3	2
P4	3	2	3
P5	4	6	4

Draw the Gantt charts illustrating the execution of these processes using FCFS, SJF (Preemptive And non-pre-emptive)and Priority (Preemptive), Smaller number indicates higher priority. Calculate average waiting time and average turn around time for all the above mentioned scheduling algorithms. **[10]**

Q3) Consider the following snapshot of the system, **[10]**

	Allocation	Max	Available
	R1R2R3	R1R2R3	R1R2R3
P1	0 1 0	7 5 3	3 3 2
P2	2 0 0	3 2 2	
P3	3 0 2	9 0 2	
P4	2 1 1	2 2 2	
P5	0 0 2	4 3 3	

P.T.O.

Answer the following questions using Banker's Algorithm

a) What are the values of Need Matrix?

b) Is the system in the safe mode? If yes, what is the safe sequence?

c) If a request from process PI arrives for (1,0,2), can the request be granted immediately?

OR

Q4) a) Explain with definition, concept of general and binary semaphore. **[5]**

b) Explain classical problem of synchronization in terms of Dining Philosopher problem. **[5]**

Q5) a) Given memory partitions of 100k, 500k, 200k, 300k and 600k (in-order), how would each of First-Fit, Best-Fit and Worst-Fit algorithms place processes of 212k, 417k, 112k,426k? Which algorithm makes the most efficient use of memory? **[8]**

b) What are the steps in-handling page fault? Explain with suitable diagram. **[10]**

OR

Q6) a) Explain the concept of Demand Paging with neat diagram. **[8]**

b) A process references pages in the following order. **[10]**
5 4 2 4 6 5 3 6 2 3 2 4 5 2 6
Determine the number of page faults for FIFO, optimal and LRU page replacement algorithms for 3 page frames

Q7) a) For the given sequence of disk request, determine the total distance travelled by disk head in satisfying the entire request for FCFS, C-SCAN and SSTF algorithms. Initial head position is 120 and total number of cylinders in the disk is 200.

120, 130, 180, 150, 25,10, 105, 90 **[12]**

b) Write a short note on I/O functions. **[4]**

OR

Q8) a) Explain the concept of File Sharing. **[8]**

b) Explain disk free space management techniques. **[8]**

Q9) Write short notes on the following: **[16]**

a) Ubuntu EDGE OS

b) Embedded Linux

c) NACH OS

d) Android OS

OR

Q10)a) Write steps for kernel compilation with necessary commands. **[8]**

b) Write a Pseudo code for simple kernel module and explain procedure for inserting a new module in existing kernel with all necessary steps.**[8]**

Total No. of Questions : 10]

SEAT No. :

P2623

[Total No. of Pages : 2

[5153]-599

T.E. (Information Technology)

MULTIMEDIA TECHNOLOGY

(2012 Pattern) (Semester - II) (End Sem.) (314452)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume Suitable data, if necessary.***

Q1) a) What is Distributed Multimedia System explain with suitable example. **[5]**

b) What is Authoring Tools. Explain the Authoring tools used in a Education field. **[5]**

OR

Q2) a) What is a need of image enhancement? Explain any one image enhancement technique. **[5]**

b) What are the different image File Format explain each. **[5]**

Q3) a) What are various audio compression techniques? Explain any one in brief. **[5]**

b) Write a short note on characteristic of sound wave Amplitute, Frequency, Waveform, Speed. **[5]**

OR

Q4) a) What are the Multimedia Supported audio formats in Android. **[5]**

b) Explain text compression technique Huffman Encoding with suitable example. **[5]**

Q5) a) What is component, composite and S-video signal formats with there application. **[8]**

b) Explain each video transmission standard briefly. **[8]**

OR

P.T.O.

Q6) a) What is a need of video file formats? Explain AVI and H.261 briefly. **[8]**

b) What is digitization of video? Explain process of digitization of video. **[8]**

Q7) a) What is OpenGL? Explain OpenGL shadowing and rendering technique. **[8]**

b) What is Animation? Explain different technique used to create Animation. **[8]**

OR

Q8) a) Enlist the 12 principles of Animation. Explain any three in detail. **[8]**

b) State and explain an essential GLUT functions of OpenGL **[8]**

Q9) a) What is Virtual Reality? Describe the devices used in Virtual Reality. **[6]**

b) Explain GStreamer based Multimedia Framework. **[6]**

c) Explain CCD and its use in the multimedia application. **[6]**

OR

Q10)a) Explain the need for synchronization in multimedia applications. State and explain types of synchronizations. **[6]**

b) Explain the terms Multimedia over IP and Media on demand briefly. **[6]**

c) Describe Android Multimedia Framework Architecture. **[6]**

Total No. of Questions : 10]

SEAT No. :

P2624

[Total No. of Pages :2

[5153]-600

T. E. (Information Technology)

INFORMATION TECHNOLOGY PROJECT MANAGEMENT

(2012 Pattern) (Semester-II) (314453)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answers Question 1 or 2, 3 or 4, 5 or 6, 7 or 8 and 9 or 10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume suitable data, if necessary.***

Q1) a) Define Management & Explain functions of Management in Detail? **[5]**

b) Explain Proposals and contract in detail? **[5]**

OR

Q2) a) Explain the fourteen principles of management stated by Henry Fayol? **[5]**

b) Define Strategy? Explain Mintzberg's 5 Ps strategy? **[5]**

Q3) a) Write a short note on Performance Reporting? **[5]**

b) Describe various Steps of Product development Process? **[5]**

OR

Q4) a) Define Decision making and discuss steps and activities in decision making? **[5]**

b) Explain Maslow's need hierarchy theory of Motivation? **[5]**

Q5) a) Explain various software tools for Project management and explain its purpose? **[8]**

b) Explain various activities of Risk management with detail? **[8]**

OR

Q6) a) What are Common Sources of Risk in Information Technology Projects. Explain in detail? **[8]**

b) What is the necessity of software documentation and explain types of Documentation? **[8]**

Q7) a) Differentiate between Quality assurance and Quality Control? **[8]**

b) Explain ISO 9000 in IT Projects in detail? **[8]**

OR

P.T.O.

