Total No. of Questions :10]

SEAT No. :

P3465

[Total No. of Pages : 2

[5560]-101
T.E.(Civil)
HYDROLOGY AND WATER RESOURCES ENGINEERING
(2012Pattern) (Semester-I)

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

Instructions to the candidates:

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

Q1) a) State various applications of Hydrology & explain any one in detail. **[5]**

b) Explain Theisen's polygon method with neat sketch. **[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 furrow irrigation and sprinkler irrigation system. **[5]**

b) Explain with neat sketch float type self-recording gauge to determine the stage of river and also state its advantages. **[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]**

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

P.T.O.

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

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, and (ii) Average rate of infiltration. **[10]**

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. :

P5114

[Total No. of Pages : 2

[5560]-102
T.E. (Civil) (Semester - I)
INFRASTRUCTURE ENGINEERING
(2012 Pattern)

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 and Q11 or Q12.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) What is PPP. Explain with suitable examples and advantages & disadvantages of PPP projects. **[6]**

OR

Q2) Compare railway transportation with road transportation. **[6]**

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

b) Explain the Points and Crossing. Draw neat labeled diagram of turnout. **[4]**

OR

Q4) a) Explain the terms short and long welded rails. **[4]**

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

Q5) What is Prefabrication? Give its advantages and disadvantages. **[6]**

OR

Q6) Discuss in detail various types of hoist used in construction. **[6]**

Q7) a) What do you understand by mucking? State various methods of mucking and explain any one in detail. **[6]**

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

c) Write a short note on TBM. **[4]**

OR

P.T.O.

Q8) a) Explain in detail NATM methods of tunneling. **[6]**

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

i) Pilot Tunnel

ii) Twin Tunnel

c) Write a short note on micro tunneling. **[4]**

Q9) a) Define harbor. State the requirements of good harbor. **[6]**

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

i) Dry dock

ii) Fenders

iii) Jetties

c) Write short note on Tetrapods. **[4]**

OR

Q10)a) Differentiate between natural and artificial harbor. **[6]**

b) Draw the schematic diagram of harbor layout showing all components. **[6]**

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

Q11)a) A construction equipment on a work site costs 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 (i) straight line method and (ii) sum of year method. **[6]**

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 construction site. **[6]**

b) Write short note on : **[12]**

i) Economic life of equipment

ii) Backhoe

Total No. of Questions : 10]

SEAT No. :

P3466

[Total No. of Pages : 3

[5560]-103
T.E. (Civil)
STRUCTURAL DESIGN- I
(2012 Course) (Semester-I)

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.***

Q1) a) State and explain classification of hot rolled steel section with stress diagram.Classify the section ISHB 350 @ 67.4 Kg/m and ISA 75×75 ×8 mm @ 8.9 kg/m. **[6]**

b) A column 8 m long consisting 2 ISMC 300 @ 35.8 kg/m spaced at 180 mm back to back. The column is restrained in translation but not in rotation at both ends. Determine design strength of section. **[4]**

OR

Q2) a) Determine the design tensile strength due to yielding and rupture of the section ISA 75×75 ×8 mm @ 8.9 kg/m connected by 4 bolts of 16 mm. **[4]**

b) Design double angle continuous strut of 2 m, carries a factored load of 200 kN assuming section placed on either side of gusset plate. **[6]**

Q3) a) A 5 m long column is effectively held in position and restrained against rotation at both ends subjected to 650 kN. Design the section using medium weight I section. **[6]**

b) Differentiate slab base and gusseted base. **[4]**

OR

P.T.O.

Q4) a) State and explain lacing and bracing with suitable example. **[4]**

b) Check the adequacy of ISHB 400 @ 82.2 kg/m to carry a factored axial compressive load of 600 kN at an eccentricity of 200 mm about major axis considering section strength. The effective length of column is 4.5 m. **[6]**

Q5) An ISMB 550 @ 103.7 kg/m has been used as a simply supported beam over 6 m span. Determine the safe uniformly distributed load w so that the beam can carry safely in flexure. Assuming compression flange is unrestrained throughout the span against lateral buckling. **[16]**

OR

Q6) Design suitable I section for simply supported beam of span 6 m. The beam is subjected to a factor uniformly distributed load 90 kN/m. The beam is laterally supported throughout the span. Also check for serviceability. **[16]**

Q7) a) An ISLB 350 @ 49.5 kg/m transmit an end reaction of 600 kN under factored load to the web of ISWB 500 @ 95.2 @ kg/m. Design bolted framed connection. **[12]**

b) Explain beam to beam and beam to column connection with suitable sketches. **[4]**

OR

Q8) A simply supported welded plate girder of an effective span of 20 m subjected to uniformly distributed load 24 kN/m throughout the whole span excluding the self weight of plate girder and central point load of 500 kN. Assuming compression flange laterally supported throughout the span, design cross section of plate girder, check for shear buckling of web, shear capacity of end panels and deflection. **[16]**

Q9) Determine the design force in members AB, AL and BL for a truss as shown in Fig.9. The design wind pressure is 1500 N/m^2. The truss is covered with GI sheet and the center to center spacing of truss is 4 m. Also design purlin using angle section. **[18]**

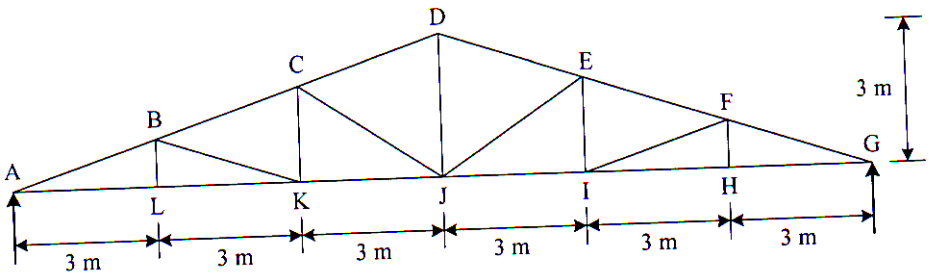


Fig. 9

OR

Q10) Design cross section of gantry girder to carry electric overhead traveling cranes with following data. **[18]**

Span of gantry : 6 m, span of crane girder: 16 m, Crane capacity: 250 kN, Self weight of crane girder including trolley: 240 kN, Minimum hook approach: 1.2 m, Center to center distance between wheels: 3.2 m and self weight of rails: 300 N/m.

Total No. of Questions : 8]

SEAT No. :

P3467

[Total No. of Pages : 3

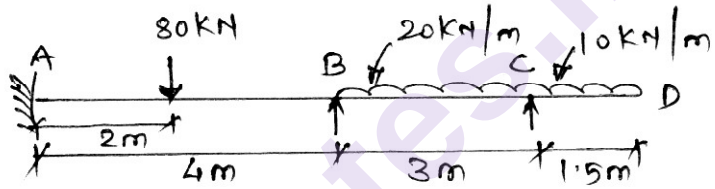
[5560]-104
T.E. (Civil)
STRUCTURAL ANALYSIS - II
(2012 Course) (Semester - I)

[Time : 2½ Hours] *[Max. Marks : 70]*

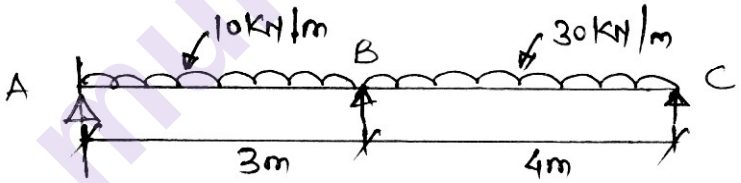
Instructions to the candidates:

1) ***Answer questions Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Figures to the right side indicate full marks.***
3) ***If necessary, assume suitable data & indicate clearly.***
4) ***Use of electronic pocket calculator is allowed.***

Q1) a) Analyse the beam shown in fig. by slope deflection method. **[10]**

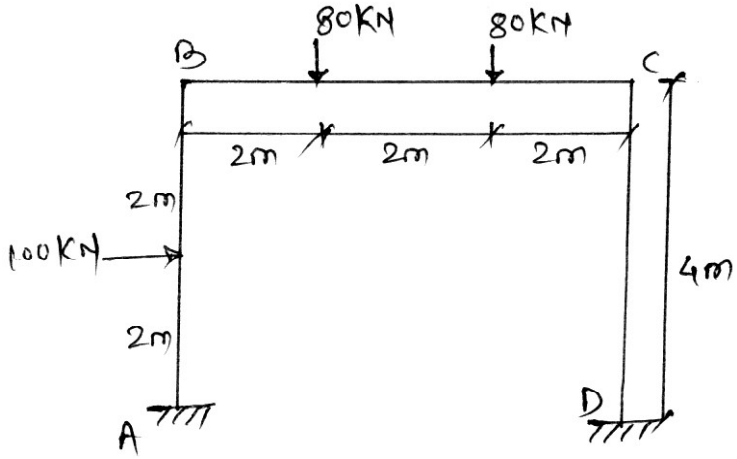


b) Analyse the continuous beam shown in fig. by flexibility method. **[10]**



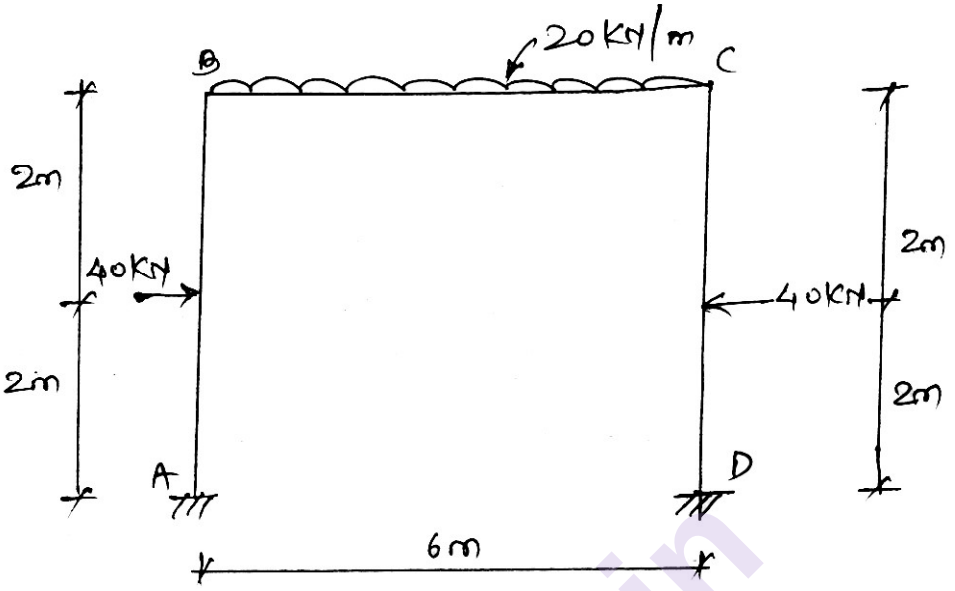
OR

Q2) a) Analyse the frame as shown in fig. using moment distribution method. **[10]**

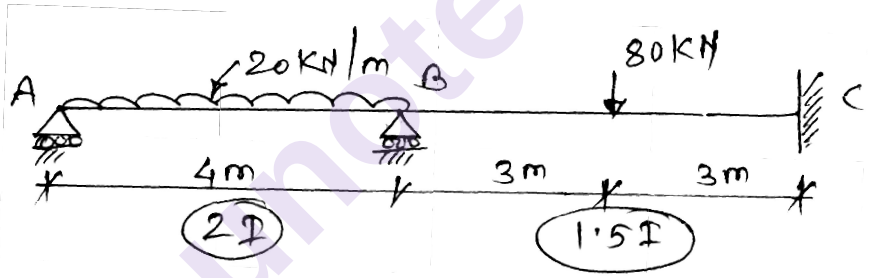


P.T.O.

b) Analyse the portal frame shown in fig. by slope defflection method. Draw BMD. **[10]**

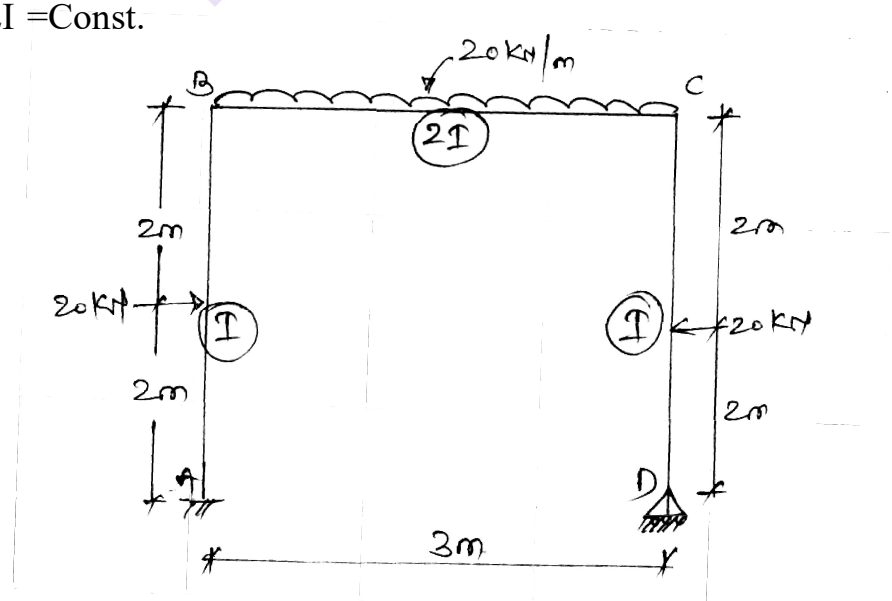


Q3) Analyse the beam shown by shiffness matrix method. Draw BMD & elastic curve. Take E=Const. **[16]**

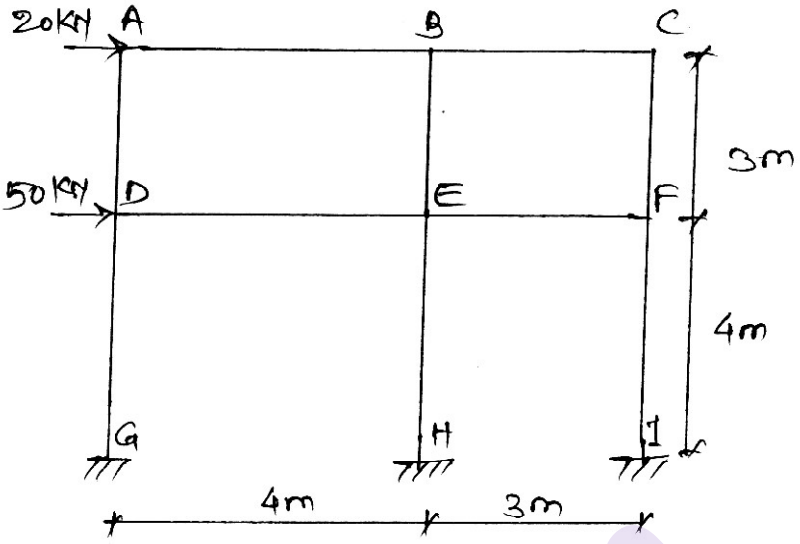


OR

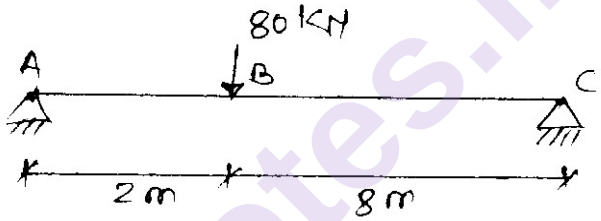
Q4) Analyse the frame by shiffness matrix method & sketch BMD. Take EI =Const. **[16]**



Q5) a) Analyse the frame by using Cantilever method & Draw BMD. **[10]**



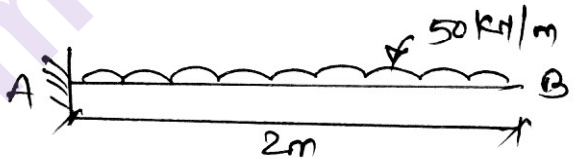
b) Using finite difference method. Determine deflection under load. Use 5 nodes. **[8]**



OR

Q6) a) Analyse the frame by portal method & Draw BMD. **[10]**

b) Using finite element method find maximum displacement for Cantilevers. Take 4 nodes. **[8]**



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

b) Determine shape functions for the constant strain triangle (CST) using polynomial function. **[8]**

(OR)

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

b) Explain plain stress and plain strain problem. **[8]**

■ ■ ■

Total No. of Questions : 12]

SEAT No. :

P3468

[Total No. of Pages : 3

[5560]-105
T.E. Civil
FLUID MECHANICS - II
(Semester - I) (2012 Course) (301005)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4 Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
4) ***Assume suitable data, if necessary.***
5) ***Figures to the right indicate full marks.***

Q1) a) Define **[2]**

i) Pressure Drag

ii) Skin Friction Drag

b) A kite weighing 8.20 N has an effective area of 0.90m^2. It is maintained in air at an angle of 11° to the horizontal. The string attached to the kite makes an angle of 46° to the horizontal and at this position the value of co-efficient of drag and lift are 0.61 and 0.79 respectively. Find the speed of the wind and the tension in the string. Take the density of air 1.245 kg/m^3. **[6]**

OR

Q2) a) Explain in brief

i) Unsteady flow **[2]**

ii) Water Hammer **[2]**

b) Find the rise of pressure in pipe line carrying water when the valve at the end of pipe is closed suddenly at 2.0 seconds. Take the dimensions of pipe as, diameter 30 cm, length 1500m, velocity of flow 1.8 m/s. **[4]**

Q3) a) Explain in brief classification of flows in open channel. **[4]**

b) Define Isovel. Draw velocity distribution in different channel sections. **[2]**

OR

P.T.O.

Q4) Derive the expression for discharge over a sharp crested Rectangular notch. **[6]**

$$Q_{act} = \frac{2}{3} C_d \cdot \sqrt{2g}\ L.H^{3/2}$$

Q5) A rectangular channel 600 mm wide carries a discharge of 200 lps at a depth of 400mm. calculate the maximum height of the hump so that critical depth occurs at the hump. **[6]**

OR

Q6) Derive the conditions for the most economical trapezoidal channel. **[6]**

Q7) a) A jet of water 5cm in diameter having velocity of 20m/s, strikes normally on a flat plate. Determine the thrust on the plate:

i) If the plate is stationary.

ii) If the plate is moving with a velocity of 5m/s in the direction of jet.

iii) Also find the workdone / sec on the plate and the efficiency of the jet when the plate is moving. **[6]**

b) What are different types of casing for centrifugal pump? Explain any one with neat sketch. **[6]**

c) Explain in brief. **[6]**

i) Selection of pumps.

ii) Reciprocating pumps.

OR

Q8) a) Explain in detail classification of centrifugal pump. **[6]**

b) Derive the expression for the workdone by the jet on flat plate inclined and moving in the direction of jet. **[6]**

c) Define "specific speed" of centrifugal pump. Derive its expression in detail. **[6]**

Q9) a) What is the significance of unit quantities? Derive the expression for unit speed, unit power and unit discharge. **[8]**

b) A turbine develops 6500kw under head of 30m at 180 r.p.m. what is its specific speed? Indicate the type of turbine suitable for the purpose. If the turbine is tested in the laboratory where the head of water available is only 10.0m, what power will it develop and at what speed? **[8]**

OR

Q10)a) Write a short note on **[4+4]**

i) Selection of turbine

ii) Cavitation in turbine.

b) A pelton wheel has a mean bucket speed of 30 m/s, when a jet of water flowing at rate of 1500 lps strikes the bucket under head of 220 m. The bucket deflects the jet through 150º. Find the power given to the runner and hydraulic efficiency. Take $C_v = 0.98$. **[8]**

Q11)a) What are the assumptions made in Gradually varied flow analysis? Derive the dynamic equation for wide rectangular channel using manning's formula. **[8]**

b) Draw the various types of water surface profiles in Gradually varied flow. **[8]**

OR

Q12)a) State various methods for finding length of flow profile. Explain graphical integration method in detail. **[6]**

b) A rectangular channel has a bed width of 8m carries a discharge of $18m^3/s$ with a normal depth of 1.2m at a bed slope of 1 in 4000. At a particular section the depth of flow is 1.4m. Determine how for upstream or downstream the depth of flow will be 2.0m. Take Manning's N=0.02. Use step method and take two steps. **[10]**

■ ■ ■

Total No. of Questions : 10]

SEAT No. :

P3469

[Total No. of Pages : 3

[5560]-106
T.E. (Civil) - II
ADVANCED SURVEYING
(2012 Course) (Semester-II) (301007)

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 sketches must be drawn wherever necessary.***
3) ***Figures to right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Elevations of two triangulation stations A and B, 90 km apart are 418.85m and 702.63 m respectively. A peak C, 66 km from A, has an elevation of 524.6 m. Ascertain the intervisibility from A to B. Also find the minimum height of signal at B, so that the line must be pass at least 3 m clearance anywhere. **[6]**

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

OR

Q2) a) Explain in brief classification of triangulation system. **[5]**

b) Write a short note on segments of GPS. **[5]**

Q3) a) Define tide and enlist the different types of tidal gauges. **[5]**

b) Define Hydrographic surveying and enlist the various objectives of hydrographic surveying. **[5]**

OR

Q4) a) Define the term Sounding. Describe any two methods of locating sounding. **[5]**

b) Explain with neat sketch how alignment of tunnel is transferred from surface to underground. **[5]**

P.T.O.

Q5) a) Define the following terms: True error, Most probable value, Residual Error, Most probable error, Conditional quantity. **[5]**

b) What is spherical excess? What are the methods of computing the sides of a spherical triangle? Explain any one method. **[5]**

c) The angles of triangle ABC were recorded as follows: **[8]**

A = 77°14'20" Weight 4

B = 49°40'35" Weight 3

C = 53°04'52" Weight 2

Find the most probable values of angle A, B, C. Use method of correlates.

OR

Q6) a) Define with example: **[5]**

i) Observation equation and Conditioned equation

ii) Direct observation and Indirect observation

b) What do you understand by setting out works? What important factors are considered while setting out? **[5]**

c) Angles were measured on a station and the observations were recorded as follows: **[8]**

A = 45°30'10" Weight 2

B = 40°20'20" Weight 3

A + B = 85°50'10" Weight 1

Find the most probable values of the angles A and B. Use Normal Equation method.

Q7) a) What are the different types of Aerial photographs? **[4]**

b) Write a short note on Crab and Drift. **[4]**

c) A scale of aerial photograph is 1:10000, effective at an average elevation of terrain of 500m. The size of aerial photograph is 230 mm× 230 mm. Focal Length of camera is 20 cm. Speed of aircraft is 180 kmph, longitudinal overlap is 60% and side overlap is 30%. Determine the number of photographs required for the area of 30 km × 22.5 km. Also determine the exposure interval and flying height. **[8]**

OR

Q8) a) Define the following terms: Air base distance, Exposure station, Principal point, Flying height. **[8]**

b) A line is measured 11 cm on a photograph taken with a camera having focal length of 21.5 cm. The same line is measured 3 cm on a map drawn to the scale 1:45000. Calculate the flying height of the aircraft, if the average altitude is 425 m. **[8]**

Q9) a) Write a note on Active and Passive remote sensing. **[5]**

b) Give the application of remote sensing with respect to natural hazards and that of archaeology. **[5]**

c) What are the components of GIS? **[6]**

OR

Q10)a) Write a note on application of remote sensing. **[5]**

b) Describe the application of GIS. **[5]**

c) Explain the advantages and disadvantages of Raster data and Vector data. **[6]**

Total No. of Questions : 10]

SEAT No. :

P3470

[Total No. of Pages : 3

[5560]-107
T.E. (Civil)
PROJECT MANAGEMENT AND ENGG. ECONOMICS
(2012 Pattern) (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) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Use of logarithmic tables, slide rule, mollier charts, electronic pocket calculator and steam tables are allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Write a short note on: **[2.5+2.5]**

i) Management by objective

ii) Gantt bar chart and its limitations

b) Draw network diag. for the data as follows. **[5]**

i) Act.A and B are starting activity

ii) Act.C and D succeeds Act.A

iii) Act. B and D precedes Act E

iv) Act F follows Act. C and D

v) Act. E and F are terminal Activities

OR

Q2) a) Write a short note on: **[2.5+2.5]**

i) Work break down structures

ii) Precedence network analysis

b) Construct network diag. for the data as follows. **[5]**

i) Event 1 is first and event 5 is last.

ii) Event 2 follows event 1

iii) Event 3 and 4 are successor of event 2

iv) Event 3 restrains occurrence of event 4

v) Event 5 succedes event 1 and 4

Q3) a) Differentiate between CPM and PERT method with suitable example.**[4+1]**

b) Explain resource allocation methods and their significance in manpower planning. **[2.5+2.5]**

OR

P.T.O.

Q4) a) What is crashing of network? Explain step by step procedure. **[1+4]**

b) What is updating of network diag.? Explain its necessity. **[3+2]**

Q5) a) How do you inspect quality of material like Cement and mud brick on your site? **[2+3]**

b) What safety precautions would you take to avoid accidents on tunneling site? Explain safety programme undertaken. **[3+2]**

c) Segregate the items as per their annual usage and plot ABC curve. **[8]**

S.No.	Item	Annual Usage (Rs.)
1	Cement	7,00,000
2	Sand	4,90,000
3	Bricks	2,20,000
4	Paint	80,000
5	Steel	6,00,000
6	Oil	9,000
7	Aggregate	1,20,000
8	Nails	3,000

OR

Q6) a) What is site layout? Draw site layout for Bridge on river construction site. **[6]**

b) How to judge nature and extent of accident based on IFR and ISR? **[6]**

c) Annual requirement of a cement for a firm 'AADI Constructions' is 4000 bags. The cost of bag of cement is Rs. 300. Ordering cost of Rs 110 per order and annual inventory carrying cost is 20 % of avg. inventory. Find EOQ and No. of orders to be placed. **[6]**

Q7) a) "Construction sector is one of the big sector which influences on economic health of Country", Comment. **[6]**

b) How to calculate simple and compound interest? What is the difference between the simple interest and compound interest payable on a principal of Rs 1500 in 2 years at the rate of 10 % p.a. **[2+4]**

c) Explain demand and supply curve and factors affecting on it. **[2+2]**

Q8) a) Define cost, price and value with the help of suitable example. **[2+2+2]**

b) Explain law of diminishing marginal utility and law of substitution with help of suitable example. **[3+3]**

c) Mrs.Mayuri brought a refrigerator for Rs.20000; she paid tax of Rs 2000 and Rs. 200 for transport. If she sold it to a customer for Rs.22500, What is the percentage profit or loss? **[4]**

Q9) a) What are the different types of appraisals required to undertake any Project? Explain any one in detail. **[2+4]**

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

i) ARR method

ii) IRR method

c) Explain Payback period method with formula and suitable example. **[4]**

OR

Q10)a) Compare the project by NPV and B/C ratio method and state its feasibility if project cost is Rs. 2, 50,000 and it has net cash flow of Rs.70, 000 for a period 5 years. Firm expect returns at 11 % per annum. **[6]**

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

i) Role PMC

ii) Break even analysis

c) Explain Detailed project report (DPR) **[4]**

Total No. of Questions : 12]

SEAT No. :

P3471

[Total No. of Pages : 3

[5560]-108
T.E. (Civil)
FOUNDATION ENGINEERING
(2012 Pattern) (Semester - II) (301009)

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, Q9 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) Explain seismic refraction method with respect to **[6]**

i) Principle

ii) Procedure

Iii) Limitations.

OR

Q2) Explain standard penetration test with a neat sketch. State the correction to be applied to the observed blow count. **[6]**

Q3) Write a note on **[7]**

i) Presumptive bearing capacity

ii) Effect of eccentricity of load on bearing capacity.

OR

Q4) Determine the safe bearing capacity of 1.2 m wide strip footing at a depth of 1.5 m resting on dry sand by Terzaghi's equation. Assume general shear failure. Use following data. $\gamma = 17 kN/m^2$, $\varphi = 38^\circ$, $Nq = 60$, $N\gamma = 75$, factor of safety = 2.5. **[7]**

P.T.O.

Q5) Explain logarithm of time fitting method for determination of coefficient of consolidation with a neat sketch. **[7]**

OR

Q6) Due to construction of a new structure, the average vertical pressure at the center of 2.5 m thick clay layer increases from 100 kPa to 200 kPa. A laboratory consolidation test was performed on a 20 mm thick clay undisturbed sample of that clay. Under applied stress of 100 kPa & 200 kPa, the void ratio of the sample was found 0.9 and 0.786 respectively, Compute the consolidation settlement of the structure. **[7]**

Q7) a) Explain classification of piles according to function. **[5]**

b) Describe the static pile load test with a neat sketch. **[6]**

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

OR

Q8) a) Calculate the ultimate capacity of single pile in clay with following data. Diameter of pile =200mm, Length of the pile = 8m, Adhesion factor= 0.9, Nc=9, Unconfined compressive strength of clay = 100 kN/m^2. **[5]**

b) Write a note on 'Caisson Disease'. **[6]**

c) Explain concept of negative skin friction. How it is calculated in single pile and group of piles? **[6]**

Q9) a) What is anchored sheet pile? Explain any four methods of anchoring. **[5]**

b) Explain 'pre loading technique' with a neat sketch. **[6]**

c) Explain the construction procedure of under-reamed pile with a neat sketch. **[6]**

OR

Q10)a) Explain engineering problems associated with black cotton soil. **[5]**

b) Explain 'stone column technique' of ground improvement with a neat sketch. **[6]**

c) Write a note on 'cellular cofferdam'. **[6]**

Q11)a) What is earthquake? Explain types of earthquakes with examples. **[5]**

b) Write a note on 'liquefaction' of soil **[5]**

c) Explain the advantages of geosynthetics over conventional materials. **[6]**

OR

Q12)a) Distinguish between primary waves and secondary waves. **[5]**

b) Explain the use of geosynthetics to improve the bearing capacity of soil. **[5]**

c) What are the functional requirements of geosynthetics. **[6]**

■ ■ ■

Total No. of Questions : 12]

SEAT No. :

P3472

[Total No. of Pages : 6

[5560]-109
T.E. (Civil)
STRUCTURAL DESIGN - II
(2012 Course) (Semester - II) (End Sem.) (301010)

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 and Q.11 or Q.12.***
2) ***Bold figures to the right indicate full marks.***
3) ***Use of IS 456-2000 and non programmable calculator is allowed.***
4) ***Neat diagrams must be drawn wherever necessary.***
5) ***Mere reproduction from IS Code as answer, will not be given full credit.***
6) ***If necessary assume suitable data and indicate clearly.***

Q1) a) Compare working stress method (WSM) with limit state method (LSM) **[4]**

b) Why partial safety factor for concrete is higher than that for steel. **[2]**

OR

Q2) A RC beam 300 mm X 600 mm overall is reinforced with 4 number of 16 mm diameter bar. Using WSM approach, calculate stresses induced in concrete and steel when bending moment of 60 kNm is applied. Use M20 grade of concrete, Fe 250 steel and 40 mm cover to tension reinforcement. **[6]**

Q3) A rectangular beam section, 230mm wide and 600mm deep is reinforced with 4 bars of 20mm diameter in the tensile zone and 2 bars of 16mm in the compression zone. The clear cover is 25mm for both the reinforcement. Determine ultimate moment of resistance of the section using. Use M25 grade of concrete and Fe 415 grade of steel. **[8]**

OR

Q4) Calculate the area of tension reinforcement, A_{st} for T- beam to resist factored bending moment M_u = 210 kNm. Following are sectional properties of T-beam **[8]**

Width of flange, b_f = 1000 mm

Depth of slab, D_f = 100 mm

Width of web, b_w = 300 mm

Effective depth, d = 450 mm

Grade of concrete = M 20

Grade of steel = Fe 415

P.T.O.

Q5) Design a cantilever RC slab for an effective span of 1.2 m carrying live load of 3.25 kN/m^2 and floor finish of 1.25 kN/m^2. Use M20 grade of concrete and Fe 250 grade of steel. Also show details of reinforcement. Use LSM approach. **[6]**

OR

Q6) Design a simply supported two-way slab panel having effective dimensions as 4.0 m × 3.5 m. Assume the corners are restrained against torsion and lifting up. Take live load of 3.50 kN/m^2 and floor finish of 1.50 kN/m^2. Use M20 grade of concrete and Fe 415 grade of steel. Also show details of reinforcement. Use LSM approach. **[6]**

Q7) a) Design reinforcement required for a rectangular RC beam section for following data: **[10]**

Size of beam (b × D)	= 300 mm × 450 mm
Factored shear V_u	= 35 kN
Factored bending moment M_u	= 75 kNm
Factored torsional moment T_u	=40 kNm
Grade of concrete	= M 20
Grade of steel	= Fe 250

Also detail the reinforcement

b) Explain following with reasons: **[6]**

i) Minimum shear reinforcement is required to be provided in beams

ii) The useful contribution to shear resistance by bent up bars is restricted to only 50% of total shear reinforcement.

OR

Q8) Design a continuous beam ABCD (AB = BC = CD = 3 .75m) for flexure and shear using IS code method for following data: **[16]**

Dead load = 14 kN/m

Live load =25 kN/m

Grade of concrete = M 20

Grade of steel = Fe 250

Also detail the reinforcement

Q9) a) What are advantages of redistribution of moments? **[4]**

b) A continuous RC floor beam is simply supported at A and C and continuous over support B. Span AB =Span BC = 3.75 m. The beam carries a working dead load of 18 kN/m and a working live load of 28 kN/m. Calculate the design moment at continuous support and near mid-span of AB and BC assuming 15 % redistribution of moments from an elastic analysis at ultimate load. Draw the design moment envelope and design the beam for flexure and shear.

