Total No. of Questions : 10]

SEAT No. : ____

P3238

[Total No. of Pages : 2

[5353] - 101
T.E. Civil
HYDROLOGY AND WATER RESOURCES ENGINEERING
(2012 Pattern)

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 whenever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) How hydrology plays important role in all disciplines of science. **[5]**

b) Explain isohyetal 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) Explain methods to improve duty. **[5]**

Q3) a) Differentiate between furrow irrigation and Drip irrigation system. **[5]**

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

OR

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

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

P.T.O.

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

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

OR

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

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

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

Surface runoff resulting from the storm is equivalent to 20 cm of depth over the catchment. Determine (i) Average infiltration, and (ii) Average rate of infiltration.

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

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

OR

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

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

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

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

OR

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

b) Drawa 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. : ____

P3239

[Total No. of Pages : 2

[5353] - 102
T.E. (Civil) (Semester - I)
INFRASTRUCTURE ENGINEERING
(2012 Pattern)

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, Q.11 or Q.12.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) Discuss in detail importance of construction sector in any country's economic development, with the help of example **[6]**

OR

Q2) Discuss the provision made for highways with reference to 12^{th} five year plan.**[6]**

Q3) Write short note on : **[8]**

a) Railway as a mode of land transport

b) Minimum depth of ballast cushion

OR

Q4) a) Define gauge of a railway track .State different gauges in India **[4]**

b) What are the function of points & crossing **[4]**

Q5) What are the various applications of dredging **[6]**

OR

Q6) Explain various types of hoisting equipment required in construction project.**[6]**

P.T.O.

Q7) a) Differentiate between open cut & Tunnel **[6]**

b) Write short note on : Types of TBM **[6]**

c) Discuss the advantages of trenchless technology **[4]**

OR

Q8) a) Explain in detail NATM construction technique **[6]**

b) What is mucking. Explain any one methods of mucking **[6]**

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

Q9) a) What are the factors to be considered while selecting a site for a harbor **[6]**

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

i) fenders

ii) dolphins

c) Explain in brief merits & demerits of water transportation **[4]**

OR

Q10)a) Discuss various factors to be considered in design of a breakwater **[6]**

b) Explain in brief classification of harbor based upon protection needed **[6]**

c) Write short note on : Jetty **[4]**

Q11)a) Differentiate between Rope operated & Hydraulic operated shovel **[6]**

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

i) Dragline

ii) Depreciation

iii) Repair cost

OR

Q12)a) Construction machinery Cost Rs.11 Crores.The salvage value of the same is 11 %.Its useful life is 12 years. Estimate the depreciation of the equipment using following methods. **[6]**

i) Straight line method

ii) Double Declining balance method

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

i) Shovel ii) Scraper

iii) Labour cost

Total No. of Questions : 10]

SEAT No. : ____

P3240

[Total No. of Pages : 3

[5353] - 103
T.E. Civil End Sem.
STRUCTURAL DESIGN - I
(2012 Pattern) (Semester - I)

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

Instructions to the candidates:

1) ***Answer Q.1 or Q.2. Q.3 or Q.4, Q5. or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat 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, fub = 400 N/mm^2.***
6) ***Assume suitable data if necessary.***
7) ***Use of electronic pocket calculator IS:800-2007 and steel table allowed.***
8) ***Use of cell phone is prohibited in the examination hall.***

Q1) a) State the advantages and disadvantage of steel as structural material. **[4]**

b) A column 10m long consisting 2 ISMC 300@ 35.8kg/m spaced at 190mm back to back to carry factor load of 1200 kN. The column is restrained in translation but not in rotation at both ends. Design suitable lacing system. **[6]**

OR

Q2) a) Determine the block shear strength of the tension member ISA 75 × 75 × 8 mm @ 8.9 kg/m connected by 2 bolts of 20mm with 10mm thick gusset plate. **[4]**

b) Design double angle discontinuous strut to carry a factored load of 160 kN. The length of the strut is 2.3m considering angles are placed on opposite side of gusset plate. **[6]**

Q3) a) A 6 m long column is effectively held in in position and restrained against rotation at both ends. If an ISHB 350@ 67.4 kg/m is used, calculate design compressive strength of the column. **[4]**

b) Explain types of column bases with suitable sketches **[6]**

P.T.O.