Q8) a) Explain Various Objectives of Quality Control? **[6]**

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

i) Six Sigma
ii) Benchmarking
iii)CMMI

Q9) a) Explain various Objectives and Components of SCM? **[6]**

b) Explain ERP implementation Life Cycle? **[6]**

c) Explain the concept of IP patent and Copyright concern with IT project management? **[6]**

OR

Q10)a) List out advantages and disadvantages of ERP System? **[6]**

b) Define Supply chain management & Explain with example? **[6]**

c) What is Customer Relationship management & what is its importance in project management? **[6]**

♦ ♦ ♦

Total No. of Questions : 10]

SEAT No. : ____

P2625

[Total No. of Pages :3

[5153]-601

T.E. (Chemical)

CHEMICAL ENGINEERING MATHEMATICS

(2012 Course) (End Semester) (Semester - I)

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

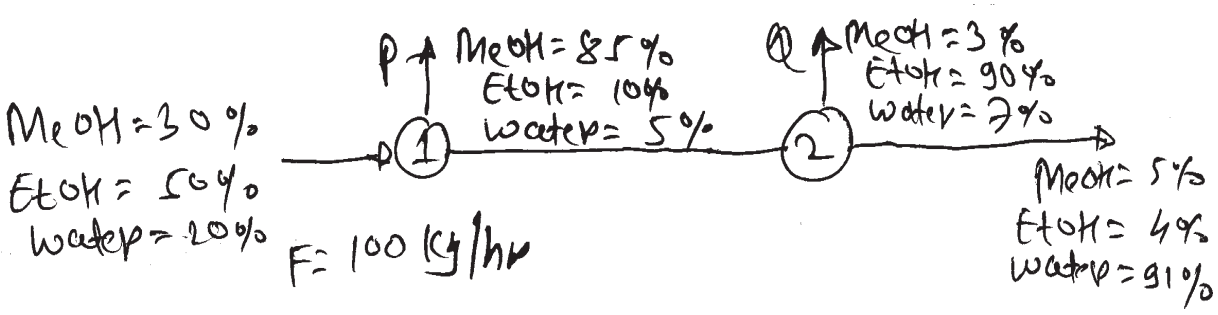
Instructions to the candidates:

1) ***Answer Q1 or 2, Q3 or 4, Q5 or 6, Q7 or 8, Q9 or 10.***
2) ***Figures to the right indicate full marks.***

Q1) The equation that gives the depth x to which the ball is submerged under water is given by $x^3 - 0.165x^2 + 3.993 \times 10^{-4}$. The floating ball has a specific gravity of 0.6 and has a radius of 5.5 cm. Use the bisection method of finding roots of equations to find the depth x to which the ball is submerged under water. Conduct three iterations to estimate the root of the above equation. Find the absolute relative approximate error at the end of each iteration, and the number of significant digits at least correct at the end of each iteration. **[10]**

OR

Q2) A process stream containing a mixture of methanol, ethanol and water is fed to two separating units (1 and 2) at a rate of 100 kg/hr. In the first separating unit, most of methanol is removed, and in the second separating unit, most of ethanol is removed. The final outlet contains a waterrich stream. The compositions of the three outlet streams (in weight %) are shown in the following figure.



Perform a material balance to obtain simultaneous equations for P, Q and R. Solve these equations by Gauss elimination to calculate the flow rates of the three outlet streams. **[10]**

P.T.O.

Q3) a) State and explain graphical interpretation of Newton raphson method. **[5]**

b) A function $f(x)$ is described by following data.

x	1	1.1	1.2	1.4	1.6	1.9	2.2
$f(x)$	3.123	4.247	5.635	9.299	14.303	24.759	39.319

Find numerical integration of function in limit from 1 to 2.2 using trapezoidal rule. **[5]**

OR

Q4) A Gas expands according to law $PV^{1/3} = c$ from pressure of 10 N/m^2. Assuming initial volume of gas 1 m^2 and final volume 7m^2. Calculate work done using Simpsons 1/3 rule. Divide volume in 6 equal parts. **[10]**

Q5) A ball at K is allowed to cool down in air at an ambient temperature of K. Assuming heat is lost only due to radiation, the differential equation for the temperature of the ball is given by

$$\frac{d\theta}{dt} = -2.2067 \times 10^{-12} \left(\theta^4 - 81 \times 10^8\right)$$

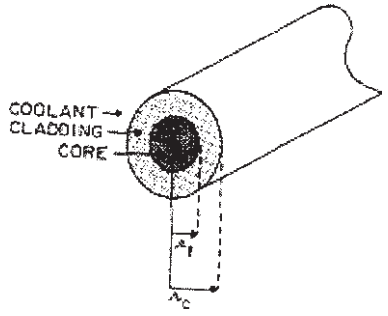
Where θ is in K and in seconds. Find the temperature at t - 480 seconds using Runge - Kutta 2nd order method. Assume a step size of $h = 240$ seconds. **[16]**

OR

Q6) a) Solve by Eulers method $\frac{dy}{dx} = x - y^2$, for the given boundary conditions, at $x = 0$, $y = 1$, find y at $x = 4$ Take step size $h = 1$. **[8]**

b) Discuss errors induced by Eulers method. **[8]**

Q7) A nuclear fuel element consists of a cylindrical core of fissionable material surrounded by a metal cladding. Within the fissionable material heat is produced as a by-product of the fission reaction. A single fuel element is pictured in Figure. Set up the difference equations in order to calculate the radial temperature profile in the element.