Use M20 grade of concrete and Fe 415 grade of steel. **[12]**

OR

Q10)a) Design a short helically reinforced column of effective length 3.5 m to carry working axial load of 1100 kN. Use M 20 grade of concrete and Fe 250 steel. **[4]**

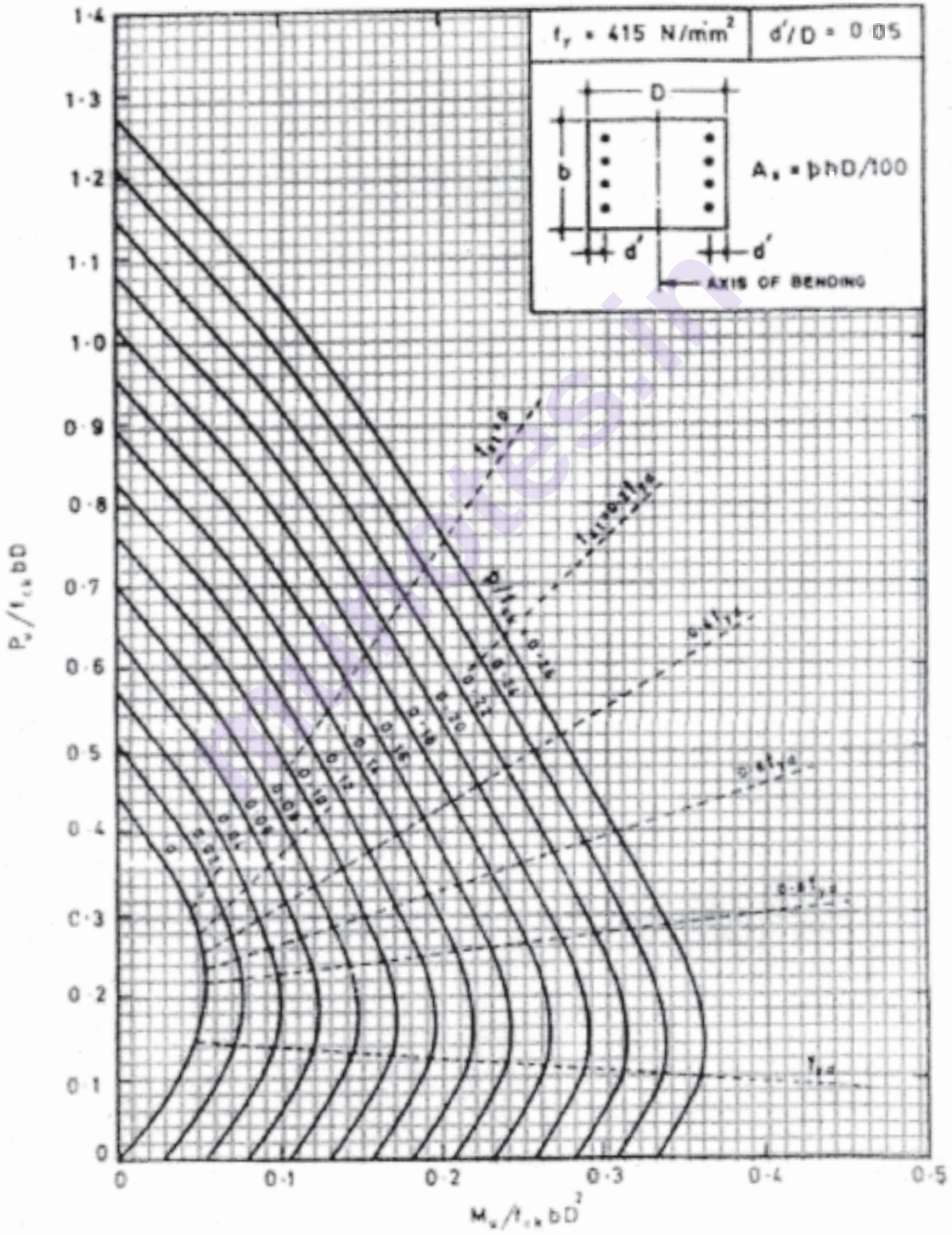
b) Design a rectangular column subjected to working axial load of 800 kN along with a working moment of 70 kN/m about an axis bisecting the depth. The unsupported length of column is 5.6 m. Assume column is effectively held in position and restrained against rotation at both the ends. Grade of concrete is M 20 and steel as Fe 415. Use charts for column design. Provide equal steel on both tension and compression face. **[12]**

Q11)Design an isolated rectangular footing for the RC column of size 300 mm X 750 mm, reinforced with 6 bars of 20 mm diameter and carrying working axial load of 1300 kN (working). The safe bearing capacity of soil is 200kN/m^2. Use M20 grade of concrete and Fe 415 steel. Show detailed design calculations and draw reinforcement details in plan and sectional elevation. **[18]**

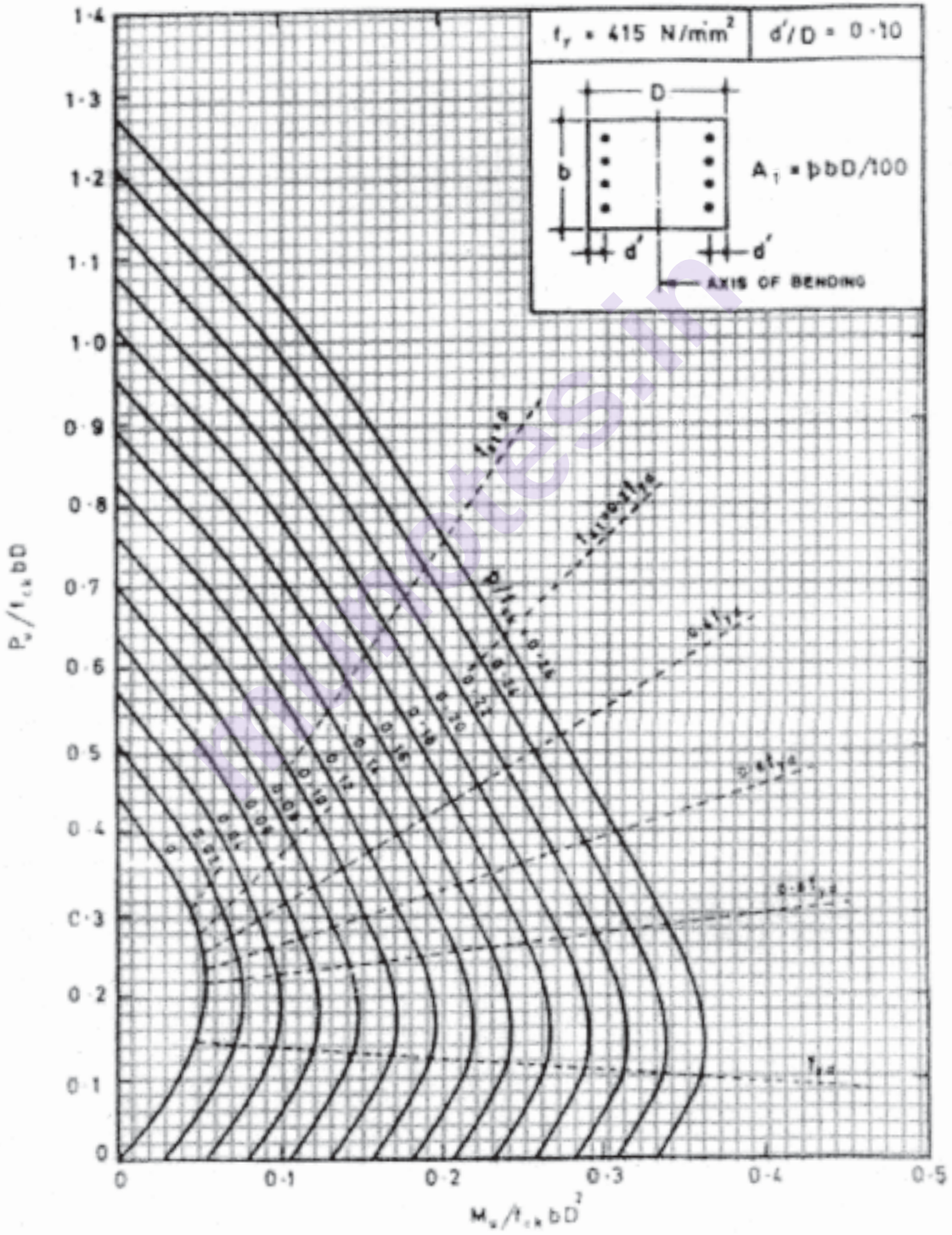
OR

Q12)Design a suitable footing for a 400 mm X 400 mm column with 6 bars of 25 mm diameter transferring 1200 kN working axial load and a working moment of 40 kNm. The safe bearing capacity of soil is 200kN/m^2. Use M20 grade of concrete and Fe 415 steel. Show detailed design calculations and draw reinforcement details in plan and sectional elevation. **[18]**

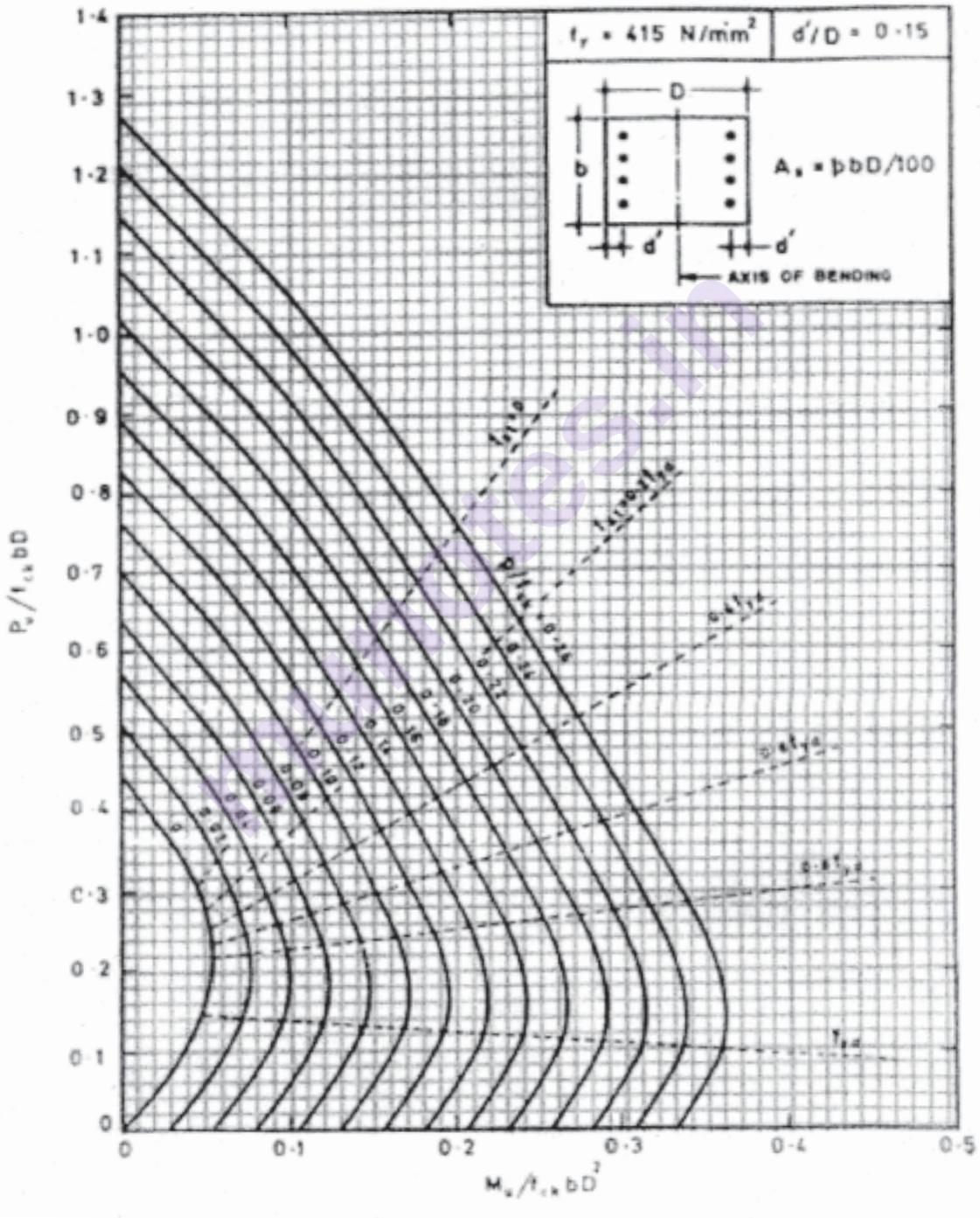
SP 16 Chart 31 COMPRESSION WITH BENDING – Rectangular Section – Reinforcement Distributed Equally on Two Sides



SP 16 Chart 32 COMPRESSION WITH BENDING – Rectangular Section – Reinforcement Distributed Equally on Two Sides



SP 16 Chart 32 COMPRESSION WITH BENDING – Rectangular Section – Reinforcement Distributed Equally on Two Sides



Total No. of Questions : 10]

SEAT No. :

P3473

[Total No. of Pages : 3

[5560]-110
T.E. (Civil)
ENVIRONMENTAL ENGINEERING - I
(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.7or Q.8, Q.9 or Q.1O***

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, jf necessary.***

Q1) a) Write a short note on jack well and also draw a neat sketch of jack well. **[6]**

b) Explain working principle of bag filter with a neat sketch. **[4]**

OR

Q2) a) Enlist different methods of population forecasting and Explain in detail one of them. **[6]**

b) Following are the SPLs of 6 machines in a factory. Find the total SPL when all the machines are in operation. **[4]**

Machine No.	1	2	3	4	5	6
SPL in dB	78	81	81	79	72	65

Refer the following table for determining the cumulative decibel SPL when the differences between two or more levels are known

P.T.O.

Difference between levels, dB	No. of dB to be added to higher level
0	3.0
1	2.6
2	2.1
3	1.8
4	1.5
5	1.2
6	1.0
7	0.8
8	0.6
10	0.4
12	0.3
14	0.2
16	0.1

Q3) a) What are the various types of plain sedimentation basins? Explain any one type of basin with a neat sketch. **[6]**

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

OR

Q4) a) Prove that theoretically, the surface loading (Q/A) and not the depth is a measure of effective removal of particles in a sedimentation tank. **[6]**

b) Write a procedure for the determination of chloride of water. **[4]**

Q5) a) Design a mechanical flocculator to treat water for a population of one lakh, water being supplied at the rate of 150 litres per capita per day. The temperature of water is 30°C, detention time is 30 minutes and paddle speed is 3 r.p.m. kinematic viscosity at 30° C=0.8039×10^{-6} m^2/sec. **[8]**

b) Draw a neat sketch of a rapid sand gravity filter and show various components. Explain mechanisms of rapid sand gravity filter. **[8]**

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) Explain break point chlorination with sketch. **[8]**

Q7) a) Write short note on **[8]**

i) Chloramines

ii) Effect of pH on chlorination

iii) Plain chlorination

iv) Post chlorination

b) Explain odour and colour removal of water using activated carbon. **[8]**

OR

Q8) a) What do you mean by disinfection? Discuss the factors affecting efficiency of disinfection. Enlist at least four disinfectants used in water treatment plant and discuss anyone in detail. **[8]**

b) Explain with necessary chemical reactions 'Lime Soda Process' of water softening. Also explain advantages of this method. **[8]**

Q9) a) Explain RO process with a neat sketch. **[9]**

b) What is service reservoir? What are its functions? Explain anyone with a neat sketch. **[9]**

OR

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

b) Explain the following layout systems for water distribution: **[9]**

i) Tree or Dead end System

ii) Ring or Circular System

Total No. of Questions :10]

SEAT No. :

P3474

[Total No. of Pages : 4

[5560]-111

T.E. (Mechanical) Examination, May-2019
DESIGN OF MACHINE ELEMENT-I
(2012 Pattern)(Semester-II)

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]**

i) Factor of safety and service factor.

ii) Preferred series

b) Design a key for muff coupling which connect two shaft of 30 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. Obtain the equation for shear stress and crushing stress in key. **[4]**

b) Draw neat labeled sketch knuckle joint. Write design steps. **[6]**

Q3) a) Explain ASME code design for 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]**

i) Sut = 600 N/mm^2.

ii) Surface finish factor = 0.43

iii) Size factor = 0.85

P.T.O.

iv) Reliability factor = 0.897 at 90% releability.

v) Factor of safety = 1.5

vi) Notch sensitivity = 0.8

vii) Theoretical stress concentration = 2.6

OR

Q4) a) A cantilever of beam made of cold drawn steel 40C8 with sut = 600N/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) Explian design of shaft based on torsional rigidity. **[4]**

Q5) a) Explain with neat sketch Re-circulating Ball screw. **[4]**

b) A power screw having tripple start square threads nominal diameter 50 mm and pitch 8 mm subjected to axial load of 15KN. The outer and inner diameter of the screw coller is 100 and 65 mm respectively. The coefficient of friction for collar thread and screw thread are 0.15. The screw rotates at 12 rpm. Assume uniform wear condition. Determine.**[12]**

i) Torque required to raise the load

ii) Torque required to lower the load

iii) Force required to raise load if applied at 500mm radius.

OR

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

i) Maximum clamping force = 4000N

ii) Screw type - single start trapezoidal threaded

iii) Nominal diameter = 12 mm

iv) Pitch = 12 mm

v) Coefficient of collar friction = 0.25

vi) Coefficient of screw friction = 0.12

vii) Mean collar diameter = 12mm

viii) Operator force at the end of handle = 80 N

ix) Distance between the axis of handle and surface of nut in clamped condition = 150 mm

x) Nut height = 25 mm

Determine,

1) Length of handle is 50 mm additional length for gripping
2) Stresses in screw body at two critical sections
3) Bearing pressure on screw thread

b) Derive the efficiency of square threaded screw is less than 50%. **[3]**

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

b) Determine the size of bolt for joint as shown in figure 1 below. The bracket is made of steel with sys 254 Mpa. Assume factor of safety 2. **[12]**

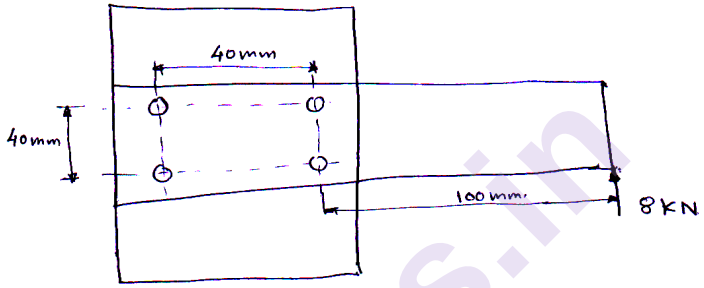


figure - 1

All dimensions are in mm

OR

Q8) a) 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. **[5]**

b) A welded bracket is shown in figure 2 below, carries a load of 30 KN. Calculate size of weld if shear stress in weld is 80 N/mm^2. **[13]**

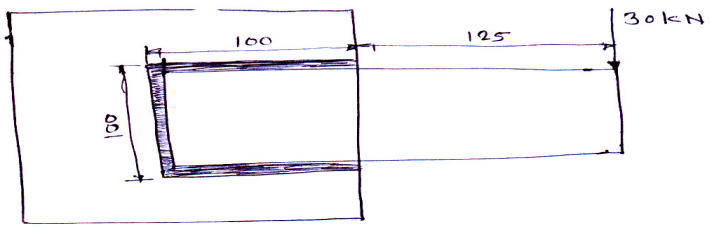


figure - 2

All dimensions are in mm

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

b) An elevator 20 identical spring with spring index 5 are arranged in parallel to absorb the shock due to impact during. In case of failure of rope maximum possible free fall is 12 m. The total weight of elevator is 7.5 KN. If maximum permissible compression of each spring in case of free fall is 120 mm, design the spring. Take permissible shear stress at 650 N/ mm^2 and modulus of rigidity 85 Gpa. **[11]**

OR

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

i) Wahl's factor

ii) Active and lnactive coils

b) A composite compression spring has two closed coil. Outer spring is of 20 mm longer than inner spring. The outer spring has 7 coils of outer diameter 240 mm & wire diameter 40 mm. The inner spring has 10 coils of outer diameter 150 mm & wire diameter 25 mm. When spring is subjected to an axial load 100KN, Modulus of rigidity may be taken as 80000N/mm^2. Find. **[12]**

i) Deflection of each spering.

ii) Load shared by each spering

iii) Combine spring stiffness

iv) Shear stress induced in each spring

Total No. of Questions : 10]

SEAT No. :

P3475

[Total No. of Pages : 4

[5560]-111A
T.E. (Mechanical)
DESIGN OF MACHINE ELEMENTS - II
(2012 Course) (Semester - II)

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) Derive an expression for minimum number of teeth on helical gear. **[4]**

b) A pair of spur gear with 20° full depth involute teeth consists of 20 teeth pinion meshing with 85 teeth internal gear. Pinion is made of 40C8 S_{ut}=580 N/mm^2 and gear is of FG200. The pinion shaft is coupled to 15 kW electric motor running at 1440 rpm. The face width is 12 times module. The grade is 7 and deformation factor is 240 N/mm. If F.O.S is 1.5 design the gear pair using dynamic factor (6/6+v) and Buckingham equation. **[6]**

OR

Q2) a) Following data is given for a steel helical gear pair transmitting 150 kW power from a shaft rotating at 1440 rpm to another shaft rotating at 360 rpm, for a 20° full depth system. Center distance: 435 mm, helix angle=24, face width =14m_n number of teeth on pinion:20, permissible bending strength for pinion = 152 N/mm^2, permissible bending strength for gear = 1125 N/mm^2, service factor:1/53. Combined tooth error: 0.0406 mm, deformation factor: 11600 e N/mm. Calculate factor of safety against bending failure and surface hardness if FOS is 1.5 for pitting failure. **[6]**

b) Explain Force analysis of spur gears. **[4]**

P.T.O.

Q3) a) Why mountings are used in bearings? What are different types of mountings. **[4]**

b) An electric motor running at 1440 rpm is directly coupled to a shaft of 60 mm diameter, which is supported by two cylindrical roller bearings. The radial force is 2500 N and axial force 1200 N. The radial and thrust factors are 0.56 and 2.0. The load factor is 1.2. If the expected rating life is 25000 hrs. Calculate the require basic dynamic capacity of the bearing. **[6]**

OR

Q4) a) How to account for formative number of teeth of bevel gears. **[4]**

b) A deep groove ball bearing operates on following cycle: **[6]**

Element No.	Radial Load (N)	Speed(RPM)	Element Time
1	3000	720	30
2	7000	1440	40
3	5000	900	30

The dynamic load capacity of bearing is 16600 N. Calculate the average speed of rotation, equivalent radial load and bearing life.

Q5) a) A worm drive transmits 15 kW at 2000 rpm to machine carriage at 75 rpm. The worm is triple threaded and has 65 mm pitch diameter. The worm gear has 90 teeth of 6 mm module. The tooth form is to be 20° full depth involute. The coefficient of friction between the mating teeth may be taken as 0.10. **[8]**

Calculate

i) Tangential force acting on worm

ii) Axial thrust and separating force on worm and

iii) Efficiency of worm drive

b) Explain thermal consideration in worm gears? **[8]**

OR

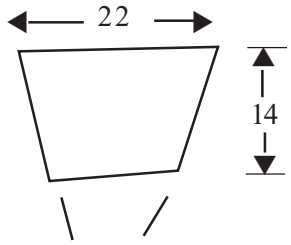
Q6) a) What are the design criterion of worm gears? **[8]**

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 200. 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 **[8]**

i) Component of tooth forces acting on worm wheel

ii) Efficiency of worm gear.

Q7) a) A V-belt drive connecting 20 kW, 1440 rpm motor to a compressor having pitch diameter of pulley 300 and 900 mm respectively. The pulley rotates at 480 rpm and coefficient of friction between pulley and belt is 0.2. The center distance between pulley is 1 m and the cross section of the belt are as shown in figure. The density of belt is 0.97g/cc and allowable tension per belt is 850 N. How many belts are required for this application. The included angle of V is 40°. **[12]**



b) Explain the procedure for the selection of v belt from manufacturer's catalogue. **[4]**

OR

Q8)a) Discuss advantages and applications of rope drives. **[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 × 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) Explain following with reference to journal bearings

a) Materials of journal bearings **[4]**

b) Construction of hydrodynamic bearings **[6]**

c) Design procedure of hydrodynamic bearings **[8]**

OR

Q10)a) Compare long and short journal bearings. **[6]**

b) The following data is given for a 360° hydrodynamic bearing :
Journal diameter : 100 mm, bearing length : 50 mm, journal speed : 1500 rpm, minimum oil thickness : 15 microns, viscosity : 30 cP, specific gravity: 0.86, specific heat of lubricant: 2.09 kJ/kgC.
Assuming that the total heat produced in the bearing is carried by the total oil flow. Calculate dimensions of bearing, coefficient of friction, power lost in friction, total flow of oil, side leakage and temperature rise. **[12]**

$\frac{l}{d}$	$\frac{h_0}{e}$	e	S	$\left(\frac{r}{e}\right) f$	$\frac{Q}{r\,cn,\,l}$	$\frac{Q_s}{Q}$	$\frac{p_{max}}{p}$
∞	0.0	1.0	0	0	0	0	∞
	0.1	0.9	0.0115	0.756	0.411	0	2.793
	0.2	0.8	0.021	0.961	0.760	0	2.020
	0.4	0.6	0.0389	1.20	1.56	0	1.499
	0.6	0.4	0.0626	1.52	2.26	0	1.309
	0.8	0.2	0.123	2.57	2.83	0	1.228
	0.9	0.1	0.240	4.80	3.03	0	1.210
	1.0	0.0	∞	∞	3.142	0	-
1.	0.0	1.0	0	0	-	1.0	-
	0.03	0.97	0.00474	0.514	4.82	0.973	6.579
	0.1	0.9	0.0188	1.05	4.74	0.919	4.048
	0.2	0.8	0.0446	1.70	4.62	0.842	3.195
	0.4	0.6	0.121	3.22	4.33	0.680	2.409
	0.6	0.4	0.264	5.79	3.99	0.497	2.066
	0.8	0.2	0.631	12.8	3.59	0.280	1.890
	0.9	0.1	1.33	26.4	3.37	0.150	1.852
	1.0	0.0	∞	∞	3.142	0	-
1/2	0.0	1.0	0	0	-	1.0	∞
	0.03	0.97	0.0061	0.610	5.88	0.980	7.936
	0.1	0.9	0.0313	1.60	5.69	0.939	4.854
	0.2	0.8	0.0923	3.26	5.41	0.874	3.745
0.5	0.4	0.6	0.319	8.10	4.85	0.730	2.739
	0.6	0.4	0.779	17.0	4.29	0.552	2.267
	0.8	0.2	2.03	40.9	3.72	0.318	1.976
	0.9	0.1	4.31	85.6	3.43	0.173	1.912
	1.0	0.0	∞	∞	3.142	0	-
1/4	0.0	1.0	0	0	-	1.0	∞
	0.03	0.97	0.0101	0.922	6.12	0.984	9.259
0.25	0.1	0.9	0.0736	3.50	5.91	0.945	5.555
	0.2	0.8	0.261	8.8	5.60	0.884	4.166
	0.4	0.6	1.07	26.7	4.99	0.746	2.994
	0.6	0.4	2.83	61.1	4.37	0.567	2.409
	0.8	0.2	7.57	153.0	3.76	0.330	2.045
	0.9	0.1	16.2	322.0	3.45	0.180	1.941
	1.0	0.0	∞	∞	3.142	0	-

× × ×

Total No. of Questions : 10]

SEAT No. :

P3476

[Total No. of Pages : 4

[5560]-112

T.E. (Mechanical) (Mech. S/W & Automobile)

HEAT TRANSFER

(2012 Course) (Semester-I) (302042)

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 whrerver necessary.***
3) ***Use of scientific calculator is allowed.***
4) ***Assume suitable data wherever necessary.***
5) ***Figures to the right indicates full marks.***

Q1) a) Differentiate between natural and forced convection. **[4]**

b) A 1 m high and 1.5m wide double-pane window consists of two 4 mm thick layers of glass (k= 0.026 W/m-K). The room is maintained at 20°C and the outside air is at 40°C. Take the convective heat transfer coefficient on the inside and the outside surface ot the window as 10 and 40 W/m^2- K respectively. **[6]**

Calculate:

i) The rate of heat transfer through this window.

ii) The temperature of the inside surface,

OR

Q2) An electric current of 34000 amp flows along a flat steel plate 1.25 cm thick and 10 cm wide. The resistivity of the steel material (ρ) is 12×10^{-6} ohm -cm, and thermal conductivity (K) is 54 W/m-K. The temperature of one surface of the plate is 80°C and that of the other is 95°C. **[10]**

i) Find the temperature distribution, across the plate.

ii) Maximum temperature of the plate and its position.

iii) The total amount of heat generate per meter length of plate.

iv) Flow of heat from each surface of the plate.

Q3) a) What is physical significance of Biot number? Is the Biot number more likely to be larger for high conducting solids or poorly conducting ones? **[4]**

P.T.O.

b) A steel ball having specific heat (C) 0.46 kJ/kg-K, thermal conductivity (k) 35 W/m-K and diameter of 50 mm. The steel ball initially at a uniform temperature of 450°C is suddenly placed in a controlled environment in which the temperature is maintained at 100°C. The convective heat transfer coefficient is 10 W/m^2-K. Calculate the time required for the ball to attain a temperature of 150°C. **[6]**

OR

Q4) a) What is critical radius of insulation? Justify whether addition of insulation will increase the rate of heat transfer into the surrounding in the case of refrigerant suction line of 25 mm outer diameter, which is to be insulated using insulation of thermal conductivity 0.25 W/m-K. The surface heat transfer coefficients is 10 W/m^2-K. **[4]**

b) A 50 mm × 50 mm iron bar 0.4 m long is connected to the wall of two heated reservoirs, each at 120°C. The ambient air temperature is 35°C and the convective heat transfer coefficients is 17.4 W/m^2-K. Calculate the rate of heat loss from the bar and the temperature of the bar midway between the reservoirs. The thermal conductivity of iron is 52 W/m-K. **[6]**

Q5) a) Explain significance of any three dimensionless numbers used in convection. **[6]**

b) Explain the difference between the local and average heat transfer coefficient. **[4]**

c) Water is passed through the annulus formed by two tubes of 0.05 m and 0.03 m in diameter at a velocity of 0.5 m/sec. If the inlet temperature of water is 20°C and 0.03 m diameter tube temperature is maintained at 80°C, find the heat transfer coefficient between the water and small tube surface. **[6]**

Take the following properties of water at 50°C.

ρ = 880 kg/m^3; Cp=2100kg/m^3; k = 0.12 W/m-K; ν = 3.6 × 10^{-6} m^2/s.

Use the following correlation:

Nu = 0.023 Re$^{0.8}$ pr$^{0.4}$ for turbulent flow; Nu = 3.66 for laminar flow

OR

Q6) a) Write a short note on velocity boundary layer and thermal boundary layer. **[6]**

b) Explain the mechanism of natural convection and force convection with suitable examples. **[4]**

c) The maximum allowable surface temperature of an electrically heated vertical plate is 0.15m high and 0.1 m wide is 140°C. Estimate the maximum rate of heat dissipation by convection from both sides of the plate in an atmosphere at 20°C. **[6]**

Take following properties of air at 80°C:

$v = 21.09 \times 10^{-6}$ m^2/s, Pr =0.692 and k = 0.03 W/m-K

Use following correlations: $Nu = 0.59 (Ra)^{0.5}$

Q7) a) Write statement and mathematical expression of following laws of radiations in heat transfer. **[4]**

i) Wein's Law ii) Lambert's cosine rule.

b) What do you mean by radiation shape factor? List any four properties/rules of radiation shape factor. **[6]**

c) Two very large parallel planes with emissivities 0.3 and 0.8 having temperatures 1000K and 600K, exchanges radiation energy. A polished aluminium radiation shield with emissivity (ε) 0.1 is placed between them to reduce radiation heat transfer between two planes. Determine.**[6]**

i) The radiation heat loss without radiation shield.

ii) The radiation heat loss with the radiation shield.

iii) Percentage reduction in heat transfer rate after placing radiation shield.

OR

Q8) a) Define Radiosity and Irradiation. **[4]**

b) Explain the concept of surface resistance and space resistance. **[6]**

c) A black surface is emitting thermal radiation at 4727°C. Calculate heat flux due to thermal radiation from the black surface, maximum monocromatic emissive power and the wavelength at which it occurs.**[6]**

Q9) a) Derive an expression for LMTD of parallel flow heat exchanger. **[6]**

b) In a chemical plant, a product is produced at 700°C (C_p = 3.6 kJ/kg-K) at the rate of 1000 kg/min is to be cooled by using another liquid available at 100°C (C_p = 4.2 kJ/kg-K) flowing in counter flow direction at a rate of 1200 kg/ min. The surface are of the heat exchanger is 42 m^2 and over all heat transfer coefficient is 1000 W/m^2-K. Determine outlet temperature of both fluids. **[8]**

c) Differentiate between dropwise condensation and filmwise condensation. **[4]**

OR

Q10) a) Draw a labeled sketch of pool boiling curve. Explain following terms with reference to this curve. **[8]**

i) Nucleate boiling

ii) Critical heat flux

b) A counter flow shell and tube type heat exchanger is used to heat water at a rate of 0.8 kg/sec from 30°C to 80°C. With hot oil entering at 120°C and leaving at 85°C. Overall heat transfer coefficient is 125 W/m^2. Calculate area of the heat exchanger required. Take specific heat of water as 4180 J/kg °C. **[6]**

c) Explain effectiveness and NTU for a heat exchanger. **[4]**

Total No. of Questions : 10]

SEAT No. :

P3477

[Total No. of Pages : 3

[5560]-113
T.E. (Mechanical) (Mechanical S/W & Automibile)
THEORY OF MACHINES - II
(2012 Pattern) (Semester - I)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Answer all questions.***
2) ***Figures to the right indicate full marks.***

Q1) a) Derive an expression for length of path contact of involute gears. **[6]**

b) Two helical gears having gear ratio of 4 and normal module 8 mm with normal pressure angle 20º and helix angle 28º . If the centre distance is approximately 650 mm apart, determine the number of teeth on each gear and the exact center distance. **[6]**

OR

Q2) a) A pinion is to mesh with rack, equal pinion and a gear wheel with the gear ratio 3:1. If the pressure angle is 20º and standard addendum of one module is to be used, find the minimum number of teeth on the pinion in all three cases, if interference is to be avoided. **[6]**

b) Derive an expression for velocity ratio and center distance for worm gear drive. **[6]**

Q3) The arm of an simple epicyclic gear train rotates at 100 rpm in anticlockwise direction. The arm carries two wheels A and B hagving 36 and 45 teeth respectively. The wheel A is fixed and arm rotates about the center of wheel A. Draw the sketch and find the speed of wheel B. What will be the speed of B, if the wheel A instead of being fixed, makes 200 rpm clockwise? **[8]**

OR

Q4) a) Explain in detail with neat sketch compound epicyclic gear train. **[6]**

b) Explain difference between gear box and gear train. **[2]**

P.T.O.

Q5) a) Explain with near sketch positively infinitely variable drive (PIV) **[6]**

b) A ship is pitching through an angle of 12^0 and the motion is simple harmonic. A complete oscillation takes 30 seconds. The turbine rotor rotates at 2000 rpm and it has mass moment of inertia of 7200 Kg-m^2. If the rotor rotates in anticlockwise direction when viewed from the stern find the following

1) Magnitude of maximum gyroscopic couple and state its effect.
2) Maximum angular acceleration of the ship during pitching. **[10]**

OR

Q6) a) Describe in brief continuous varianble transmission (CVT) with a neat sketch. **[6]**

b) A two wheeler and a rider has a mass of 250 Kg. When the vehicle is upright their combined center of gravity is at 0.6m above the ground level. Each road wheel of a motor cycle has a mass moment of inertia of 1.5 Kg-m^2 and that for rotating parts of the engine is 0.25Kg-m^2 the speed of the engine is 5 times the speed of the wheels and in the same direction. Find the angle of heel if the vehicle is travelling at 50 Km/hr and taking a turn of 30m. Take wheel diameter 0.6 m. **[10]**

Q7) a) Design a slider crank mechanism to coordinate three positions of input and output links for the following data by inversion method.

$\theta_{12} = 30°,\ \theta_{13} = 60°,\ S_{12} = 40$ mm, $S_{13} = 96$ mm and eccentricity = 20 mm **[10]**

b) Explain the followig terms

1. Function generation
2. Path generation
3. Motion generation **[6]**

OR

Q8) a) Determine three angular posions of input and output links for the function $y = 2x^3 - x$ for a range $0 \le x \le 4$ and $\Delta\theta = 45°$ and $\Delta\phi = 90°$. Use Chebyshave spacing formula. **[10]**

b) Write short note on

1. Type synthesis
2. Number synthesis
3. Dimensional synthesis **[6]**

Q9) a) What is polynomial cam and where it is used? **[2]**

b) Draw the profile of the cam to raise a valve with S.H.M. through 40 mm in $1/4^{th}$ of revolution keep it fully raised $1/10^{th}$ revolution and to lower it with uniform acceleration and retardation in $1/6^{th}$ revolution. The valve remains closed during the rest of the revolution. The diameter of roller is 20mm and minimum radius of the cam is to be 30 mm. The axis of the valve rod passes through the axis of the cam shaft. The cam shaft rotates at 360 rpm clockwise. Determine maximum velocity and maximum acceleration of the follower during the outstroke and return stroke. **[16]**

OR

Q10)a) What is cam jump phenomenon? What are possible ways to avoid that? **[6]**

b) A cam rotation with uniform speed is required to the following motion to a knife edge follower:

- The outstroke of the follower is 40 mm for 60º of cam rotation.
- Dwell period for the next 30º of cam rotation.
- The return stroke druign next 60º of cam rotation.
- Dwell for the remaining 210º of cam rotation.

The maximum radius of the cam 50 mm. The follower moves with uniform velocity for both outstroke and return stroke. Draw the cam profile when the follower passes through the axis of cam shaft and also determine maximum velocity during the outstroke and return stroke. **[12]**

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Total No. of Questions : 9]

SEAT No. :

P3478

[Total No. of Pages : 2

[5560]-114
T.E. (Mechanical)
METROLOGY & QUALITY CONTROL
(2012 Pattern) (Semester - I) (302044)

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) ***Q.9 is compulsory***
4) ***Assume suitable data, if necessary.***
5) ***Use of calculator is allowed.***
6) ***Figures to the right side indicate full marks.***

Q1) a) Explain Gauge R and R concept? And interchangeability concept. **[5]**

b) Explain different types of errors in measurement. **[5]**

OR

Q2) a) Write different types of comparators, explain Pneumatic comparator. **[5]**

b) Define surface texture? Explain difference between primary and secondary texture. **[5]**

Q3) a) Explain with neat sketch of Gear tooth vernier measurement. **[5]**

b) Explain Floating Carriage Micrometer in thread measurement. **[5]**

OR

Q4) a) Explain juran Trilogy approach in details. **[5]**

b) State Taylor's principle of gauge design, Explain types of gauges and gauge design for shaft. **[8]**

P.T.O.

Q5) a) Explain Seven Quality Tools. **[8]**

b) Explain Quality Circle. **[8]**

OR

Q6) a) Write a short note on (any two) **[8]**

i) DMAIC

ii) Kaizen

iii) Poka yoke

b) Explain ISO - 9000 Quality system standards with its type. **[8]**

Q7) a) Five thermostatic control are tested to determine On temperature. The measured value are 344, 338, 342, 335 and 336 degree. These values constitutes first subgroup for certain control chart.

Computer the athematic mean, median, range, standard deviation and variance of this subgroup. **[8]**

b) Explain in detail with flowchart single sampling and double sampling plan. **[8]**

OR

Q8) a) Control Chart for mean $\overline{X}$ and R are maintained on tensile strength in Kg. The subgroup size is 5. The values of mean $\overline{X}$ and R are computed for each subgroup. After 25 subgroup average $\sum \overline{X} = 2005$ and $\sum R = 515$. Compute the control limit for $\overline{X}$. If the process is statistical control. Determine the process capability. Take $d_2 = 2.326$ for subgroup of 5 items. **[10]**

b) Explain OC Curve and its characteristics. **[6]**

Q9) Write a short note on (any four) **[18]**

a) FMECA

b) Zero defect

c) TPM

d) 5 S

e) JIT

■ ■ ■

Total No. of Questions :8]

SEAT No. : ____

P3479

[Total No. of Pages :3

[5560]-115
T.E. (Mechanical)
HYDRAULICS AND PNEUMATICS
(2012 Pattern) (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) ***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) What is the difference between the terms fluid power, hydraulics and pneumatics? **[6]**

b) Explain the different types of accumulator used in hydraulic circuit and state their applications. **[6]**

c) A positive displacement pump has geometric displacement of 81.95cm^3 It delivers of 75.84lpm of oil while operating at 1000 RPM at a pressure of 6.9 Mp a the input torque of the prime mover is 101.25N-m find: **[8]**

(a) Overall efficiency of the pump.

(b) Theoretical torque required to operate the pump.

OR

Q2) a) What are effects of contaminants on different components of hydraulic system? **[6]**

b) Explain the term Beta rating in relation with filter. **[6]**

c) State and explain governing law used in fluid power system in detail. **[8]**

Q3) a) What is a function of a shuttle valve? Explain its working with simple sketch. **[6]**

b) Draw a circuit showing the application of a 3/2DCV. **[6]**

c) Draw a neat sketch and explain working of a pressure reducing valve. **[6]**

OR

P.T.O.