OR

Q4) a) State and explain classification of cross section by bending stress distribution. **[4]**

b) Check the adequacy of ISHB 400 @ 82.2 kg/m to carry a factored axial compressive load of 700 kN at an eccentricity of 150 mm about major axis cindering section strength. The effective length of column is 3m.**[6]**

Q5) a) An ISLB 550 @ 86.3 kg/m has been used as a simply supported beam over 8 m span. Determine the safe uniformly distributed load w so that the beam can carry safely in flexure. Assuming compression flange is restrained throughout the span against lateral buckling. **[12]**

b) Explain web buckling and crippling with suitable sketches. **[4]**

OR

Q6) Design suitable I section for simply supported beam of span. 6m. The beam is subjected to a dead load of 30kN/m and a live load of 40 kN/m. The beam is laterally unsupported throughout the span. Also check for serviceability.**[16]**

Q7) a) An ISLB 350 @ 49.5kg/m transmit an end reaction of 400 kN under factored load to the web of ISWB 500 @95.2kg/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 25 kN/m throughout the whole span excluding the self weight of plate girder. Assume compression flange laterally supported throughout the span. Design cross section of plate girder, check for shear buckling of web and shear capacity of end panels. **[16]**

Q9) Determine the design forces in the members AB,AL and BL of a truss as shown in Fig. 9.The design wind pressure is 900 N/m^2. The truss is covered with AC sheet and the center to center spacing of truss is 6m. **[18]**

\

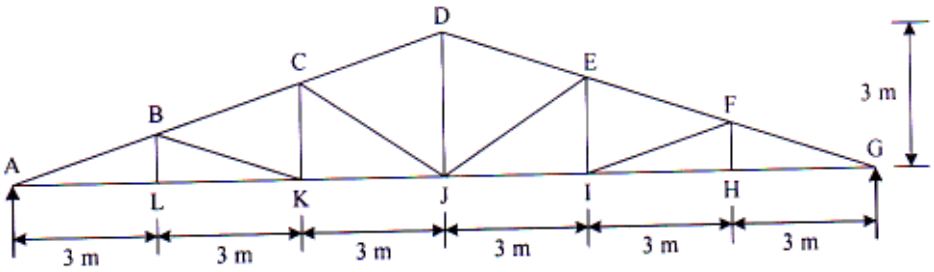


Fig. 9

OR

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

Span of gantry: 4m, Span of crane girder: 15m, Crane capacity:320 kN, self weight of crane girder excluding trolley : 40 kN, Minimum hook approach: 1m, center to center distance between wheels:3.2 m and self weight of rails 300N/m.

Total No. of Questions : 8]

SEAT No. :

P3241

[Total No. of Pages : 4

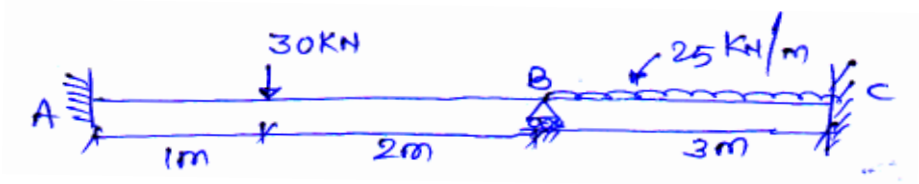
[5353] - 104
T.E. (Civil Engineering)
STRUCTURAL ANALYSIS - II
(2012 Pattern)

Time :2½ Hours] *[Max. Marks :70*

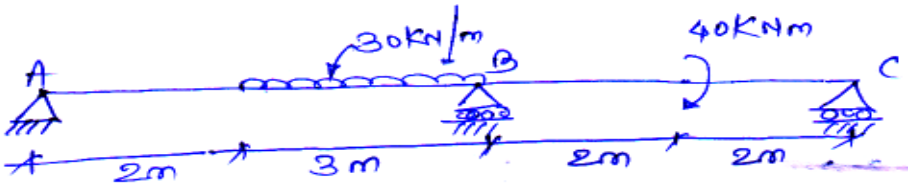
Instructions to candidate:

1) ***Attempt 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.***
3) ***Assume suitable data if necessary & indicate clearly.***
4) ***Use of electronic non-programmable calculator is allowed.***

Q1) a) Determine the support moments by using slope deflection method for the beam shown in figure. Take EI = Constant. **[10]**

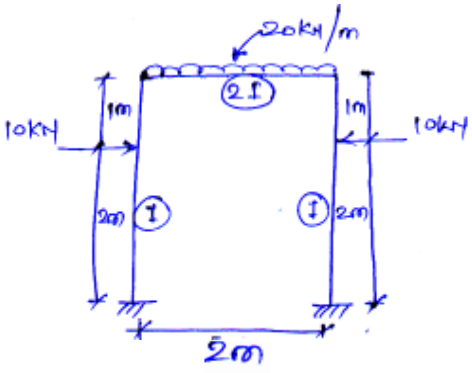


b) Analyse the beam shown in fig. by flexibility method. Take EI = constant.**[10]**



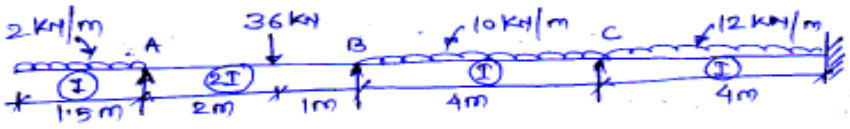
OR

Q2) a) Analyse the beam by slope deflection method. Draw SFD & BMD.**[10]**

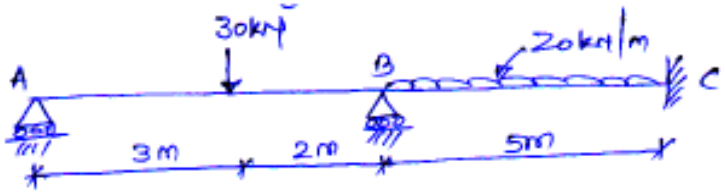


P.T.O.

b) Determine moment at support of the continuous beam using moment distribution method.Draw BMD. **[10]**

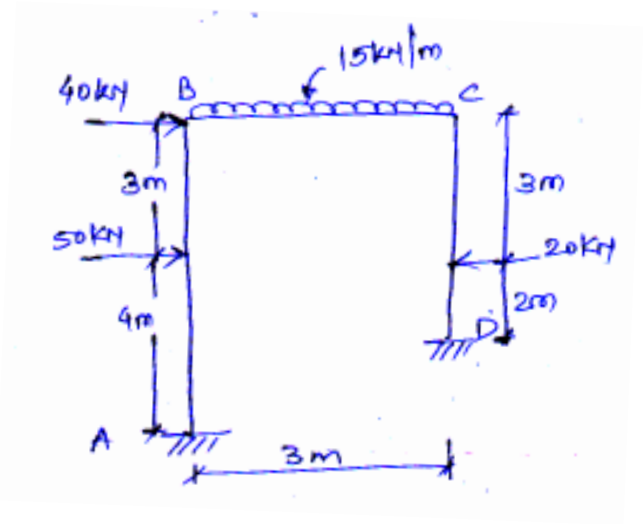


Q3) Analyse the beam shown in fig. by stiffness method. Support 'B' sinks by 30mm. Take EI = 380 kNm^2. **[16]**