Data: Let

$T_c = T(r_c)$

k_f = thermal conductivity of core, $k_f \neq k_f(r)$

k_c = thermal conductivity of the cladding, $k_c \neq k_c(r)$

$S(r)$ = source function of thermal energy, S = 0 for $r > r_f$ **[16]**

OR

Q8) Solve boundary value problem $\frac{d^2y}{dx^2} - 64y + 10 = 0$ with $y(0) = y(1) = 0$.

Using finite difference method and calculate $y(0.5)$, taking step size $h = 0.25$. **[16]**

Q9) a) What are the six steps of optimization. **[9]**

b) Explain scanning and bracketing procedures for optimization of unconstrained functions of one dimensional search. **[9]**

OR

Q10) A chemical is produced by batch process. Chemicals X and Y are used to make 2 with the following relationship for kg of 2 produced and kgs of X and Y used, $Z = 1.5 (1.1 X Z + 1.3 YZ - XY)^{0.5}$ X costs Rs. 0.18/kg, Y Rs. 0.08/kg and 2 sells for Rs. 1.60/kg. One half of the selling price for 2 is due to costs other than raw materials. Only 2 is recovered from the process. Find the maximum profit obtainable per kg of Z. **[18]**

Total No. of Questions :10]

SEAT No. :

P2626

[Total No. of Pages :4

[5153] - 602

T.E. (Chemical)

MASS TRANSFER - I

(2012 Course) (Semester - I) (End Sem.)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Assume suitable data, if necessary.***
3) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is permitted.***

Q1) a) A gas mixture containing one fifth hydrogen and four fifth methane by volume is prepared through which oxygen Is allowed to difuse. The total pressure is $1*10^5 N/m^2$ and temperature is 2^oC. Estimate the rate of diffusion of oxygen through a film of gas mixture 3 mm thick when the concentration change across film is 12 to 7% by volume. The diffusivity of oxygen through hydrogen and methane are $7.1*10^{-5}$ m^2 /sec. & $1.88*10^{-5}$ m^2/sec respectively. **[8]**

b) Give importance of mass heat and momentum analogies. **[2]**

OR

Q2) a) A gas mixture of A-air is fed to the absorption tower at 288^Ok and 3 atm. Individual mass transfer coefficient in liquid and gas phase are 0.152 Kmol A/hr.m^2.mol/m^3 and 1.22 Kmol A/hr.m^2.atm. the equilibrium relation is $P_{Ai} = 0.25\ C_{Ai}$. Determine overall gas and liquid phase transfer coefficient. **[6]**

b) State Fick's First law of diffusion. Derive an expression for steady state equimolar counter current Diffusion. **[4]**

P.T.O.

Q3) a) What is gas phase controlled mass transfer. **[4]**

b) A soluble gas is absorbed in water using a packed tower. The equilibrium relationship is Y = 0.06 X where X and Y are the liquid and gas compositions and expressed as ratio of moles solute to moles of solvent, the terminal conditions of the column are **[6]**

	Top	Bottom
x	0	0.08
y	0.001	0.009

If the height of transfer units based on liquid and height of transfer units based on gas phase respectively are 0.24 m & 0.36 m, determine the total height of packing.

OR

Q4) a) What is significance of minimum liquid to gas ratio for absorption? **[6]**

b) Using Chilton-Colburn analogy determine the mass transfer coefficient for absorption of NH_3 by wet surface of cylinder placed in a turbulant air stream flowing across the cylinder at 4.6 m/sec. heat transfer coefficient for the system is 1.357×10^{-4} cal/cm^2. sec.^{o}K. for air prandtl number is 0.74 and for the system schemidt number is 0.61. specific heat = 0.49×10^{-3} cal/gm^{o}K, density = 0.0012 gm/cc. **[4]**

Q5) a) Give classification of cooling towers. What are the equipments used for humidity measurement? Explain any one in brief. **[8]**

b) A mixture of nitrogen-acetone vapor at 800 mmHg and 25^{o}C has percentage saturation of 80%. Calculate **[8]**

i) absolute humidity,

ii) partial pressure of acetone

iii) absolute molal humidity and

iv) volume percent of acetone.

The vapor pressure of acetone at 25^{o}C is 190 mmHg.

OR

Q6) a) A horizontal spray chamber with recirculated water is used for adiabatic humidification and cooling of air. The active part of chamber is 2 m long and has cross section area of 2 m^2, with air entering at 3.5 m^3/s with dry bulb temperature (DBT) of 65°C and absolute humidity of 0.017 Kg water/Kg dry air. The air is cooled and humidified to DBT of 34°C, WBT of 32.5°C and leaves at 90% saturation. For the system the volumetric mass transfer coefficient is 1.12 $kg/m^3.s$. the density of air is 1.113 kg/m^3. Determine the length of chamber. **[8]**

b) Derive an expression for finding the total height of cooling tower. **[8]**

Q7) a) Define: **[5]**

i) Murphree tray efficiency,

ii) Overall tray efficiency,

iii) Coning,

iv) Weeping,

v) Ideal tray.

b) Explain flooding and loading. **[5]**

c) With neat sketch explain working of **[6]**

i) Mechanically Agitated vessels,

ii) Wetted Wall Column.

OR

Q8) a) Compare tray towers and packed towers. **[6]**

b) Explain the end effects of axial mixing. **[4]**

c) Give classification of packing's. What are the characteristics that tower packing should offer? **[6]**

Q9) a) 100 Kg batch of granular solids containing 30% moisture is to be dried in a tray dryer to 16% moisture by passing current of air at 350°K across its surface at a velocity of 1.8 m/s. if the constant rate of drying under these conditions is 0.7×10^{-3} kg/m^2. hr, and the drying surface is 0.03 m^2/kg dry weight estimate the time required for constant rate period. **[8]**

b) Draw and explain the Rate of Drying Curve. **[6]**

c) Define: **[4]**

i) wet bulb temperature,

ii) equilibrium moisture,

iii) free moisture and

iv) bound moisture.