Q4) a) Draw a regenerative circuit by using 4/3 DCV and explain its application **[6]**

b) Name three different types of cylinder mounting with sketch. **[6]**

c) Differentiate between meter in circuit and meter out circuit. **[6]**

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

b) Explain the terms in respect of a hydraulic motor. **[6]**

i) Volumetric Efficiency

ii) Mechanical Efficiency

iii) Overall Efficiency

c) Explain the difference between direct and pilot operated pressure relief valve. **[4]**

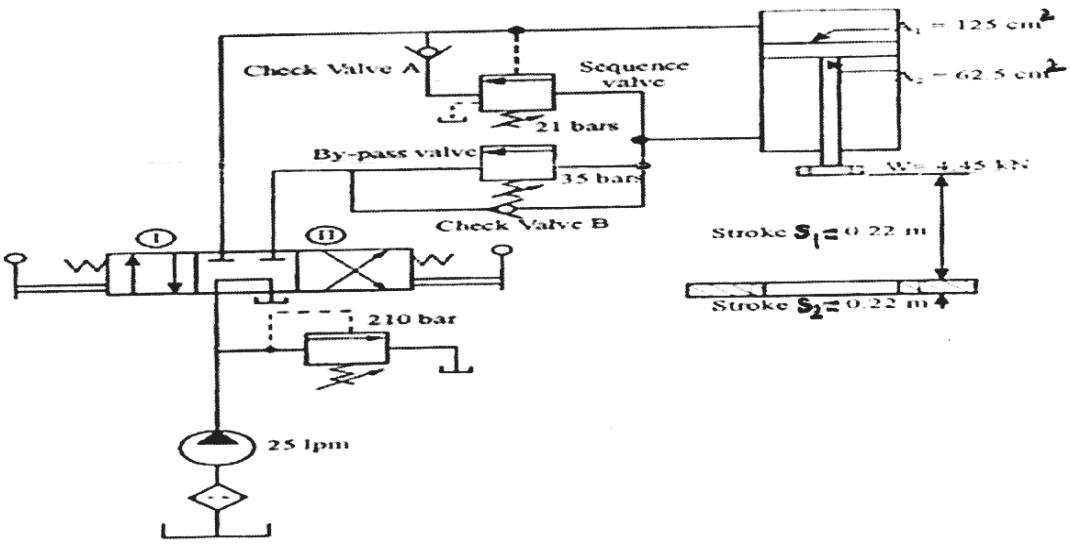
OR

Q6) a) Draw a typical circuit showing control of a double acting cylinder operated through use of an air pilot actuated direction control valve and explain working of the circuit. **[6]**

b) Draw and Explain a typical sketch for sequencing of two double acting cylinders in respect of pneumatics. **[6]**

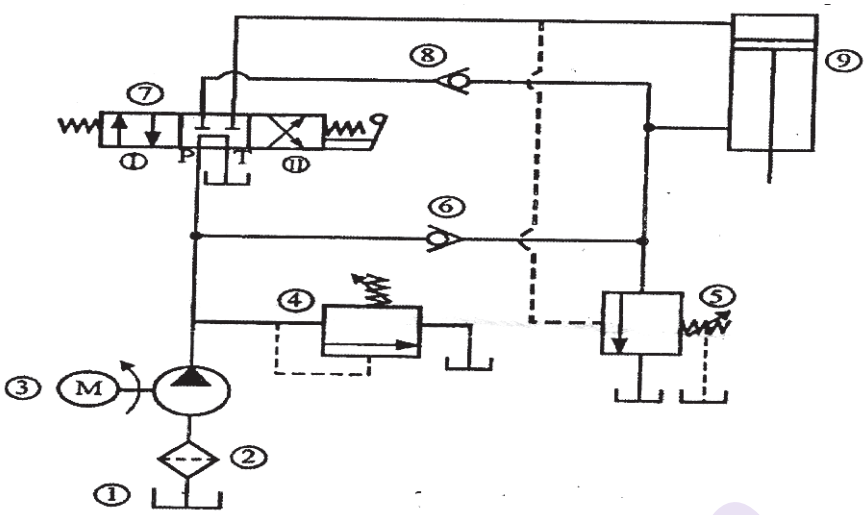
c) Draw a typical symbol of FRL unit and Explain its function. **[4]**

Q7) Analyze the hydraulic press circuit given below and find load and time required for press operation. **[16]**



OR

Q8) identify the different components and analyze the given circuit with operations **[16]**



Total No. of Questions : 12]

SEAT No. :

P3480

[Total No. of Pages : 4

[5560]-116
T.E. (Mechanical/Automobile)
NUMERICAL METHODS & OPTIMIZATION
(2012 Pattern) (Semester - II) (End Semester) (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 Q12.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of programmable calculator is not permitted.***
5) ***Assume suitable data, if necessary.***

Q1) Draw the flowchart for Bisection method. **[6]**

OR

Q2) If $x = 3.26426$, find absolute, relative and percentage error, if **[6]**

a) x is truncated to 4 decimal places.

b) x is rounded off to 4 decimal places.

Q3) Solve by Gauss seidel method. **[6]**

$$2x_1 + 3x_2 + 10x_3 = 27.1$$
$$5x_1 + x_2 - x_3 = 4.7$$
$$x_1 + 8x_2 + 2x_3 = 15.7$$

OR

Q4) Draw the flowchart for Gauss Elimination method. **[6]**

Q5) a) Minimize : $Z = 6000x_1 + 4000x_2$ **[5]**

Subjected to the constraints

$3x_1 + x_2 \geq 40$

$x_1 + 2.5x_2 \geq 22$

$x_1 + x_2 \geq 40/3$

$x_1, x_2 > 0$

(Use Graphical Method)

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

OR

P.T.O.

Q6) Using simplex method **[8]**

Maximize $Z = 1600x + 1500y$

Subject to

$5x + 4y \leq 500$

$15x + 16y \leq 1800$

$x_1, x_2 \geq 0$

Q7) a) Using least square criteria, fit a equation $y = ax^2 + bx + c$; to the following data: **[8]**

X	1	2	3	4	5	6	7
Y	–5	–2	5	16	31	50	73

b) The values of x, y and y' are given below. Use Hermit interpolation to find the value of y at $x = 0.25$. **[8]**

x	y	y'
0	0	0
1	1	1

OR

Q8) a) Equation of the best fitting curve is of the type $y = ab^x$. Find the values of constants a and b by fitting a curve through the following points: **[8]**

X	1	3	4	6	9
Y	0.84	0.4116	0.2888	0.141	0.048

b) Draw the flowchart for Newton's Forward Difference Interpolation. **[8]**

Q9) a) Time required for cooling an object is given by the relation **[8]**

$$Time = \int_{400}^{700} \frac{9.085 \times 10^3 \, d\mathrm{T}}{7.895(\mathrm{T}-293) + 3.4 \times 10^{-8}\left(\mathrm{T}^4 - 293^4\right)}$$

Compute the time using Simpson's 1/3rd method and taking four intervals.

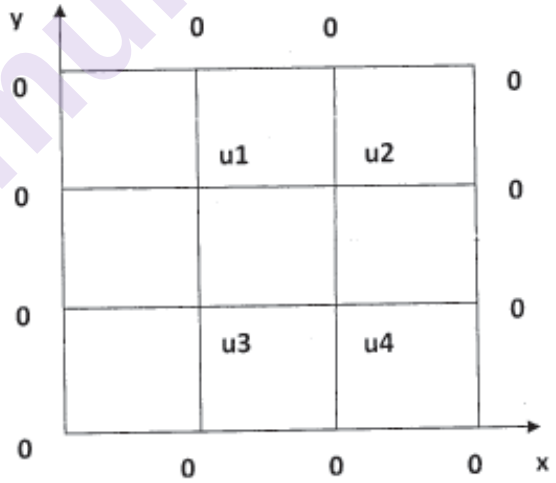
b) Solve using Trapezoidal rule $\int_0^1 \int_0^1 x^2 y^2 dx\, dy$.. Taking step length in x and y as 0.25. **[8]**

OR

Q10)a) Draw the combine flowchart for Simpson's 1/3rd and Simpson's 3/8th rule. **[8]**

b) Using Gauss Legendre three point formula, find $\int_0^2 e^x + 4x - 3dx$. **[8]**

Q11)a) Solve the equation $\nabla^2 u = -10\left(x^2 + y^2 + 10\right)$ over the square with sides $x = y = 0$ and $x = y = 3$. with $u = 0$ on the boundary and mesh length = 1. **[10]**



b) Solve the equations $\frac{dy}{dx} = (x + yz)$ and $\frac{dz}{dx} = \left(x^2 - y^2\right)$ using Runge Kutta method under the boundary conditions x = 0.0, y = 0.1 and z = 0.5. Find y and z and x = 0.2. **[8]**

Q12)a) Solve for $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$ the following explicit finite scheme is given by,**[12]**

i) $u = \sin(\pi x)$ for $t = 0$ where $0 \leq x \leq 1$,

ii) $u = 0$ for $x = 0$ and $x = 1$ for $t = 0$ to 0.06, and

iii) increment in t is $k = 0.02$ and in x is $h = 0.2$,

Calculate values of u for t = 0 to 0.06 at x = 0 to 1.

b) Draw the flowchart for Euler's method. **[6]**

x x x

Total No. of Questions : 10]

SEAT No. :

P3481

[Total No. of Pages : 4

[5560]-118
T.E. (Mechanical)
TURBOMACHINES
(2012 Course) (Semester-II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Figures to the right indicate full marks.***
3) ***Use of scientific calculator is allowed.***
4) ***Use of steam table is permitted.***
5) ***Assume data whenever necessary.***
6) ***Due credit will be given to neat figures wherever necessary.***

Q1) a) Derive the expression for maximum blade efficiency in a single stage impulse steam turbine. **[4]**

b) A jet of water discharges 140 N per second at 40 m/s in a direction making 30º to the direction of series of curved vanes moving at 17.50 m/s. If the outlet angle of the vanes is 20º, determine **[6]**

i) Inlet vane angle of the vane so that there is no shock at entry

ii) The direction of flow at outlet and

iii) The work done per second.

OR

Q2) a) Show that the hydraulic efficiency of a pelton wheel is given by

$$\eta_h = (1+\cos\phi)\frac{2u(V-u)}{V^2}$$

Where all symbols have their usual meaning. **[4]**

b) A Kaplan turbine is having hydraulic efficiency of 90% and the mechanical efficiency of 93%, with the runner diameter of 6 m and a boss diameter of 1.80 m. If the discharge of the turbine is 180 m^3/sec, calculate the head on the turbine and the shaft power of the turbine. Assume that there is no whirl at outlet and the discharge is free. Neglect the losses in the turbine. **[6]**

P.T.O.

Q3) a) What methods are used in reducing the speed of the rotor? Explain any one. **[4]**

b) A reaction turbine works under a head of 120 m and runs at 450 rpm. Its diameter at inlet is 1.20 m and the flow area is 0.4 m^2. The angle made by absolute velocity and relative velocity at inlet is 20° and 60° respectively with the tangential velocity. Determine **[6]**

i) The volume flow rate

ii) The power developed

iii) Hydraulic efficiency.

Assume no whirl at outlet.

OR

Q4) a) What is the basis of selection of turbine at a particular site? **[4]**

b) The velocity of steam exiting from the nozzle of the impulse stage of a turbine is 400m/sec. The blades operate close to maximum efficiency. The nozzle angle is 20º. Considering equiangular blades and neglecting blade friction calculate for a steam flow of 0.6 kg/s, the diagram power and diagram efficiency. **[6]**

Q5) a) What do you mean by manometric head? How it is different from head generated by the impeller? What are the various expressions for the manometric head. **[8]**

b) A centrifugal pump running at 1000 rpm has an impeller 350 mm diameter. The outlet vane angle is 30°. The velocity of flow through impeller is constant at 2.5 m/s. The static suction lift is 3.25 m. The following losses of head takes place. The loss of head in the suction pipe = 0.75 m, The loss of head in impeller = 0.6 m, Loss of head in volute casing = 0.95 m. Find the pressure heads **[10]**

i) At the inlet to the impeller

ii) At the outlet to the impeller

iii) At the inlet to the delivery pipe.

Take the suction and delivery pipes as 1.50 m/s.

OR

Q6) a) How can you determine minimum starting speed of a centrifugal pump? **[6]**

b) A centrifugal pump has an external diameter of 450 mm and discharge area of 0.11 m^2. The vanes are set backwards so that the direction of the relative velocity at the outlet makes an angle of 145° with the tangent to the outer periphery drawn in the direction of impeller rotation. The diameter of suction and delivery pipes is 300 mm and 230 mm respectively. Pressure gauges at the points on the suction and delivery pipes close to the pump; each gauge 1.50 metre above the level in the supply sump showed a gauge pressure heads of 3.70 metres below and 19 metres above atmospheric head respectively, when the pump was delivering 200 litre per second of water at 800 rpm. It requires 70 kW to drive the pump. Determine: **[12]**

i) The loss of head in the suction pipe

ii) Manometric efficiency

iii) Overall efficiency.

Q7) a) Describe surging and choking in a centrifugal compressor. How do these phenomena affect the working of a compressor? **[6]**

b) A single inlet type centrifugal compressor handles 528 kg/min of air. The ambient air conditions are 1 bar and 20°C. The compressor runs at 20000 rpm with isentropic efficiency of 80%. The air is compressed in the compressor from 1 bar static pressure to 4 bar total pressure. The air enters the impeller eye with a velocity of 145 m/s with no prewhirl. Assuming that the ration of whirl speed to the tip speed is 0.9, calculate

i) Rise in total temperature during compression if the change in the K.E. is negligible. **[10]**

ii) The tip diameter of the impeller

iii) Power required

iv) Eye diameter if the hub diameter is 12 cm.

OR

Q8) a) What is centrifugal compressor? How it differs from axial flow compressor? **[6]**

b) A centrifugal compressor running at 10000 rpm delivers 660 m^3/min of free air. The air is compressed from 1 bar and 20°C to a pressure ratio of 4 with an isentropic efficiency of 82%. Blades are radial at outlet of the impeller and the flow velocity of 62 m/s may be assumed throughout constant. The outer radius of the impeller is twice the inner and the slip factor may be assumed as 0.9. The blade area coefficient is 0.9 at inlet. Calculate: **[10]**

i) Final Temperature of the air

ii) Theoretical power

iii) Impeller diameter at inlet and outlet

iv) Impeller blade angle at inlet

v) Diffuser blade angle at inlet

Q9) a) Explain various losses in axial flow compressor stage. **[8]**

b) An axial flow compressor with an overall isentropic efficiency of 85% draws air at 20°C and compresses it in the pressure ratio of 4:1. The mean blade speed and flow velocity are constant throughout the compressor, Assuming 50% reaction blading and taking blade velocity as 180 m/s, work input factor as 0.82, angle made by absolute velocity at inlet as 12° and that of relative velocity in axial direction to blade velocity as 42°. Calculate: **[8]**

i) Flow velocity

ii) Number of stages

OR

Q10)a) What do you understand by slip factor and pressure coefficient in a compressor. **[6]**

b) In an axial flow compressor, the overall stagnation pressure ratio achieved is 4 with overall stagnation isentropic efficiency of 85%. The inlet stagnation pressure and temperature are 1 bar and 300 K. The mean blade speed is 180 m/s. The degree of reaction is 0.5 at the mean radius with relative air angles of 12° and 32° at the rotor inlet and outlet respectively. The work done factor is 0.9. Calculate **[10]**

i) Stagnation polytropic efficiency.

ii) Number of stages

iii) Inlet temperature and pressure

iv) Blade height in first stage if hub-tip ratio is 0.42

Take mass flow rate = 19.5 kg/s.

■ ■ ■

Total No. of Questions : 10]

SEAT No. :

P3482

[Total No. of Pages : 4

[5560]-119
T.E. (Mechanical/Mechanical-Sandwich)
MECHATRONICS
(2012 Course) (Semester-II) (302050)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain the significance of static and dynamic characteristics of measuring instruments while selecting an instrument for a particular application. **[6]**

b) A strain gauge and bridge circuit is used to measure the tension force in the steel bar. The steel bar has across section area of 50 mm^2. The strain gauge has nominal resistance of 120 Ω and gauge factor of 2. The bridge supply voltage is 10 Volts. When the bar is unloaded, the bridge is balanced so the output is 0 Newton. When force 'F' is applied to the bar, the bridge output voltage goes to 0.0005 Volts. Find the value of 'F' if the Young Modulus of the bar material is 2.1×10^5 N/mm^2. **[4]**

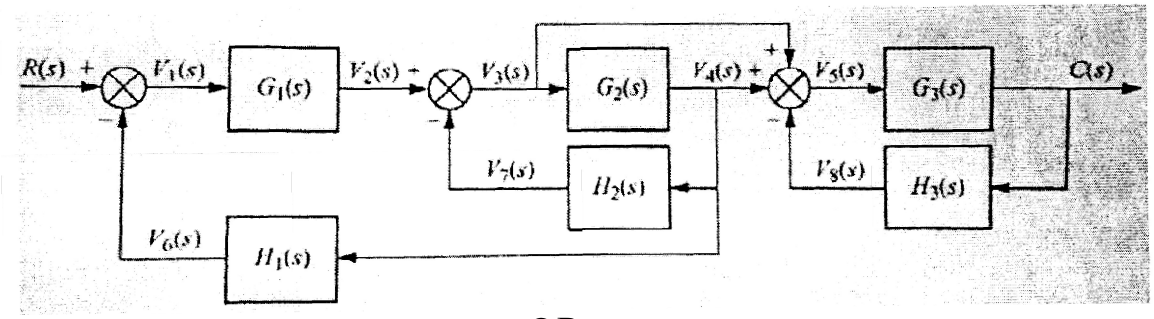
OR

Q2) a) Explain with neat sketch the working principle of solenoid. **[5]**

b) Rotary potentiometer is used for angle measurement. Potentiometer is supplied with 10 Volts and set up with 82°. The range of single turn of pot is 350°. Calculate the output voltage. **[5]**

Q3) a) Explain the role of sample and hold process in the conversion of analog signal into equivalent digital signal. **[5]**

b) Find the overall transfer function for the following block diagram. **[5]**



OR

P.T.O.

Q4) a) Explain the advantages of closed loop control system for the open loop control system. **[5]**

b) Explain in detail any one application of interfacing various sensors/actuators to DAQ system. **[5]**

Q5) a) Explain with suitable example the role of following in PLC. **[8]**

i) Counter ii) Timer

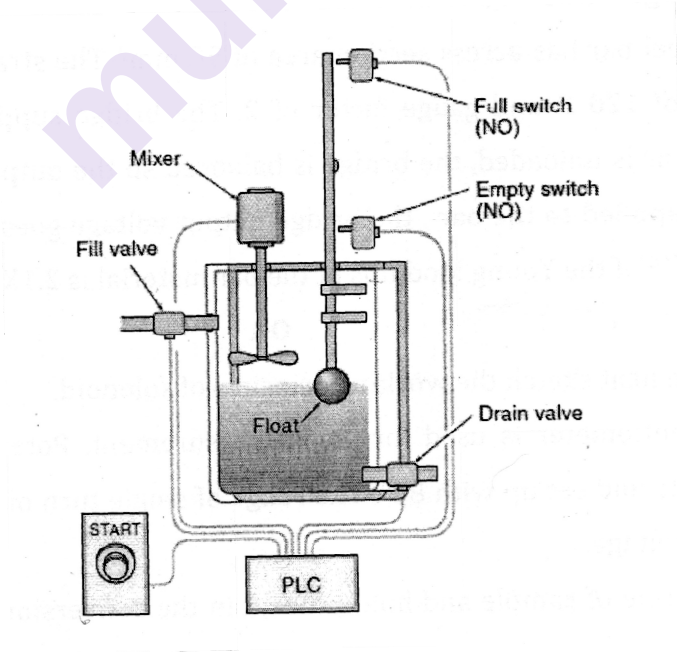
b) A batch process - which involves filling a vat with a liquid, mixing the liquid, and draining the vat - is automated with a PLC. Following figure shows the hardware. The specific sequence of events is as follows: When the start button near the process is pushed: **[8]**

i) A fill valve opens and lets a liquid into a vat until it's full.

ii) The liquid in the vat is mixed for 3 min.

iii) A drain valve opens and drains the tank.

Draw the ladded diagram for the PLC program.



OR

Q6) a) Explain with suitable example the architecture of SCADA system. **[8]**

b) A process for washing parts requires the following sequence: **[8]**

i) Spray water and detergent for 2 min (Wash cycle).

ii) Rinse with water spray only for 1 min (Rinse cycle).

iii) Water off, air blow dry for 3 min (Drying cycle).

The sequence is started with a toggle switch. Draw the ladder diagram for this process.

Q7) a) Explain in brief the following terms: **[8]**

i) % Overshoot

ii) Damping factor

iii) Rise time

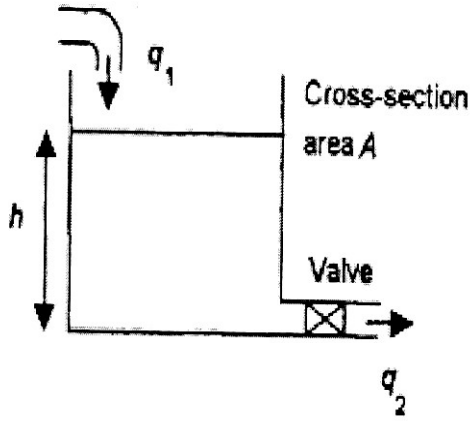
iv) Damping frequency

b) Develop a model for the temperature of a room containing a heater which supplies heat at the rate q1 and the room loses heat at the rate q2. Make use of suitable notations and assumptions. **[8]**

OR

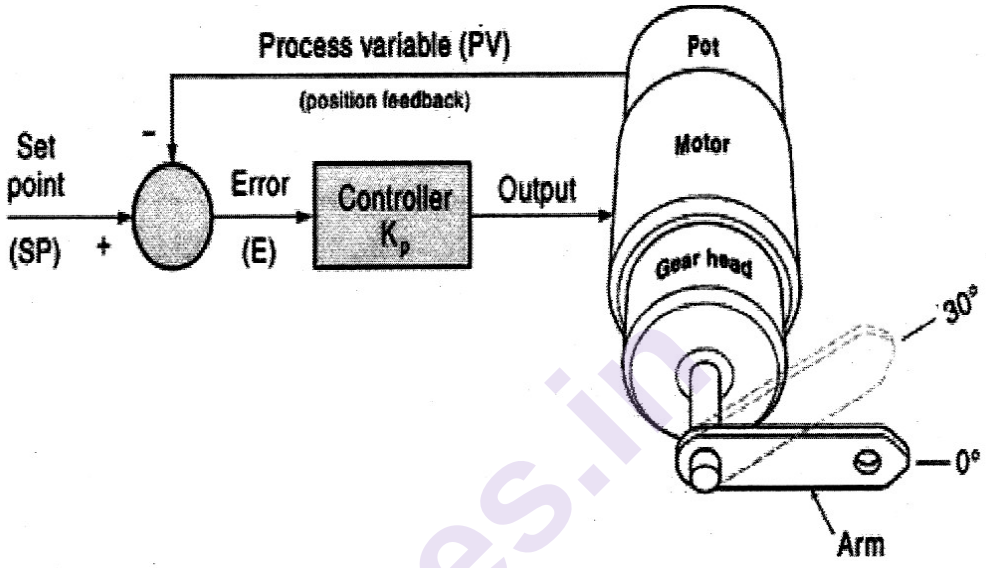
Q8) a) Explain the difference and need for time and frequency domain analysis. **[8]**

b) Develop a model for the hydraulic system shown in the following figure where there is a liquid entering a container at one rate q1 and q2. Make use of suitable notations and assumptions. **[8]**



Q9) a) Narrate the advantages of PID controller over PI controller. Justify your answer with suitable example. **[8]**

b) A motor driven arm was originally at 0° and then was directed to move to a new position at 30°. The gain of the system is KP = 2 in.·oz/deg. Describe how the controller responds to this situation. **[10]**



OR

Q10)a) Discuss the effect of each of P, I and D from PID controller on stability of the system. **[8]**

b) An integral controller is used to control the temperature of a system with a set point of 12°C within a range of 10-15°C. The controller output is 22% initially. The constant K_I = –0.15% controller output per second per percentage error. If the temperature jumps to 13.5°C, calculate the controller output after 2 second from the constant e_p. **[10]**

Total No. of Questions : 10]

SEAT No. :

P3483

[Total No. of Pages : 3

[5560]-120
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) Explain following grinding wheel nomenclature. **[6]**

S-D-54-L-4-R-12

b) Determine machining time required to drill a hole of 20mm diameter and 60mm length when feed is 0.2mm/rev and speed is 20m/min. Assume approach and over travel as 5mm each. **[6]**

OR

Q2) a) Determine indexing movement required for making 69 teeth on a gear black using compound indexing. **[6]**

Plate - 1: 15, 16, 17, 18, 19, 20

Plate - 2: 21, 23, 27, 29, 31, 33

Plate - 3: 37, 39, 41, 43, 47, 49

b) Differentiate between honing and lapping process. **[6]**

Q3) a) Explain flank and crater wear with a neat sketches. **[4]**

b) Taylor's tool life equation for machining C-40 steel $VT^n = C$. Feed is 0.2mm/rev. **[4]**

V(m/min)	25	35
T(min)	90	20

Determine1.n and c 2. Recommend cutting speed for 60 minutes tool life.

OR

P.T.O.

Q4) a) Explain any two types of chips with neat sketch and mentioning their favourable conditions. **[4]**

b) Explain Merchant's force circle with neat sketch. **[4]**

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

b) Explain variable process parameters in USM process with their effect on MRR. **[8]**

OR

Q6) a) Explain with a neat sketch ECM process. **[8]**

b) Explain with a neat sketch LBM process. Also comment on applications and limitations. **[8]**

Q7) a) Differentiate between NC and CNC machines. **[5]**

b) Explain following codes: **[6]**

G02, M02, G84, M06

c) What is Word address format? Explain with an example. **[5]**

OR

Q8) a) Differentiate between open and closed loop system. **[6]**

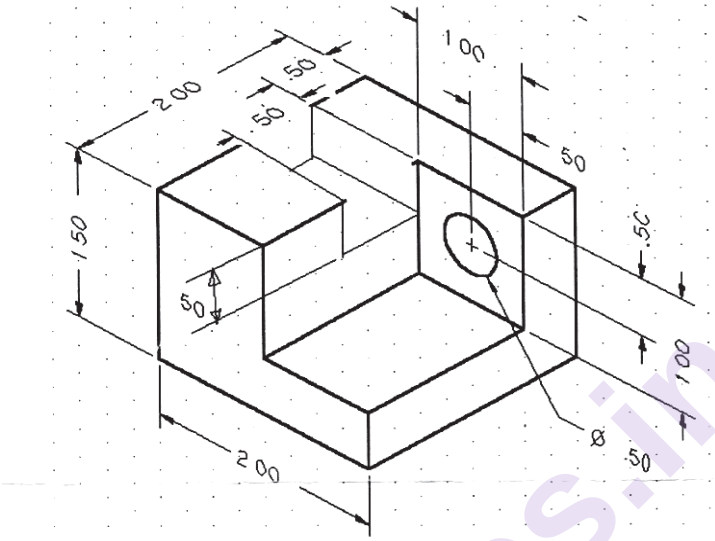
b) Explain DNC with block diagram. **[6]**

c) Explain with a neat sketch Automatic tool changer. **[4]**

Q9) a) Explain with a neat sketch diamond pin locator. **[4]**

b) Explain 3-2-1 principle for location. **[6]**

c) Design and draw a drilling jig to produce 50mm diameter hole in the given component. **[8]**



OR

Q10)a) What is modular fixturing? Explain with advantages. **[4]**

b) List various types of clamps and explain any one with a neat sketch. **[6]**

c) Design and draw a milling fixture to create a slot of 50X 50X 100mm for the job given in Q.9. **[8]**

Total No. of Questions : 12]

SEAT No. :

P3484

[Total No. of Pages : 3

[5560]-122

T.E. (Mechanical Sandwich)

NUMERICAL METHODS & COMPUTATIONAL TECHNIQUES

(2012 Course) (Semester-I) (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) Use Trapezoidal rule to evaluate take h=k=0.5 **[6]**

$$I = \int_2^3 \int_2^3 \frac{dx\,dy}{x^2 + y^2}$$

OR

Q2) Solve x^3-9x+1 = 0 using Modified Newton Raphson method take initial point as x=3 and accuracy as 0.0001. **[6]**

Q3) Find f (1986) using Newton's Backward Interpolation method. **[6]**

x	1951	1961	1971	1981	1991
F(x)	13	17	22	28	41

OR

Q4) Explain : **[6]**

Interpolation

Inverse Interpolation

Extrapolation

Q5) Solve following set of equations using Gauss Elimination method. **[8]**

2X + 4Y- 6Z = -4

X +5Y +3Z = 10

X +3Y +2Z = 5

OR

P.T.O.

Q6) Using Gauss Siedel method, solve the following set of simultaneous equations up to two decimal accuracy. **[8]**

$8X + 2Y - 2Z = 8$

$X - 8Y + 3Z = -4$

$2X + Y + 9Z = = 12$

Q7) a) Explain with suitable example. **[8]**

i) Error propagation

ii) Concept of convergence

b) Fit a curve of the form $xy^a = b$ through following set of points. **[4]**

x	200	150	100	60	40	10
y	1	1.5	1.8	2.4	4.1	10

OR

Q8) a) Explain following types of errors with suitable example. **[8]**

i) Inherent Error

ii) Rounding Error

iii) Truncation Error

iv) Algorithmic Error

b) Draw flow chart to fit and equation $y = ax^b$ using Least Square Method. **[8]**

Q9) a) Draw flow chart for 'Modified Euler's Method'. **[8]**

b) Using 'Runge Kutta method of order 4', find y at x=0.1 and 0.2 for the following equation $dy/dx = x+y^2$, where y (0) =1 **[8]**

OR

Q10) a) Using 'Modified Euler's Method', find y at x = 0.2 and 0.4 for the following equation $dy/dx = y + e^x$, where y (0) = 0 for 2 decimal accuracy. **[8]**

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

Q11) a) Draw flowchart to solve Hyperbolic equation. **[8]**

b) Solve the partial differential equation $\frac{\partial^2 u}{\partial x^2}+\frac{\partial^2 u}{\partial y^2}$ = -10(x^2+y^2+10) Over the square with x=y=0 and x=y=3, with u=0 on the boundary and mesh length 1. **[10]**

Q12) a) Draw flowchart to solve elliptic equation. **[8]**

b) Describe the procedure to solve a partial differential equation by explicit method State its limitations. **[10]**

Total No. of Questions :10]

SEAT No. :

P3485

[Total No. of Pages :4

[5560]-123
T.E. (Mechanical Sandwich Engineering)
MACHINE DESIGN
(302062) (2012 Pattern) (Semester-I)

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

Instructions to the candidates:

1) ***Answer questions 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 indicate full marks.***
4) ***Use of electronic pocket calculator is allowed.***
5) ***Assume suitable data, if necessary.***
6) ***Assume suitable data if necessary.***

Q1) a) Explain design of knuckle joint in detail. **[6]**

b) Explain ASME code for design of shaft in detail. **[4]**

OR

Q2) a) Write a short note on wahl shear stress factor. **[4]**

b) What are preferred series? Explain in detail with its advantages. **[6]**

Q3) a) A steel bar of 50mm diameter is subjected to a completely reversed bending stress of 250 N/mm^2. The ultimate tensile strength of steel is 600N/mm^2. The surface finish factor and size factor are 0.43 and 0.85 respectively. The reliability factor is 0.897. Assuming there is no stress concentration; determine the life of the bar. **[6]**

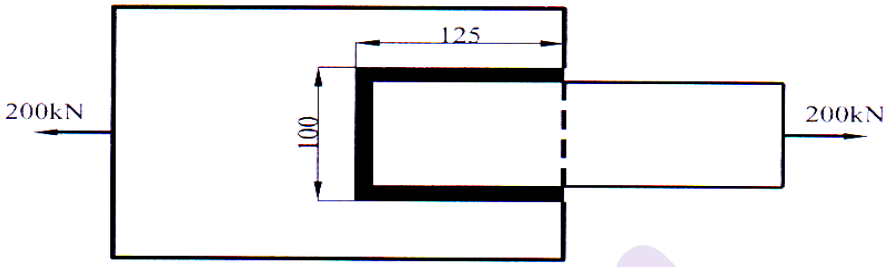
b) A steel screw driving a bronze nut is to develop an axial load of 300 kN in an extrusion press. The screw is having single start square threads with an outside diameter of 100 mm and a lead of 16 mm . Determine the nut length if the bearing pressure between screw and nut threads is not to exceed 16 N/mm^2 and shear stress in the nut threads is not to exceed 28N/mm^2. **[4]**

OR

P.T.O.

Q4) a) Design a helical spring for a maximum load of 1200 N for a deflection of 25 mm using the value of spring index as 5. Assume maximum permissible shear stress for spring material as 400N/mm^2. Modulus of rigidity can be assumed as 85 GN/m^2. **[6]**

b) Two plates joined by fillet welds, as shown in figure are subjected to a tensile load of 200 kN. If the allowable shear stress for the weld material is 85 MPa, calculate the size of the weld. All dimension of length in figure in mm. **[4]**



Q5) a) A spur pinion having 2 teeth is to mesh with a gear having 43 teeth. The pinion and gear are to be made of plain carbon steels having ultimate tensile strengths of 600N/mm^2 and 400N/mm^2 respectively. The pinion is to be driven by a three phase induction motor having a speed of 1440 RPM and 10kW rating. The starting torque of the motor is twice the working torque. If the surface hardness of the gear pair is 400 BHN, design a gear pair with a factor of safety of 1.5

Take lewis form factor for pinion as well as gear as Y= 0.484- (2.87/z), where z are number of teeth.

Assume velocity factor accounts for the dynamic load. **[12]**

b) Explain various types of gear tooth failures in detail. **[6]**

OR

Q6) a) Explain the significance of virtual number of teeth in the design process of helical gear. Write the equation for the same. **[6]**

b) A helical pinion having 21 teeth to be made of plain carbon steel 55C8 (S_{ut} = 720N/mm^2) is to mesh with a gear to be made of plain carbon steel 40C8 (S_{ut} = 580 N/mm^2). The gear pair is required to transmit 10 kW power from an electric motor running at 1000 RPM to a machine running at 300 RPM. The starting torque of the motor is 125% of the rated torque. The factor of safety required is 1.25. The face width is 10 times the normal module and tooth system is 20° full depth involute. The helix angle is 25°. The gears are to be machined to meet the specifications of the grade 6. The gear and pinion are to be case hardened to 300 BHN and 350 BHN respectively. Design the gear pair by using the velocity

factor and Buckingham's equation for dynamic load. The deformation factor 'C' for gear pair is 11500e, N/mm. Take : **[12]**

$K_v = \frac{5.6}{5.6 + \sqrt{V}}$;e = 8.0+0.63 [m_n +0.25 $\sqrt{d}$] and

$$F_d = \frac{21V[bC\cos^2\psi + F_t \max]\cos\psi}{21V + \sqrt{bC\cos^2\psi + F_t \max}}$$

Q7) a) Derive an expression for load-life relationship for rolling contact bearings. **[6]**

b) A ball bearing operates on a work cycle consisting of three parts. A radial load of 3000 N at 720 RPM for 30% of the cycle, a radial load of 7000 N at 1440 RPM for 40% of the cycle, and a radial load of 5000 N at 900 RPM for the remaining part of the cycle. The basic dynamic load carrying capacity of the bearing is 30700N. Calculate. **[10]**

i) The rating life of bearing in hours;

ii) The average speed of rotation; and

iii) The life of the bearing with 95% reliability.

OR

Q8) a) A 10 kW, 720 RPM motor is directly coupled to a shaft of 25mm diameter, which is supported by two cylindrical roller bearings. The shaft transmits power to another line shaft through a flat pulley of 250 mm diameter which is placed mid way between the two bearings. The coefficient of friction between the belt and the pulley is 0.3, while angle of lap is 180°. The belt is vertical. The overload factor is 1.75. If the expected life of bearing is 76000 hours, select the bearing from manufacturer's catalogue. **[10]**

Use following data.

Bearing No.	NU2205	NU2305
Basic Dynamic Capacity, 'C',kN	15.99	31.39

b) Explain various types of failures in rolling contact bearings. **[6]**

Q9) a) Explain different stresses in the wire ropes in detail. **[4]**

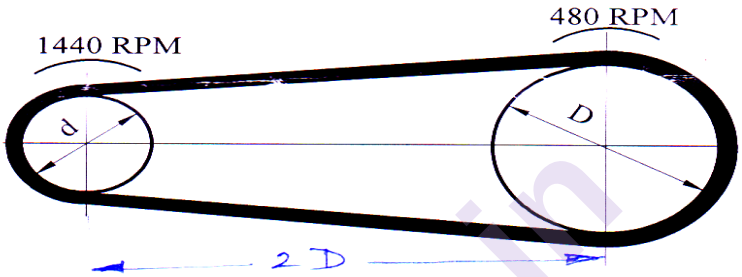
b) The layout of the leather belt drive transmitting 15 kW power is shown in

below figure. The centre distance between the pulleys is twice the diameter of the big pulley. The belt should operate at a velocity of 20 m/s approximately and the stresses in the belt should not exceed 2.25 N/mm^2. The density of leather is 0.95 gm/cc and the coefficient of friction is 0.35. The thickness of the belt is 5 mm. Calculate. **[12]**

i) The diameters of the pulleys;

ii) The length and width of the belt; and

iii) The belt tensions.



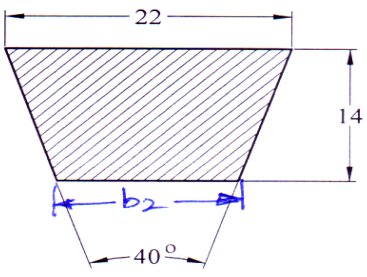
OR

Q10) a) Explain polygonal effect in chain drives. **[4]**

b) The following data is given for a V-belt drive connecting a 20 kW motor to a compressor. **[12]**

	Motor Pulley	Compressor pulley
Pitch diameter(mm)	300	900
Speed (RPM)	1440	480
Coefficient of Friction	0.2	0.2

The centre distance between pulleys is 1m and the dimensions of the cross section of the belt are given in below figure. The density of the composite belt is 0.97 gm/cc and the allowable tension per belt is 850N. How many belts are required for the application?



Total No. of Questions : 12]

SEAT No. :

P3486

[Total No. of Pages : 3

[5560]-124
T.E. (Mechanical Sandwich)
MATERIALS AND MANUFACTURING ENGINEERING (302066)
(2012 Course) (Self Study-I) (Semster - II)

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

Instructions to the candidates:

1) ***Answer 3 questions from Section-I and 3 questions from Section-II.***
2) ***Answers to the two sections should be written in separate books.***
3) ***Neat diagrams must be drawn whenever 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) What is ceramics? What are applications of ceramics? What are imperfections in ceramics? **[8]**

b) Differentiate between thermoplast and thermoset polymers. **[8]**

OR

Q2) a) Give classification of engineering polymers and discuss their applications. **[8]**

b) List out any four processing techniques for polymers and ceramics each.

Q3) a) Discuss "Properties and Technological advantages of Nano Materials". **[8]**

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

OR

Q4) a) List out any two modern material applications in each of the following disciplines. **[8]**

i) Civil Engineering,

ii) Electronics and electrical Engineering

iii) Medical field

iv) Manufacturing Engineering

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

P.T.O.

Q5) Differentiate between:

a) Dry and Wet corrosion **[6]**

b) Anodic and Cathodic inhibitors **[6]**

c) Inter-granular and stress corrosion **[6]**

OR

Q6) a) State the limitations of galvanic series in predicting the corrosion resistance of metals and alloys in various corrosive environment. **[6]**

b) What are the different methods of prevention of corrosion? Explain any two of them. **[6]**

c) Discuss the mechanisms of dry corrosion. **[6]**

SECTION - II

Q7) a) Write short notes on: **[8]**

i) Production of Metal Powder,

ii) Compacting and sintering.