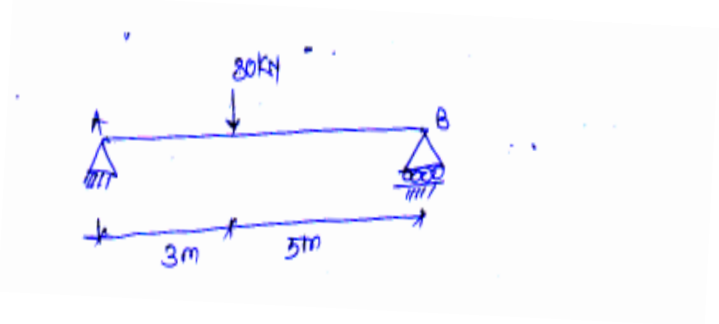


OR

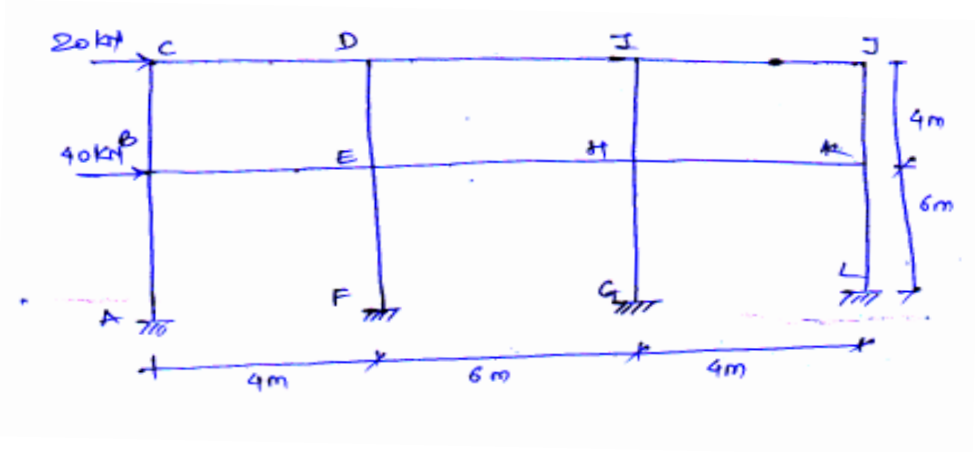
Q4) Analyse the frame by stiffness matrix method. Take EI = const. **[16]**



Q5) a) The beam is supported & loaded as shown in fig. find defl^n under load. Take 5 nodes **[8]**

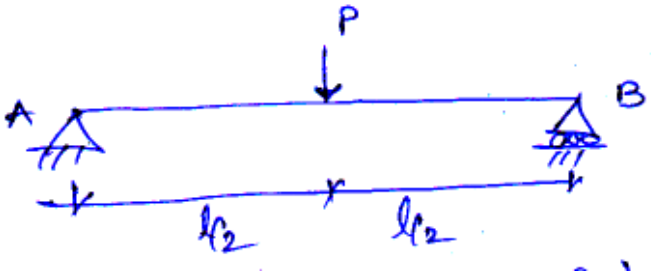


b) Analyse the frame shown in fig. by cantilever method & draw BMD. **[10]**



OR

Q6) a) The beam is supported & loaded as shown in fig. Determine deflection at centre. Use finite difference method. **[8]**



b) Analyse portal frame of Q. 5 (B) by using portal method. Draw BMD. **[10]**

Q7) a) Explain the terms **[8]**

i) Axisymonetric element

ii) Shape function

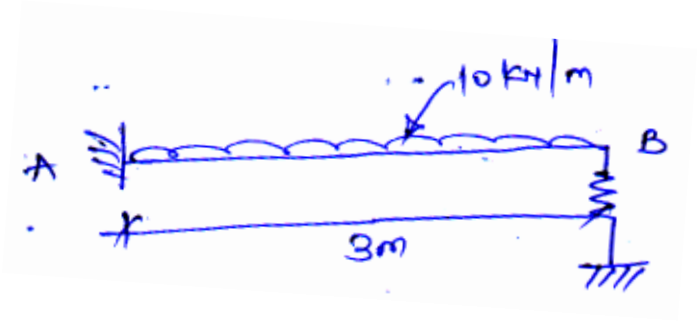
iii) Quatrilateral element

iv) Quadratric stress - strain triangle

b) Determine shape function for constant strain triangle. Use polynominal function. **[8]**

OR

Q8) a) Analyse the beam shown in figure. Take EI = constant stiffness of spring is EI/2 **[8]**



b) Explain terms **[8]**

i) Nodes

ii) Constant strain triangle

iii) Linear strain triangle

iv) Higher order elements

❀ ❀ ❀

Total No. of Questions : 12]

SEAT No. :