OR

Q10)a) A batch of solid to be dried from 28% to 6% moisture on wet basis. The initial weight of wet solid is 380 kg and the drying surface is 0.15 m^2/40 kg dry weight. The critical moisture content is 18% (dry basis) and constant drying rate is 0.32 kg/m^2.hr. for the falling rate period the following data are available. Calculate total time of drying. **[10]**

Moisture % (Dry basis) (X)	25	21.9	19	16	13.6	11	8.2	7.5	6.5
kg/hr.m^2 (N)	0.30	0.27	0.24	0.21	0.18	0.15	0.07	0.044	0.025

b) Give detail classification of drying equipments. **[2]**

c) A wet solid is to be dried from 35% to 10% moisture under constant drying conditions in five hours. If the equilibrium moisture content is 4% and critical moisture content is 14% how long it will take to dry solids to 6% moisture under same conditions? **[6]**

EEE

Total No. of Questions : 10]

SEAT No. :

P2627

[Total No. of Pages : 2

[5153]-603
T.E. (Chemical)
INDUSTRIAL ORGANISATION AND MANAGEMENT
(2012 Pattern) (Semester-I) (End Semester) (New)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain cooperative societies with advantages and disadvantages. **[6]**

b) Write a note on Merit Rating. **[4]**

OR

Q2) Explain with a neat sketch Line and Staff Organization along with Advantages. **[10]**

Q3) a) Explain different types of Wages. **[6]**

b) Explain in detail Recruitment. **[4]**

OR

Q4) Explain various functions of Storekeeper. **[10]**

Q5) a) What is sales promotion? Explain sales promotion technique. **[8]**

b) What is sales forecasting? Explain the two types of sales forecasting in detail. **[8]**

OR

Q6) a) Explain in detail Marketing Mix. **[8]**

b) Write an explanatory note Advertising. **[8]**

P.T.O.

Q7) a) Write Notes on **[8]**

i) Antidumping Duty.

ii) MODVAT.

b) Explain in detail the procedure to import equipment from foreign source. **[8]**

OR

Q8) a) Explain the role of Quality Circles for Quality Management of a process industry. **[8]**

b) Explain in detail various factors affecting international trade. **[8]**

Q9) Write short notes on **[18]**

a) MRTP

b) Monopolies Restrictive Trade Practices (MRTP)

c) Flow Chart and Flow Diagram.

OR

Q10)a) Explain the term Agreement in Contract Act. Explain the various types of Contract according to enforceability, formation and performance. **[12]**

b) Write note on FERA and FEMA. **[6]**

❄ ❄ ❄

Total No. of Questions :10]

SEAT No. :

P2628

[Total No. of Pages :2

[5153] - 604

T.E. (Chemical)

CHEMICAL PROCESS TECHNOLOGY

(2012 Course) (Semester - I) (End Semester) (309344)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume suitable data if necessary.***

Q1) Describe production of elemental Aluminium. **[10]**

OR

Q2) Describe the process for manufacturing NaOH & Cl_2 with major engineering problems. **[10]**

Q3) Explain production of nitric acid. **[10]**

OR

Q4) Describe contact process in details for production of sulphuric acid and compare it with Chamber process. **[10]**

Q5) Draw and explain production of ethyl alcohol by fermentation of molasses. **[10]**

OR

Q6) Discuss production method of sucrose from sugarcane with engineering problems. **[10]**

Q7) a) Discuss how oil is extracted from natural raw materials. **[10]**

b) Explain cooking of coal and the types of coke oven. **[10]**

OR

P.T.O.

Q8) a) Write a note on refinery operations. Explain alkylation in detail. **[10]**

b) Explain pyrolysis with neat flow diagram. **[10]**

Q9) a) Discuss production method of natural gas and water gas. **[10]**

b) Discuss production method of methanol by Synthesis gas. **[10]**

OR

Q10)a) Discuss production of Isopropanol by indirect hydration of propylene. **[10]**

b) Discuss Production of ethylene and acetylene-steam cracking of hydrocarbons. **[10]**

EEE

Total No. of Questions : 10]

SEAT No. :

P2629

[Total No. of Pages : 3

[5153]-605

T.E.(Chemical)

CHEMICAL ENGINEERING THERMODYNAMICS -II

(2012 Pattern) (Semester-I) (End Sem.) (309345)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) Show that the fugacity of a gas obeying Van der Waal's equation of state is given by **[10]**

$$\ln f = \frac{b}{v-b} - \frac{2a}{RTV} + \ln\left(\frac{RT}{V-b}\right)$$

OR

Q2) A 30% by mole methanol-water solution is to be prepared. How many cubic meters of pure methanol (molar volume, 40.727×10^{-6} m^3/mol) and pure water (molar volume, 18.068×10^{-6} m^3/mol) are to be mixed to prepare $2m^3$ of desired solution? The partial molar volumes of methanol and water in a 30% solution are 38.632×10^{-6} m^3/mol and 17.765×10^{-6} m^3/mol, respectively. **[10]**

Q3) a) The azeotrope of ethanol benzene system has a composition of 44.8% (mol) ethanol with a boiling point of 341.4 k at 101.3 Kpa. At this temperature the vapour pressure of benzene is 68.9 Kpa and the vapour pressure of ethanol is 67.4 Kpa. What are the activity coefficients in a solution containing 10% alcohol? **[8]**

b) Explain the Daltons law with its applicability in the context of VLE. **[2]**

OR

Q4) Assuming Raoults law to be valid prepare t-x-y diagram for a pressure of 90 Kpa for- Chlorobutane (1)/Chlorobenzene (2) system. Antoine equation and constants are **[10]**

$$ln\ P^{sat}/\text{Kpa} = A - \frac{B}{T+C}\ (T \text{ in } {}^{\circ}C)$$

P.T.O.