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

OR

Q8) a) Explain the term powder metallurgy. Give its advantages, limitations and applications. **[8]**

b) Draw a neat flow chart to explain various steps in production of components by powder Metallurgy. **[8]**

Q9) a) Explain open loop and closed loop numerical control system with block diagram. **[8]**

b) Write any eight G codes (or) M codes and their functions. **[8]**

OR

Q10)a) Explain the different modes of programming in NC/CNC. **[8]**

b) Write a note on Flexible manufacturing System (FMS). **[8]**

Q11)a) Compare merits and demerits of following thread production processes based on parameters Production rate, Accuracy, Surface finish and ease of manufacturing for: **[10]**

i) Thread cutting using single point cutting tool on lathe

ii) Thread tapping

iii) Die threading

iv) Thread rolling

v) Thread chasing

b) Explain the working principle of Gear shaping. **[8]**

OR

Q12)a) Suggest a suitable process and machine tool for production of following gear tooth production: **[10]**

i) Helical gears,

ii) Worm wheels,

iii) Straight bevel gears,

iv) Gear grinding,

v) Cluster gear

b) Differentiate between Pull type and Push type broaching. Draw broach tool. **[8]**

■ ■ ■

Total No. of Questions : 12]

SEAT No. :

P3487

[Total No. of Pages : 2

[5560]-125
T.E. (Mechanical Sandwich)
INDUSTRIAL ENGINEERING AND PRODUCTION MANAGEMENT
(2012 Course) (302067) (Semester - II)

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

Instructions to the candidates:

1) ***Answer 3 questions from Section I and 3 questions from Section II.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Black figures to the right indicate full marks.***
4) ***Use of logarithmic table slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
5) ***Assume suitable data, if necessary.***

SECTION - I

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

b) Briefly mention contribution of Gantt & Maynard to industrial engineering. **[8]**

OR

Q2) a) Explain concept & functions of management. **[8]**

b) Explain evolution of management thoughts. **[8]**

Q3) a) Explain steps & tools used in Method study. **[8]**

b) Explain importance of ergonomics in industry. **[8]**

OR

Q4) a) Explain time study procedure in detail. **[8]**

b) Explain techniques of work measurement. **[8]**

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

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

OR

Q6) a) Explain objectives, functions & principles of material handling. **[10]**

b) Explain significance of material handling equipment selection. **[8]**

P.T.O.

SECTION - II

Q7) a) What is safety stock inventory control system, state its advantages. **[8]**

b) Give types of inventories in a manufacturing firm. **[8]**

OR

Q8)a) What is Bill of materials? Discuss its importance in production management. **[8]**

b) State objectives and requirements of an inventory management system. **[8]**

Q9) a) Explain what a process sheet is, with an example. **[8]**

b) Give comparison between CPM & PERT Method. **[8]**

OR

Q10)a) List general consideration for selecting a machining method in process planning. **[8]**

b) Explain the steps in Process planning. **[8]**

Q11)Write Short Note on any 3 of the following **[18]**

a) Waste Elimination.

b) Concurrent Engineering.

c) Agile & reconfigurable manufacturing.

d) Lean manufacturing.

OR

Q12)Write Short Note on any 3 of the following **[18]**

a) Activities conducted in industry for energy conservation.

b) Green Production.

c) Continuous improvement technique in the industry.

d) Advantages of Computerization in Production process.

Total No. of Questions :10]

SEAT No. :

P3488

[Total No. of Pages :3

[5560]-132

T. E. (Automobile Engineering)

DESIGN OF MACHINE ELEMENTS

(2012 Pattern) (Semester - I) (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 figures to the right indicates full marks.***
4) ***Use of electronic pocket calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Differentiate between rigid and flexible coupling. **[4]**

b) Explain the general design procedure. **[6]**

OR

Q2) a) Define the terms factor of safety and Service factor. **[6]**

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

Q3) a) Differentiate between transmission shafts and machine shafts. **[2]**

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

OR

Q4) a) Determine the required length of square key if key and shaft are made up of same material. Take diameter of shaft as 40mm. **[2]**

b) Derive an expression for torque required to raise the load in power screws. **[8]**

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 500 mm, 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 500 kg is being lowered by means of steel wire rope having cross sectional area 250 mm^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 $E=0.8\times10^6$ Mpa. **[6]**

Q7) a) Derive Petroff's equation for bearings. **[6]**

b) The following data is given for a 360° hydrodynamic bearing. Radial load = 3.2 KN, journal speed = 1490 rpm, journal diameter = 50mm, bearing length = 50mm, radial clearance = 0.05mm, viscosity of lubricant = 25 cP. 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]**

I/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) Explain the Hydrodynamic theory of lubrication. **[6]**

b) A 6306 radial ball bearing with inner ring rotation has a 10 seconds work cycle as follows. If basic dynamic capacity of the bearing is 24/25KN, determine the expected life of this bearing. Take radial factor x= 0.56, thrust factor y = 1.43 and rotating factor v = 1. **[10]**

	For 2 seconds	For 8 seconds
Radial load	4 KN	3KN
Axial load	2KN	0
Speed	900 rpm	1200 rpm

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

b) Design spur gear set to transmit 20 KW at 900 rpm of pinion. The transmission ratio is 3. Take 20° FDI, Z_1=18 , σ_d= 193.2 Mpa, BHN = 250 for pinion and σ_d= 47.1 Mpa, 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) Design a pair of helical gears are to transmit 15 KW at 10,000 rpm of the pinion with PCD 80mm. The transmission ratio is 3:1. Assume α=20°FDI, β=45°. σ_d= 193.2MPa, BHN = 250 for pinion and gear. Check only tangential tooth load. Y= π (0.154-0.912/Z_e), C_v= 5.55/5.55+$V^{0.5}$ **[12]**

Total No. of Questions :10]

SEAT No. :

P3489

[Total No. of Pages :2

[5560]-133

T.E. (Automobile Engineering)

AUTOMOTIVE ELECTRICAL AND ELECTRONICS

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

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) What is use of current regulator? Explain any one type of current regulator. **[4]**

b) Explain Maintenance free Battery. **[6]**

OR

Q2) a) Discuss the selection of cranking motor with the help of performance curve. **[4]**

b) Compare Earth return and insulated return system. **[6]**

Q3) a) Enlist the different types of battery tests. **[2]**

b) Explain the working of Wind shield wiper. **[8]**

OR

Q4) a) What is use of Voltage regulator? **[2]**

b) Explain working of Temperature gauge. **[8]**

Q5) a) What are the different types of actuators? Explain any one. **[8]**

b) Explain with neat sketch Airflow rate sensor. **[8]**

OR

Q6) a) Explain with neat sketch Lambda sensor. **[8]**

b) What are the different types of Sensors? Explain any one. **[8]**

P.T.O.

Q7) a) Explain MPFI system with neat sketch. **[8]**

b) Write down the difference between cold start and warm start system. **[8]**

OR

Q8) a) Write short note on CI Engine management system. **[8]**

b) Explain CRDI system with neat sketch. **[8]**

Q9) a) Explain Collision avoidance system with layout. **[10]**

b) Write short note on Smart parking assist system (SPAS). **[8]**

OR

Q10)a) Explain Radar warning system. **[10]**

b) What is Driver State monitoring? Explain in brief . **[8]**

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Total No. of Questions : 9]

SEAT No. :

P3490

[Total No. of Pages : 3

[5560]-134

T.E. (Automobile Engineering)

DESIGN OF ENGINE COMPONENTS

(2012 Course) (Semester-II) (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) ***Use of Logarithmic tables, Slide rule, Electronic pocket calculator is allowed.***
4) ***Assume Suitable data if necessary.***

Q1) a) Write short note on design considerations for combustion chamber. **[6]**

b) Explain Selection of engine type on the basis of No. of cylinders & cylinder arrangement. **[4]**

OR

Q2) a) Write short note on engine balancing. **[4]**

b) What is the function of radiator? Explain any one neat sketch. **[6]**

Q3) a) Explain heat balance sheet for cooling system with suitable example. **[6]**

b) What are the advantages and disadvantages of aluminum piston over cast iron piston? **[4]**

OR

P.T.O.

Q4) The following data is given for the piston of a four-stroke diesel engine: Cylinder bore=250 mm, 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 = 42 mm, Number of piston rings = 4 Calculate: **[10]**

a) radial width of the piston rings

b) axial thickness of the piston rings

c) gap between the free ends of the piston ring before assembly

d) gap between the free ends of the piston ring after assembly

e) width of the top land

f) width of the ring grooves

g) thickness of the piston barrel and

h) thickness of the barrel at open end.

Q5) a) What is the function of rocker arm? Explain the forces acting on rocker arm and material used for rocker arm. **[6]**

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°. Assume exhaust gas velocity 50m/s, take k for steel valve 0.42. Calculate: **[10]**

i) diameter of the valve port

ii) diameter of the valve head

iii) thickness of the valve head

iv) diameter of the valve stem and

v) maximum lift of the valve.

OR

Q6) a) Design a centre crankshaft for a single-cylinder vertical engine (Top Dead Centre position) using the following data: Cylinder bore = 125 mm. (L/r) ratio = 4.5, Maximum gas pressure = 2.5 MPa, Length of stroke = 150 mm. Weight of flywheel cum belt pulley = 1 kN. Total belt pull = 2 kN. Width of hub flywheel cum belt pulley = 200 mm. The torque on the crankshaft is maximum when the crank turns through 25° from the top dead centre and at this position the gas pressure inside the cylinder is 2 MPa. The belts are in the horizontal direction. Assume suitable data and state the assumptions you make. **[12]**

b) Write short note on types of cylinder liners. **[4]**

Q7) a) Write short note on fuel pump testing. **[8]**

b) Explain how the compression testing and leakage testing is carried out in engine cylinder. **[8]**

OR

Q8) a) Explain exhaust has CO and HC analyzer with suitable sketch. **[8]**

b) Write short note on distributor dwell-angle. **[8]**

Q9) Write short note on, (Any Three): **[18]**

a) Variable Timing Control (VTC).

b) Advanced Turbulent Flow Technology (ATFT).

c) Dual Twin Spark - ignition (DTS-i).

d) Four valve engine and Dual fuel engine.

e) Homogenous Charge Compression Ignition (HCCI).

Total No. of Questions : 10]

SEAT No. :

P3491

[Total No. of Pages : 2

[5560]-135
T.E. (Automobile Engg.)
AUTOMOTIVE TRANSMISSION
(Semester - II) (2012 Course) (316485)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain the characteristics of front engine front wheel drive layout with neat sketch. **[5]**

b) Explain construction and working of electromagnetic type of clutch. **[5]**

OR

Q2) a) Suggest and justify the good requirements of automotive clutch in vehicle. **[5]**

b) Explain Constant mesh gearbox with neat sketch. **[5]**

Q3) a) Explain the features of constant velocity joint with neat sketch. **[5]**

b) Explain the construction and working of Hotchkiss drive with neat sketch. **[5]**

OR

Q4) a) Explain the features of rear wheel drive layout of vehicle with neat sketch. **[5]**

b) Explain the construction of propeller shaft with neat sketch. **[5]**

Q5) a) Explain with neat sketch construction and working principle of non slip type of differential. **[8]**

b) What is necessity of final drive and explain various types of final drive used in vehicle. **[8]**

OR

P.T.O.

Q6) a) Suggest and justify the various factors affecting on selection of lubrication in final drive. **[8]**

b) Draw and explain the constructional details and working of semi floating type of rear axle with its applications. **[8]**

Q7) a) Explain the construction and working of torque converter with neat sketch. **[8]**

b) Draw and explain the performance characteristics curve of fluid flywheel. **[8]**

OR

Q8) a) Draw and Explain the construction and working of Wilson type of gear box. **[8]**

b) Explain the construction and working principle of CVT with neat sketch. **[8]**

Q9) a) Explain the construction and working principle of Simple epicyclic gear train. **[6]**

b) Differentiate in-between semiautomatic and automatic transmission. **[6]**

c) Differentiate between torque converter and gear box. **[6]**

OR

Q10)a) What is meant by Hydramatic transmission? Explain it in brief. **[6]**

b) List and explain merits and demerits of Continuous Variable Transmission (CVT). **[6]**

c) List and explain the function of various components in the Hydraulic control system of transmission. **[6]**

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Total No. of Questions : 10]

SEAT No. :

P5115

[Total No. of Pages : 2

[5560]-136

T.E. (Automobile Engineering) (Semester - II)

AUTOMOTIVE AERODYNAMICS & BODY ENGG.

(2012 Pattern)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Discuss flow field around car. **[4]**

b) Explain the Aerodynamic drag & Its Types. **[6]**

OR

Q2) a) How performance of vehicle is affected by forces and moments of fluid flow? **[6]**

b) What are application CFD in Vehicle aerodynamics? **[4]**

Q3) a) Write a short note on improvement of windshield and A-pillar to increase aerodynamic performance vehicle. **[6]**

b) Write a short note on Fundamentals of wind tunnel technique. **[4]**

OR

Q4) a) Write a short note on Mechanism of generation and transmission of wind noise. **[6]**

b) Calculate aerodynamic drag of car running with 83 km/hr with frontal projected area 3.0 m^2. Coefficient of drag for car in 0.35 and density of air is 1.2225 kg/m^3. **[4]**

Q5) a) Discuss the methods for improving visibility of vehicle. **[8]**

b) Sketch and explain in details any 4 types of bus body. **[8]**

P.T.O.

OR

Q6) a) Explain Integral types of Chassis Frame. **[8]**

b) Explain with a neat sketch single decker Bus body. **[8]**

Q7) Explain the following with neat sketch. **[16]**

a) Flat platform

b) Tipper body

c) Tanker body

d) Fixed side

OR

Q8) a) Explain driver seat design in relation to control. **[8]**

b) Write any three energy absorbing systems used in vehicles in brief. **[8]**

Q9) a) Explain Symmetric & Asymmetric Vertical Load in Car in sketch? **[10]**

b) Define Ergonomics & Anthropometry for vehicle? **[8]**

OR

Q10)a) Explain Importance of Bumper in Automobile. **[8]**

b) Explain different types of seats and seat belts used in Automobiles. **[10]**

Total No. of Questions :8]

SEAT No. :

P3492

[Total No. of Pages :3

[5560]-141
T. E. (Electronics)
ELECTRICAL MACHINES & POWER DEVICES
(2012 Pattern) (Semester - I) (304201) (End Semester)

Time : 2 Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) What do you understand by safe operating area of power semiconductor devices? **[7]**

b) Why SCR is called a latching type device? Derive an expression for anode current I_A. **[7]**

c) Explain the presence of integral reverse diode in structure of power MOSFET. **[6]**

OR

Q2) a) Draw and explain switching characteristics of MOSFET in detail. **[6]**

b) Explain with the help of equivalent circuit, causes of latches in IGBT and how to avoid it? **[7]**

c) Write note on triggering circuit or TRIAC using DIAC. **[7]**

Q3) a) Explain the basic action of a commutator with the help of neat sketches. **[6]**

b) Write a short note on permanent magnet DC motor (PMDC) in detail. **[6]**

c) A 25 kW, 250V, DC shunt generator has armature and field resistance of 0.6 Ω and 100 Ω respectively. Determine the total armature power developed when working as a motor taking 25 kW input. **[4]**

OR

P.T.O.

Q4) a) What are the different types of armature winding of a DC machine? Explain essential difference between them in reference to merits, demerits and applications. **[6]**

b) Distinguish between self excited and separately excited DC generator. **[4]**

c) A 4 pole series motor has 944 wave-connected armature conductors. At a certain load the flux per pole is 34.6 mWb and the total mechanical torque developed is 209 Nm. Calculate the line current taken by the motor and speed at which it will run with an applied voltage of 500 V. The motor resistance is 3Ω. **[6]**

Q5) a) What are draw back of a three point starter? Explain the four point starter with a neat diagram. **[8]**

b) While delivering an useful power of 24 kW to the full load, a 3ϕ, 50 Hz, 8 pole induction motor draw a line current of 57 A. It runs at a speed of 720 rpm and is connected to 415 supply. The P. F. of the motor is observed to be 0.707 lagging . Stator resistance per phase is 0.1Ω. Mechanical losses are 1000 watts.

Calculate : i) Shaft torque ii) Gross torque developed

iii) Rotor copper losses iv) Stator copper losses

v) Stator iron losses vi) Overall efficiency.

(Assume star connected stator winding.) **[10]**

OR

Q6) a) Draw the power flow diagram and explain how power flows in a three phase induction motor. **[8]**

b) A 400 V, 4 pole, 3 phase, 50 Hz star connected induction motor has a rotor resistance and reactance per phase equal to 0.01Ω and 0.1 Ω respectively. Determine (i) Starting torque (ii) slip at which maximum torque will occur (iii) speed at which maximum torque will occur (iv) Maximum torque (v) Full load torque if full load slip is 4%. Assume ratio of stator to rotor turns as 4. **[10]**

Q7) a) Write a short note on: AC servomotor. **[8]**

b) Discuss the complete torque slip characteristics of a three phase induction motor including motoring, generating and breaking region. **[8]**

OR

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

b) Derive an transfer function of an armature controlled DC motor. **[8]**

Total No. of Questions :8]

SEAT No. :

P3493

[Total No. of Pages : 2

[5560]-142
T.E. (Electronics Engg.)
DATA COMMUNICATION
(2012 Pattern) (Semester-I) (304202)

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 diagram must be drawn whenever necessary.***
3) ***Figure to the right indicates full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) Define parallel and serial communication schemes. What are the advantages and disadvantages of serial communication. **[6]**

b) Explain properties of any four line formats. Compare R3 NRZ in the basic of above properties. **[8]**

c) Explain: **[6]**

i) Stop and wait ARQ

ii) Go gack N ARQ

OR

Q2) a) A serial transmission link TLI uses 8 bits 1 start bit, 1 stop bit and 1parity bit for each character and synchronous transmission line TL2 user 3 eight bit synch characters followed by 30 digit bit information characters, if the bit rate is 1200 bps, what is transfer rate of TL1 and TL2. **[8]**

b) Explain ISI and also describe how the eye pattern used to interpret the ISI. **[6]**

c) Write note on CRC codes. **[6]**

Q3) a) What steps are involved in Shannon Fano Coding Procedure? Evaluate its performance over Huttman code for large ensemble with equal probabilities. **[8]**

b) Derive Huttman Coding procedure for. **[8]**

x	*x*1	*x*2	*x*3	*x*4	*x*5	*x*6
p	0.1	0.2	0.15	0.09	0.20	0.26

OR

P.T.O.

Q4) a) Define and explain the followings: **[8]**

i) Entropy ii) Information

b) Calculate H(x) and comment on results. **[8]**

i) x = { 0.75,0.25 }= {P_i}

ii) x = { 0.1, 0.1 , 0.1, 0.5, 0.1 ,0.1, }={P_i}

Q5) a) Derive expression for error probability & BPSK. **[8]**

b) A source produces polar NRZL binary data at the rate of 100 kbps. The source output is transmitted using two modulation schemes BPSK and QPSK. Assuming that the bandwidth of the above binary data pulses is 100 KH_2, calculate Bandwidth requirements of. **[8]**

i) BPSK ii) QPSK

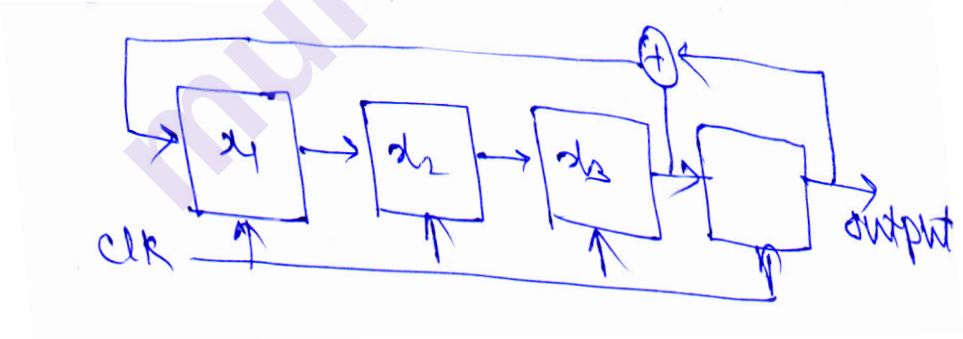
OR

Q6) a) With the help of suitable block explain QPSK modulation scheme. **[8]**

b) Draw block diagram and write working OFDM. Transmitter and receiver. **[8]**

Q7) a) Explain in detail working of FH-SS system. **[10]**

b) Obtain the PN sequence for given LFSR. **[8]**



Q8) a) Compare and comment on performance of slotted CSMA over CSMA/CD. **[10]**

b) Draw and explain the block-diagram of DS-SS transmitter and receiver. **[8]**

Total No. of Questions : 8]

SEAT No. :

P3494

[Total No. of Pages : 2

[5560]-143
T.E. (Electronics Engineering)
MICRO CONTROLLER AND APPLICATIONS
(2012 Pattern) (Semester-I) (304203)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Answer the Q1 or Q2, and Q3 or Q4, and Q5 or Q6, and Q7 or Q8.***
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) Describe in detail Assembler, Compiler, Simulator and debugger. List software used for 8051. **[8]**

b) How the priorities of interrupts can be changed in 8051 microcontroller? **[4]**

c) Draw and explain port structure of PIC18FXXX microcontroller. **[8]**

OR

Q2) a) Differentiate microprocessor & microcontroller with example. **[6]**

b) Explain the memory organization of 8051 microcontroller. **[8]**

c) Explain the role of configuration bits in PIC18FXXX controller. **[6]**

Q3) a) Write a program to generate a square wave of 50Hz frequency on pin PORTB.0. Use Timer 0 in 16-bit mode, with pre-scaler = 128.

Assume XTAL = 10 MHz **[8]**

b) Draw & explain interrupt structure of PIC18FXXX Microcontroller. **[8]**

OR

P.T.O.

Q4) a) Draw an interfacing diagram of 16×2 LCD with PIC18FXXX and write Embedded C program for displaying 'HELLO' message on second line of LCD. **[8]**

b) Write Embedded C code to get a byte of data from PORTC. If it is less than 100 send it to PORTB otherwise send it to PORTD. **[8]**

Q5) a) Write Embedded C code to transmit "SPPU" serially to PC at 9600 baud rate. Assume XTAL = 10MHz **[8]**

b) Explain SPI protocol with timing diagram. Compare it with 12C protocol. **[8]**

OR

Q6) a) Draw and explain interfacing of RTC with PIC18FXXX. Also write Embedded C code to update Date. **[8]**

b) Write Embedded C code for reading single analog input (range 0 to 5V) and display it on LCD. **[8]**

Q7) a) Design a voltmeter to display range between 0v to 100v using internal ADC of PIC18FXXX. Display voltage on LCD. **[8]**

b) Draw the interfacing of DC motor to PIC18 using PWM and write a Embedded C code for 50% duty cycle if switch is open, 25% duty cycle if switch is closed. **[10]**

OR

Q8) a) Design a frequency counter using PIC18FXXX for following specifications. Frequency range DC to 5MHz. Design and draw interfacing circuit. **[10]**

b) Draw and explain data acquisition system in detail. **[8]**

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Total No. of Questions : 10]

SEAT No. :

P3495

[Total No. of Pages : 3

[5560]-144
T.E. (Electronics)
ELECTROMAGNETIC & WAVE PROPAGATION
(2012 Pattern) (Semester - I) (304204)

Time : 3 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) ***Figures to right indicate full marks.***
3) ***Use of electronic pocket calculator is allowed.***
4) ***Assume and mention suitable data if necessary.***

Q1) a) Derive an expression for an electric field due to infinite line charge density ρ_l c/m along z axis at a point on y-axis located at distance 'd' from z-axis. **[5]**

b) Volume charge density is given by $\rho_v = 10\ e^{-100r}\ e^{-100z}$ c/m^3 **[5]**

Find, i) Value of ρ_v in the region $0 < 1 < 0.01$ m, $0 < \phi < 2\ \pi$ and $0 < z < 0.01$ m.

ii) Find the total charge contained in the first octant where *x, y, z* are positive.

OR

Q2) a) Derive Boundary condition at an interface between free space and conductor. **[4]**

b) Find the incremental field strength at p_2 due to current element of $2\pi \hat{a}_z$ μA.m at p_1. The co-ordinates of p_1 and p_2 are (4, 0, 0) and (0, 3, 0) respectively. **[6]**

Q3) a) Derive the expression for capacitance of parallel plate capacitor using Laplace's equation. **[4]**

b) Derive Maxwell's equation in point form for time varying field. **[6]**

OR

P.T.O.

Q4) a) Determine value of 'k' such that following pairs of fields satisfy Maxwell's equations in the region were $\rho_v = 0$ and $\sigma = 0$. **[6]**

i) $\bar{E} = [kx - 100t]\hat{a}_y$ V/m

$\bar{H} = [x + 20t]\hat{a}_z$ where $\mu = 0.25$ H/m

$\varepsilon = 0.01$ F/m

ii) $\bar{D} = 5x\,\hat{a}_x - 2y\,\hat{a}_y + 12z\,\hat{a}_z\ \mu c/m^2$

$\bar{B} = 2\hat{a}_y m\text{T}$

$\mu = \mu_0\ \varepsilon = \varepsilon_0$

b) Explain displacement current and derive an expression for displacement current density. **[4]**

Q5) a) State poynting theorem. What is its significance. Derive an expression for poynting vector $\bar{p}$. **[8]**

b) Find the value of k so that following pair of fields satisfy Maxwell's equations in region where $\sigma = 0$ and $\rho_v = 0$ **[8]**

$\bar{E} = \left[60\sin 10^6 t\ \sin 0.01z\right]\hat{a}_x$ V/m

$\bar{H} = \left[0.6\cos 10^6 t\ \cos 0.01z\right]\hat{a}_y$ A/m

$\mu = k,\ \varepsilon = C_1$

OR

Q6) a) State and explain Faraday's law for induced emf. **[6]**

b) Show that $\nabla \cdot \bar{J} = -\frac{\partial \rho_v}{\partial t}$ **[4]**

Where $\bar{J}$ = conduction current density A/m^2

ρ_v = Volume charge density c/m^2

c) Given $\varepsilon_r = \mu_r = 1$ and $\sigma = 0$ also **[6]**

$\bar{A} = \left[10^{-3} y\cos 3\times10^8 t\cos z\right]\hat{a}_z$ Wb/m

$V = 3\times10^5 y\sin 3\times10^8 t\sin z$ volts

Find $\bar{E}$ and $\bar{H}$

Q7) a) Explain the concept of uniform plane wave. Also explain the terms: Propagation constant, attenuation constant, phase constant in relation with uniform plane wave in free space. **[8]**

b) A lossy dielectric has $\mu_r = 1$, $\varepsilon_r = 12$ and $\sigma = 20$m $\mho/m$ at 1MHz frequency. Find attenuation constant, phase constant, velocity and intrinsic impedance if the uniform plane wave is travelling through this medium. **[8]**

OR

Q8) a) What is polarization. Explain different types of polarization of uniform plane wave. **[8]**

b) A wave propagation in losseless dielectric has $\bar{E} = 500\cos\left(10^7 t - \beta z\right)\hat{a}_x$ V/m and $\bar{H} = 1.1\cos\left(10^7 t - \beta z\right)\hat{a}_y$ A/m Components. If wave velocity is 0.5 times the velocity in tree space then find, **[8]**

i) Relative permittivity.

ii) Relative permeability.

iii) Phase constant.

iv) Wavelength.

Q9) a) Explain the fundamental equations for free space propagation and Friis Transmission equation. **[8]**

b) Explain : **[10]**

i) Ground wave propagation.

ii) Sky wave propagation.

iii) Space wave propagation.

Explain the effect of Earths's curvature on propagation.

OR

Q10)a) Explain the following terms: **[8]**

i) Skip distance.

ii) Virtual height.

iii) Critical frequency.

iv) MUF.

b) Explain in detail the characteristics of wireless channel. **[10]**

⌘⌘⌘

Total No. of Questions : 8]

SEAT No. :

P3496

[Total No. of Pages : 4

[5560]-145
T.E. (Electronics Engg.)
NETWORK SYNTHESIS
(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.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of electronic pocket calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) List properties of positive real function and test whether the following function is positive real function,

$$Z(s) = \frac{s^2 + 2s + 25}{s^2 + 5s + 16}$$ **[6]**

b) Synthesize the following function using Foster-I and Cauer-I form,

$$Z(s) = \frac{s^4 + 5s^2 + 4}{s^3 + 3s}$$ **[6]**

c) State the properties of Transfer function and synthesize the following Transfer function $Z_{21}(s) = \frac{2}{s^3 + 3s^2 + 4s + 2}$ as a 1 Ω terminated two port LC ladder network. **[8]**

OR

Q2) a) Test the following polynomials for the Hurwitz property.

i) $s^4+s^3+2s^2+2s+2$

ii) $s^6+s^4+s^2+s+1$ **[6]**

b) State and explain the properties of LC driving point impedance function and also indicate which of the following functions are LC, RC, RL or RLC functions.

P.T.O.

i) $Z(s) = \dfrac{s^3 + 2s}{s^4 + 4s^2 + 3}$

ii) $Z(s) = \dfrac{s^2 + 4s + 3}{s^2 + 6s + 8}$

iii) $Z(s) = \dfrac{s^4 + 5s^2 + 6}{s^3 + s}$ **[7]**

c) Synthesize the following voltage transfer function as a constant resistance lattice terminated in a 1Ω resistor.

$$\frac{V_o}{V_i} = \frac{(s^2 - s + 1)(s - 1)}{(s^2 + s + 1)(s - 1)}$$ **[7]**

Q3) a) Compare Butterworth and Chebyshev Approximation Techniques. **[4]**

b) Determine the transfer function and realize low pass Butterworth approximation filter whose requirements are characterized by,

Pass band edge frequency 0.2 Mrad/sec, maximum loss in pass band 2dB, Stop band loss at least 60 dB at 6 Mrad/sec **[8]**

c) Normalized third order Low pass filter is shown below in Fig.1 **[4]**

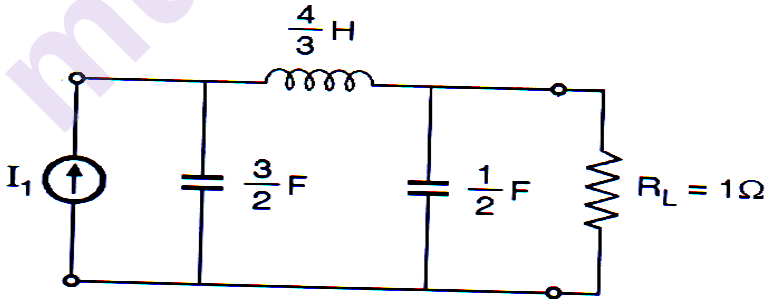


Figure 1

Design the corresponding low pass filter with its cutoff frequency $\omega_c = 10^4$ rad/sec and the impedance load of 500Ω .

OR

Q4) a) Explain frequency and impedance Scaling with suitable example. **[6]**

b) State the properties of Butterworth Approximation. **[4]**

c) Determine the transfer function of Chebyshev low pass filter to meet the following specification, **[6]**

i) 0.5 dB ripple in the pass band.

ii) Cut off frequency $\omega_c = 5\times10^5$ rad/sec.

iii) The magnitude must be down to 30 dB at $\omega = 1.5\times10^6$ rad/sec.

iv) $R_L = 600\,\Omega$

Q5) a) Differentiate between Passive and Active filters. **[4]**

b) Synthesize 2nd order active low pass filter to have a pole frequency of 2 kHz and pole Q of 10. Then using RC-CR transformation, realize HPF with same cut off frequency. **[6]**

c) What are the Advantages and Disadvantages of Active filter. **[6]**

OR

Q6) a) Explain with suitable example the coefficient matching techniques for obtaining element values. **[6]**

b) Explain the different feedback topologies used in active filter designing. **[4]**

c) Synthesize the following high pass filter function using RC-CR transformation. $H(s) = \dfrac{ks^3}{s^2+s+36}$ **[6]**

Q7) a) Define Sensitivity? Give some of its important properties. **[4]**

b) Explain the concept of gain sensitivity? Also explain the various factors affecting the gain sensitivity. **[6]**

c) Explain effect of the following op-amp characteristics on the active filter. **[8]**

i) Input offset voltage

ii) Dynamic range.

iii) Slew rate.

iv) CMRR

OR

Q8) a) For the series RLC circuit shown in Fig.2, find transfer function. Calculate the sensitivities of K, the resonant frequency ω_p, the quality factor (Q_p) with respect to R, L and C. Comment on the result obtained. **[6]**

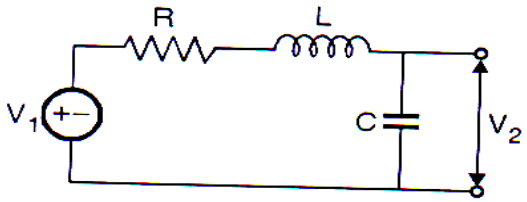


Figure 2

b) Prove the following sensitivity relationships **[6]**

i) $S_{x^2}^{p} = \frac{1}{2} S_x^p$

ii) $S_{\sqrt{x}}^{p} = 2\, S_x^p$

iii) $S_x^p = S_y^p\, S_x^y$

c) The op-amp used in the inverter circuit has $R_1 = 10k\Omega$ and $R_f = 100k\Omega$. It has input bias current 500nA and an input offset current that can range $\pm$ 100 nA. Find resulting output offset voltage. **[6]**

Total No. of Questions : 8]

SEAT No. :

P3497

[Total No. of Pages : 2

[5560]-146

T.E. (Electronics Engineering)

INSTRUMENTATION SYSTEMS

(2012 Course) (Semester-II) (304209)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Draw and explain the functional block diagram of measuring instrument system. **[6]**

b) Explain the principle and working of optical proximity sensors. **[6]**

c) List various differential head type flow meters and explain the working of orifice tube. **[8]**

OR

Q2) a) Explain the concept of following with one example each: **[6]**

i) Accuracy

ii) Precision

b) Sketch and explain the working the of optical encoder. **[6]**

c) Draw the diagram of transit time ultrasonic flow meter and explain its working for single transmitter receiver pair. **[8]**

Q3) a) Draw and explain the block diagram of LM 75. **[8]**

b) Explain the principle and working of Hall effect sensor, with the help of its diagram. **[8]**

OR

P.T.O.

Q4) a) Explain the sensor fabrication by surface micromachining. **[8]**

b) Explain the working of piezoelectric sensors. **[8]**

Q5) Draw the schematic of IEEE 488 bus. Explain various types of devices connected to it, structure of the bus, function of different lines on the bus. **[18]**

OR

Q6) a) Draw the circuit diagram of current to voltage converter. Explain its working and design the circuit for converting 0-20 mA into 0-5 V. **[10]**

b) What is HART protocol? Explain principle of HART technology in detail. **[8]**

Q7) a) Explain the principle of hydraulic actuator with the help of neat diagram. **[6]**

b) Draw the diagram of check valve and poppet valve and explain their operation in brief. **[10]**

OR

Q8) a) List the types of stepper motor and explain any one application where stepper motor is used as an actuator. **[8]**

b) Explain with neat diagram, the control of single acting cylinder. **[8]**

Total No. of Questions : 10]

SEAT No. :

P3498

[Total No. of Pages : 3

[5560]-147

T. E. (Electronics)

Discrete Time Signal Processing

(2012 Course) (Semester - II) (304210)

Time :2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

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

Q1) a) Define sampling theorem. Explain the aliasing effect. **[4]**

b) Perform circular convolution of following two sequences. Using DFT-IDFT method. $x_1(n)=\{1\,1\,1\,1\}$ $x_2(n)=\{1\,2\,3\,4\}$ **[6]**

OR

Q2) a) An analog signal is represented as $x(t)=5\cos 2\pi\ 2000t+\cos 2\pi\ 5000t$ **[4]**

i) What is Nyquist rate of the signal.

ii) If the signal is sampled with a sampling frequency of 8KHz, what is the folding frequency?

iii) Write the equation of sampled signal of (ii).

b) Compute 4- point DFT using DIT-FFT algorithm. $x(n)=\{1\ -1\ 1\ -1\}$. **[6]**

Q3) a) State and prove the following properties of Z- Transform. **[6]**

i) Convolution of two sequences in time domain.

ii) Differentiation in Z-domain.

b) A causal discrete time system is described by **[4]**

$$y(n)=\frac{3}{4}y(n-1)+\frac{1}{8}y(n-2)=x(n)$$

i) Determine the system function.

ii) Compute the impulse response of the system.

OR

P.T.O.

Q4) a) Explain advantages of digital signal processing over analog signal processing. **[4]**

b) Compute the inverse Z-transform of **[6]**

i) $x(z) = \dfrac{z^2}{(z-1)(z-0.2)}$

ii) $x(z) = \dfrac{z^{-1}}{1-3z^{-1}} \quad ROC\,|z| < 3$

Q5) a) Compare FIR and IIR filter. **[8]**

b) Design a low pass filter of length 11, with a frequency response : **[9]**

$$H_d\left(e^{jw}\right) = 1 \qquad -\frac{\pi}{2} \le w \le \frac{\pi}{2}$$

$$= 0 \qquad \frac{\pi}{2} \le |w| < \pi$$

OR

Q6) a) Using frequency sampling method, design a band pass filter with following specifications **[9]**

F_s = 8000 Hz

Fc_1 = 1000 Hz

Fc_2 = 3000 Hz

Determine filter coefficients. Take N = 7

b) Explain the need of window functions in design of FIR filter. Also explain advantages and disadvantages of window function. **[8]**

Q7) a) Explain impulse invariance transformation. What is its drawback? How it is overcome through bilinear transformation? Explain the concept of frequency warping? **[9]**

b) Determine direct form I and direct form II realization for following system. **[8]**

$$y(n) = -0.1y(n-1) + 0.72y(n-2) + 0.7x(n) - 0.252x(n-2)$$

OR

Q8) a) Design a single pole low pass digital filter with a 3dB bandwidth of 0.2π, using bilinear transformation applied to analog filter.