P3242

[Total No. of Pages : 3

[5353] - 105
T.E. (Civil) (End Sem.)
FLUID MECHANICS - II
(2012 Pattern)

Time :2.½ hours] ***[Max. Marks :70***

Instructions to the candidates:

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

Q1) a) Differentiate between bluff body and streamlined body. **[2]**

b) A metallic ball of diameter 2.1×10^{-3}m drops in fluid of sp. gravity 0.96 and viscosity 16 Poise. The density of metallic ball is 12010 kg/m^3. Find:

i) The drag force exerted by fluid on metallic ball;

ii) The pressure drag and skin friction drag and

iii) The terminal fall velocity of ball in fluid. **[6]**

OR

Q2) a) Describe in brief the phenomenon of "Water Hammer". **[2]**

b) Water flows through a 2.90 km long pipeline at velocity of 2.15 m/s when the valve at the end of the pipe is fully open and the head acting there is 29.6 m. The valve is desired to be closed fully in 15 seconds in such a manner that the velocity of water in the pipe is decelerated uniformly. Calculate the required area of the valve opening at 5 and 10 seconds from start, if the initial opening area is equal to the pipe cross sectional area. **[6]**

Q3) Discuss with neat sketches the following terms: **[6]**

a) Classification of Channels and

b) Channel Flows

OR

Q4) Explain in brief: i) Specific Force diagram ii) Channel Transitions **[6]**

P.T.O.

Q5) A maximum discharging trapezoidal channel of best section has a depth of 2.1 m and fall of 1:2680. Calculate the discharge and draw a section of channel with side of 1:1. **[6]**

OR

Q6) Derive the following expression for the loss of energy of hydraulic jump in horizontal rectangular channel. **[6]**

$$\Delta E = \frac{(y_2 - y_1)^3}{4 y_1 y_2}$$

Q7) a) Derive expression for the "work done by the jet" in case of flat plate inclined and moving in the direction of jet. **[6]**

b) Draw neat labeled sketch of a Centrifugal pump and Also explain its working. **[6]**

b) A centrifugal pump with 1 .25m diameter runs at 210 rpm and pumps 1890 lit/sec, the average lift being 6. 1 m. The angle which the vane makes at exit with the tangent to the impeller is 27° and the radial velocity of flow is 2.6 m/s. Determine the manometric efficiency and the least speed to start the pumping against the head of 6.lm, the inner diameter of the impeller being 0.6m. **[6]**

OR

Q8) a) Explain the working of "reciprocating pump" with neat sketch. **[6]**

b) Explain in brief with neat sketches "types of impellers" related with centrifugal pump. **[6]**

c) A 8.5 cm diameter jet having a velocity of 27m/s strikes a flat plate, the normal of which is inclined at 45° to the axis of jet. Find the normal pressure on the plate:

i) When the plate is stationary.

ii) When the plate is moving with velocity of 14 m/s away from the jet.

Also determine the power and the efficiency of the jet when the plate is moving. **[6]**

Q9) a) Draw the neat sketch of hydroelectric power plant. Explain various elements of it. **[8]**

b) Define specific speed. Derive the expression for the same. **[8]**

OR

Q10)a) i) Differentiate between Reaction turbine and Impulse turbine

ii) Explain the "Governing of turbine" **[8]**

b) A Pelton wheel is to be designed for head of 70m when running at 210 rpm. The Pelton wheel develops 95.80 kW shaft power. The velocity of bucket is = 0.46 times the velocity of jet, overall efficiency=86% and coefficient of velocity is equal to 0.98. **[8]**

Q11)a) Derive the following equation of GVF with usual notations. State also the assumptions made for it. **[6]**

$$\frac{dy}{dx} = \frac{S_o - S_f}{1 - Fr^2}$$

b) A rectangular channel 8m wide carries a discharge of 11m^3/s (Manning's n = 0.025 and bed slope of 0.0016). Compute the length of back water profile created by a dam which backs up a depth of 2 m immediately behind the dam by direct step method. Take at least 3 steps to compute the profile. **[10]**