Compound	A	B	C
1- Chlorobutane	13.7965	2723.73	218.265
Chlorobenzene	13.8635	3174.78	211.700

Q5) a) Explain following two methods of consistency tests for VLE data **[10]**

i) Using coexistence equation

ii) Using partial pressure data.

b) Explain Txz diagrams. **[6]**

OR

Q6) a) Derive the following expression for SLE: **[10]**

$$\psi_i = \exp \int_{Tm_i}^{T} \frac{H_i^l - H_i^S}{RT^2} dT$$

$$\psi_i \equiv f_i^S \; / \; f_i^l$$

where

b) Explain triple point and eutectic temperature with neat diagram. **[6]**

Q7) a) Develop expressions for the mole fractions of reacting species as functions of the reaction co ordinate for **[9]**

i) A system initially containing 2 mol NH_3 and 5 mol O_2 and undergoing the reaction

$4NH_3\ (g) + 5O_2\ (g) \rightarrow 4NO\ (g) + 6H_2O\ (g)$

ii) A system initially containing 3 mol H_2S and 5 mol O_2 and undergoing the reaction

$2H_2S\ (g) + 3O_2\ (g) \rightarrow 2H_2O\ (g) + 2SO_2\ (g)$.

b) A gas mixture consisting of 60% H_2, 20% N_2 and rest inert gas is passed over a suitable catalyst for the production of ammonia at 50 bar. **[9]**

$\frac{1}{2}N_2 + 3/2\ H_2 \rightarrow NH_3$ $\qquad$ $Kp = 1.25 \times 10^{-2}$

Assuming ideal gas behaviour, determine the composition of the gases leaving the reactor.

OR

Q8) a) The equilibrium constant at 420 K for the following reaction **[14]**

$C_2H_4 + H_2O \rightarrow C_2H_5OH$, is 6.8×10^{-2} and the standard heat of reaction at 298K is -45.95×10^3 J. The specific heat data is

	C_P, J/mol. K
Ethylene	$11.886+120.12\times10^{-3}T-36.649\times10^{-6}T^2$
Water	$30.475+9.652\times10^{-3}T+1.189\times10^{-6}T^2$
Ethanol	$29.358+166.9\times10^{-3}T-50.09\times10^{-6}T^2$

Formulate the general relationship for estimating the equilibrium constant and standard free energy change as functions of temperature.

b) Comment on feasibility of a chemical reaction. **[4]**

Q9) a) Calculate values of kp at 25°C and 800°C for the reaction **[10]**

$CO(g)+H_2O \rightarrow H_2(g)+CO_2(g)$

Using the following data at 298K and 1 bar.Make suitable assumptions.

Component	H_2	CO	H_2O	CO_2
$\triangle G^0_f$, KJ/mole	0	-137.25	-228.59	-394.38
$\triangle H^0_f$, KJ/mole	0	-116.52	-241.88	-392.51

b) Explain how would the equilibrium yield in a gaseous chemical reaction be affected by increasing the pressure, if there is a decrease in the number of moles during the reaction **[6]**

OR

Q*10)*a) Calculate the equilibrium constant at 298 K for the reaction **[9]**

$C_2H_4(g) + H_2O(g) \rightarrow C_2H_5OH(g)$

with the help of following data. Also comment about the feasibility of reaction.

	S^o_{298},J/mol.K	H^o_{298},J/mol.K
C_2H_4 (g)	220.85	48,986
H_2O (g)	189.12	-241997
C_2H_5OH (g)	278.00	-238941

b) A stoichiometric mixture of N_2(g) and H_2(g) at 100 bar and 800 K enter a catalytic reactor for the synthesis of ammonia. Assuming that the gas phase is ideal, estimate the degree of conversion and the equilibrium composition. The equilibrium constant for the reaction at 800K is 1.122×10^{-5}. **[7]**

Total No. of Questions :10]

SEAT No. :

P2630

[Total No. of Pages :4

[5153] - 606

T.E. (Chemical Engineering)

CHEMICAL REACTION ENGINEERING -I

(2012 Course) (Semester-II) (End - Semester)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

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

Q1) a) Differentiate between molecularity and order of reaction. **[3]**

b) For a first order reaction the following data is available. Estimate activation energy for the reaction. **[7]**

Temperature ^oC	310	330
$K(sec)^{-1}$	0.000886	0.0139

Assume R = 8.314 J/mol K.

OR

Q2) a) The first order reversible liquid reaction $A \rightarrow R$, $C_{A0} = 0.5$mol/lit, $C_{R0} = 0$ takes place in a batch reactor. After 8min conversion of A is 33% while equilibrium is 66%. Find rate equaiton for this reaction. **[7]**

b) Differentiate elementary and non-elementary reaction. **[3]**

Q3) A homogeneous gas reaction $A \rightarrow 3R$ has reported rate at 215 ^oC **[10]**

$$-r_A = 10^{-2} C_A^{1/2} \text{ [mol/lit.sec]}.$$

Find the space time needed for 80% conversion of 50% A and 50% inerts feed to a Plug flow reactor operating at 215^{o}C and 5 atm (C_{A0} = 0.0625 mol/lit)

OR

P.T.O.

Q4) a) Derive performance equation of mixed Flow Reactor. **[6]**

b) At certain temperature, the half life period and initial concentration for a reaction are **[4]**

$t_{½} = 420$ sec, $C_{A0} = 0.405$ mol/lit

$t_{½} = 275$ sec, $C_{A0} = 0.64$ mol/lit

Find the rate constant of reaction.