$H(S) = \frac{\Omega_c}{S + \Omega_c}$ where Ω_c is 3dB bandwidth. **[6]**

b) A digital low pass filter is to be designed using Butter worth approximation using bilinear transformation. Find order and cut-off frequency for : **[4]**

Ripple in passband : 1dB

Ripple in stopband : 15dB

Passband edge frequency : 0.2 π

Stopband edge frequency : 0.3 π

c) Realize the following second order system in direct form I & direct form II. **[7]**

$$y(n) = 2r\cos\omega\, y(n-1) - r^2 y(n-2) + x(n) - r\cos\omega\, x(n-1)$$

Q9) a) Explain the role of antiimaging filter in interpolation. **[4]**

b) An audio signal is to be decimated by a factor of 30. Design a 2-stage decimator with factors 15 & 2, that satisfy following specifications. **[6]**

Sampling frequency : 240 KHz

Highest frequency of interest : 3.4 KHz

δ_p : 0.05

δ_s : 0.01

c) Explain the process of sampling rate conversion by a non-integer factor. **[6]**

OR

Q10)a) Draw the architecture of TMS320C28X processor and explain salient features. **[7]**

b) Write notes on : **[9]**

i) Multiply and Accumulate unit

ii) Pipelining

iii) Barrel Shifter

* * *

Total No. of Questions : 8]

SEAT No. :

P3499

[Total No. of Pages : 2

[5560]-148
T.E. (Electronics Engineering)
EMBEDDED PROCESSORS
(2012 Course) (Semester - II) (304211)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 and Q7 or Q8.***
2) ***Figures to the right side indicate full marks.***
3) ***Assume suitable data, if necessary.***

Q1) a) Explain the need of pin connect block in LPC 2148. Explain in detail functions of pin connect block registers. **[6]**

b) List the features of UART 0 of LPC 2148. Explain with block diagram UART 0 of LPC 2148. **[6]**

c) Explain the following instructions of ARM 7. **[8]**

i) MRS R0, CPSR

ii) TEQ R1, #09

iii) LDR R0, [R1, LSL #02]

iv) UMULL R1, R4, R2, R3

OR

Q2) a) Explain CPSR of ARM 7 in detail and also state the functions of Program Counter and Stack Pointer of ARM7. **[6]**

b) Write an embedded C program to generate saw tooth (Ramp), triangular and square wave using on chip DAC of LPC 2148. **[6]**

c) Explain PLL 0 and PLL 1 and VPB driver of LPC 2148. Explain PLL programming by using suitable examples. **[8]**

Q3) a) Describe the need of operating system in developing complex applications in embedded system design. Explain desired features of operating system & hardware support from processor. **[8]**

b) Draw and explain block diagram of ARM Cortex M3, Compare ARM Cortex M3 with ARM 7 TDMI. **[8]**

OR

Q4) a) What are the features of ARM Cortex processors? Explain different operating modes of CORTEX M3 with the help of state diagram. **[8]**

P.T.O.

b) What are the improvements of ARM Cortex over classical series ARM controllers? Explain how ARM Cortex are advantages in Embedded system design. **[8]**

Q5) a) What is PWM? Draw DC motor interfacing diagram with LPC 1768. Write an embedded C program for PWM to derive DC motor with LPC 1768. **[8]**

b) What do you mean by Sleep mode, Deep Sleep mode, Power-down mode and Deep Power-down mode related with LPC 1768? **[8]**

OR

Q6) a) Draw the block diagram of LPC 1768 and explain the function of each block in brief. **[8]**

b) Explain in detail the NVIC of LPC 1768. What is difference between NVIC and VIC? **[8]**

Q7) a) What is Global self-test and Local self-test in CAN controller? Explain function of CAN command register and CAN mode regiter. **[10]**

b) What features of USB make it popular as compared to other serial buses? Explain different types of frames of USB bus. **[8]**

OR

Q8) Write short note on the following (any three) **[18]**

a) USB

b) CAN

c) Role of DMA engine function in Ethernet.

d) Structure of Ethernet packet.

■ ■ ■

Total No. of Questions : 8]

SEAT No. :

P3500

[Total No. of Pages : 2

[5560]-149
T.E. (Electronics)
POWER ELECTRONICS & APPLICATIONS
(2012 Course) (304212)

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 necessry.***

Q1) a) Compare **[6]**

i) 1-∅ Semi converter and Full converter for RL-load.

ii) Feedback diode and Freewheeling diode

b) Define Inverter? With neat circuit diagram and waveforms, explain 3∅ full bridge inverter with R-load for 180° conduction mode. **[8]**

c) The step-down chopper with resistive load of R=10Ω and i/p voltage 220V. When the chopper is on, its voltage drop is 2v and chopping frequency is 1kHz. If duty cycle is 50%. **[6]**

Determine :

i) Average output voltage

ii) RMS output voltage

iii) Chopping efficiency

OR

Q2) a) Derive an expression for average o/p voltage and rms o/p voltage for 1-∅ semi converter with R-load? **[6]**

b) With the help of circuit diagram & waveforms, explain the operation of single phase full wave AC voltage controller for R-load using SCRs. **[8]**

c) What are different control techniques used for DC choppers? Explain in detail? **[6]**

P.T.O.

Q3) a) Define power quality. State various power line disturbances and their sources. **[8]**

b) With the help of circuit diagram and waveforms, explain the operation of SLR dc-dc converter. **[8]**

OR

Q4) a) What are the different needs for Resonant converters? Explain in detail? **[4]**

b) Write a short note on Resonant Switches used in Resonant converters. **[6]**

c) Give the comparison between ZCS and ZVS in detail. **[6]**

Q5) a) With the help of neat diagram, application of Stand-alone PV System? **[6]**

b) Write a note on : Grid connected PV System. **[8]**

c) Explain different types of generators used for variable speed wind turbines? **[4]**

OR

Q6) a) What is mean by MPPT? Explain in detail. **[8]**

b) Write a note on solar cell in detail. **[6]**

c) Explain different types of inverters used in stand-alone PV System? **[4]**

Q7) a) With the help of block diagram, Explain the operation of Electronic Ballast? **[8]**

b) Write a short note on : "Power Electronics used in Capacitor Charging Application". **[8]**

OR

Q8) a) Write a short note on : UPS. **[8]**

b) Draw and explain the block diagram of HVDC transmission system? **[8]**

Total No. of Questions : 8]

SEAT No. :

P3501

[Total No. of Pages : 2

[5560]-150
T.E. (Electronics Engineering)
INDUSTRIAL MANAGEMENT
(2012 Pattern)

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 electronic pocket calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) Distinguish between Traditional organization and Modern organization. **[8]**

b) Explain the importance of ISO 9001:2008 standards in detail with suitable examples on application of this standard. **[8]**

c) Define Juran's and Demings view of quality. **[4]**

OR

Q2) a) Write a note on Project network analysis. **[8]**

b) State the roles of Security and Exchange board of India. **[8]**

c) Explain Project Management. State the differences between CPM and PERT. **[4]**

Q3) a) Elaborate Capital Structure, Fixed & working capital, capital budgeting and Techniques of capital budgeting. **[8]**

b) Write a note on Cost-Benefit analysis and CVP graph **[8]**

OR

Q4) a) Discuss a case study on recent trends in Human Resource development. **[8]**

b) Elaborate challenges to HR professionals in terms of Role, Responsibilities and competencies. **[8]**

P.T.O.

Q5) a) Discuss the strategic importance of HRM. **[8]**

b) Explain the "Business - Re-engineering". **[8]**

OR

Q6) a) What is e-commerce Explain with suitable example. **[8]**

b) With suitable example elaborate the philosophy of 8 business process. **[8]**

Q7) a) Write a note on Woman enterprises. **[8]**

b) Definition of MIS, Need, Purpose and Objectives. **[10]**

OR

Q8) a) Explain the importance of studying information system **[8]**

b) Write a note on each **[10]**

Overview of ERP

B2B

B2C

C2B

C2C

Total No. of Questions : 10]

SEAT No. :

P3503

[Total No. of Pages : 4

[5560]-152
T.E. (E & TC)
DIGITAL SIGNAL PROCESSING
(2012 Course) (304182)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer all questions.***
2) ***Figures to the right indicate full marks.***

Q1) a) Draw the spectrum for three Nyquist cases of sampling as

i) $f_s > 2\ f_{max}$

ii) $f_{max} < f_s < 2\ f_{max}$

iii) $f_s < f_{max}$

with respect of frequency axis. **[6]**

b) i) Write analysis and synthesis equations for DTFT. Write down its basis function.

ii) What is orthogonality? Write its application.

[4]

OR

Q2) a) Calculate 4-point DFT using DIT-FFT algorithm for $x(n)=2^{(2n)}$ **[6]**

b) Find $X(5), X(6), \& X(7)$ for given 8-point DFT,

X(k) = {20, –5.82 –2.41j, 0, –0.17 –0.41j, 0, ___, ___, ___,}

Which property did you use for writing remaining three values? **[4]**

Q3) a) Draw the ROC for

i) Stable & causal

ii) Stable & non-causal

iii) Unstable & causal

IIR systems. **[6]**

b) Write any two properties of DFT along with their mathematical equations. **[4]**

OR

P.T.O.

Q4) a) Determine the system function H(Z) of

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

Show poles & zeros in Z-plane. **[6]**

b) Calculate Z-transform of

$x(n)=\left(\frac{1}{4}\right)^{(n-1)}$. Draw ROC. **[4]**

Q5) a) i) Convert the analog filter with system function,

$$\mathrm{Ha(S)}=\frac{\mathrm{S}+0.1}{(\mathrm{S}+0.1)^2+16}$$

into a digital IIR filter by means of the Bilinear Transformation. The digital filter is to have a resonant frequency of $\mathrm{Wr}=\pi/2$.

ii) Implement this filter using Direct form - II structure. **[8]**

b) Draw the labelled magnitude response for

i) Butterworth LPF

ii) Chebyshev Type I & Type II LPF

Show f_p, f_c, f_s in the diagram. **[8]**

OR

Q6) a) i) Write the substitutions for 'S' for

1) Approximation of derivatives

2) Impulse Invariance

3) Bilinear Transformations

to convert the analog TF to digital TF (transfer function)

ii) State one advantage & one limitation of Impulse Invariance Method. **[8]**

b) Realize the

i) Cascade &

ii) Parallel form

structure for the given TF :

$$H(Z)=\frac{\left(1-\frac{1}{2}Z^{-1}\right)}{\left(1-\frac{1}{4}Z^{-1}\right)\left(1+\frac{1}{4}Z^{-1}\right)}$$ **[8]**

Q7) a) Determine a Direct form realization for the following linear phase filters

i) h(n) = {1, 2, 3, 4, 3, 2, 1}

ii) h(n) = {1, 2, 3, 3, 2, 1} **[8]**

b) Write expressions for

i) Phase delay

ii) Group delay

iii) Linearity condition for symmetrical & antisymmetrical FIR systems.

[8]

Draw

i) Symmetric and

ii) Asymmetric impulse responses

OR

Q8) a) i) What are the possible types of impulse response for linear phase FIR filters?

ii) The frequency response of a digital filter is

$$H\left(e^{jw}\right)=\left(0.4+0.7\cos 2w-0.5\cos 4w\right).e^{-j(0.3\pi+4w)}$$

Determine the phase delay and group delay. **[8]**

b) Design a linear phase FIR low pass filter using rectangular window by taking 7 samples of window sequence, and with a cut-off frequency, $W_c = 0.2\pi$ rad/sample.

Implement the above designed FIR LPF using linear phase structure.

[8]

Q9) a) i) Draw block schematic for

1) Decimation
2) Interpolation

ii) Consider the discrete time signal,

$x(n) = \{1,2,3,4,5,6,7,8,9,10\}$

Determine the result of the signal when

1) D = 2 &
2) I = 3
3) I = 2

[9]

b) Discuss:

i) DMA
ii) MAC and
iii) VLIW architecture

[9]

OR

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

i) Music signal processing
ii) Image processing
iii) Radar signal processing

■ ■ ■

Total No. of Questions : 8]

SEAT No. :

P4789

[Total No. of Pages : 2

[5560]-153

T.E. (E&TC)

MICROCONTROLLERS AND APPLICATIONS

(2012 Pattern) (Semester - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Compare Microcontroller family and explain the limitations of 8-Bit Microcontroller. **[6]**

b) Explain the operational diagram of Timer/Counter of 8051 in detail. **[7]**

c) State features of PIC and draw the block diagram of PIC 18F. **[7]**

OR

Q2) a) Compare the RS232 and RS 485 communication protocol. **[6]**

b) Explain the different addressing modes with examples of 8051. **[7]**

c) Draw and explain the Data memory organization of PIC 18F. **[7]**

Q3) a) Draw and explain the Timer 0, 8bit operation in details. **[8]**

b) Draw an interfacing diagram of LED connected to Port C and write and embedded C program for flashing alternately. **[8]**

OR

Q4) a) Draw an interfacing diagram to display the Uni-PUNE on LCD, also write C program. **[8]**

b) Write a program for 2.5 KHz and 75 % duty cycle PWM generation with N = 4. Fosc = 10MHz. **[8]**

P.T.O.

Q5) a) Draw and explain the SPI mode of MSSP structure in detail. **[8]**

b) State four important features of RTC and draw an interfacing diagram with PIC 18F. **[8]**

OR

Q6) a) Draw and explain the Transmitter block diagram of UART in detail. **[8]**

b) Explain the internal block diagram of ADC in PIC and explain the conversion steps. **[8]**

Q7) a) Design a PIC test board using LED, keypad, buzzer and relay connected to ports with control using keys and draw a flowchart for testing with S1 pressed LED ON and S2 pressed relay and buzzer ON. **[8]**

b) Explain with flowchart and algorithm design of DMM using PIC18F. **[10]**

OR

Q8) a) State features of DAS, Draw and explain generalized block diagram of DAS. **[8]**

b) Design a frequency counter with display on LCD using PIC18F, make provision of Alarm if exceed the set count. **[10]**

❖❖❖❖

Total No. of Questions : 8]

SEAT No. :

P3504

[Total No. of Pages : 2

[5560]-154

T.E. (Electronics and Telecommunication)
ELECTROMAGNETIC AND TRANSMISSION LINES
(2012 Course) (Semester-I) (304181)

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) Derive the expression for electric field intensity $\vec{E}$ for infinite sheet of charge. **[8]**

b) Find the current crossing the portion of y = 0 plane defined by $-0.1 \leq x \leq 0.1$ m and $-0.002 \leq z \leq 0.002$m if $\vec{J} = 10^2 |x| \widehat{ay}$ where $\vec{J}$ is the current density. **[6]**

c) State and explain Biot-Savart law. **[6]**

OR

Q2) a) Derive boundary condition between conductor and free space. **[8]**

b) A point charge of 5 nC is located at the origin.If V=2 V at (0,6,-8), Find **[6]**

i) The potential at A (-3, 2, 6)

ii) The potential at B (1, 5, 7)

ii) Potential difference V_{AB}

c) State and prove Stoke's theorem **[6]**

Q3) a) What is poynting theorem? What is its significance? Derive the equation for poynting Theorem. **[10]**

b) Calculate the displacement current through parallel plate air filled capacitor having plates of area 10 cm^2 separated by a distance 2 mm connected to 300V, 1 MHz. **[8]**

OR

P.T.O.

Q4) a) What do you mean by uniform plane wave? Obtain equation of wave travelling in free space in terms of $\vec{E}$. **[10]**

b) In free space, $\vec{E}$ = 50 cos (ωt-βz) $\hat{a}_x$ V/m. Find the average power crossing a circular area of radius 2.5 m in the plane z=0. Assume Em=Hm.η0 and η0 = 120Π Ω. **[8]**

Q5) a) State primary and secondary constant of transmission line & hence derive relationship between primary & secondary constant of transmission line. **[8]**

b) The characteristics impedance of uniform transmission line is 2040 Ω at a frequency of 800 Hz. At this frequency, the propagation constant is 0.054/-87.9°. Find the values of R, L, G and C. **[8]**

OR

Q6) a) Derive the expression of characteristics impedance and propagation constant in terms of primary constant of transmission line. **[8]**

b) A transmission line has series inductance of 0.56 mH and capacitance of 0.1 μF per km. IF the losses due to conductor resistance and insulation leakage are negligible, calculate , **[8]**

i) Characteristics impedance

ii) Phase velocity.

Q7) a) What do you mean by single stub matching on a line and derive the equation of single stub along the line. **[8]**

b) Design a quarter wave transformer to match a load of 200 Ω to a source resistance of 500 Ω at operating frequency of 200 MHz. **[8]**

OR

Q8) a) Explain the phenomena of reflection of transmission line and hence define reflection coefficient. **[8]**

b) Write and explain any 4 properties of smith chart. **[8]**

Total No. of Questions :8]

SEAT No. :

P3505

[Total No. of Pages :2

[5560]-155

T. E. (E& TC)

SYSTEM PROGRAMMING AND OPERATING SYSTEM

(2012 Pattern) (304185)

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

Instructions to the candidates:

1) ***Attempt Q.No1or Q.No2, Q.No.3 or Q.No.4, Q.No.5 or Q.No.6. Q.No.7 or Q.No.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
3) ***Assume suitable data, if necessary.***

Q1) a) Describe the language processor in detail with various language processing activities. **[7]**

b) Explain different assembly language statements with examples. **[7]**

c) Explain the need for a lexical analyzer with examples. Explain how it works. **[6]**

OR

Q2) a) Explain scanning and parsing. **[7]**

b) List down components of programming environments. Explain any two components in detail. **[7]**

c) Explain with example MACRO processor to handle nested macro definitions. **[6]**

Q3) a) Draw and explain Many to One , One to One and Many to Many multithreading models. **[6]**

b) Explain pre-emptive and non-pre-emptive scheduling with examples. **[6]**

c) Explain Round Robin Scheduling algorithm with an example. **[6]**

OR

P.T.O.

Q4) a) Draw and explain process control block. **[6]**

b) What is swapping? Does swapping increase the operating systems overheads? **[6]**

c) Explain the classical IPC dining philosopher's problem with solution. **[6]**

Q5) a) Explain contiguous and non-contiguous memory allocations. **[6]**

b) Explain the term paging. State the constraints which decide the page size. **[6]**

c) What are the advantages and disadvantages of segmentation? **[4]**

OR

Q6) a) Explain the differences between :

i) Logical and physical address space

ii) Paging and segmentation **[6]**

b) Explain the following with example :

i) FIFO Page replacement algorithm.

ii) LRU Page replacement algorithm. **[6]**

c) What do you mean by page fault? How does the operating system handle page fault? **[4]**

Q7) a) Explain in brief Ext2 and Ext3 file systems of Linux. **[8]**

b) Explain how I/O devices communicate with CPU? What is the role of operating system to manage I/O devices? **[8]**

OR

Q8) a) What are different file operations and how the file is protected? **[8]**

b) What is disk scheduling? Explain different terms of disk scheduling. **[8]**

Total No. of Questions : 8]

SEAT No. :

P3506

[Total No. of Pages : 3

[5560]-156

T.E. (Electronics and Telecommunication Engineering)
INFORMATION THEORY AND CODING TECHNIQUES
(2012 Course) (Semester-II) (304189)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Obtain the coding efficiency of a Shannon Fano and Huffman code for a zero memory source that emits six messages (R, N, E, R, A, O, G) with probabilities of {0.19, 0.15, 0.02, 0.16, 0.4, 0.08} respectively. **[8]**

b) What is Run Length Encoding? Use RLE method of compression to compress the following data: 0000011110000111111. **[6]**

c) What is Mutual Information? State and prove any two properties of Mutual Information. **[6]**

OR

Q2) a) Write short notes on Hamming Code. **[4]**

b) The generator matrix for the (7, 4) linear block code is given below: **[8]**

$$\begin{bmatrix} 1 & 0 & 0 & 0 & 1 & 1 & 0 \\ 0 & 1 & 0 & 0 & 0 & 1 & 1 \\ 0 & 0 & 1 & 0 & 1 & 1 & 1 \\ 0 & 0 & 0 & 1 & 1 & 0 & 1 \end{bmatrix}$$

i) Find all the codewords and its minimum distance.

ii) If the received codeword is 0101011, check for the error and correct if any.

c) Construct a generator matrix for a systematic (7, 4) cyclic code using generator polynomial $g(X) = X^3 + X + 1$. Find syndrome for the received code word 1101100. **[8]**

P.T.O.

Q3) a) Find the generator polynomial for BCH code over GF (2^3) using primitive polynomial $p(x) = x^3 + x + 1$. The code should correct $t_c = 1, 2$ error. **[10]**

b) Explain the following terms with the help of equations: **[6]**

i) Primitive polynomial

ii) Minimal Polynomial

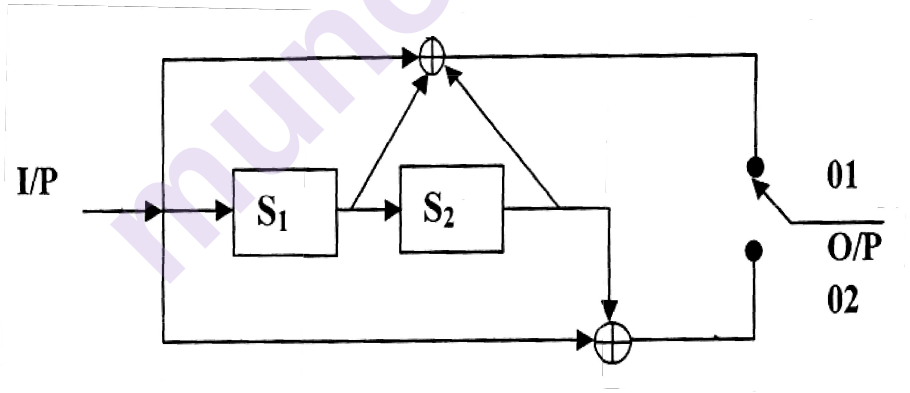
iii) Generator Polynomial

OR

Q4) a) Explain the encoding and decoding procedure for BCH codes. **[10]**

b) Differentiate between BCH and RS codes. **[6]**

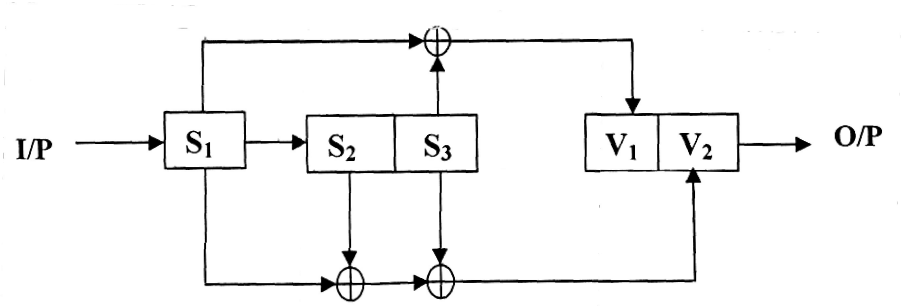
Q5) a) A convolution encoder has code rate = ½ constraint length K = 3 as shown in Figure below. Draw the state diagram and trellis diagram. Encode the sequence 10110. **[10]**



b) Explain Viterbi Decoding mechanism for convolutional codes with suitable example. **[8]**

OR

Q6) a) For the convolution encoder shown in figure below. Sketch the state diagrams, Code Tree and trellis diagram. Find the output data sequence 10101. **[12]**



b) Explain FEC and ARQ systems. **[6]**

Q7) a) What are the Ungerboek's TCM design rules. Explain asymptotic coding gain. **[8]**

b) Explain set partitioning for 8-PSK and 16-PSK system. **[8]**

OR

Q8) a) What are turbo codes? Explain necessity of Inter leaver in turbo codes? **[6]**

b) Explain Euclidean distance, Asymptotic coding gain of trellis coded Modulation. **[4]**

c) Discuss the importance of Trellis Coded Modulation with the block diagram of Communication System. **[6]**

Total No. of Questions : 8]

SEAT No. :

P3507

[Total No. of Pages : 2

[5560]-157
T.E. (E&TC)
ANTENNA AND WAVE PROPAGATION
(2012 Pattern) (Semester - II) (End Semester)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer any one questions out Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicates full marks.***
4) ***Assume suitable dat if necessary.***

Q1) a) Assume the medium is lossless with relative permeability $\mu r = 1$ and relative permittivity $\varepsilon r = 3.5$, wave of 700MHz is propagating through a material, which has maximum electric field intensity of 30V/m. Determine velocity of propagation, wavelength, and intrinsic impedance propagation constant. **[8]**

b) Explain the following terms with respect to the wireless channel propagation. **[6]**

i) Multipath

ii) Delay Spread

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 i) Critical frequency ii) Skip Distance. **[6]**

c) An antenna has a radiation resistance of 72Ω, a loss resistance of 12Ω and power gain of 15db; calculate the antenna efficiency and its directivity. **[8]**

Q3) a) Derive the equation for input impedance 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

P.T.O.

Q4) a) Hertzian dipole of length L = 2m operates at 2MHz, find radiation resistance if copper conductor has $\sigma = 57\times10^{6}$mho/m, $\mu r = 1$ and radius of 1mm. **[6]**

b) Give the comparison of far fields of small loop and short dipole. **[6]**

c) Write a short note on: monopole antenna. **[4]**

Q5) a) Calculate the null to null beam width and half power beam width in degrees if an array contains 100 isotropic radiators with an inter element spacing of 0.3λ. It is required to produce broadside beam. **[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) Determine the null to null beam width of endfire array when the array length is 15λ and number of elements are 25. **[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) Rhombic antenna

b) Lens antenna

c) Super turnstile antenna

OR

Q8) a) Explain the working of Micro strip antenna in detail. **[8]**

b) With the help of suitable diagram explain the operating principle of **[10]**

i) Antenna with parabolic reflector

ii) Slot antenna

Total No. of Questions : 10]

SEAT No. :

P3508

[Total No. of Pages : 2

[5560]-158
TE (E & TC)
EMBEDDED PROCESSOR
(2012 Pattern) (Semester - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Draw and explain ARM 7 data flow model. **[6]**

b) Explain IOSET and IOCLR Registers of LPC 2148. **[4]**

OR

Q2) a) Draw and explain memory map of LPC 2148. **[6]**

b) Draw and explain format of GPSR register of ARM 7. **[4]**

Q3) a) Draw interfacing diagram and write an embedded C program to flash 8 LEDs connected at P0.8 to P0.15 of LPC 2148. **[6]**

b) Explain SD card interfacing with LPC 2148. **[4]**

OR

Q4) a) Draw interfacing diagram and write an embedded 'C' program to display string 'SPPU' on 16*2 LCD. **[6]**

b) With the help of interfacing diagram explain GSM interfacing with LPC 2148. **[4]**

Q5) a) Compare ARM CORTEX A, CORTEX M, CORTEX R processors. **[8]**

b) Explain CMSIS standard of ARM. **[8]**

OR

P.T.O.

Q6) a) Explain registers used in CORTEX M3 processor. **[8]**

b) Explain thread and handler modes of Cortex M3. **[8]**

Q7) a) State feature of LPC 1768. **[8]**

b) Interface two 7 segment display to LPC 1768 and write a 'C' program to display digits '54' on them. **[8]**

OR

Q8) a) Draw & explain block diagram of LPC 1768. **[8]**

b) Interface RGB LED to LPC 1768 & Write a 'C' program to display red, blue and green colour with some delay. **[8]**

Q9) a) Explain USB communication. **[9]**

b) Explain PIN connects black of LPC 1768 & registers associated with this block. **[9]**

OR

Q10)a) Explain CAN protocol in details. **[9]**

b) Explain Ethernet based communication. **[9]**

■ ■ ■

Total No. of Questions : 8]

SEAT No. :

P3509

[Total No. of Pages : 2

[5560]-159
T.E. (E & TC)
INDUSTRIAL MANAGEMENT
(2012 Pattern) (Semester - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) A concern is manufacturing a product which is sold for Rs. 10.50 per unit and the fixed cost of assets is Rs. 50,000 with a variable cost of Rs. 6.50 per unit. How many units must be produced to break-even? How many units must be produced to earn profit of Rs. 10,000 ? What would be the profit for sales volume of 20,000 units? **[8]**

b) Why both fixed and working capital are important for setting up the business? Discuss various sources of these capital in detail. **[8]**

c) Sketch goalpost view of quality and explain. **[4]**

OR

Q2) a) Discuss Henri Fayol's Management principle in detail. **[8]**

b) What do you understand by quality of design, conformance and performance? Explain in detail. **[8]**

c) Distinguish between Program Evaluation and Review Technique and Critical Path Method. **[4]**

Q3) a) Discuss different functions of HRM in detail. **[9]**

b) Explain merits & demerits of partnership. **[8]**

OR

Q4) a) Explain the four stages of systematic approach to training. **[9]**

b) Explain different sources of Recruitments. **[8]**

P.T.O.

Q5) a) Write short notes on **[9]**

i) Joint stock

ii) Co-operative Society

b) Explain different forms of ownership. **[8]**

OR

Q6) a) Discuss various forms of organisation. Explain any one in detail. **[9]**

b) Define Sole Proprietorship. Give its applications. Also explain merits and demerits of it. **[8]**

Q7) a) What is MIS? Explain its purpose and objectives with suitable example. **[8]**

b) What is information system? Differentiate between information system and MIS. **[8]**

OR

Q8) a) Explain decision making models and types of decisions. How DSS differ with MIS? **[8]**

b) Explain "Business process re- engineering". **[8]**

Total No. of Questions : 8]

SEAT No. :

P3510

[Total No. of Pages : 2

[5560]-160
T.E. (E&TC Engineering)
POWER ELECTRONICS
(2012 Pattern) (Semester - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams and waveforms must be drawn wherever necessary.***
3) ***Use of non-programmable calculator is allowed.***
4) ***Assume suitable data if necessary.***

Q1) a) Draw the steady-state characteristic of SCR and explain all regions. **[6]**

b) Draw the circuit diagram of single phase Full converter with R load. Explain the circuit operation with neat equivalent circuit diagrams. Sketch the neat waveform for output voltage at firing angle 90º. **[7]**

c) Draw the circuit diagram of single phase Full Bridge Inverter with R load. Explain the circuit operation with neat equivalent diagrams. Also, sketch the waveform for output voltage. **[7]**

OR

Q2) a) Draw the circuit diagram of synchronized UJT triggering circuit for SCR. Sketch the waveforms of voltage across zener, capacitor and base voltage. Show firing angle α in waveforms. **[6]**

b) Draw and explain 3ϕ semi-converter with R load. Draw the output voltage waveform. **[7]**

c) Draw the circuit diagram of 3ϕ inverter with balanced star R load with 180º conduction mode. Explain the operation. **[7]**

Q3) a) Draw the circuit diagram of stepdown chopper. Explain the operation with neat waveforms for i/p and o/p voltages. **[6]**

b) A DC chopper is operated with resistive load R = 10Ω, input voltage V_S = 230V, Determine the average and rms output voltage with duty cycle 50%. **[4]**

c) Draw the circuit diagram of two quadrant chopper and explain the operation with neat equivalent diagram. **[8]**

OR

P.T.O.

Q4) a) Draw the circuit diagram of single-phase Full Wave AC voltage controller with R load. Explain its operation with neat waveform of output voltage at $\alpha = 90^{o}$. **[6]**

b) A step up chopper is operated with R load. R = 10Ω, input voltage V_S = 100 V. Determine the average and rms output voltage when duty cycle is 50%. **[4]**

c) Draw and explain DC step-up chopper. Sketch the waveform for output voltage. **[8]**

Q5) a) Draw and explain on-line and off-line UPS system. **[8]**

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

i) Battery charger.

ii) HVDC.

iii) Stepper motor control.

iv) Induction motor speed control.

OR

Q6) a) Draw and explain 1ϕ separately excited DC motor speed control circuits. **[8]**

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

i) HVAC.

ii) Circuit breaker.

iii) UPS system specifications.

Q7) a) Draw and explain ZCS resonant converter with neat waveforms and equivalent diagrams. **[10]**

b) What is EMI? List sources of EMI and explain its reduction techniques. **[6]**

OR

Q8) a) Explain over voltage and over current protection circuits. **[8]**

b) Draw and explain SLR with neat equivalent diagrams and waveforms. **[8]**

Total No. of Questions :10]

SEAT No. :

P3511

[Total No. of Pages :2

[5560]-161
T. E. (Electrical)
ADVANCED MICROCONTROLLER AND ITS APPLICATIONS
(2012 Pattern) (Semester - I) (303141)

Time : 2 ½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q10.***
2) ***Neat diagram must be drawn whenever necessary.***
3) ***Figures to the right indicate full marks.***
3) ***Assume suitable data if necessary.***

Q1) a) Explain the function of Bank select register. **[4]**

b) Explain the functions of following SFR's related to the ports of PIC18 microcontroller PORTx, and TRISx. **[6]**

OR

Q2) a) Explain the status of the flags in status register if the PIC18 MPU adds the following two numbers 0xFF and 0x01. **[6]**

b) Explain any four data types with example used in C programming of PIC18F458. **[4]**

Q3) a) Explain the CALL and RETURN instructions in PIC18 microcontroller. **[6]**

b) Write a program in C to load Timer 0 by a data AAFF H. **[4]**

OR

Q4) a) Explain interrupt handling in PIC18 microcontroller. **[6]**

b) Write a program in C to configure PORT C as input port and PORT D as output port. **[4]**

P.T.O.

Q5) a) Explain interfacing of 4X4 keypad with PIC18F458 microcontroller. **[8]**

b) Explain SPI protocol in details. **[8]**

OR

Q6) a) Write a program in C to receive bytes of data serially and place the data in WREG register continuously. Set the baud rate 9600, 8 bit data 1 stop bit. XTAL = 10 MHz. **[8]**

b) Explain interfacing of 16X2 LCD with PIC18F458 microcontroller. **[8]**

Q7) a) Explain compare mode of PIC18F458 and also explain SFR CCP1CON register in details. **[8]**

b) Explain interfacing of stepper motor with PIC18F458 microcontroller. **[8]**

OR

Q8) a) Explain capture mode of PIC18F458 microcontroller in details. **[8]**

b) With flow chart explain speed control of DC motor using PIC18F458 microcontroller. **[8]**

Q9) a) Explain interfacing of LM35 with PIC18F458 microcontroller for temperature measurement. **[9]**

b) Explain programming of A/D converter in PIC18F458 microcontroller. **[9]**

OR

Q10)a) Explain with neat diagram interfacing of DAC 0808 with PIC18F458 microcontroller. **[9]**

b) Explain in details the function of following SFR : **[9]**

ADCON0

ADCON1

Total No. of Questions :10]

SEAT No. :

P3512

[Total No. of Pages : 2

[5560]-162
T.E. (Electrical)
ELECTRICAL MACHINES-II
(2012Course) (Semester-I) (303142)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Black 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) Give comparison between salient pole and non salient pole type of synchronous machines. **[5]**

b) A 3 phase, 4 pole alternator has 60 slots, 2 conductors per slot, the pitch of coil is 3 slots less than full pitch. Find coil span factor & distribution factor. **[5]**

OR

Q2) a) State and explain conditions to be satisfied for satisfactory parallel operation of 3 phase synchronous generators. **[5]**

b) Explain EMF method of finding voltage regulation of 3 phase synclmonous generater. **[5]**

Q3) a) Explain any two methods of starting 3 phase synchronous motor with suitable diagrams. **[5]**

b) For 2200 volt, 440 KVA, single phase alternator the armature resistance is 0.5 ohm. A field current of 40 Ampere gives an open circuit voltage of 1160 volt and short circuit current of 200 Amp. Calculate synchronous impedance and reactance . **[5]**

OR

Q4) a) Explain parallel generator theorem. **[5]**

b) Explain the phenomenon of hunting in case of synohronous motor. How hunting is eliminated? **[5]**

P.T.O.

Q5) a) Explain construction and working of 3 phase induction voltage regulator. **[8]**

b) Give comparison between normal induction motor and linear induction motor. **[8]**

OR

Q6) a) Explain construction & working of BLDC motor. **[8]**

b) Explain V/F method of speed control of 3 phase induction motor. **[8]**

Q7) a) Draw phasor diagram of single phase AC series motor and explain it in brief . **[8]**

b) Explain the constructional features, working and applications of universal motor. **[8]**

OR

Q8) a) Explain the operation of DC series motor on AC supply. And explain problems associated in this mode of operation. **[8]**

b) Describe the procedure of drawing circle diagram of plain AC series motor. **[8]**

Q9) a) State the methods to make single phase induction motors self starting . Explain in detail operation, characteristics and application of capacitor start motors. **[10]**

b) A 6 pole, 250 volt, 50 Hz single phase induction motor runs at slip of 0.05. The data is as follows. **[8]**

i) No load frictional 1055=75 watt

ii) Forward field gross power absorbed = 160 watt

iii) Backward field gross power absorbed = 20 watt

Find the shaf torque.

OR

Q10) a) Why capacitor start motor is better than the resistance split phase type. Explain with the help of phasor diagram and torque speed characteristics **[10]**

b) Draw equivalent circuit of single phase induction motor neglecting core loss at no load condition and explain it. **[8]**

Total No. of Questions :10]

SEAT No. :

P3513

[Total No. of Pages : 2

[5560]-163
T.E. (Electrical)
POWER ELECTRONICS
(2012 Course) (Semester-I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer any one question from Q1 & Q2, Q3 & Q4, Q5 & Q6, Q7 & Q8, Q9 & Q10.***
2) ***Figures to the right indicate full marks.***

Q1) a) What are different methods of triggering of SCR? Explain RC triggering method. **[5]**

b) Describe the working of single phase half controlled converter with RLE load. Draw neat circuit diagram, and waveforms for

i) Output voltage ii) Output current. **[5]**

OR

Q2) a) Explain gate characteristics of SCR during Turn on. **[5]**

b) Explain working of single phase AC voltage regulator with RL load. **[5]**

Q3) a) Draw V-I characteristics of TRIAC & explain four mode operation of TRIAC. **[5]**

b) What is a dual converter? Explain working of single phase dual converter with suitable diagram to give 4 quadrant operation of a motor. **[5]**

OR

Q4) a) Explain working of a three phase fully controlled bridge rectifier feeding highly inductive load with help of neat circuit diagram. What is the boundary of discontinuous conduction? Write expression of average output voltage. **[5]**

b) A single phase full wave rectifier connected to 230 V, 50 Hz source, is feeding a load of $R = 10\,\Omega$ in series with a large inductance that makes a load current ripple free. For a firing angle of 45°, determine **[5]**

i) Output voltage

ii) Output power

iii) Form Factor

iv) Ripple Factor.

P.T.O.