Q5) a) Define instantaneous fractional yield and overall fraction yield. **[8]**

Find out instantaneous fractional yield of reaction (ψ)

$$A + B \xrightarrow{K1} R \qquad \frac{dC_R}{dt} = 1.0 C_A^{1.2} C_B^{1.4}$$

$$A + B \xrightarrow{K2} S \qquad \frac{dC_S}{dt} = 1.0 C_A^{0.6} C_B^{2.0}$$

b) The desired liquid phase reaction **[8]**

$$A + B \rightarrow P + T \qquad \frac{dC_P}{dt} = \frac{dC_T}{dt} = K_1 C_A^{1.5} C_B^{0.4}$$

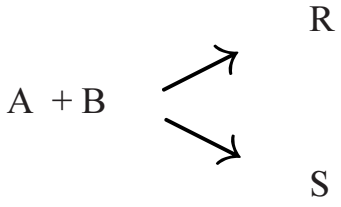
is accompanied with undesirable side reaction.

$$A + B \rightarrow S + U \qquad \frac{dC_U}{dt} = \frac{dC_S}{dt} = K_2 C_A^{0.5} C_B^{1.8}$$

What contacting scheme (reactor type) would you use to carry above reaction to minimize concentration of undesired product?

OR

Q6) Consider the following aqueous reaction. **[16]**



$$\frac{dC_R}{dt} = 1.0\, C_A^{1.5} C_B^{0.3}$$

$$\frac{dC_S}{dt} = 1.0\, C_A^{0.5} C_B^{1.8}$$

For 90% conversion of A find the concentration of R in the product stream. Equal volumetric flow rates of the A and of B steam are fed to the reactor, and each stream has concentration of 20 mol/lit of reactant . The flow in the reactor follow:

a) Plug flow

b) Mixed flow

c) Plug flow with low concentraion of B when plug flow A with mixed flow B.

Q7) Calculate the heat or reaction at 600°C of the reaction. **[16]**

$$A \rightleftarrows B + C$$

Heat capacities of the reacting species may be expressed as $C_P = \alpha + \beta T + \gamma T^2 + \delta T^3$.

Component	α	$\beta \times 10^2$	$\gamma \times 10^5$	$\delta \times 10^9$
A	-0.24	8.65	-5.12	12.05
B	-1.30	8.40	-5.55	14.25
C	6.45	0.104	-0.008	0

The heat of reaction at the standard state (25°C) of the reaction is 27.23 k cal/g mol.

OR

Q8) a) Explain effect of temperature, pressure and inert on equilibrium conversions (X_{AC}) for exothermic and endothermic reactions. **[6]**

b) Explain optimum temperature progression for exothermic reversible reaction. **[6]**

c) Draw and explain energy balance equation line for adiabatic operations. **[4]**

Q9) A sample of tracer was injected into a vessel and effluent concentration was measured as function of time. Construct C and E and determine the fraction of material leaving the vessel that has spent 33 and 6 min and fraction of material that has spent 7.75 and 8.2 min in the vessel. **[18]**

t(min)	0	1	2	3	4	5	6	7	8	9	10	12	14	16
C (g/m^3)	0	1	5	8	10	8	6	4	3	2.2	1.5	0.6	0	0

OR

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

a) Tank in series model.

b) C and E curve.

c) Micro and macro mixing of fluids.

d) Dispersion model.

EEE

Total No. of Questions : 10]

SEAT No. :

P2631

[Total No. of Pages : 2

[5153]-607
T.E. (Chemical)
TRANSPORT PHENOMENA
(2012 Course) (309349) (End Sem.) (Semester - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) Derive the expression of momentum flux and velocity for flow of falling film of constant viscosity. **[10]**

OR

Q2) Derive the expression of heat flux and temperature distribution for nuclear heat source of spherical form. **[10]**

Q3) Calculate the mass flux of benzene through a layer of air 10 mm thickness at 25ºC and 200 KN/m^2 (total pressure), partial pressure of benzene is 6×10^3 N/m^2 at the left side of the layer and 1 KN/m^2 at the right side. The mass diffusivity at this temperature and pressure is 4.4×10^{-6} m^2/s. **[10]**

OR

Q4) a) Explain Ostwald de-waele model of non-Newtonian fluid. **[5]**

b) Explain stepwise procedure to solve heat transfer problems. **[5]**

Q5) a) Derive Euler's equation in rectangular coordinate system. **[12]**

b) Explain scale factors in detail. **[6]**

OR

Q6) a) Show that rate of change of density at a fixed point is due to change in mass velocity vector. **[12]**

b) Explain different types of derivatives used in deriving equation of change? **[6]**

P.T.O.

Q7) a) Derive relation between friction factor and Reynolds number for laminar flow of fluid through the tube. **[8]**

b) Derive equation of pressure drop for flow through packed bed. **[8]**

OR

Q8) a) Explain macroscopic energy balance equation. **[8]**

b) Derive expression of frictional loss for sudden expansion of a pipe. **[8]**

Q9) a) Explain Chiton-Colburn analogy. **[8]**

b) Discuss transfer coefficients at high transfer rates by penetration theory. **[8]**

OR

Q10)a) Explain the correlation of binary mass transfer coefficient in one phase at low mass transfer rates. **[8]**

b) Explain Martinnelli's analogy. **[8]**

x x x

Total No. of Questions : 10]

SEAT No. :

P2632

[Total No. of Pages : 4

[5153]-608

T.E.(Chemical Engineering)

CHEMICAL ENGINEERING DESIGN-I

(2012 Pattern) (Semester-II) (End Sem.)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume Suitable data if necessary.***

Q1) a) Write a short note a Hortonspheres. **[3]**

b) A storage tank of diameter 20 m and height 12 m is to be constructed. The plates of size 6300 mm×1800 mm in varying thickness are available for fabrication. Density of liquid to be stored is 1000kg/m^3. Material of construction is carbon steel having permissible stress of 165 N/mm^2. Weld joint efficiency is 85% and corrosion allowance is 1.5 mm. Calculate total numbers of courses required and thickness of each course. **[7]**