Q5) a) Draw and explain switching characteristics of MOSFET. **[8]**

b) Explain operation of four quadrant chopper. **[8]**

OR

Q6) a) Explain with neat diagram working of a step up chopper feeding an inductive load. Draw output voltage and current waveforms. Derive average and rms output voltages equations in terms of duty cycle. **[10]**

b) A step-up chopper has input voltage of 220 V and output of 660 V. If the conduction time of chopper is 120 μ sec, compute the pulse width of output voltage. If the output voltage pulse width is increased to there times its previous width for constant frequency operation, find the average output voltage. **[6]**

Q7) a) Explain with neat circuit diagram and waveforms the operation of single phase current source inverter feeding RL load. **[8]**

b) Give comparison between voltage source inverter and current source inverter. **[8]**

OR

Q8) a) Explain multiple pulse width modulation with necessary waveforms.**[8]**

b) How inverters are classified? What are the external and internal voltage control methods in inverter? **[8]**

Q9) a) Draw the circuit diagram of three phase inverter feeding resistive load (star connected) using 120° conduction mode. Draw the switching sequence of the devices and waveforms of output phase and line voltages. **[10]**

b) Compare multilevel inverter with Multi pulse Inverter. **[8]**

OR

Q10) a) What are the types of Multilevel Inverter? Explain cascaded multilevel inverter. **[10]**

b) What is the necessity of controlling the voltage at the output terminals of the inverter? Explain briefly the various methods employed for the control of output voltage of inverters. **[8]**

Total No. of Questions : 8]

SEAT No. :

P3514

[Total No. of Pages : 2

[5560]-164
T.E. (Electrical)
ELECTRICAL INSTALLATION, MAINTENANCE AND TESTING
(2012 Pattern) (Semester - I) (303144)

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

Instructions to the candidates:

1) ***Answers all questions.***
2) ***Figures to the right indicate full marks.***

UNIT - I, II & III

Q1) a) Draw a neat tree chart showing different maintenance strategies. Explain each in brief. **[7]**

b) With proper diagram explain motor current signature analysis used in condition monitoring of induction motor. **[7]**

c) State and explain the different failure modes of transformers. **[6]**

OR

Q2) a) Explain the process of filtration of transformer oil with suitable diagram. **[7]**

b) What are the different insulation stressing factors? Explain them in brief. **[7]**

c) Discuss the different fault monitoring methods of induction motors and give suitable remedies for them. **[6]**

UNIT - IV

Q3) a) Prepare a trouble-shooting chart for an Induction motor. **[8]**

b) Describe the methods of cable fault location. **[8]**

OR

Q4) a) State and explain the different type test and routine test performed on transformers. **[8]**

b) Describe the testing of Capacitor banks. **[8]**

P.T.O.

UNIT - V

Q5) a) Derive and compare the following two overhead system on the basis of volume requirement for conductor. **[8]**

i) 1 phase 2 wire system and

ii) 3 phase 3 wire system

b) A single phase distributor 2 km long supplies a load of 120A at 0.8 p.f. lagging at its far end and a load of 80A at 0.9 p.f. lagging at its mid-point. Both power factors are referred to the voltage at the far end. The resistance and reactance per km (go and return) are 0.05 ohm and 0.1 ohm respectively. If the voltage at the far end is maintained at 230V, calculate: **[10]**

i) Voltage at the sending end.

ii) Phase angle between voltages at the two ends.

OR

Q6) a) A 2 wire feeder carries a constant current of 250A throughout the year. The portion of capital cost which is proportional to area of cross section is Rs. 25 per kg of copper conductor. The interest and depreciation total 10% per annum and cost of energy is Rs. 5 per kWh. Find the most economical area of cross-section of the conductor. Given that density of copper is $8.93 gm/cm^3$ and its specific resistance is $1.73 \times 10^{-8} \Omega m$. **[10]**

b) Explain general design consideration of distribution feeder. **[8]**

UNIT - VI

Q7) a) Draw and explain the different types of bus bar arrangement in substations. **[8]**

b) Explain the followig terms with their equivalent circuit. **[8]**

i) Touch potential

ii) Step Potential

OR

Q8) a) State the general factors that should be considered in estimation of HT or LT lines. **[8]**

b) Explain with neat diagram plate earthing. **[8]**

■ ■ ■

Total No. of Questions : 10]

SEAT No. :

P3515

[Total No. of Pages : 3

[5560]-165
T.E. (Electrical Engineering)
POWER SYSTEM - II
(2012 Course) (Semester - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain why the conjugate of current is required to express complex power. **[5]**

b) What are different types of HVDC link? With neat diagram, elaborate one type in details. **[5]**

OR

Q2) a) Prove that long transmission line is a two port network possessing properties **[5]**

i) Symmetric

ii) Reciprocity

b) Compare HVDC and HVAC systems with respect to advantages and disadvantages. **[5]**

Q3) a) Derive power flow equation for receiving end side of transmission line. **[5]**

b) A three phase 220 kV, 50 Hz transmission line consists of 1.2 cm radius of conductor spaced 2 m at the corner of an equilateral triangle. Calculate disruptive critical voltage between the lines. Irregularity factor = 0.96, temperature = 20°C, barometric pressure = 72.2 cm of Hg. Dielectric strength of air = 21.1 kV(rms)/cm. **[5]**

OR

Q4) a) Define and write formula for **[5]**

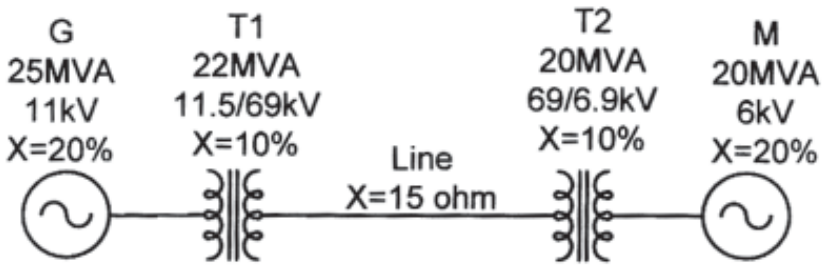
i) Disruptive critical voltage

ii) Visual critical voltage

b) Describe the concepts line regulation and compensation. **[5]**

P.T.O.

Q5) a) Take base MVA = 25MVA and base kV = 69 kV on transmission network and draw per unit diagram to these base values. **[8]**



b) Derive static load flow equation for n bus system. **[8]**

OR

Q6) a) Compare Newton Raphson method with Gauss Seidal method of load flow analysis. **[8]**

b) Determine the unknown elements from following Y_{Bus} matrix. **[8]**

$$Y_{BUS} = \begin{bmatrix} ? & ? & ? & ? \\ -j2 & ? & -j5 & ? \\ -j4 & ? & ? & -j4 \\ 0 & -j7 & ? & ? \end{bmatrix}$$

Q7) a) A three phase 11kV, 5MVA, generator has a direct axis steady state reactance of 20%. It is connected to a 3MVA transformer having 5% leakage reactance and ratio of 11/33kV. The 33kV side is connected to a transmission line having 30 ohm reactance. A three phase fault occurs at other end of transmission line. Calculate steady state fault MVA and current supplied by generator assuming no load prior to the fault. Take base of 11kV, 5MVA on generator. **[8]**

b) In case of three phase fault at the terminal of an unloaded alternator, prove that $x_d'' < x_d' < x_d$ and $I_f'' > I_f' > I_f$ with mathematical relation and diagram. (where I_f is fault current) **[8]**

OR

Q8) a) What are the different types of current limiting reactor? With circuit diagram, elaborate operation of each type. **[8]**

b) A three phase 11kV, 10 MVA, generator has a direct axis steady state reactance of 10%. It is connected to a 5 MVA transformer having 5% leakage reactance and ratio of 11/33kV. The 33kV line side is connected to a transmission line having 1+j4 ohm impedance. A three phase fault occurs at other end of transmission line. Calculate steady state fault MVA and current assuming no load prior to the fault when fault is at **[8]**

i) Sending end of the line

ii) Receiving end of line. Take base of 11kV, 10MVA on generator.

Q9) a) In three phase transmission line, show that positive, negative and zero sequence impedence $Z_1 = Z_2 = Z_s - Z_m$ and $Z_0 = Z_s + 2Z_m$ **[9]**

where Z_s is self impedance and Z_m is mutual impedance of lines.

b) Draw zero sequence diagram for all types of combinations of transformer. **[9]**

OR

Q10)a) In case of LLG fault, show that fault current **[10]**

$$I_f = \frac{-3E_{a1}Z_2}{Z_1Z_2 + Z_2Z_0 + Z_0Z_1}$$

b) Prove that apparent power in three phase circuit is given by **[8]**

$$s_{abc} = 3V_{a0}I^*_{a0} + 3V_{a1}I^*_{a1} + 3V_{a2}I^*_{a2}$$

■ ■ ■

Total No. of Questions : 8]

SEAT No. :

P3516

[Total No. of Pages : 3

[5560]-166
T.E. (Electrical)
CONTROL SYSTEM - I
(2012 Course) (Semester - II) (End Semester)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

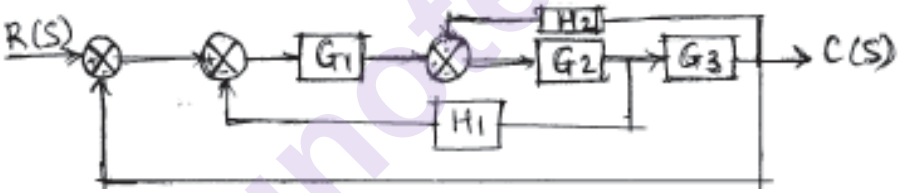
1) ***Answer any one question from each pair of questions: Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Figures to the right indicate full marks.***

Q1) a) Differentiate between **[6]**

i) Feedback and feed forward control system

ii) Open loop and closed loop control system

b) Find the simplified bock diagram and obtain the transfer function. **[6]**



c) Derive transfer function of DC Servo motor (armature control). **[8]**

OR

Q2) a) Draw and explain time response of second order for **[6]**

i) $\xi = 1,$

ii) $\xi = 0$

iii) $\xi < 1$

b) A characteristic equation of a feedback control system is given by

$s^6 + 3s^5 + 5s^4 + 9s^3 + 8s^2 + 6s + 4 = 0$ comment on stability. **[6]**

c) Sketch the root locus and comment on stability

$$G(s)H(s) = \frac{K}{s(s+3)(s^2+2s+2)}$$ **[8]**

P.T.O.

Q3) a) Expalin the following terms in context of bode plot. **[8]**

i) Gain margin,

ii) phase margin,

iii) phase crossover frequency,

iv) gain crossover frequency

b) Sketch bode plot showing the magnitude and phase plot for open loop tranfer function given by $G(s)=\frac{K s^2}{(1+0.2s)(1+0.02s)}$. **[8]**

OR

Q4) a) State and explain nyquist stability criteria. Explain principle of argument. **[8]**

b) Construct nyquist plot for feedback system with open loop transfer function. **[8]**

$$G(s)=\frac{K(s-2)}{(s+1)^2}$$

Q5) a) Determine frequency domain specification for second order system given by **[8]**

$$G(s)=\frac{225}{s(s+6)}$$

b) Draw bode plot for unity feedback system with **[8]**

$$G(s)=\frac{10(s+10)}{s(s+2)(s+5)}$$

OR

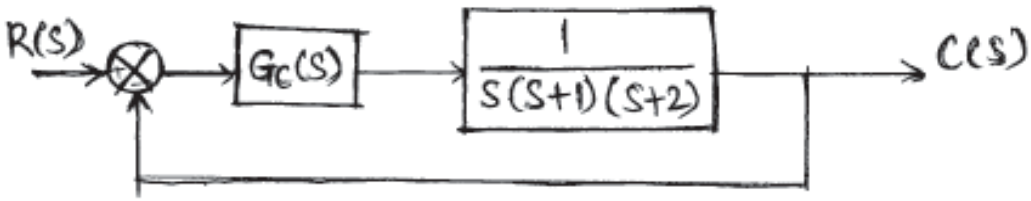
Q6) a) Compare frequency and time domain specification of control system. **[8]**

b) Sketch nyquist plot for the system with open loop transfer function **[8]**

$$G(s)H(s)=\frac{20}{(s+3)(s+2)}$$

Q7) a) Explain PID controller and there function with proper block diagram. **[9]**

b) For the system given below, design PID controller using ZN tuning control **[9]**



OR

Q8) a) Explain Ziegler Nichol tuning method for PID controller. **[9]**

b) Design a PI controller so that the unity feedback system having open loop transfer function $G(s)H(s)=\frac{5}{(s+1)(s+2)}$ will have the damping ratio of 0.5 and natural frequency of oscillations will be 2 rad/sec. **[9]**

Total No. of Questions : 10]

SEAT No. :

P3517

[Total No. of Pages : 3

[5560]-167
T.E. (Electrical)
UTILIZATION OF ELECTRICAL ENERGY
(2012 Pattern) (End Sem.) (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 required.***
3) ***Assume suitable data, if necessary.***
4) ***Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam table is allowed.***
5) ***Figures to the right indicates full marks.***

Q1) a) Explain various ways in which temperature of resistance furnace can be controlled. **[4]**

b) A 40 Kilo Watt, 3-phase, 400 V resistance oven is to employ Ni-Cr strip of 0.3 mm thickness. The heating elements are connected in delta, if the temperature of wire to be 1200°C and that of charge is 700°C. Determine length and width of wire. Take radiation efficiency 0.55, emissivity as 0.9 and specific resistance as $1.03*10^{-6}$ Ωm. **[6]**

OR

Q2) a) State faraday's laws of electro deposition and explain the need for it. **[4]**

b) Explain the construction and working of contactor. **[6]**

Q3) a) Explain metal halide lamp construction & working with neat diagram. **[4]**

b) Describe the construction and working of core type induction furnace. **[6]**

OR

P.T.O.

Q4) a) Define following terms, **[4]**

i) Illumination

ii) Depreciation factor

iii) Candle power

iv) Reflection

b) A room size of 15×8 meter is to be illuminated by 22 number of 200 Watt each lamp. The MSCP of each lamp is 250. Take depreciation & utilization factor as 1.2 and 0.6 respectively. Find average illumination produced on the floor. **[6]**

Q5) a) Draw the block diagram of electric locomotive and state the function of each component. **[8]**

b) Explain the functions of following equipment in traction substation. **[8]**

i) Circuit breaker

ii) Interrupter

OR

Q6) a) Explain diesel electric drive with its merits and demerits. **[8]**

b) Explain composite system for track electrification. **[8]**

Q7) a) Derive the expression for total tractive effort. **[8]**

b) An electric train uniformly accelerated at 6 km/hr/sec for 21 second on a level track, braked at 6km/hr/second. The free running period for the train is 10 minutes and stop time of 5 minutes. Draw speed time curve and calculate distance between stations, average speed and scheduled speed. **[8]**

OR

Q8) a) Define following terms and state it's unit. **[8]**

i) Specific energy consumption

ii) Tractive effort

iii) Coeffiecient of adhesion

iv) Dead weight

b) Derive the expression for simplified quadrilateral speed time curve. **[8]**

Q9) a) What is a transition, explain shunt & bridge transition in detail. **[6]**

b) Explain suitability of D.C series motor for traction service. **[4]**

c) Two 600 Volt DC series motors are started by series parallel method. Each motor takes a current of 400A during starting time of 20 second. And has a total resistance of 0.1 Ohm. Calculate. **[8]**

i) Energy loss in starting rheostat

ii) Energy loss in a motor

iii) Motor output

iv) Total energy input

v) Starting efficiency

OR

Q10)a) What are the desirable characteristics of motor used in traction? Explain. **[8]**

b) Draw and explain block diagram of route relay interlock. **[4]**

c) Explain following systems of colour light signalling, **[6]**

i) Two aspect colour light signalling

ii) Three aspect colour light signalling

iii) Four aspect colour light signalling

Total No. of Questions : 8]

SEAT No. :

P3518

[Total No. of Pages : 2

[5560]-168
T.E. (Electrical)
DESIGN OF ELECTRICAL MACHINES
(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.***
2) ***Assume suitable data wherever necessary.***
3) ***Figures to the right in bold indicate maximum marks.***
4) ***Use of non-programmable scientific calculator is permitted.***
5) ***Neat diagrams must be drawn wherever necessary.***

Q1) a) Develop the output equation of single phase shell type transformer. **[6]**

b) Discuss electrical steel sheets used for stampings of magnetic core of transformers and three phase induction motors. Explain with neat sketch the basic directional properties of cold rolled grain oriented transformer steel. **[6]**

c) A 200 kVA, 6600/440 V, 50 Hz, delta star, core type transformer has maximum flux density of 1.3 Wb/m^2, current density of 2.5 A/mm^2 and window space factor of 0.3. The overall height is equal to overall width and window area is 1.25 times the core area. Determine the overall core dimensions. Assume three stepped core. **[8]**

OR

Q2) a) How total resistance of a designed three phase transformer is calculated without carrying out any tests on it. **[6]**

b) Draw neat sketches of mitred joints used for cores of cold rolled oriented steel : **[6]**

i) 45º mitre joint.

ii) 35º/55º mitre joint.

c) Write down in detail the steps to calculate the no load current of three phase transformer. **[8]**

Q3) a) What are various types of the stator slots? Draw any three types of slots and indicate the dimensions of the slots. **[8]**

b) Develop mush winding for 4 pole, 36 slots three phase induction motor. Draw winding diagram for anyone phase. **[10]**

OR

P.T.O.

Q4) a) Develop the output equation of three phase induction motor write down the nomenclatures used with their respective units. **[9]**

b) Determine the main dimensions of 3.7 KW, 400 V, 4 pole, 50 Hz three phase squirrel cage induction motor. The specific electric and magnetic loadings are 0.45 Wb/m^2 and 23000 A/m respectively. The full load efficiency is 0.85 and power factor is 0.84. Design the motor for cheapness assuming winding factor of 0.955. **[9]**

Q5) a) Which factors should be considered when estimating the length of the airgap of induction motor? Explain the effect of larger air gap on any two. **[8]**

b) How to calculate the dimensions of rotor bars for three phase squirrel cage induction motor? **[8]**

OR

Q6) a) What are different methods to improve starting torque of three phase squirrel cage induction motor? Explain any one in detail. **[8]**

b) A 6 pole, three phase squirrel cage induction motor has 72 slots with 15 conductors in each slot. There are 55 rotor slots. The coil span is 11 slots and the phase spread is 60°. Determine the current in rotor bars and end rings if the stator current is 24.1A & power factor is 0.83. **[8]**

Q7) a) Write detail procedure to calculate copper loss of a designed three phase induction motor (Without performing any test). **[8]**

b) Describe the significance of B_{60} in three phase induction motor. A 75 kW, 8 pole 3300V, 50 Hz., star connected induction motor has a magnetizing current which is 35% of full load current. Calculate the number of stator winding turns per phase if the mmf required for flux density at 60° from the inter polar axis is 500 a. Assume winding factor of 0.95, full load efficiency of 0.94 and full load power factor of 0.86. **[8]**

OR

Q8) a) How stator and rotor resistances are calculated in three phase squirrel cage induction motor. **[8]**

b) Why does skewing lowers the power factor and overload capacity. **[8]**

Total No. of Questions : 12]

SEAT No. :

P3519

[Total No. of Pages : 2

[5560]-169
T.E. (Electrical)
ENERGY AUDIT & MANAGEMENT
(2012 Course) (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) ***Your answers will be valued as a whole.***
4) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) Explain following in detailed: **[6]**

a) Energy Intensity.

b) Energy security.

c) Energy conservation.

OR

Q2) Give salient features of Energy Conservation Act 2001. **[6]**

Q3) What is the energy policy? Explain format of energy policy with example. **[7]**

OR

Q4) What will be the role of finance department, personnel department and engineering department in energy management. **[7]**

Q5) Explain with examples how Supply Side Management can be used for managing electricity demand? **[7]**

OR

Q6) Explain with suitable diagram role of SCADA system in energy management. **[7]**

P.T.O.

Q7) a) Compare preliminary audit and detailed energy audit. What is A-B-C analysis? Explain with suitable example. **[10]**

b) Give typical format of energy audit reporting format. What is the importance of executive summary? **[8]**

OR

Q8) a) Explain the term plant energy performance. Also explain different benchmarks used in energy auditing. **[8]**

b) What are different techniques of data analysis? What is CuSum technique? How it is used for accessing energy saving potential? **[10]**

Q9) a) Enlist energy conservation opportunities in pumping system. Also explain flow control methods in pumping system. **[8]**

b) What are affinity laws for fans and blowers? How these are useful in energy conservation? Also explain process of performance assessment of fans. **[8]**

OR

Q10)a) Explain effect of unbalanced supply voltage on motor performance. Enumerate the effect of harmonics on operation of motor. **[8]**

b) State different losses taking place in boiler. Also suggect measures to reduce them. **[8]**

Q11)a) Justify economic feasibility of project by calculating net present value method based on following data. Initial investment of the project is Rs. 5 lacs and revenue generated for five years are as follows Rs. 1 lacs, Rs. 1.25 lacs, Rs. 2.4 lacs, Rs. 2.2 lacs and Rs. 1.5 lacs. Take discounting factor as 14%. **[8]**

b) Explain energy efficiency measures in transmission and distribution systems. **[8]**

OR

Q12)a) Explain break even analysis. Also explain internal rate of return. **[8]**

b) Discuss outcome of energy audit carried out in IT industry. **[8]**

Total No. of Questions :8]

SEAT No. : ____

P3520

[Total No. of Pages :2

[5560]-170
T.E. (Electrical)
INDUSTRIAL AND TECHNOLOGY MANAGEMENT
(2012 Pattern) (Semester-I) (311121)

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) ***Figure to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Differentiate between administration and management. **[6]**

b) Define and explain concept of Quality. How TQM can be used in industrial manufacturing to improve product quality. **[7]**

c) What is online marketing. Explain any three benefits of online marketing. **[7]**

OR

Q2) a) Explain the meaning of following terms **[6]**

i) Price

ii) Capital

iii) Credit & Debit

b) What is Kaizen. How 5S is used in implementation of Kaizen. **[7]**

c) Explain contribution of Henry Fayol in the field of management. **[7]**

Q3) a) Enlist the theories of Motivation. With suitable diagram explain Maslow's Hierarchy of Needs theory in detail. **[8]**

b) Write a short note on group dynamics? Explain stages in group dynamics. **[9]**

OR

Q4) a) Define and explain term Motivation. Explain Theory X and Theory Y in detail. **[8]**

b) Define the term leadership? Explain any six qualities good leadership. **[9]**

P.T.O.

Q5) a) Explain the process of recruitment. What is the importance of training and development of employees. **[8]**

b) Write short note on Professional and Business Ethics. **[9]**

OR

Q6) a) What is performance management? Explain the methods of performance appraisal. **[8]**

b) Write short note on self-development, time management and stress management. **[9]**

Q7) a) What is Patent? Write format for Patent in detail. **[8]**

b) What are the Intellectual Property Rights. Explain different forms of IPR. **[8]**

OR

Q8) a) Write short note on Patent Laws. What is criteria for securing Patents? **[8]**

b) Explain the concept of Copyright and trademark. **[8]**

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Total No. of Questions : 10]

SEAT No. :

P5116

[Total No. of Pages : 2

[5560]-171

T.E. (Instrumentation & Control) (Semester - I)

EMBEDDED SYSTEM DESIGN

(2012 Pattern)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain internal memory organization of 8051 μC. **[7]**

b) Explain PSW register of 8051 μC. **[3]**

OR

Q2) a) Explain with suitable diagram, timer mode-2 operation of 8051 μC. **[7]**

b) Explain alternate functions of port-3 of 8051 μC. **[3]**

Q3) a) With neat sketch explain interfacing of ADC0808 with 8051 μC. **[7]**

b) Write a program to clear 10 RAM locations starting at RAM address 1000H. **[3]**

OR

Q4) a) With neat sketch explain interfacing of 3-digit common anode multiplex LED display with 8051 μC. **[6]**

b) Enlist various interrupts of 8051 μC. **[4]**

Q5) a) Explain with suitable diagram the interfacing of LM35 with 89C51 μC. **[8]**

b) Explain the interfacing of serial EPROM with 89C51 μC. **[8]**

OR

Q6) Discuss the design of ON/OFF temperature controller using 89C51 μC based on following points.

a) Block diagram. **[6]**

b) Circuit explanation. **[10]**

P.T.O.

Q7) a) Explain register file structure of the AT8535 AVR μC. **[8]**

b) Explain any four addressing modes of AT8535 AVR μC with suitable instructions. **[8]**

OR

Q8) a) Explain following instructions of AT8535 AVR μC. **[8]**

i) SUBI R15,$l0

ii) SBRS Rd, b

iii) LD R15,Y+

iv) LPM

b) Explain timer-0 operation of AVR microcontroller. **[8]**

Q9) a) Explain 16-bit Timer/Counter-1 of AVR microcontroller. **[9]**

b) Explain ADC prescaler of AT8535 AVR microcontroller. **[9]**

OR

Q10)a) What are the features of ATMega8535 AVR μC. **[9]**

b) Explain how the baud rate is defined with the help of UBRR in AVR μC. **[9]**

Total No. of Questions :10]

SEAT No. :

P3521

[Total No. of Pages : 2

[5560]-172

T.E. (Instrumentation & Control)

INSTRUMENTAL METHODS FOR CHEMICAL ANALYSIS

(2012 Pattern) (Semester - I)

Time : 2 ½ 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) Define classical and Instrumental methods in Chemical Analysis. **[4]**

b) Compare the Potentiometry and Coulometry methods in Electro analytical method. **[6]**

OR

Q2) a) Explain principal and experimental setup of coulometey (any one). **[6]**

b) Explain with sketch working of Hallow cathode lamp. **[4]**

Q3) a) Explain with neat sketch Double beam Filter Photometer. **[4]**

b) Explain with neat sketch Microprocessor based Spectrophotometer. **[6]**

OR

Q4) a) State the Laws of Photometery (Beer's Law & Lamberts Law). **[4]**

b) Explain the Instrumentation of Flame Photometer. **[6]**

Q5) a) Explain Fourier Transform Nuclear Magnetic Resonance Spectrometer (FTNMR) with a neat sketch. **[8]**

b) What is phosphoresce? Draw and Explain Spectrophosporimeter. **[8]**

OR

P.T.O.

Q6) a) What is Fluorescence? Explain the working of double beam flouriometer. **[8]**

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

i) Hydrocarbon

ii) CO Gas Analyzer

Q7) a) Explain the Principle of Mass Spectrometer. Explain with neat sketch Time of Flight Mass analyzer. **[10]**

b) List the detectors used in HPLC. Explain any one type of HPLC Detector. **[8]**

OR

Q8) a) Explain the block diagram of Gas Chromatography. List the GC detectors. **[10]**

b) Compare Magnetic Deflection and Time of Flight mass analyzer. **[8]**

Q9) a) Explain with neat sketch Proportional counter. **[8]**

b) What is ESCA? Explain Auger Emission Spectroscopy? **[8]**

OR

Q10)a) Explain the Instrumentation for X-ray spectrometry. **[8]**

b) Write short notes on Ionization Chamber. **[8]**

❄❄❄❄

Total No. of Questions :10]

SEAT No. :

P3522

[Total No. of Pages : 2

[5560]-173

T.E. (Instrumentation & Control)

CONTROL SYSTEM COMPONENTS

(2012 Course) (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 and Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***

Q1) Draw the symbolic representation and give any 2 practical application of following type of switches. **[10]**

a) Pressure switch

b) Level switch

c) Drum switch

d) Push button switch

e) Selector switch

OR

Q2) a) Explain construction, working and application of Electro Mechanical Relay. **[5]**

b) Explain construction, working and application of contactor. **[5]**

Q3) a) What is meant by interlock? Explain by giving example. **[5]**

b) Draw using standard symbols electrical wiring diagram for direct online starter. **[5]**

OR

Q4) a) Explain pneumatic power supply circuit with neat sketch. **[4]**

b) Draw the pneumatic circuit for the To and Fro motion of the piston (Reciprocating motion) **[6]**

P.T.O.

Q5) a) Compare hydraulic system with pneumatic system based on the following. **[16]**

a) Power developed

b) Energy storage

c) Installation

d) Running cost

e) Maintenance

f) Environmental effects

g) Noise

h) Application

OR

Q6) a) Using standard symbols draw hydraulic circuit for meter in. **[8]**

b) Draw the symbol and explain the function of **[8]**

i) Relief valve

ii) Non return flow control valve

iii) 3/2 direction control valve

iv) 5/2 direction control valve

Q7) a) Give the classification of hydraulic pumps. Explain working of any one type. **[10]**

b) Explain with neat sketch following auxiliary components. **[10]**

i) Synchros

ii) Feeders

OR

Q8) a) Explain Hydraulic power supply in details. **[10]**

b) Explain with neat sketch following auxiliary components. **[10]**

i) Dampers

ii) Flow totalizer

Q9) a) Draw and explain circuit breaker. **[5]**

b) Explain hazardous area triangle and its classification. **[9]**

OR

Q10) a) Write short notes on fluidics. **[5]**

b) Explain hazardous area and material classification as per NEC standards. **[9]**

Total No. of Questions : 10]

SEAT No. : ____

P5117

[Total No. of Pages : 3

[5560]-174

T.E. (Instrumentation & Control) (Semester - I)

CONTROL SYSTEM DESIGN

(2012 Pattern)

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) ***Use of non-programmable calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) List down differences between lead and lag compensator and draw their frequency response. **[6]**

b) Write atleast four comments on effect of Proportional plus Derivative controller for a first order plant. **[4]**

OR

Q2) a) Design a lead compensator for a system $G(s)=\frac{10K}{s(s+3)}$ such that velocity error constant is atleast 30 and phase margin should be atleast 50°. **[6]**

b) The following transfer function is obtained from step response of the system.

$$G(s)=\frac{3e^{-2.5s}}{5s+1}$$

Find the parameters for PI using Cohen-Coon method. **[4]**

Q3) a) The transfer function of a unity feedback system is given as

$$G(s)=\frac{K}{s(s+1)(s+3)}$$

Find the parameters of PID using Ziegler-Nichols method. **[5]**

P.T.O.

b) The open loop transfer function for unity feedback network is **[5]**

$$G(s)=\frac{25}{(s+1)(s+3)}$$

Design a PD controller having phase margin atleast 55° at $\omega = 1.5$ rad/sec.

OR

Q4) a) Explain the open loop method for tuning a PID controller. List down its advantages and disadvantages. **[5]**

b) The open loop transfer function for unity feedback network is

$$G(s)=\frac{50}{(s+1)(s+5)}$$

Obtain PD controller transfer function if the desired closed loop poles are at $-2 \pm j3$. **[5]**

Q5) a) Derive the expression to convert state space model to transfer function model. **[6]**

b) Determine the state space model in observable canonical form for a transfer function given as **[10]**

$$G(s)=\frac{(s+6)}{(s+2)\ (s+3)(s+5)}$$

OR

Q6) a) Find the transfer function of the following state space representation. **[10]**

$$\dot{x}=\begin{bmatrix}3 & 1 & 0\\ 0 & 1 & 2\\ 1 & 2 & 1\end{bmatrix}x+\begin{bmatrix}0\\ 2\\ 3\end{bmatrix}u$$

$$y=\begin{bmatrix}4 & -2 & 0\end{bmatrix}x+2u$$

b) Explain the terms state vector, output equation and state variable. **[6]**

Q7) a) Define controllability and observability with an example. **[8]**

b) Determine state transition matrix using similarity transformation approach for the following state space model. **[10]**

$$\dot{x}=\begin{bmatrix}0 & 1\\ -4 & -6\end{bmatrix}x+\begin{bmatrix}0\\ 1\end{bmatrix}u$$

OR

Q8) a) Determine state transition matrix using Cayley Hamilton approach for the following state space model. **[10]**

$$\dot{x}=\begin{bmatrix}0 & 1\\ -2 & -6\end{bmatrix}x+\begin{bmatrix}0\\ 1\end{bmatrix}u$$

b) Determine controllability and observability of the following state space model. **[8]**

$$\dot{x}=\begin{bmatrix}0 & 1 & 0\\ 0 & 0 & 1\\ -2 & -8 & -1\end{bmatrix}x+\begin{bmatrix}0\\ 2\\ 1\end{bmatrix}u$$

$$y=\begin{bmatrix}-3 & -2 & 0\end{bmatrix}x$$

Q9) Find state feedback gain matrix for the system to place the desired closed loop poles at location s = –2, –3 **[16]**

$$\dot{x}=\begin{bmatrix}0 & 1\\ -1 & -3\end{bmatrix}x+\begin{bmatrix}0\\ 1\end{bmatrix}u \text{ and } y = [1 \;\; 0]x$$

OR

Q10)Design a full order observer for the system defined by following state equation.

$$\dot{x}=\begin{bmatrix}1 & -1\\ 2 & 3\end{bmatrix}x+\begin{bmatrix}0\\ 1\end{bmatrix}u \text{ and } y = [1 \;\; 0]x$$ **[16]**

The set of desired poles for the observer to be at S = –2, –4.

Total No. of Questions :10]

SEAT No. : ____

P3523

[Total No. of Pages :2

[5560]-175

T.E. (Instrumentation and Control Engineering)
INDUSTRIAL ORGANIZATION AND MANAGEMENT
(2012 Course) (Semester-I) (306265)

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 should be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) Write short notes on- **[10]**

a) Ishikawa diagram

b) Remedies to reduce the pollution

OR

Q2) a) Define management. Explain any four functions of it briefly. **[5]**

b) What is Inventory? How it is controlled? **[5]**

Q3) a) Explain BCG Matrix in brief. **[5]**

b) Explain the importance of Quality circle. **[5]**

OR

Q4) Write notes on- **[10]**

a) Porter's 5 forces of competition.

b) Importance of purchasing

Q5) a) Write short notes on- **[10]**

i) Human resource Management

ii) Motivation

b) Briefly explain Manpower planning. **[6]**

OR

P.T.O.

Q6) a) Explain need and methods of training according to the levels of management. **[8]**

b) Explain the role of Human resource manager in corporate industries. **[8]**

Q7) Write short notes on- **[18]**

a) Capital

b) Budget, objectives and types

c) Balance sheet

OR

Q8) a) Explain the different sources of finance. **[6]**

b) Explain concept of budget, its objectives and types. **[6]**

c) What is capital budget? What are its methods? **[6]**

Q9) a) Explain ERP for a manufacturing industry.

b) What is E-business? Explain business strategies.

[16]

OR

Q10)a) What is MIS Explain its usefulness to modern business. **[8]**

b) Write a note on " Business Ethics and Professional Ethics" **[8]**

Total No. of Questions : 10]

SEAT No. :

P3524

[Total No. of Pages : 3

[5560]-176

T.E. (Instrumentation & Control)

DIGITAL SIGNAL PROCESSING

(2012 Pattern) (Semester-II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***All questions are compulsory. Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Figures to the right side indicate full marks.***
3) ***Draw neat figure wherever necessary.***

Q1) a) What do you mean by signal? List out the types of signal. **[4]**

b) Compute the convolution sum of 2 sequences. **[6]**

$x(n) = \{3,2,1,2\}$ $h(n) = \{1,2,1,2\}$

OR

Q2) a) Determine if the following systems are time invariant or time variant. **[4]**

i) $y(n) = x(n) + x(n-1)$

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

b) Determine & sketch the magnitude & phase response of the system. $y(n) - 5y(n-1) = x(n) + 4x(n-1)$ **[6]**

Q3) a) Find the z-transform of following: $x(n) = 2^n u(n-2)$. **[4]**

b) Find the DFT of a sequence: **[6]**

$$x(n) = \frac{1}{4} \text{ for } 0 \le n \le 2$$
$$= 0 \text{ otherwise}$$

OR

P.T.O.

Q4) a) Determine the circular convolution of the given two sequences using DFT method. $x_1(n)=\{1,1,2,2\}$ $x_2(n)=\{1,2,3,4\}$. **[6]**

b) What is the relation between *z*-transform & DFT. **[4]**

Q5) a) Obtain the 8 point DFT of sequence. $x(n)=\{1,2,3,4,4,3,2,1\}$ using DIT FFT algorithm. **[12]**

b) What is FFT? Why FFT is needed? **[4]**

OR

Q6) a) Obtain IDFT of following sequence. **[12]**

$X(k)=\{36,-4+j9.656,-4+j4,-4+j1.656,-4,-4-j1.656,-4-j4,$

$-4-j9.656\}$. Find $x(n)$ using IFFT.

b) Sketch the signal flow graph of 4 point decimal in frequency (DIF) FFT algorithm. **[4]**

Q7) a) Explain the different methods for designing FIR filter. **[6]**

b) A lowpass filter is to be designed with the following desired freq. response. **[12]**

$$H_d\left(e^{j\omega}\right)=\begin{cases} e^{-2j\omega} & -\frac{\pi}{4}\le\omega\le\frac{\pi}{4} \\ 0 & \frac{\pi}{4}<|\omega|\le\pi \end{cases}$$

Determine the filter coefficient $h_d(n)$ if the window function is defined below.

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

OR

Q8) Design a lowpass filter with 11 coefficient for the following specifications. **[18]**

Passband frequency edge = 250 Hz

Sampling frequency = 1000 Hz

Use rectangular, Hamming & Hanning window for design.

Q9) a) Convert the analog filter into a digital filter whose system is given below: **[4]**

$$H(s) = \frac{s + 0.2}{(s + 0.2)^2 + 9}$$ use the impulse invariance technique. Assume T = 1 s.

b) Design a digital Butterworth filter that satisfies the following constraint using bilinear transformation. Assume T = 1 s. **[12]**

$$0.9 \le \left|H\left(e^{j\omega}\right)\right| \le 1 \qquad 0 \le \omega \le \pi/2$$

$$\left|H\left(e^{j\omega}\right)\right| \le 0.2 \qquad \frac{3\pi}{4} \le \omega \le \pi$$

OR

Q10)a) Compare the features of digital Butterworth & Chebyshev type 1 filter in terms of **[4]**

i) Filter order

ii) Transient width.

b) Determine H(*z*) for a Butterworth filter safisfying the following constraints.

$$\sqrt{0.5} \le \left|H\left(e^{j\omega}\right)\right| \le 1 \qquad 0 \le \omega \le \pi/2$$

$$\left|H\left(e^{j\omega}\right)\right| \le 0.2 \qquad \frac{3\pi}{4} \le \omega \le \pi$$ **[12]**

with T = 1 sec. Apply impulse invariance transformation.

Total No. of Questions : 10]

SEAT No. :

P3525

[Total No. of Pages : 3

[5560]-177
T.E. (Instrumentation and Control)
PROCESS LOOP COMPONENTS
(2012 Pattern) (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 diagram must be drawn wherever necessary.***
3) ***Figures to right indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) a) Draw and explain the P&ID symbols for: **[6]**

i) Pneumatic control valve

ii) Temperature Transmitter

iii) Flow Recorder and Controller

iv) Level Indicator controller

v) Low Pressure Switch

vi) Pneumatic Signal Line

b) Compare two wire and four wire transmitter **[4]**

OR

Q2) a) Write output equation for PID controller. Also write advantages of PID controller over other controller. (any four points) **[6]**

b) Explain concept of Field area and control room area. List minimum two components in each area. **[4]**

Q3) a) Explain the following terms related to controller. **[6]**

i) Dead Zone

ii) Reset action

iii) Proportional Band

b) A controller outputs a 4m A to 20mA signal to control the minimum and maximum 50 LPH to 350 LPH flow rate respectively. Calculate the current corresponding to 150 LPH flow rate **[4]**

OR

P.T.O.