OR

Q2) A tall vertical vessel 1.7 m in diameter and 15 m in high is to be provided with skirt supports. Weight of the vessel with all its attachments is 80,000 kg. Diameter of skirt is equal to diameter of the vessel. Height of skirt is 2.4 m. Wind pressure acting over vessel is 100 kg/m^2 seismic coefficient= 0.08, permissible tensile stress of skirt material = 960 kg/cm^2, permissible compressive stress is 1/3 of yield stress of material. Yield stress is 2400 kg/cm^2. Estimate the thickness of the skirt support. **[10]**

Q3) 0.8 kg/sec of furnace oil is to be heated from 10°C to 90°C in a shell and tube heat exchanger. Heating is done by steam available at 120°C. Oil is circulated through the tubes while steam is circulated in the shell. Tubes of 16.5 mm inside diameter and 19 mm outside diameter are available. Length of tube= 3.0 m. The film coefficient of heat transfer for oil is 90W/m^2K while the film coefficient of heat transfer for condensing steam is 7400 W/m^2 K.

P.T.O.

Density of furnace oil= 900 kg/m^3

Specific heat of furnace oil= 1970 J/kg K

Fouling resistance for furnace oil= 0.0009 m^2 K/W

Fouling resistance for steam side= 0.00005 m^2 K/W

Suggest suitable design of the shell and tube heat exchanger. Maximum oil velocity that can be used is 0.05 m/sec. Estimate the number of passes on tube side required in a heat exchanger. **[10]**

OR

Q4) a) What is temperature correction factor? How is it calculate? Why is it used in design of heat exchanger? **[6]**

b) Discuss briefly on shell and tube side heat transfer coefficients in a shell and tube heat exchanger. **[4]**

Q5) a) Explain various methods of feeding for multiple effect evaporators. **[8]**

b) A single effect evaporator is to be designed to operate at absolute pressure of 0.13 bar. Estimate the heat transfer area necessary to concentrate 4500 kg/hr of caustic soda solution from 10% to 40% (by weight) using saturated steam at 117^oC as heating media. The overall heat transfer coefficient may be taken as 1.25 KW/$m^{2o}C$. **[8]**

Data: Specific heat of feed= 4000 J/kg^oC,

Specific heat of product= 3260 J/kg^oC,

Feed temperature= 18^oC,

BPR= 30^oC,

Density of boiling liquid= 1390 kg/m^3.

The liquid level in the evaporator is 1200 mm above the heating surface.

OR

Q6) a) In case of reboilers how the heat transfer coefficient is calculated for Pool boiling. Explain all the equations involved in the calculations. **[8]**

b) Explain the design methods for mixed vapor condensers and how the true temperature difference is evaluated in such cases? **[8]**

Q7) a) Discuss the power requirements calculation for agitation systems. **[8]**

b) A pitched blade turbine impeller running at 90 rpm is used for agitating 5000 liter of liquid with a density of 900 kg/m^3 and viscosity of 100 cP. The tank diameter is 1 m and the ratio of agitator diameter to tank diameter is 0.4. Find the power required for mixing. **[10]**

N_{Re}	1000	2000	3000	4000
N_P	1.1	1.2	1.3	1.4

OR

Q8) a) Explain criteria for jacket selection in a reactor. **[6]**

b) Toluene is continuously nitrated to mono-nitrotoluene in a cast iron vessel, 1 m diameter, fitted with a propeller agitator 0.3 m diameter, rotating at 2.5 Hz. The temperature is maintained at 310 K by circulating 0.5kg/sec cooling water through a stainless steel coil 25 mm OD and 22 mm ID, wound in form of a helix, 0.8m in diameter. The reacting material is having the same physical properties as 75% sulphuric acid. If the mean water temperature is 290 K, what is the overall heat transfer coefficient for desired heat transfer? **[12]**

Properties:

Water-Thermal conductivity= 0.59 W/m K, Cp= 4180 J/kg K, viscosity=1.08 mN s/m^2, density = 998 kg/m^3, 75% sulphuric acid- Thermal conductivity = 0.40 W/m K, Cp = 1880 J/kg K, viscosity = 6.5 mNs/m^2, density = 1666 kg/m^3,Viscosity at the surface= 8.6 mN s/m^2

Thermal conductivity of stainless steel is 15.9 W/m K, Dirt resistance at inside and outside surfaces are 0.0002 and 0.0004 m^2 K/W respectively.

Q9) a) Explain the importance of column auxiliaries. **[6]**

b) Design a decanter to separate light oil from water. The oil is the dispersed phase. Oil flow rate is 1000 kg/h, density of oil is 900 kg/m^3 and viscosity of oil is 3 mNs/m^2. Water flow rate is 5000 kg/h, density of water is 1000 kg/m^3 and viscosity of water is 1 mN s/m^2. **[10]**

OR

Q10)a) Write about knockout drum, role of demister pad and reflux drum. **[8]**

b) Design a horizontal separator to separate 10,000 kg/h, of liquid, density 962.0 kg/m^3, from 12,500 kg/h of vapor, density 23.6 kg/m^3. The vessel operating pressure will be 21 bars. **[8]**

Total No. of Questions : 10]

SEAT No. :

P2633

[Total No. of Pages : 3

[5153]-609
T.E. (Chemical)
MASS TRANSFER - II
(2012 Course) (Semester - II) (End Semester) (309351)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) 100 kmol of mixture containing 45% by mole of A (more volatile) and 55% by mole of B is differentially distilled till the composition of the residue is 0.31. Calculate the percentage of liquid distilled. The average relative volatility is 2.2. **[6]**

b) Explain flash distillation and derive the operating line equation. **[4]**

OR

Q2) a) A continuous fractionating column is used for separating a feed containing 0.16 mole fraction ethanol and 0.84 mole fraction water, to give a product containing 0.77 mole fraction alcohol and a bottom product containing 0.02 mole fraction alcohol. Find number of theoretical plates required, if the feed is 40% vapour and the reflux ratio is 2. The equilibrium data is as follows: **[8]**

x	0.05	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.89
y	0.33	0.42	0.54	0.58	0.62	0.65	0.71	0.76	0.83	0.89

b) What is minimum reflux ratio? **[2]**

Q3) a) Carbon disulphide is used to extract iodine from its saturated solution in water. The distribution coefficient is given by K = Y/X = 588.2, where Y is g iodine / 1l of CS_2 and X is g of Iodine / 1l of water. Calculate the concentration of iodine in the aqueous when 1l of saturated solution containing 0.3 g of iodine per 1l of water at 293K is treated with 50 ml of carbon disulphide. Repeat for 2 cross current extractions with 25 ml extracting solvent in each case. **[6]**

b) Give the criteria for selection of solvent in LLE. **[4]**

OR

P.T.O.

Q4) a) A mixture of 45 mol% A and 55 mol% B is to be fractionated to give a distillate containing 95% A and a bottom product containing 90% B. The feed is saturated vapour. A reflux ratio of 4 is used and the relative volatility is 2.2. Find the number of theoretical stages. **[6]**

b) What are the different conditions of feed to a distillation column? **[4]**

Q5) a) Seeds containing 25% by weight of oil are to be extracted in a countercurrent plant and 90% of the oil is extracted as 40% solution in solvent. Fresh solvent is fed to the system and with every 2.2 kg insoluble solid 1 kg solution is removed. Find the number of equilibrium stages required and the amount of solvent required. **[10]**

b) Explain the functioning of Rotocell Extractor. **[6]**

OR

Q6) a) Give the steps for finding number of stages in N-x, y method for leaching. **[9]**

b) Write the material balance equations for cross-current leaching process. **[7]**

Q7) a) Water is absorbed by a silica gel in contact with moist air. The equilibrium relation is given by Y = 0.03 X, where Y = kg water/kg dry air and X = kg water adsorbed/kg silica gel. 0.6 kg silica gel containing 5% moisture on dry basis is placed in a collapsible vessel in which there is 10 m^3 of moist air. The partial pressure of water vapour is 15 mmHg. The total pressure and temperature are 1 atm. and 298 K respectively. Calculate the quantity of water adsorbed. **[8]**

b) What are the desirable characteristics of an adsorbent? **[8]**

OR

Q8) a) A solution is to be decolorized by treatment with an adsorptive carbon in a contact filtration plant. The original solution has a color concentration of 9.6 measured on an arbitrary scale and it is desired to reduce the color by 80%. Calculate the minimum quantity of the fresh carbon per kg solution for a continuous countercurrent process when the solid fed is solute free. The data for an equilibrium isotherm is as follows: **[10]**

Kg carbon /kg solution	0	0.001	0.004	0.008	0.02	0.04
Equilibrium color	9.6	8.6	6.3	4.3	1.7	0.7

b) Explain the concept of length of unused bed in detail. **[6]**

Q9) a) Explain reverse osmosis in detail with application. **[8]**

b) Explain the working of vacuum crystallizer. **[6]**

c) What is the importance of seeding in crystallization? **[4]**

OR

Q10)a) Explain spiral wound and hollow fiber modules for membranes. **[8]**

b) A continuous crystallizer is used to produce hydrated crystals of sodium sulphate ($Na_2So_4.10H_2O$) by cooling a solution from 310 K to 300K with the help of cooling water which enters at 280K and leaves at 290K. Assuming evaporation to be negligible, determine the number of sections of the crystallizer each 3m long, required to process 0.2 kg/s of product. Data: Solubility of Na_2SO_4 at 310K = 40 kg/100kg water, Solubility of Na_2SO_4 at 300 K = 14 kg/ 100 kg water, Mean heat capacity of liquor = 3.8 kJ/kg K, heat of crystallization = 230 kJ/kg, available area for heat transfer = $3m^2/m$ length of crystallizer, overall heat transfer coefficient = 0.14 kW/m^2K. **[10]**

Total No. of Questions : 10]

SEAT No. :

P2634

[Total No. of Pages :2

[5153]-610
T. E. (Chemical)
PROCESS INSTRUMENTATION & CONTROL
(2012 Pattern) (Semester-II) (End Sem.) (309352)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicates full marks.***
4) ***Use of logarthmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Explain types of transducers. **[5]**

b) Explain need and scope of process instrumentation **[5]**

OR

Q2) a) Describe the classification of instruments in detail. **[5]**

b) Explain functional elements of instruments in detail. **[5]**

Q3) a) Give classification of pressure measuring instruments. **[5]**

b) Explain with diagram, construction and working bellows. **[5]**

OR

Q4) a) Explain with diagram, construction and working thermocouples. **[6]**

b) Write short note on RTD. **[4]**

Q5) a) Explain the principle , construction and working of venturimeter. **[8]**

b) Describe the principle, construction and working of Electromagnetic flow meter. **[8]**

OR

Q6) a) Explain the ultrasonic method used for measurement of liquid level. **[6]**

b) Classify different methods for level measurement. **[10]**

P.T.O.

Q7) Write short notes on: **[16]**

a) Mass Spectroscopy

b) HPLC

OR

Q8) a) Describe with diagram of Ultraviolet absorption spectroscopy. **[8]**

b) Explain principle, construction and working of IR absorption spectroscopy. **[8]**

Q9) a) State the difference between feedback and feed forward control. **[6]**

b) Derive transfer function of single tank liquid level system response equation for the process if input is given a step change. **[12]**

OR

Q10)a) Explain modes of Controller with transfer function. **[9]**

b) Describe the characteristics of step response of second order under damped system **[9]**

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