Q4) a) List various tuning methods. Explain Quarter Amplitude Decay ratio for tuning of controller. **[6]**

a) Draw block diagram of Digital controller. **[4]**

Q5) a) Develop physical ladder diagram for a motor with following: **[8]**

No start Button, NC stop button, thermal overload limit switch open on High temperature, Green light when running and Red light for thermal overload. Assume suitable data if required.

b) Compare Relay logic and PLC logic (Minimum 4 comparison points). **[8]**

c) Explain the significance of latch in ladder logic. **[2]**

OR

Q6) a) Define Programmable Logic Controller. And also develop logic gates AND, OR, NAND, NOR in ladder logic for two inputs (A and B). **[10]**

b) Give examples of Analog Input and analog output for programmable logic controller (min 2 each). **[8]**

Q7) a) Draw and explain the concept of failsafe action {Air to Open (ATO) and Air to Close (ATC)} with one application each. **[8]**

b) List Various Types of Control valves. Draw and explain any one type in detail. **[8]**

OR

Q8) a) Explain the need of control valve. An equal percentage valve has a maximum flow of $180m^3/s$ and a minimum flow of $10m^3/s$. If the full travel is 3cm. Find the flow at a 1cm opening. **[8]**

b) Explain with respect to control valve: **[8]**

i) Yoke

ii) Valve capacity

iii) Plug

iv) Turndown

Q9) a) Find (a) the valve coefficient (Cv) for a control valve that must allow 150gal/min of ethyl alcohol with a specific gravity of 0.8 at a mixiumum pressure of 50 psi and (b) the required valve size in inches. Use following data. **[8]**

Cv	0.3	3	14	35	55	108	174	400	725
Valve size in inches	0.25	0.5	1	1.5	2	3	4	6	8

b) What is cavitation? Explain the remedies to reduce cavitation. **[8]**

OR

Q10)a) Give the selection criteria of control valve. **[8]**

b) Explain high temperature service valves. **[8]**

Total No. of Questions : 10]

SEAT No. :

P3526

[Total No. of Pages : 2

[5560]-178

T.E. (Instrumentation & Control)

UNIT OPERATIONS & POWER PLANT INSTRUMENTATION

(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) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) What do you mean by unit process and unit operation? **[5]**

b) Explain Spray dryer with neat sketch. **[5]**

OR

Q2) a) Explain any one type of Evaporator with neat sketch. **[5]**

b) Explain any one type of distillation coloumn with sketch. **[5]**

Q3) a) Explain Importance of control station in nuclear power plants. **[5]**

b) With the help of schematic diagram ,Explain Nuclear Power Plant. **[5]**

OR

Q4) a) Explain the following terms (any two) **[4]**

i) Solar Power Generation.

ii) Hydro-electric Power Plant.

b) Derive Overall material balance equation for heat exchanger and explain importance of LMTD. **[6]**

Q5) a) Fire tube boiler used in power plant are low cost & more fuel efficient", justify with suitable reason. **[8]**

b) Explain power generation method in thermal power plant. **[8]**

OR

P.T.O.

Q6) a) Explain Swelling & Shrinkling effect in boiler. What is remedial measures for swelling & Shrinkling in boiler drum control system. **[10]**

b) Explain the three element drum level control in boiler. **[6]**

Q7) a) Explain need of thermal stress measurement & controlled in turbine. **[10]**

b) Write a short notes on "Turbine Instrumentation". **[8]**

OR

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

a) burner management systems in boiler.

b) shell temperature monitoring and control.

c) Instrumentation for Boiler ancillaries.

d) Heat Loss Method for boiler efficiency.

Q9) a) Compare Solar and wind power plant. **[8]**

b) Compare thermal and nuclear power plant. **[8]**

OR

Q10)a) Compare Thermal & Hydroelectric power plant. **[8]**

b) Explain any one type of reactor used in Nuclear power plant with neat sketch. **[8]**

Total No. of Questions : 10]

SEAT No. :

P3527

[Total No. of Pages : 2

[5560]-179
T.E. (Instrumentation and Control Engineering)
INSTRUMENT & SYSTEM DESIGN
(2012 Course) (Semester - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain Ergonomics and Asthetics. **[5]**

b) Give two differences between IC HCNR 200 and IC HCNR 201. Define transfer gain. **[5]**

OR

Q2) a) Classify noise and explain popcorn noise. **[5]**

b) Explain breakfront type control panel layout. **[5]**

Q3) a) Write a short note on NEMA standard. **[5]**

b) Explain the term ESD. Give three ways to minimise its effect. **[5]**

OR

Q4) a) Explain various instrument specifications. **[4]**

b) Draw the connection diagram of IC XTR 110 for 0-5V input and 4-20mA current output. **[6]**

Q5) a) Draw internal diagram of IC MCT 2E. How it works? Enlist the applications of it. **[8]**

b) Explain the following related to PLL IC CD 4046. **[8]**

i) Phase comparator I

ii) ÷ N

iii) Comparator IN

iv) VCO OUT

OR

P.T.O.

Q6) a) Explain the following pins of IC 7107:

Back Plane/Ground, Test, AB4, Polarity **[8]**

b) Enlist the features and applications of IC ULN 2803. Give its two main specifications. A load that consumes a current of 950 mA, how it can be driven? **[8]**

Q7) a) What is solder mask? What is its need? Give its advantages and disadvantages? **[9]**

b) Differentiate between single side board, double side and SMD board. **[9]**

OR

Q8) a) A PCB is to be designed for an analog circuit. What different rules shall be considered? **[9]**

b) What is soldering flux? What are the characteristics required for flux? What are the different types of flux? **[9]**

Q9) a) Explain the terms MTTR and MTBF. **[4]**

b) Differentiate between reliability and quality. **[6]**

c) What are the cause of unreliability? What are the techniques to enhance unreliability? **[6]**

OR

Q10)a) Define reliability. Draw and explain the bath tub curve. **[8]**

b) Define and explain : Availability, Maintainability. **[8]**

■ ■ ■

Total No. of Questions : 10]

SEAT No. :

P3528

[Total No. of Pages : 2

[5560]-180
T.E. (Instrumentation & Control)
BIOMEDICAL INSTRUMENTATION
(2012 Pattern) (Semester - II) (306271) (End Semester)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Draw & explain the equivalent circuit for two electrodes connected to skin for bio potential measurement. **[6]**

b) Write a short note on Polarization of Electrodes. **[4]**

OR

Q2) a) Draw & Explain Cardiac Cycle. **[6]**

b) Write a short note on Internal Electrodes. **[4]**

Q3) a) Explain the Plethysmography with neat diagram. **[5]**

b) Explain the Transient Protection circuit used in designing the biomedical equipment. **[5]**

OR

Q4) a) State the Cause, Charactertics, Duration & Frequency of Generated Heart Sounds. **[5]**

b) Explain the Thermal Convection method of blood flow measurement along with neat diagram. **[5]**

Q5) a) What is EEG & its waveforms? Explain the structure of neuron with neat diagram. **[10]**

b) Explain the EEG amplifier with neat diagram. **[8]**

OR

P.T.O.

Q6) a) What is Electromyography? State the type of electrode used for its measurements. Explain Electromyography in details. **[10]**

b) Elaborate the concept of Electroencephalography with neat sketch. **[8]**

Q7) a) Write short note on hearing aids. State the role of Cochlea in hearing mechanism. **[8]**

b) Explain the various errors in Vision & their method of correction with neat sketch. State the Functions of three layers of eyes. **[8]**

OR

Q8) a) Define a hearing Threshold. Explain the Pure tone Audiometer with neat diagram. **[8]**

b) Describe the working of Audiometer system Bekesy with neat diagram. **[8]**

Q9) a) What is Spirogram? Draw & Explain the working of basic water sealed Spirometer for Respiration measurements. **[8]**

b) Draw & Explain the working of Oxygen Analyzer. **[8]**

OR

Q10)a) What is Oxygenator? Explain the principle & working of Membrane type Oxygenator. **[8]**

b) Explain the concept of ventilators with a neat sketch. **[8]**

Total No. of Questions :8]

SEAT No. :

P3529

[Total No. of Pages :2

[5560]-181
T.E. (Computer Engg)
THEORY OF COMPUTATION
(2012 Pattern) (Semester-I)

Time : 2½ Hours] *[Max. Marks : 70*

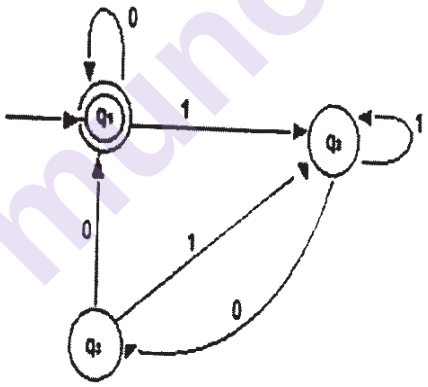
Instructions to the candidates:

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

Q1) a) Determine the regular expression over the alphabets{a.b} for the following. **[6]**

1) All the strings containing exactly two a's
2) All the strings containing ab
3) All the strings starting with xx

b) Determine the regular expression for following finite automata using Arden's Theorem. **[8]**



c) Prove that (1+00*1)+(1+00*1)(0+10*1)*(0+10*1)=0*1(0+10*1). **[6]**

OR

Q2) a) Construct NFA for the regular expression b+ba* **[6]**

b) Prove by Mathematical Induction
$2^0+2^1+2^2+2^3+.....+2^n=2^{n+1}-1$ for all integers n>=0 **[6]**

c) Construct CFG for the language $L=\{0^i1^j2^k \mid j< k\}$ **[8]**

Q3) a) Convert the following CFG to chomskey's normal form (CNF) **[5]**
$S \rightarrow AB, A \rightarrow CA|\wedge, B \rightarrow DB|\wedge, C \rightarrow 011|1, D \rightarrow 01$

P.T.O.

b) Remove the ε productions from the CFG by preserving meaning of it. **[4]**

P={S $\rightarrow$ XYX, X $\rightarrow$ OX| ε, Y $\rightarrow$ 1Y| ε }

c) Write a short note on **[9]**

a) Unrestricted Grammar

b) CFG

c) Derivation Graph

OR

Q4) a) Construct Finite Automata for **[8]**

- 01[((10*)+111*)+0]*1
- 1(1+10)*+10(0+01)*

b) Simplify the following Grammar **[10]**

- S $\rightarrow$ Ab, A $\rightarrow$ a, B $\rightarrow$ C | b, C $\rightarrow$ D, D $\rightarrow$ E, E $\rightarrow$ a
- S $\rightarrow$ 0A0 | 1B1 |BB, A $\rightarrow$ C, B $\rightarrow$ S|A, C $\rightarrow$ S | ε

Q5) a) What is post machine? Construct a post Machine for strings having odd length and 'a' as a center symbol over Σ (a,b). **[6]**

b) What is NPDA? Construct a NPDA for L={$a^i b^j c^k$ | i $\neq$ j or j $\neq$ k} **[10]**

OR

Q6) a) What do you mean by NP-Complete problems? List all the problems in the class and explain any one in detail. **[8]**

b) Why do we need to reduce the given problem to Np-complete problem?Explain with suitable example. **[8]**

Q7) a) What is SAT problem? Explain in detail. **[8]**

b) What are tractable and Intractable problems? Explain **[4]**

c) What is Computational Complexity? Explain. **[4]**

OR

Q8) a) Construct TM which accepts even palindrome strings over the Σ={a.b}. **[8]**

b) Explain travelling salesperson problem. **[8]**

● ● ●

Total No. of Questions :10]

SEAT No. :

P3530

[Total No. of Pages : 2

[5560]-182
T.E. (Computer Engineering)
OPERATING SYSTEMS DESIGN
(2012 Course) (310242)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain Monolithic, Micro and Exokernel in detail. **[5]**

b) Explain different system calls for file system. **[5]**

OR

Q2) a) Explain Bankers Algorithm. **[5]**

b) Explain Linux thread management in detail. **[5]**

Q3) a) Explain init() process. **[2]**

b) Why is TLB used by virtual memory scheme? Describe how TLB works with the help of neat diagram. **[8]**

OR

Q4) a) Write a short note on Android Memory Management. **[5]**

b) Explain demand paging with suitable diagram. **[5]**

Q5) a) Explain advantages and disadvantages of process tracing in detail. **[8]**

b) What is IPC? Explain various models with the help of suitable diagram. **[8]**

OR

P.T.O.

Q6) a) Explain Pipes and Sockets with the help of suitable examples. **[8]**

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

i) Tunis system

ii) Semaphores

Q7) a) Explain : **[8]**

i) make

ii) nmake

iii) cmake

iv) egrep

b) Explain in detail Fedora 19 EFI files. **[8]**

OR

Q8) a) What do you mean by secure boot. Explain differences between BIOS and UEFI. **[8]**

b) Explain AWK tools in detail. **[8]**

Q9) a) Explain different classes of real time scheduling algorithms **[9]**

b) Explain Embedded System architecture with suitable diagram. **[9]**

OR

Q10) Write note on following. **[18]**

a) UNIX free BSD scheduling

b) Microsoft Windows CE

c) Palm OS

Total No. of Questions :10]

SEAT No. :

P3531

[Total No. of Pages : 2

[5560]-183

T. E. (Computer Engineering)

DATA COMMUNICATION AND WIRELESS SENSOR NETWORKS

(2012 Pattern) (Semester - I) (End Sem.) (310243)

Time : 2 ½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain in detail the Pulse code modulation technique. List its Advantages and Disadvantages. **[7]**

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

OR

Q2) a) Explain Framing. Detail the methods of framing. (fixed and variable size framing) **[5]**

b) Explain Packet switching technique with an example. **[5]**

Q3) a) What is sliding window protocol? Explain 1 bit sliding window protocol. **[5]**

b) Ten thousand reservation stations are available for use of single slotted ALOHA channel. The average station has 18 reservation request per hour. A slot has 125 microseconds. What is approximate channel load? **[5]**

OR

Q4) a) Draw and Explain the Software and Hardware components of wireless node or sensor node. **[5]**

b) Explain the architecture of Sensor node? **[5]**

Q5) a) Describe how does STEM protocol provide solution to idle listening problem? Explain STEM-B and STEM-T. **[8]**

b) Write a note on schedule based Protocols and Contention based protocols. **[8]**

OR

P.T.O.

Q6) a) Explain S-MAC protocol for WSN in detail. **[8]**

b) LEACH, is a TDMA based MAC protocol integrated with clustering and routing-justify. Also explain with diagram the organization of LEACH rounds. **[8]**

Q7) a) Explain data dissemination and gathering and Detail about Flooding Technique in Wired and Wireless adhoc Networks. **[10]**

b) Explain in detail Attribute based routing with an example attribute value event record. **[8]**

OR

Q8) a) List out the Routing Challenges and Design Issues in WSN. **[8]**

b) What is the main objective behind designing SPIN routing protocol for WSN? Also discuss its various deficiencies. **[10]**

Q9) a) Explain the role of every sensor node in information driven sensor querying (IDSQ) method. **[8]**

b) Explain the impact of anchor Placement and Discuss how a node with unknown position can directly communicate with anchors. **[8]**

OR

Q10)a) How the design of Sensor Operating System (SOS) different from traditional operating system? List the issues in designing OS for WSN. **[7]**

b) Comparison of Tiny OS with other OS like MATE, MAGNET and MANTIS. **[6]**

c) "In future, WSNs are expected to be integrated into the "Internet of Things". Justify the statement. **[3]**

❄❄❄❄

Total No. of Questions :10]

SEAT No. :

P3532

[Total No. of Pages :2

[5560]-184

T. E. (Computer Engg.)

DATABASE MANAGEMENT SYSTEM APPLICATIONS

(2012 Course) (Semester - I) (End Sem.) (310244)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q.No1or Q.No2, 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) State and explain the advantages of Database systems over conventional file systems. **[5]**

b) Explain difference SQL vs NoSQL **[5]**

OR

Q2) a) Explain the concept of Primary key and foreign key with example. **[5]**

b) Explain the concept of Conflict Serializability and View Serializability. **[5]**

Q3) a) Explain CRUD operations in MongoDB. **[5]**

b) Write note on Performance Tuning in SQL Databases. **[5]**

OR

Q4) a) Given the following database: **[5]**

Stud_marks(rollno,name,class)

Stud_result(rollno,total_marks,grade)

Write SQL queries for :

i) Find all students class wise who got distinction grade.

ii) Find the average of total_marks obtained by each class.

iii) Display the students names with respect to class who are failed and at least 3 characters are in the name.

b) Explain the concept of Indexing in MongoDB. **[5]**

P.T.O.

Q5) a) What are Distributed Databases? Explain with architecture, also enlist its advantages and disadvantages. **[8]**

b) Explain the concept and steps in JDBC Connectivity. **[8]**

OR

Q6) a) Explain the concept of Parallel Databases. Also explain speed up and scale up of Parallel Databases. **[8]**

b) Write short note on Cassandra and list out the differences of Cassandra and MySQL. **[8]**

Q7) a) Write note on HADOOP. **[7]**

b) Write note on : **[10]**

i) XML DTD's

ii) Querying XML data

OR

Q8) a) Explain the concept of HDFS and MapReduce. **[7]**

b) Explain the concept of R-Programming. **[5]**

c) Explain the concepts : i) JSON ii) BIGDATA **[5]**

Q9) a) Write short note on ETL Process. **[5]**

b) List out and explain any two Data Mining Techniques. **[7]**

c) Explain the BIS Components. **[5]**

OR

Q10)a) Differentiate between Operational Database and Data Warehouse. **[5]**

b) Explain the Association Rule Mining with example. **[7]**

c) Write note on: **[5]**

i) Recommendation Algorithm

ii) Supervised Vs Unsupervised Algorithm

Total No. of Questions : 8]

SEAT No. :

P3533

[Total No. of Pages : 2

[5560]-185

T.E. (Computer Engineering)

COMPUTER FORENSIC AND CYBER APPLICATIONS

(2012 Course) (Semester-I) (310245)

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) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) What are the different types of transmission media? Explain with example. **[8]**

b) How the attacker and gender offenders misuse internet? **[6]**

c) Differentiate between Bridge and Router. **[6]**

OR

Q2) a) What are different digital investigation process model? **[8]**

b) Explain periodic listen & sleep operation in S-MAC. **[6]**

c) What is modus operandi? Explain motives behind it. **[6]**

Q3) a) Write a short note on cyber stalking & cyber stalkers. **[8]**

b) What is an investigative reconstruction process? Apply investigative reconstruction process in case of violent crime. **[8]**

OR

Q4) a) What are the different steps applied in examining the compute crime? Prepare an investigative report for " Mouse theft in Computer Lab from College". **[8]**

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

i) Private Key encryption

ii) Public Key encryption

P.T.O.

Q5) a) How to handle mobile devices as source of evidence? **[8]**

b) Describe Intellectual Property Rights (IPR) **[8]**

OR

Q6) a) Describe NTFS file system. **[8]**

b) Difference between digital evidence on window system & Unix system. **[8]**

Q7) a) What is an E-mail forgery & tracking? How it is carried out? **[8]**

b) How different logs in TCP/IP related digital evidence traced? Explain with example. **[10]**

OR

Q8) a) Explain concept of searching & tracking on IRC **[8]**

b) Write short note on :

i) Etherent

ii) ATM network. **[10]**

Total No. of Questions : 10]

SEAT No. :

P3534

[Total No. of Pages : 2

[5560]-186

T.E. (Computer Engineering)

PRINCIPLES OF CONCURRENT AND DISTRIBUTED PROGRAMMING

(2012 Course) (Semester-II) (310249)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) What are the different computational Models? Explain in detail. **[6]**

b) Write a program in LISP to find factorial of a given number. **[4]**

OR

Q2) a) Explain inter process communication. **[6]**

b) Explain how to count task dependency. **[4]**

Q3) a) Write a note on Feng's classification. **[6]**

b) Explain various types of parallelism. **[4]**

OR

Q4) a) Explain: **[6]**

- General purpose computer architecture.
- Special purpose computer architecture.

b) Compare GPU and CPU. **[4]**

P.T.O.

Q5) a) What are the major issues of designing a Distributed OS? **[10]**

b) List and explain any two transparencies of a distributed system with a suitable example. **[8]**

OR

Q6) a) What is distributed computing system? Explain tightly and loosely coupled system with neat diagram. **[10]**

b) Explain the processor pool model along with advantages and disadvantages of it? **[8]**

Q7) a) Explain Domain0 and DomainU in Xen? **[8]**

b) What is memory and MMU 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) What are the advantages of virtualization? Explain. **[4]**

Q9) a) Explain the concept of mobile computing with respect to the following points: **[6]**

i) Mobile computing classification.

ii) Advantages.

iii) Security issues before mobile computing.

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 multi-GPU model in single-node systems in CUDA. **[6]**

c) Explain CUDA Task Execution Model. **[4]**

Total No. of Questions : 10]

SEAT No. :

P3535

[Total No. of Pages : 2

[5560]-187
T.E. (Computer Engg.)
EMBEDDED OPERATING SYSTEMS
(2012 Pattern) (Semester - II) (310250)

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) What the features of ARM processor? List the Registers of ARM. **[6]**

b) Explain the features of Real time operating system. **[4]**

OR

Q2) a) Name and explain the different operating modes of ARM. **[6]**

b) Define hard real time, soft real time, Latency, Deadline. **[4]**

Q3) a) Justify Linux is more popular in embedded system. **[4]**

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

i) Tool Chain

ii) UBoot.

OR

Q4) a) Name and explain kernel image components. **[6]**

b) What is cross development environment for Linux? **[4]**

Q5) a) How to format and partition a USB stick? Explain the commands used. **[5]**

b) Explain the term 'journaling'. Name and explain two file systems which use journaling. **[6]**

c) Explain the following Linux utilities used: **[6]**

i) mount

ii) mke2fs

iii) fdisk

OR

P.T.O.

Q6) a) What is Das U-Boot? What are U-Boot command sets? **[7]**

b) What are the different file systems used for embedded Linux? **[7]**

c) What are pseudo file systems? Name any one. **[3]**

Q7) a) Why tracing and profiling tools are required? Name and explain 3 such tools. **[7]**

b) How to debug a core dump using GDB? **[6]**

c) What is SSH? When do you use it? **[4]**

OR

Q8) a) Explain interfacing of BBB with Stepper motor. **[7]**

b) How to debug Linux kernel code? **[6]**

c) What are the various development tools used in embedded development? **[4]**

Q9) a) Explain System Server, Activity Manager in Android. **[5]**

b) How to port Linux on target board? **[5]**

c) How do you customize Linux for specific board? **[6]**

OR

Q10)a) Which Linux version supports real-time features? What are the real-time features of this Linux kernel? **[6]**

b) How different latency periods affect the real-time process execution? **[6]**

c) Explain Init process. **[4]**

Total No. of Questions : 8]

SEAT No. :

P3536

[Total No. of Pages : 2

[5560]-188
T.E. (Computer Engineering)
COMPUTER NETWORKS
(2012 Course) (Semster - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Assume suitable data, if necessary.***

Q1) a) What is requirement of DNS. Explain its working in detail. **[8]**

b) What are different DHCP messages. Explain with examples. **[6]**

c) Draw UDP header structure; explain significance of each field in UDP header. **[6]**

OR

Q2) a) Explain in detail RIP protocol. **[6]**

b) Divide the network 220.125.5.192/26 into 4 sub networks. How many hosts can be connected in each network? Show their IP range, network address and broadcast address. **[8]**

c) Compare IPv6 and IPv4. Draw and explain IPv6 header format. **[6]**

Q3) a) Explain all versions of 802.11 standard and components. **[8]**

b) Write short note on following (any 2) **[8]**

i) WLAN

ii) WAP 2.0

iii) SONET

OR

Q4) a) Explain WAP protocol stack. **[8]**

b) Explain Hidden station and Expose station Problem? **[8]**

P.T.O.

Q5) a) Explain the Architecture diagram of Delay Tolerant 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) What is ATM? Explain in detail. Explain the Heterogeneous vehicular Communication protocol Module. **[8]**

b) Explain working of SDN in detail with diagram. **[10]**

■ ■ ■

Total No. of Questions : 8]

SEAT No. :

P3537

[Total No. of Pages : 2

[5560]-189
T.E. (Computer Engineering)
SOFTWARE ENGINEERING
(2012 Pattern) (Semester - II) (310252)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve question number 1 or 2,3 or 4,5 or 6 and 7 or 8.***
2) ***Neat diagram must be drawn whenever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume Suitable datas if necessary.***

Q1) a) What is software engineering? What are the characteristics of software? **[6]**

b) Describe the User Interface analysis and design process with diagram and Explain interface design element. **[7]**

c) What is the fundamental difference between the structured analysis and object oriented strategies for requirements analysis. **[7]**

OR

Q2) a) Explain in detail the Unified process indicating workflows and process phases. What are the advantages of iterative development? **[7]**

b) Explain Behavioral model and what types of "states" behavioral model represents? **[7]**

c) Explain the quality attributes, considered in software design. **[6]**

Q3) a) What do you understnad by the term integration testing? Which types of defects are uncovered during integration testing. **[6]**

b) Distinguish between **[6]**

i) alpha testing and beta testing

ii) Verification and validation

c) Describe User Interface Testing, Positive testing and Nagative testing. **[5]**

OR

Q4) a) Explain Boundary value analysis testing and orthogonal Array testing. **[6]**

b) Explain System testing and regression testing? **[6]**

c) Basis path testing is covers all statement in program module. Justify with example. **[5]**

P.T.O.

Q5) a) Explain COCOMO II model. **[6]**

b) List the four P's of software project management spectrum. Explain how "the people" factor contributes towards the success of the software project. **[6]**

c) Explain the decision tree for make/buy decision. **[5]**

OR

Q6) a) Explain project scheduling? What are the basic principles of project scheduling? **[6]**

b) Discuss time line chart? Explain with suitable examples. **[6]**

c) Explain Risk identification? What are the different categories of risks? **[5]**

Q7) a) Explain Service-oriented architecture? **[5]**

b) What is OCL? Where it is used? **[5]**

c) Discuss architectural patterns in detail? **[6]**

OR

Q8) a) What is client server computing? Explain. **[5]**

b) Explain ISO 9126 Quality Factors. **[5]**

c) Describe the formal methods for software development? **[6]**

Total No. of Questions : 10]

SEAT No. :

P3538

[Total No. of Pages : 2

[5560]-190
T.E. (Computer Engineering)
DIGITAL SIGNAL PROCESSING APPLICATIONS
(2012 Pattern) (Semester - II) (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) Define mean, standard deviation, SNR, histogram and probability density function. **[5]**

b) State and define the periodic and non-periodic signal, even and odd signal also energy and power signal. **[5]**

OR

Q2) a) Find the circular convolution of $x(n)=\{1,2,2,1\}$ and $h(n)=\{1,2,3,1\}$ using matrix method. **[5]**

b) Show the relationship between DFT and DTFT. **[5]**

Q3) a) Compare between Radix-2 DIT FFT and DIF FFT algorithms. **[5]**

b) State and explain any two properties in terms of z-transform. **[5]**

OR

Q4) a) State and explain any three properties in terms of Fourier transform. **[5]**

b) Draw the neat flow graph for DIF FFT algorithm and consider N = 8. **[5]**

Q5) a) Describe the characteristic of filter and all pass filters. **[9]**

b) A DT System is given by

$$y(n)=\left(\frac{3}{4}\right)y(n-1)-\left(\frac{1}{8}\right)y(n-2)+x(n)+\left(\frac{1}{2}\right)x(n-1)$$

Obtain and Draw Direct Form - I and Direct Form - II IIR filter structure. **[9]**

OR

P.T.O.

Q6) a) Obtain and realize linear phase FIR filter structure having impulse response

$$h(n)=\delta(n)+½\delta(n-1)-1/4\,\delta(n-2)+½\delta(n-3)+\delta(n-4)$$ **[9]**

b) Derive the Direct Form-II IIR filter structure form system function H(Z) and represent it using multipliers, adders and delay elements. **[9]**

Q7) a) Describe about the SIMD architecture and instructions. **[8]**

b) Explain the application of DSP in telecommunication and biomedical. **[8]**

OR

Q8) a) What is OMAP? Explain the Software architecture of OMAP in brief. **[8]**

b) Write short note on OMAP multimedia applications. **[8]**

Q9) a) Explain the gray scale image is different than color image. Write shot note on image enhancement. **[8]**

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

OR

Q10)a) What is Companding? How important this process is in audio processing? Explain the high fidelity audio in brief. **[8]**

b) Explain the brightness, contrast adjustment and gray scale transformation in brief. **[8]**

Total No. of Questions :10]

SEAT No. :

P3539

[Total No. of Pages : 2

[5560]-191

T.E. (Information Technology)

COMPUTER NETWORK TECHNOLOGY

(2012 Pattern) (Semester-I) (314441)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) What are the problems with RIP protocol? How does it overcome it. **[6]**

b) What is three way handshake mechanisms in TCP? Draw suitable diagram. **[4]**

OR

Q2) a) How is file transferred using FTP? Why does FTP need two ports for file transfer? **[6]**

b) What are the different request reply messages in ICMP? Discuss each. **[4]**

Q3) a) What is socket? Describe any five socket primitives. **[6]**

b) How TCP's Silly window syndrome created by sender resolved? **[4]**

OR

Q4) a) How is an E-mail transferred from client to mail server and then to recipient? Discuss the protocols. **[6]**

b) How does TCP control congestion? **[4]**

Q5) a) Draw and explain architecture adhoc and infrastructure based network of 802.11. **[8]**

b) How CSMA/CA works as MAC layer mechanism for WLAN? **[8]**

OR

P.T.O.

Q6) a) What is hidden station and exposed station problem in WLAN? Can these problems avoidable? Explain. **[8]**

b) Describe Bluetooth protocol stack. **[8]**

Q7) a) State applications of setting up wireless sensor network. **[8]**

b) Draw neatly Sensor Node Architecture showing different hardware components in WSN. Explain each component in detail. **[8]**

OR

Q8) a) What are the operating environment constraints in WSN? **[8]**

b) What is the meaning of propagation impairments in radio wave propagation? How they influence radio wave communication? Explain in detail. **[8]**

Q9) a) What are the challenges of routing in sensor network? How are routing protocols for sensor network classified? Explain SPIN as routing protocol for WSN. **[10]**

b) What are the design issues of MAC protocol for wireless sensor network? **[8]**

OR

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

i) Software defined networking

ii) Internet of things

iii) Bring your own device

b) Explain routing in MANET using AODV and DSR. **[8]**

Total No. of Questions :10]

SEAT No. :

P3540

[Total No. of Pages :2

[5560]-192

T.E. (Information Technology)

THEORY OF COMPUTATION

(2012 Pattern) (Semester-I) (314442)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Construct FA that accepts odd number of ones & any number of zeros. **[6]**

b) Define regular sets. List out closure properties of regular sets. **[4]**

OR

Q2) a) Design a Moore machine to generate 1's compliment of the given binary number. **[5]**

b) Construct FSM for divisibility by 3 tester for decimal number. **[5]**

Q3) a) Define the following and give appropriate examples.

i) Derivation Tree

ii) Context free grammar **[4]**

b) Convert right linear grammar to its equivalent left linear grammar. **[6]**

$S \rightarrow bB$

$B \rightarrow bC$

$B \rightarrow aB$

$C \rightarrow a$

$B \rightarrow b$

OR

Q4) a) Convert following CFG to CNF **[6]**

$S \rightarrow aaaaS$

$S \rightarrow aaaa$

b) Write a short note on the applications of CFG. **[4]**

P.T.O.

Q5) a) Design a PDA that checks wellformedness of parentheses. Simulate PDA for (( )()( )). **[9]**

b) Define post machine. Compare FA, PDA and post machines. **[9]**

OR

Q6) a) Construct PDA from CFG **[9]**
$S \rightarrow SS \mid (S) \mid ()$ Derive for (()()).

b) Design a PM to accept language **[9]**
$L=\{a^n b^{n+1}, n >=0\}$.

Q7) a) Design a TM that recognizes strings containing equal number of zeros and equal number of ones. **[8]**

b) Explain the following for a TM- **[8]**
i) Power of TM over finite state machine
ii) Universal TM.

OR

Q8) a) Design a TM that performs the addition of two unary numbers. **[8]**

b) Write a short note on: **[8]**
i) Church Turing Hypothesis.
ii) Post correspondence problem.

Q9) a) Write a short note on decidable problems concerning. **[8]**
i) Context free languages
ii) Turing machines

b) State and prove Halting problem of Turing Machine is unsolvable. **[8]**

OR

Q10)a) Write short note on unsolvability of Turing machine. **[8]**

b) Define decidability. How to prove the given language is undecidable? List some undecidable problems. **[8]**

● ● ●

Total No. of Questions :10]

SEAT No. :

P3541

[Total No. of Pages : 3

[5560]-193

T.E. (Information Technology)

DATABASE MANAGEMENT SYSTEMS

(2012 Course) (Semester - I)

Time : 2 ½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answers Q 1 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 Different types of attributes with suitable example and notation **[3]**

b) When the database is said to be in 3NF? **[3]**

c) A database is being constructed to keep track of the teams and games of a sports league. A team has number of players, not all of whom participate in each game. It is desired to keep track of the players participating in each game for each team, the positions they played in that game, and the result of the game. Design an ER schema diagram for this application, stating any assumptions you make. Choose your favorite sport (e.g. soccer, baseball, football). **[4]**

OR

Q2) a) Explain two types of Log Based Protocol. **[6]**

b) What is Embedded SQL? **[2]**

c) Explain Lock-compatibility Matrix **[2]**

Q3) a) Consider the relational database given below : **[5]**

employee (emp_name, street, city)

works (emp_name, company_name, salary)

company (company_name, city)

manager (emp_name, manager_name)

P.T.O.

Write a query for each of the following :

i) Find the emp_name, street and cities of residence of employees whose salary exists in between 10000 and 20000 and work for ABC Ltd.

ii) Find the name, street and cities of employees who live in the same city as the company they work for.

iii) Find all employees in the database who earn more than each employee of Central Bank.

iv) Find the company that has the most employees.

v) Find all employees who live in the same city and on the same street as do the manager.

b) Explain the concept of Conflict and View Serializability with proper example. **[5]**

OR

Q4) a) Explain DBMS System Architecture. **[5]**

b) Explain the need of concurrency control in transaction management. **[5]**

Q5) a) What are the advantages and disadvantages of Distributed Database System? **[4]**

b) Define following terms : **[6]**

i) Throughput

ii) Response time

iii) Speed-up

c) Explain 2-tier and 3-tier Architecture of databases. **[8]**

OR

Q6) a) Differentiate between client-server and centralized architecture. **[6]**

b) Explain Shared nothing and Shared memory parallel database architectures. **[6]**

c) Explain sharding in Mongo DB **[6]**

Q7) a) Explain working of different nodes in HDFS. **[6]**

b) Explain HBase architecture. **[5]**

c) What is XML DTD? Explain with example. **[5]**

OR

Q8) a) Explain X Query and X Path. **[6]**

b) Explain how JSON Object and Array are created? **[6]**

c) Enlist similarities and differences between XML and JSON. **[4]**

Q9) a) Explain main components of "Data Warehouse". **[8]**

b) Define data mining. Explain data mining tasks with suitable example. **[8]**

OR

*Q10)*a) Explain the concept of mobile databases. **[8]**

b) Explain how to deal with massive datasets using map-reduce and hadoop. **[8]**

Total No. of Questions :10]

SEAT No. :

P3542

[Total No. of Pages : 2

[5560]-194

T. E. (Information Technology)

SOFTWARE ENGINEERING

(2012-Pattern) (Semester - I)

Time : 2 ½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain the generic process model of software development. **[5]**

b) What is difference between hardware & software? Explain bath tub curve. **[5]**

OR

Q2) a) Explain software engineering process framework activates. **[5]**

b) State and Explain different software myths & realties. **[5]**

Q3) a) Explain Agility principles used in agile development. **[5]**

b) Explain in detail Extreme programming (XP) values. **[5]**

OR

Q4) a) Explain the requirements elicitation work products. **[5]**

b) Draw and explain use case Diagram for Library Management System. **[5]**

Q5) a) What is functional Independence? Differentiate between coupling functional independence and cohesion functional independence. **[8]**

b) What is software architecture? Explain Data Centered and Object Oriented architectural style of the system. **[8]**

OR

P.T.O.

Q6) a) What are elements of Design model? What are the elements of architectural design? Explain design principles **[8]**

b) Explain architectural trade-off analysis method (ATAM) **[8]**

Q7) a) Write a short note on Interface Designs principles. **[8]**

b) Define Usability. Explain different characteristics Usability & ISO. **[8]**

OR

Q8) a) Explain the Hick's law & Fitt's Law? How is it used in UI design? **[8]**

b) Write short note on Shneiderman's 8 golden rules **[8]**

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

i) Technology evolution

ii) Collaborative development

b) What is clean room software development? Explain major task conducted during clanroom approach. **[8]**

OR

Q10)a) Explain the software configuration management process & SCM repository. **[10]**

b) i) Write short note on test driven development. **[8]**

ii) What are challenges of Global Software Development?

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Total No. of Questions :10]

SEAT No. :

P3543

[Total No. of Pages : 2

[5560]-195

T.E. (Information Technology)

WEB ENGINEERING & TECHNOLOGY

(2012 Course) (Semester -I) (314445)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) What is search engine? Explain its working. **[5]**

b) Explain various phases of Web Engineering. **[5]**

OR

Q2) a) Explain drawbacks of the two-tier client-server architecture. **[5]**

b) Explain how Cohesive Organization systems are created. **[5]**

Q3) a) Explain with suitable example HTML tags used to create a Table. **[5]**

b) Differentiate between HTML and DHTML. **[5]**

OR

Q4) a) What are the types of CSS explain with examples? **[5]**

b) Explain with example Audio and video support in html. **[5]**

Q5) a) Explain Java Script Characteristics. **[8]**

b) What are benefits of using PHP? **[8]**

OR

Q6) a) Explain session management with respect to PHP. **[8]**

b) Explain use of Cookies in PHP. **[8]**

P.T.O.

Q7) a) Explain life cycle of servlets. **[8]**

b) Differentiate between HTML and XML. **[8]**

OR

Q8) a) Explain DTD with suitable example. **[8]**

b) Write a note on ontology. **[8]**

Q9) a) What is Word Press Cashing and why is it important? **[9]**

b) Write a short note on Drupal. **[9]**

OR

Q10)a) What are different steps in website deployment? **[9]**

b) What is AJAX? Explain the working of AJAX. **[9]**

Total No. of Questions :10]

SEAT No. :

P3544

[Total No. of Pages : 2

[5560]-196

T.E. (Information Technology)

DESIGN AND ANALYSIS OF ALGORITHMS

(2012 Pattern) (Semester -II) (314449)

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.***

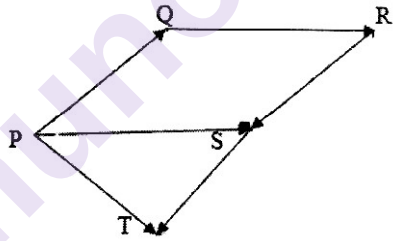
Q1) a) Construct a recurrence relation for the larger integer multiplication using divide and conquer strategy. Solve the same to analyze its time complexity. **[5]**

b) Write an algorithm for quicksort using divide and conquer. **[5]**

OR

Q2) a) Compare Greedy strategy and dynamic programming. **[3]**

b) Find the transitive closure of given graph. **[7]**



Q3) a) Solve the following instance of fractional knapsack and calculate maximum profit: n=4, p(1:4)={21,12,10,8}, w(1:4)={7,3,2,4}, m=13**[5]**

b) Write and explain the control abstraction for divide and conquer strategy **[5]**

OR

Q4) a) Define the principle of Optimality and describe its significance in dynamic programming. **[4]**

b) Find the cost of minimum spanning tree of the given graph by using Prim's algorithm. **[6]**

Edge	Cost		Edge	Cost		Edge	Cost		Edge	Cost
(a,b)	15		(b,c)	13		(c,d)	12		(c,e)	8
(a,c)	18		(b,d)	9		(d,e)	11		(a,e)	14

P.T.O.

Q5) a) Explain the following terms with suitable examples: **[9]**

i) Chromatic number of a graph

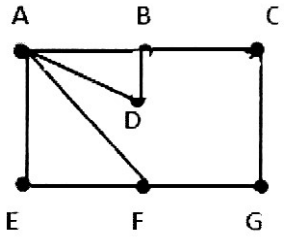
ii) Implicit Constraints

iii) Explicit Constraints

b) Solve the 4-Queen's problem. Draw the state space tree for the same. **[7]**

OR

Q6) a) Find Hamiltonian cycles starting from A in given graph. Draw state space tree for the same. **[8]**



b) Write and explain backtracking algorithm for solving Sum of subsets problem. **[8]**

Q7) Describe the Travelling Salesperson Problem. Solve the following instance of TSP by dynamic programming and by LC-branch and bound. **[18]**

$$\begin{bmatrix} \infty & 15 & 6 & 20 \\ 5 & \infty & 9 & 15 \\ 6 & 13 & \infty & 12 \\ 8 & 8 & 19 & \infty \end{bmatrix}$$

OR

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

a) LC Search

b) Bounding Function

c) Backtracking V/s Branch and Bound

Q9) a) Describe working of PRAM and its various types. **[8]**

b) Write a non-deterministic algorithm for searching of an element in an array. What is its time complexity? **[8]**

OR

Q10)Explain the following concepts with examples: **[16]**

a) Deterministic and Non-deterministic Algorithms

b) Decision and optimization problems

c) Pointer Doubling Problem.

d) Vertex Cover Problem

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Total No. of Questions : 10]

SEAT No. :

P6064

[Total No. of Pages : 3

[5560]-197
T.E. (Semester - II)
SYSTEMS PROGRAMMING
(2008 Pattern)

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 neccessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Explain the various data structures used in a two pass macroprocessor. **[6]**

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

i) Defined symbol
ii) Forward referenced symbol
iii) Back patching
iv) Assembler

OR

Q2) a) Explain overlay structure and subroutine linkage w.r.t. loaders. **[6]**

b) Explain how the statement **[4]**

A EQU LOOP +1

is processed if LOOP is a defined symbol/ forward referenced symbol.

Q3) a) Define loader and explain its funcions. **[4]**

b) Explain different parameter passing methods used in macroprocessors. **[6]**

OR

Q4) a) Compare single pass and two pass assembler. **[5]**

b) Write short note on compile and Go Loader. **[5]**

Q5) a) With neat diagram explain classification of parsers. **[6]**

b) Remove left recursion from the given grammar. **[4]**

$E \rightarrow E + E / E^* / (E) / id / num$

P.T.O.

c) For the given grammar construct the LR(0) automation of SLR parser. **[8]**

$E \rightarrow TE' \mid T$

$E' \rightarrow +TE' \mid \varepsilon$

$T \rightarrow FT' \mid F$

$T' \rightarrow *FT' \mid \varepsilon$

$F \rightarrow id \mid (E)$

OR

Q6) a) Consider the following grammar. **[10]**

$S \rightarrow Aa / bAc / Bc / bBa$

$A \rightarrow d$

$B \rightarrow d$

Construct LR (1) automation of CLR parser and parse table.

b) For the given grammar, generate the string aabbab using recursive descent parser. $S \rightarrow aSbS/ bSaS/ \varepsilon$ **[4]**

c) Compare SLR and CLR parsers. **[4]**

Q7) a) Define the following: **[4]**

i) Syntax Directed Definition.

ii) Syntax Directed Translation.

iii) Synthesized Attributes.

iv) Inherited Attributes.

b) Explain in detail quadruple generatio for 1D and 2D arrays. **[6]**

c) Explain dynamic allocation strategies. **[6]**

OR

Q8) a) Explain the need for Intermediate code generation and explain its types. **[6]**

b) Show DAG and quadruple for the given expression. **[6]**

temp = limit* (max-min)+3* limit* (max+min)

c) Generate three address code for **[4]**

```
for(i=0; i<=10; i++)
{
    p= q*r;
    q++;
}
```

Q9) a) Consider an example code and show the baisc flow graph for it. Explain the rules for forming the blocks. **[4]**

b) Explain machine dependent and independent optimization techniques. **[8]**

c) Discuss machine dependent issues for code generation. **[4]**

OR

Q10) a) Write down in detail different run time storage organization and allocation strategies. **[8]**

b) Discuss code generation issues. **[4]**

c) Write a note on activation record. **[4]**

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Total No. of Questions : 10]

SEAT No. :

P3545

[Total No. of Pages : 3

[5560]-198
T.E. (Information Technology)
OPERATING SYSTEM
(2012 Pattern) (314451) (Semester - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Which of the following instructions should be privileged? **[5]**

i) Set value of timer

ii) Read the clock

iii) Clear memory

iv) Issue a trap instruction

v) Turn off interrupts

vi) Modify entries in device-status table

vii) Switch from user to kernel mode

viii) Access I/O device

b) What resources are used when thread is created? How do they differ from those used when a process is created? **[5]**

OR

Q2) a) Explain the concept of Context Switching with the help of neat diagram. **[5]**

b) Provide two programming examples in which multithreading provides better performance than a single-threaded solution. **[5]**

Q3) a) For the table given below, draw a Gantt chart illustrating the process execution using non preemptive priority scheduling. **[5]**

A larger no indicates higher priority. Calculate average waiting time.

Process	Arrival Time	Burst Time	Priority
A	0	5	4
B	2	4	2
C	2	2	6
D	4	4	3

b) Explain message passing system for IPC and synchronization. **[5]**

OR

P.T.O.

Q4) a) Write the structure of producer and consumer process in bounded buffer problem using semaphore and discuss how critical section requirements are fulfilled. **[5]**

b) Draw and explain UNDX process state transition diagram. **[5]**

Q5) a) Consider the page reference string with 3 frames. **[9]**

A, B, C, D, E, C, D, A, F, G, H, G, H, I, G, H, I, E, D, E, D, B

Calculate the no. of page faults for following page replacement algorithms.

a) FIFO

b) OPTIMAL

c) LRU

b) Describe how Linux implements the following aspects of memory management. **[9]**

i) Virtual memory addressing

ii) Page allocation

iii) Page replacement algorithm

iv) Kernel memory allocation

OR

Q6) a) Explain Belady's anomaly with suitable example. **[4]**

b) What is cause of thrashing? How does the system detect thrashing? How the system can eliminate it? **[6]**

c) Explain the address translation mechanism in paging and segmentation. **[8]**

Q7) a) Consider a disk queue with I/O requests on the following cylinders in their arriving order: **[8]**

6, 10, 12, 54, 97, 73, 128, 15, 44, 110, 34, 45

The disk head is assumed to be at cylinder 23 and moving in the direction of decreasing number of cylinders. The disk consists of total 150 cylinders. Calculate and show with diagram the disk head movement using SCAN, C-SCAN, LOOK, C-LOOK disk scheduling algorithms.

b) Explain different file organization techniques. **[8]**

OR

Q8) a) Why I/O buffering is needed? State and explain different approaches of I/O buffering. **[6]**

b) Is disk scheduling, other than FCFS, useful in a single user environment. Explain your answer. **[6]**

c) What are different disk performance parameters? **[4]**

Q9) a) With neatly labelled diagram explain embedded Linux system architecture. **[8]**

b) Explain following operations wrt NACH OS. **[8]**

i) Modes of operations

ii) Multiprogramming

OR

Q10) Write short notes on **[16]**

a) Ubuntu EDGE

b) Android OS

c) Service Oriented OS

■ ■ ■

Total No. of Questions : 10]

SEAT No. :

P3546

[Total No. of Pages : 2

[5560]-199

T.E. (Information Technology)

MULTIMEDIA TECHNOLOGIES

(2012 Course) (Semester - II) (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 indicates full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) What is the need of multimedia? Why is multimedia important? Explain multimedia applications or any two web applications. **[5]**

b) What are various multimedia products? Explain briefing and reference products in detail. **[5]**

OR

Q2) a) Explain JPEG image compression with neat sketch. **[5]**

b) Write and explain Huffman Coding algorithm for the input with frequencies of occurrences A(3) B(5) 8(E) H(2) I(7). Construct Huffman Tree. **[5]**

Q3) a) What are image acquisition techniques? Explain image enhancement by spatial filtering. **[5]**

b) What are different Image File Format explain each. **[5]**

OR

Q4) a) What are various audio compression techniques? Explain ADPCM in brief. **[5]**

b) Write a short note on characteristic of sound wave Amplitute, Frequency, Waveform, Speed. **[5]**

Q5) a) What are various video transmission standards? Explain EDTV, CCIR, CIF, HDTV in short. **[8]**

b) What is a need of video file formats?Explain AVI and H.261 briefly. **[8]**

OR

P.T.O.

Q6) a) What is multimedia streaming? Explain RTP and RTSP Protocols in detail. **[8]**

b) Explain with suitable diagram encoding and decoding of MPEG 4. **[8]**

Q7) a) State twelve principles of animation.Explain any four of them. **[8]**

b) What is Animation? What are different techniques used to create Animation. Explain in brief. **[8]**

OR

Q8) a) What is animation? explain following techniques of animation **[8]**

i) Motion Cycling.

ii) Onion Skinning.

b) What is OpenGL? Write and explain main features of OpenGL. Explain OpenGL shadowing and rendering technique. **[8]**

Q9) a) What is virtual reality? Elaborate on immersive and telepresence virtual reality. **[6]**

b) Explain head mounted displays and their use in multimedia applications. **[6]**

c) What are the various categories of nodes in VRML? Explain in brief. **[6]**

OR

Q10)a) Explain GStreamer based Multimedia Framework with neat sketch. **[6]**

b) Describe Android Multimedia Framework Architecture. **[6]**

c) Differentiate between Virtual reality and Augmented reality. **[6]**

Total No. of Questions : 10]

SEAT No. :

P3547

[Total No. of Pages : 2

[5560] - 200
T. E. (IT)
INFORMATION TECHNOLOGY PROJECT MANAGEMENT
(2012 Pattern) (Semester - II) (End Sem.)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

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

Q1) a) Explain concept of SWOT Analysis? **[5]**

b) Describe various stages of project feasibility in detail? **[5]**

OR

Q2) a) Explain the role of manager in project management in detail. **[5]**

b) Describe various steps of product development process. **[5]**

Q3) a) Write short note on performance reporting. **[5]**

b) Explain fourteen principles of management stated by Henryl Fayol. **[5]**

OR

Q4) a) Describe various functions of Human Resource Management. **[5]**

b) Explain importance of cost management and time management in project execution. **[5]**

Q5) a) What are steps in project monitoring and control risk in project. **[8]**

b) Write short note on Risk Management. **[8]**

OR

P.T.O.

Q6) a) Explain Risk Identification with example. **[8]**

b) List contents of project proposal. **[8]**

Q7) a) Explain various objectives Quality Control. **[6]**

b) Write short note on **[10]**

i) Six sigma

ii) CMMI

OR

Q8) a) Differentiate between Quality Assurance and Quality Control. **[8]**

b) Explain ISO 9000 in detail with example. **[8]**

Q9) a) What is ERP? Why it is important to a company? **[8]**

b) Write short note on **[10]**

i) CRM

ii) IP patent and copyright

OR

Q10) a) Explain any 8 success factors for ERP implementation. **[8]**

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

i) Supply chain management

ii) Business processing Re engineering

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Total No. of Questions : 10]

SEAT No. :

P3549

[Total No. of Pages : 3

[5560]-202
T.E. (Chemical Engineering)
MASS TRANSFER - I
(2012 Pattern) (Semester - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Q.1 or 2, Q.3 or 4, Q.5 or 6, Q.7 or 8, Q.9 or 10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain the phenomenon of mass transfer by molecular diffusion. Define Fick's law of diffusion. **[4]**

b) Calculate the mass flux of benzene through a layer of air 10mm thickness at 25°C and 200kN/m^2 (total pressure), partial pressure of benzene is 6×10^3 N/m^2, at the left side of the layer and 1kN/m^2 at the right side. The mass diffusivity at this temperature and pressure is 4.4×10^{-6} m^2/sec. **[6]**

OR

Q2) a) Explain surface renewal theory. **[4]**

b) In a wetted wall column, a gas A is being stripped from A-water solution into an air stream. At a certain point in the column, the concentration of component A in liquid is 4.8 K mol/m^3 and partial of component A in gas stream is 1 atm. The equilibrium relation for dilute solution of component A in water is given by $P_{Ai} = 0.25\ C_{Ai}$ where **[6]**

P_{Ai} = Equilibrium partial pressure of component A (atm).

C_{Ai} = Equilibrium concentration of A in water $\left(\frac{\text{Kmole/ A}}{m^3 \text{ solution}}\right)$

Overall liquid coefficient, $K_L = 0.0144\ \frac{\text{Kmole A}}{\left(m^2 \cdot hr\right)\left(\frac{\text{Kmole A}}{m^3}\right)}$.

Assume that gas phase offers 70% of total resistance to mass transfer. Calculate the following:

i) Convective mass transfer coefficient in liquid phase K_l.

ii) Convective mass transfer coefficient in gas phase K_g.

iii) Overall mass transfer coefficient in gas phase K_G.

P.T.O.

Q3) a) Define absorption factor and stripping factor. Give factors to be considered for selection of solvent for absorption. **[4]**

b) Acetone is to be recovered from a 4.5% acetone-air mixture by scrubbing with water in a packed tower using counter-current flow. The liquid rate is 1.0 kg/m^2.s. and the gas rate is 0.6 kg/m^2. sec. The overall absorption coefficient K_{Ga} may be taken as 1.5×10^{-4} Kmol per sec per m^2 per (kN/m^2) partial pressure difference and the gas film resistance controls the process. What should be the height of the tower to remove 98.5% of the acetone. The equilibrium relation may be taken as Y = 0.85 X. **[6]**

OR

Q4) a) Explain concept of HETP, NTU and HTU in packed absorption column. **[4]**

b) An Acetone-air mixture containing 0.02 mol fraction acetone is reduced to 1% of this value by counter-current absorption with water in packed tower. The gas flow rate G is 1 kg/m^2 sec of air and the water entering is 1.6 kg/m^2 sec. For this system, Henry's law holds and $y_e = 1.75\ x$, where y_e is the mole fraction of acetone in a vapor in equilibrium with a mole fraction *x* in the liquid. Assume for dilute system, mole fraction are approximately equal to the mole ratio. How many overall transfer units are required? **[6]**

Q5) a) What are the different types of humidification and dehumidification equipments? Explain any one in detail. **[8]**

b) The air in a room is at 26.7°C and pressure of 101.325 kPa and contains water vapor with a partial pressure $P_A = 2.76$ kPa. Data - At 26.7°C, the vapour pressure of water is $P_{As} = 3.50$ kPa. Calculate the following: **[8]**

i) Humidity
ii) Saturation humidity
iii) Percentage humidity
iv) Percentage relative humidity

OR

Q6) a) Write a short note on : **[8]**

i) Adiabatic saturation temperature.
ii) Humid heat and Humid volume.

b) Derive an equation for height of the packings required in forced draft countercurrent water cooling tower, in term of Z = HTU × NTU where,

$NTU = \int_{H_{b-1}}^{H_{b-2}} \frac{d H_G}{H_F - H_G}$, use basic equations for heat and mass transfer in counter current cooling tower. State assumptions used. **[8]**

Q7) a) Explain with neat sketch - Mechanically agitated vessel. **[6]**

b) What are the various equipments used for gas-liquid contact? With neat sketch explain venturi scrubber and spray towers. **[10]**

OR

Q8) a) Explain the difference between Tray towers and packed towers. **[6]**

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

i) Types of packings.

ii) Types of Trays.

Q9) a) Explain the phenomena of movement of moisture within the solid. **[6]**

b) In a laboratory drying test with a solid material the following relation for the falling rate period was obtained, $\frac{dX}{d\theta} = -0.8(X - 0.05)$ where, X is the moisture content on dry basis, θ is the time in hours. The critical moisture content is 1.4 kg moisture per kg of dry material. Calculate : **[12]**

i) The time required for drying the material from $X_1 = 4.0$ to $X_2 = 0.1$.

ii) The equilibrium moisture content.

OR

Q10)a) Explain rate of drying curve. **[6]**

b) 160 kg of wet solid is to be dried from an initial moisture content of 25% to a final value of 6%. Drying test shows that the rate of drying is constant at 3×10^{-4} kg H_{20}/m^2.s. in the region 0.2 to 0.44 kg H_2O/kg of solid. The drying rate falls linearly in the range of 0.01 to 0.2 kg H_2O/kg of solid. If the equilibrium moisture content is 0.01 kg H_2O/kg of solid, calculate the time of drying. The drying surface is $1m^2$/30 kg dry weight. **[12]**

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Total No. of Questions :10]

SEAT No. :

P3550

[Total No. of Pages : 2

[5560]-203
T.E. (Chemical)
INDUSTRIAL ORGANISATION AND MANAGEMENT
(2012 Pattern) (Semester - I) (309343)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain four principles of Scientific management given by F W Taylor. **[6]**

b) Write a note on Public sector. **[4]**

OR

Q2) Explain in detail selection process. **[10]**

Q3) a) What is Job Evaluation? Explain the different types of job evaluation methods. **[8]**

b) Define recruitment. **[2]**

OR

Q4) Explain in detail

i) Tender and its types

ii) Merit rating **[10]**

Q5) a) Explain any two Pricing Strategies in detail. **[8]**

b) Write an explanatory note on Market Research techniques. **[8]**

OR

P.T.O.

Q6) a) Explain in detail sales promotion. **[8]**

b) Write an explanatory note on marketing mix. **[8]**

Q7) a) Write Notes on **[8]**

i) Factors affecting International Trade

ii) International Trade

b) Explain in detail Quality Circle. **[8]**

OR

Q8) a) Explain Total Quality Management of a process industry. **[8]**

b) What do you mean by dumping? Explain antidumping duty **[8]**

Q9) Write short notes on **[18]**

i) Work study

ii) Monopolies Restrictive Trade Practices (MRTP)

iii) Flow Chart and Flow Diagram

OR

Q10)a) What is patent? Explain the various aspects of patent rights. **[9]**

b) Write note on FERA and FEMA. **[9]**

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Total No. of Questions :10]

SEAT No. :

P3551

[Total No. of Pages : 2

[5560]-204
T.E. (Chemical)
CHEMICAL PROCESS TECHNOLOGY
(2012 Course) (Semester-I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Describe the chemical reactions involved in the process of soda Ash. **[5]**

b) Describe various electrolytic cells used in the process of sodium hydroxide and their advantages. **[5]**

OR

Q2) Discuss the production of urea with neat diagram. Also explain the major engineering problems involved in it. **[10]**

Q3) Define antibiotics and describe the production of penicillin. **[10]**

OR

Q4) Discuss any one: **[10]**

a) Production of pulp by Kraft process.

b) Manufacturing of Triple super phosphate with major engineering problem.

c) Recovery of sugar from sugarcane.

Q5) a) Describe solvent extraction process of oil. **[8]**

b) Describe the production of portland cement. **[8]**

OR

Q6) a) Draw neat diagram and explain hydrogenation of vegetable oil. **[8]**

b) Describe the blast furnace process. **[8]**

P.T.O.

Q7) a) Explain the production of water gas and give its applications. **[8]**

b) Enlist the various refining operations and explain the thermal cracking in brief. **[8]**

OR

Q8) a) Describe catalytic reforming in petroleum industry. **[8]**

b) Describe production of producer gas with major engineering problems. **[8]**

Q9) a) Discuss the production of isopropanol with its engineering problems. **[10]**

b) Explain the production of vinyl chloride. **[8]**

OR

Q10) a) Discuss the production of Styrene in details. **[10]**

b) Explain the production of phenol by any one method. **[8]**

Total No. of Questions :10]

SEAT No. :

P3552

[Total No. of Pages : 3

[5560]-205

T. E. (Chemical)

CHEMICAL ENGINEERING THERMODYNAMICS - II

(2012 Pattern) (Semester - I)

Time : 2 ½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) For a binary system show that any thermodynamic solution property is related with its component partial molar properties as **[10]**

$$M1 = M + x2\frac{dm}{dx1} \quad and \quad M2 = M - x1\frac{dm}{dx1}$$

OR

Q2) What is ideal solution Derive Equation for G^{id}, S^{id}, V^{id}, H^{id} **[10]**

Q3) a) Derive the Equation for Excess Gibbs Energy. **[4]**

b) Define the following terms : **[6]**

i) Fugacity and Fugacity Coefficient

ii) Activity Coefficient

OR

Q4) A liquid mixture of cyclohexane (a) phenol (b) for which x1 = 0.60 is in equilibrium with its vapor at 417. 15 K. Determine the equilibrium pressure P and vapor composition y1 from the following information. **[10]**

$ln\ \gamma_1 = Ax_2^2$, $ln\ \gamma_2 = Ax_1^2$ at 417.15 K, $P_1^{sat} = 1.24$ bar, $P_2^{sat} = 0.89$ bar. The system forms an azeotrope at 417.15 K for which $x_1^{a2} = y_1^{a2} = 0.294$.

P.T.O.

Q5) a) The vapour pressure of acetone Acetonitrile and Nitromethane can be represented by Antoine equation as **[10]**

$$\ln p_1^{sat} = 14.3916 - \frac{2795.82}{T + 230}$$

$$\ln p_2^{sat} = 14.2724 - \frac{2945.47}{T + 224}$$

$$\ln p_3^{sat} = 14.2043 - \frac{2972.64}{T + 209}$$

Where p_1^{sat}, p_2^{sat} and p_3^{sat} are KP_a and T is in ^0C. Assuming that the system follow raovult's law calculate

i) P and y_1 at T = 75ºC, x_1 = 0.30 x_2 = 0.40

ii) P and x_1 at T = 80ºC, y_1 = 0.45, y_2 = 0.35

b) Explain liquid - liquid equilibrium diagram. **[6]**

OR

Q6) a) Explain any two method of consistency test for VLE data **[10]**

b) Derive various criteria for phase equilibrium. **[6]**

Q7) Define and derive the Equation for Following Terms :

i) Reaction Coordinate **[6]**

ii) Application of Equilibrium Criteria **[5]**

iii) Effect of Temperature on Equilibrium Constant **[5]**

OR

Q8) a) Derive the relation $\Delta G = -RT \ln K$ **[8]**

b) Consider a reaction $H_2O \rightarrow H_2 + 1/20_2$ occurring in a closed vessel with n_0 moles of water vapor initially. Derive an expression for the mole fractions of all the components and the fractional decomposition of water in terms of the reaction coordinate. **[6]**

c) Define the term Fugacity **[2]**

Q9) a) Derive the Relation of Equilibrium Constant to Composition for gas Phase and Liquid Phase Reaction. **[12]**

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

i) Phase Rule for Reaction System.

ii) Fuel Cell

OR

Q10) The water gas Shift reaction is carried out under the different set of conditions. Calculate fraction of stream reacted in each case. **[18]**

a) The reactant consists of 1 mol of H_2O and One mole of CO. The Temp is 1100K and Pressure 1 bar

b) The reactant consists of 2 mol of H_2O and One mole of CO. The Temp is 1100K and Pressure 1 bar

c) The Initial Mixture consist of 1 mol of H_2O,2 Mol of CO other conditions are same as above.

d) The Initial Mixture consist of 1 mol of H_2O, 1 Mol of CO and 1 mol of CO_2 other conditions are same as above

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Total No. of Questions : 10]

SEAT No. :

P3553

[Total No. of Pages : 2

[5560]-206
T.E. (Chemical Engineering)
CHEMICAL REACTION ENGINEERING - I
(2012 Pattern) (309348)

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) Differentiate constant volume and variable volume methods of analysis of reactor. **[6]**

b) Distinguish between homogeneous and heterogeneous reactions? **[4]**

OR

Q2) a) Give the basis on which chemical reactions and reactors are classified with suitable examples. **[6]**

b) What are single and multiple reactions. **[4]**

Q3) a) Define the term Rate of Reaction and what are the variables affect the rate of reaction. **[6]**

b) Define molecularity and order of reaction. **[4]**

OR

Q4) Derive the performance equation for ideal Batch reactor. **[10]**

Q5) a) Discuss optimum temperature progression needed for optimum reactor performance. **[10]**

b) Explain in detail Instantaneous yield and Overall yield for multiple reactions. **[6]**

OR

Q6) a) Write note on the product distribution in Quantitative and Qualitative methods. **[10]**

b) Write advantage and Disadvantages of a batch reactor. **[6]**

P.T.O.

Q7) a) Explain contacting patterns for various combinations of high and low concentration of reactants in non-continuous and continuous flow operations. **[8]**

b) Explain E, F and C curve and find the relationship between them. **[8]**

OR

Q8) a) Explain in detail the effect of temperature on equilibrium conversion of reactant at constant pressure. **[8]**

b) Discuss Micro and Macro Mixing of fluids. **[8]**

Q9) Write short notes:

a) Segregation model **[5]**

b) Models for non-ideal reactions **[5]**

c) Dispersion model **[4]**

d) Tanks in series model **[4]**

OR

Q10)Explain in detail effect of temperature on rate of reaction by following theories

a) Arrhenius law **[5]**

b) Thermodynamics Approach **[5]**

c) Collision theory **[4]**

d) Transition state theory. **[4]**

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Total No. of Questions : 10]

SEAT No. :

P3554

[Total No. of Pages : 2

[5560]-207

T.E. (Chemical)

TRANSPORT PHENOMENA

(2012 Course) (Semester-II) (309349)

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 table is allowed.***
4) ***Assume suitable data if necessary.***

Q1) Derive expression of velocity distribution for falling film with variable viscosity. **[10]**

OR

Q2) Derive the expression of temperature distribution for viscous heat source for Newtonian fluid. **[10]**

Q3) Derive expression of molar flux for diffusion with polymerization instantaneous chemical reaction. **[10]**

OR

Q4) a) Explain thermal energy balance equation. **[5]**

b) Explain boundary conditions to solve momentum transfer problems. **[5]**

Q5) Derive equation of motion for Cartesian coordinate system. **[18]**

OR

P.T.O.

Q6) a) Use Navier stokes equation of motion and derive expression of velocity distribution for laminar flow of fluid through the tube. **[12]**

b) Explain different types of derivatives used in equation of change. **[6]**

Q7) Derive expressions of pressure rise and friction loss occurring in sudden enlargement of a pipeline. **[16]**

OR

Q8) a) Derive the expression of friction factor for turbulent flow. **[8]**

b) Derive the expression of fanning friction factor. **[8]**

Q9) a) Explain Chilton-Colburn analogy. **[8]**

b) Explain Reynold's and Prandlt analogy. **[8]**

OR

Q10)a) Discuss transfer coefficients at high transfer rates by penetration theory.**[8]**

b) Explain binary mass transfer coefficient in one phase at low mass transfer rates. **[8]**

Total No. of Questions : 10]

SEAT No. :

P3555

[Total No. of Pages : 3

[5560]-208
T.E. (Chemical Engg.)
CHEMICAL ENGINEERING DESIGN - I
(2012 Pattern) (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) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) A storage vessel is to be covered by using a conical roof. Check the suitability of 10 mm thick plates for the construction of conical roof with permissible slope of 1 in 5. Superimposed load=1250 N/m^2, density of steel is 7700 kg/m^3. Diameter of vessel is 10 m. If the plates are not suitable, suggest the required thickness for roof plates. **[10]**

OR

Q2) a) What are the various types of storage vessels? **[5]**

b) Explain the procedure for the design of saddle support with necessary equations. **[5]**

Q3) 1.2 kg/sec of an organic liquid is to be cooled from 45 ºC to 20 ºC. The organic liquid is cooled by chilled water supplied from a refrigeration unit at a temperature of 5 ºC and can be heated upto 10 ºC. Use tubes of 12 mm ID and 2 mm wall thickness. Length of tubes is 1.5 m. Properties of organic liquid and water are :

Properties	Organic liquid	Water
Specific heat, J/KgK	2150	4180
Viscosity, Ns/m^2	0.25×10^{-3}	0.8×10^{-3}
Density, kg/m^3	716	1000
Thermal conductivity, W/mK	0.133	0.61

Fouling resistance for organic liquid = 0.0002 m^2K/W, Fouling resistance for water = 0.0004 m^2K/W, Correction factor for LMTD = 0.86. Steel tubes are to be used. Thermal conductivity of steel tube = 45 W/Mk. Design a suitable heat exchanger. **[10]**

OR

P.T.O.

Q4) Give the classification of vessel support. Explain saddle support and bracket support in detail with necessary equations. **[10]**

Q5) a) Explain the design methods for mixed vapor condensers. **[6]**

b) Gas oil at 200 deg C is to be cooled to 40 deg C. The oil flow rate is 22500 kg/h. Cooling water is available at 30 deg C and the temperature rise is to be limited to 20 deg C. The pressure drop allowance for each stream is 100 kN/m^2. Design a suitable heat exchanger for this duty. **[10]**

Physical properties of water :

Temperature, deg C	30	40	50
Cp, KJ/kg deg C	4.18	4.18	4.18
k, kW/m deg C	618×10^{-6}	631×10^{-6}	643×10^{-6}
μ, m N/m^{2}s	797×10^{-6}	671×10^{-6}	544×10^{-6}
ρ, kg/m^3	995.2	992.8	990.1

Physical properties of oil:

Temperature, deg C	200	120	40
C_p, KJ/kg deg C	2.59	2.28	1.97
k, kW/m deg C	0.13	0.125	0.12
μ, mN/m^{2}s	0.06	0.17	0.28
ρ, kg/m^3	830	850	870

OR

Q6) a) 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 °C as heating media. The overall heat transfer coefficient may be taken as 1.25 KW/m^2 ºC. **[8]**

Data: Specific heat of feed = 4000 J/kg ºC, Specific heat of product = 3260 J/kg ºC, Feed temperature = 18 ºC, BPR = 30ºC, Density of boiling liquid = 1390 kg/m^3. The liquid level in the evaporator is 1200 mm above the heating surface.

b) Explain forward and backward triple effect evaporator with required energy balance. **[8]**

Q7) a) Estimate the heat transfer coefficient for condensing steam on the outside, and on the inside of 25mm OD and 25 mm ID, vertical tube 3.66m long. The steam condensate rate is 0.015 kg/s per tube and condensation takes place at 3 bars. The steam will flow down the tube. Saturation temperature = 133.5 ºC, ρ_L = 931 kg/m^3, ρ_v = 1.65 kg/m^3, k_L =0.688 W/mºC, μ_L = 0.21 mNs/m^2, Pr_c = 1.27. **[12]**

b) Explain criteria for jacket selection in a reactor. **[6]**

OR

Q8) a) 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

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

i) Classification of reboilers.

ii) Condensation outside and inside vertical tubes.

Q9) a) A jacketed agitator reactor consists of a vertical cylinder 1.5 m in diameter with a hemispherical base and a flanged flat top. Jacket is fitted to the cylindrical section only and extends to a height of 1 m. The spacing between the jacket and the vessel wall is 75 mm. The jacket is fitted with a spiral baffle. The pitch between the spirals is 200 mm. The jacket is used to cool the reactor contents with chilled water at 10 ºC at 32,500 kg/hr and exit temperature 20 ºC. Estimate the heat transfer coefficient at the outside wall of the reactor and the pressure drop in the jacket. $J_h = 3.2 \times 10^{-3}$. Physical properties at mean temperature 15 ºC, density = 999 kg/m^3, viscosity = 1.136 mNs/m^2, P r = 7.99. $k_f = 595 \times 10^{-3}$ W/m ºC. **[10]**

b) Write about knockout drum and role of demister pad. **[6]**

OR

Q10)a) Explain the importance of column auxiliaries. **[6]**

b) Make a preliminary design for a separator to separate a mixture of steam and water. Operating pressure 4 bar, steam flow rate = 2000 kg/hr, water flow rate = 1000 kg/hr. At 4 bar, saturation temperature = 143.6ºC, liquid density = 926.4 kg/m^3, vapor density 2.16 kg/m^3. **[10]**

Total No. of Questions : 10]

SEAT No. :

P3556

[Total No. of Pages : 3

[5560]-209
T.E. (Chemical)
MASS TRANSFER - II
(2012 Pattern) (309351)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or 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) A mixture of 55% ethanol and 45% propanol is differentially distilled. If 40% of the liquid is vaporized, what are the compositions of distillate and residue? The equilibrium data: **[6]**

x	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
y	0	0.19	0.34	0.47	0.58	0.67	0.76	0.83	0.89	0.95	1

b) Explain the working principle of steam distillation. **[4]**

OR

Q2) a) A liquid mixture of benzene and toluene containing 40% by mole of benzene, is to be distilled at the rate of 100 kmol/h. Feed enters at a temperature of 327.6 K. Distillate contains 10% by mole of toluene and the bottom product contains 90% by mole of toluene. Reflux ratio is 3:1. Average heat capacity of feed is 159 kJ/kmol K and the average latent heat is 32100 kJ/kmol. Calculate the distillate and bottom molar flow rate and the number of plates required. B.P. of benzene = 353K and B.P. of Toluene = 383.8 K. Equilibrium data: **[8]**

x	0	0.13	0.258	0.411	0.581	0.78	1.0
y	0	0.261	0.450	0.632	0.777	0.90	1.0

b) What is importance of location of feed plate? **[2]**

P.T.O.

Q3) a) A continuous extraction column in used to extract a solute form an aqueous stream using an organic solvent. The distribution coefficient is $y^*/x = 1.2$, where y and x are mass fractions of solute in the extract and raffinate respectively. The height of transfer unit based on extract phase is 1.1 m. Assuming water and solvent are immiscible find the height of the column required for a feed flow rate of 100 kg/h, the pure solvent flows at a rate of 100 kg/h, weight fraction of solute in feed is 0.15 and that in the raffinate phase is 0.015. **[7]**

b) Describe the working principle of pulse extraction column. **[3]**

OR

Q4) a) A mixture of benzene and toluene containing 50 mole % benzene is distilled to give 90 mole % benzene and a bottom product containing 4 mole % benzene. The feed is half vaporized and a total condenser is used. Find the number of plates required at a reflux rate of twice the minimum. The equilibrium data: **[5]**

x	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
y	0	0.21	0.37	0.51	0.62	0.71	0.78	0.85	0.91	0.95	1.0

b) Explain the triangular diagram, binodal curve and define plait point and tie lines. **[5]**

Q5) a) Seeds containing 23% by weight of oil are to be extracted in a countercurrent plant and 75% of the oil is extracted as 45% solution in solvent. Fresh solvent is fed to the system and with every 4 kg insoluble solid 2 kg solution is removed. Find the number of equilibrium stages required and the amount of solvent required. **[10]**

b) Differentiate between constant and variable underflow. **[6]**

OR

Q6) a) Write the equations for number of transfer units (for immiscible solvents, linear equilibrium relation) when raffinate phase controls and extract phase controls. Explain all the terms. **[7]**

b) Give the functioning of a Rotocell Extractor with diagram in detail. **[9]**

Q7) a) Explain the desirable characteristics of an adsorbent. **[9]**

b) Give various examples of adsorbents and highlight their applications. **[9]**

OR

Q8) a) A solution of washed raw cane sugar is colored by the presence of small amounts of impurities. The 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 color of 0.96. 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) Draw the breakthrough curve and explain all the parts. **[8]**

Q9) a) Explain ultrafiltration and nanofiltration. Give an application of each. **[8]**

b) Give the classification of crystallizers. Explain about vacuum crystallizers. **[8]**

OR

Q10)a) Calculate the yield of $MgSO_4 . 7H_2O$ crystals when 1000 Kg saturated solution of $MgSO_4$ at 353 K is cooled to 303 K assuming 10% of the water is lost by evaporation during cooling. Data: **[8]**

Solubility of $MgSO_4$ at 353 K = 64.2 Kg/100 Kg water.

Solubility of $MgSO_4$ at 303 K = 40.8 Kg/100 Kg water.

Atomic Wt. Mg: 24, S : 32, O : 16, H : 1

b) Explain the functioning of Oslo crystallizer. **[8]**

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Total No. of Questions : 10]

SEAT No. :

P3557

[Total No. of Pages : 2

[5560] - 210

T. E. (Chemical)

PROCESS INSTRUMENTATION AND CONTROL

(2012 Pattern) (End Sem.) (Semester - II) (309352)

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) ***Assume suitable data, if necessary.***
4) ***Figures to the right indicate full marks.***

Q1) Explain Static and dynamic Characteristics of measuring instruments. **[10]**

OR

Q2) Explain intermediate elements of measurement system. **[10]**

Q3) a) Explain working principle, construction of thermistor. **[5]**

b) Explain Radiation pyrometer with diagram. **[5]**

OR

Q4) a) Explain with neat diagram construction, working principle of Bourdon pressure gauge. **[5]**

b) Describe working of LVDT. **[5]**

Q5) Explain with neat diagram construction, working principle of Orifice meter & pitot tube. **[16]**

OR

P.T.O.

Q6) Explain with neat diagram construction, working principle of Venturimeter & rotameter. **[16]**

Q7) Write a short note on : **[16]**

a) Ultraviolet absorption spectroscopy

b) HPLC

OR

Q8) Explain : **[16]**

a) PH Meter

b) Liquid Chromatography

c) IR absorption spectroscopy

Q9) a) Derive the dynamic response equation of thermometer. **[10]**

b) Explain feedback control system with transfer function. **[8]**

OR

Q10) a) Explain modes of control system. **[9]**

b) Derive the dynamic response equation of liquid level system. **[9]**

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