OR

Q12)a) Describe with neat sketches the following: **[10]**

i) Classification of channel bottom slopes

ii) Classification of water surface profiles

b) A rectangular channel 7.6 m wide has a uniform depth of flow of 2.1 m and has bed slope of 1 in 3000. If due to weir constructed at the downstream end of the channel, water surface at a section is raised by 0.76 m, determine the water surface slope with respect to horizontal at this section. Take Manning's n = 0.02. **[6]**

Total No. of Questions : 10]

SEAT No. : ____

P3243

[Total No. of Pages : 3

[5353] - 106
T.E. (Civil)
ADVANCED SURVEYING
(2012 Pattern)

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 whenever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) State the objects of Geodetic Surveying and Explain Secondary Triangulation? **[5]**

b) What is SBPS? State and explain GAGAN system. **[5]**

OR

Q2) a) Define, **[5]**

i) Well conditioned triangle

ii) Strength of a figure

iii) Accuracy of Triangulation

iv) Indivisibility of stations

v) Station marks

b) Differentiate between absolute positioning and relative positioning. **[5]**

Q3) a) Explain the graphical method of solving three point problem. **[5]**

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

OR

P.T.O.

Q4) a) Explain the three point problem and method of solution of three point problem using Tracing paper. **[5]**

b) Enlist the methods of setting out of tunnel; explain anyone with a neat sketch. **[5]**

Q5) a) Define with example **[6]**

i) Direct and indirect observation

ii) Independent and conditioned quantity

iii) Observation equation and conditioned equation

b) Explain stepwise procedure of computations of sides of spherical triangle by spherical trigonometry. **[4]**

c) The following angles are measured at a station closing the horizon. The values of the angles are: **[8]**

A = 77°14’20” weight 4

B = 49°40’35” weight 3

C = 53°04’52” weight 2

Give the corrected values of the angles. (Use method of correlates)

OR

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

i) True error,

ii) Most probable value,

iii) Conditioned Quantity,

iv) Residual error,

v) Weight of an observation.

b) What kinds of error in triangulation adjustment? Explain in detail. **[5]**

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

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

Q7) a) Define the following terms with sketch: **[8]**

i) Principal point, ii) Scale,

iii) Air base distance, iv) Digital elevation model.

b) The scale of aerial photograph is 1 : 10000, effective at an average elevation of terrain of 500 m. The size of aerial photograph is 230mm x 230mm. Focal length of camera lens is 20 cm. Speed of aircraft is 180 kmph, longitudinal overlap is 60% and side overlap is 30%. Determine the number of photographs required to cover an area of 30kmx22.5 km. Also determine exposure interval and flying height. **[8]**

OR

Q8) a) Derive an expression for Relief displacement due to ground. **[8]**

b) A pair of photograph is taken with a camera having focal length 15 cm. The scale of photography is 1 : 10000 and photo base is 5.65 cm. The measured parallax of a vertical control point having an elevation 140 m is 87.28 mm. Compute the elevation of another point P whose measured parallax is 84.18 mm. **[8]**

Q9) a) Define remote sensing. State how it differs from Photogrammetry. **[4]**

b) Give the application of remote sensing with respect to natural hazards. **[4]**

c) What is GIS? State various GIS software's and Explain how remote sensing and GIS are linked. **[8]**

OR

Q10)a) State and explain various components of GIS. **[5]**

b) Differentiate between raster data and vector data. **[5]**

c) Explain Remote sensing applications in disaster management with suitable example. **[6]**

Total No. of Questions : 5]

SEAT No. :

P3244

[Total No. of Pages : 3

[5353] - 107
T.E. (Civil) (Semester - II) End Semester
PROJECT MANAGEMENT AND ENGINEERING ECONOMICS
(2012 Pattern) (301008)

Time :2.5 hours] *[Max. Marks :70*

Instructions to the candidates:

Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9or Q.10

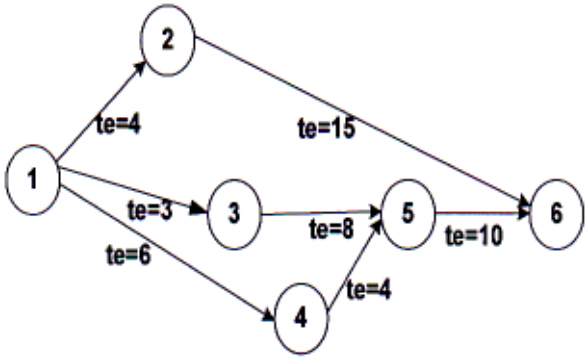
Q1) a) Explain any five principles of scientific management. **[5]**

b) Define delegation of Authority. What are its advantages? **[5]**

OR

Q2) a) What are the domain areas of Project management? **[5]**

b) Find out expected project duration of the net work diag. given below. What are the chances of completing project in 21 weeks? Mark critical path. **[5]**



Q3) a) Draw the network diag., find Project duration and mark critical path By using following data **[6]**

i) Activity A &B are starting activities, requires 9 and 6 days to complete resp.

ii) Activity C follows activity B, activity C takes 2 days to complete.

iii) Activity D succeeds activity C and A, activity D take 5 days to complete

iv) Activity D is terminal activity

b) What are the methods of planning and scheduling? Explain any one. **[4]**

P.T.O.

OR

Q4) a) List out step by step procedure of network compression. **[4]**

b) Find out the cost of project before crashing? What will be the change in cost of project by crashing it to minimum time? Consider indirect cost is Rs.l00/-day **[6]**

Activity	NT (days)	CT (days)	NC (Rs.)	CC (Rs.)
10-20	6	2	1000	1200
10-30	8	5	1500	1800
10-50	13	10	2000	2450
20-30	4	3	500	550
20-40	10	8	1600	2000
30-50	7	4	1200	1500

Q5) a) Explain the following **[8]**

i) Annuities and their types

ii) Law of diminishing marginal utility

b) Discus importance of economics in construction industry **[4]**

c) What do you understand by Law of substitution? **[4]**

OR

Q6) a) Write a short note on: **[8]**

i) Demand curve and factors affecting on it

ii) Supply curve and factors affecting on it

b) Define Goods, Wants, assets, liability with the help of example. **[4]**

c) Ms.Madhuri invests Rs. 100000/- in a bank at nominal interest rate 12% for 7 years. The compounding is Monthly. Find future amount she will get after 7 yrs. **[4]**

Q7) a) What are the objectives of material management and functions of purchase dept.? **[6]**

b) Define inventory and explain any one technique of controlling inventory. **[6]**

c) Define IFR, ISR and injury index with formulas **[6]**

OR

Q8) a) What do you know about the indent? Explain process of material issue and return of site you visited. **[6]**

b) What points should you consider while making safety programme of construction site? **[4]**

c) "Sakalp groceryshoppee" carries the following items .Segregate the items based on their annual usage and plot ABC curve. **[8]**

Sr. No.	Item	Annual Consumption	Cost in Rs. per unit
1	Sugar	150 bags	4000/-
2	Wheat	400 quintal	2000/-
3	*Moog dal*	3000 kg	60/-
4	*Tur dal*	4500 kg	100/-
5	Oil sunflower	3000 lit.	90/-
6	Chocolates	3000 pkts.	50/-
7	Soap	10,000 nos.	10/-

Q9) a) What are the different types of appraisals required to undertake any Project? Explain any one in detail. **[6]**

b) Explain break even analysis with help of figure showing breakeven point, break even sales, angle of incidence and margin of safety. **[6]**

c) Write a short note on any one **[4]**

i) Payback period

ii) Role of PMC

OR

Q10)Write a short note on any four **[16]**

a) IRR method

b) BC ratio method

c) Detailed project report (DPR)

d) NPV method

e) Pre tendering and post tendering

Total No. of Questions : 12]

SEAT No. :

P3245

[Total No. of Pages : 2

[5353] - 108
T.E. (Civil) (Semester - II)
FOUNDATION ENGINEERING
(2012 Pattern)

Time :2½ hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q. 3or Q. 4,Q.5 or Q.6 Q.7 or Q.8, Q.9 or Q.10. and, Q.11 or Q.12.***
2) ***Neat diagrams must be drawn whenever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data ,if necessary and mention it clearly.***

Q1) Explain with neat sketch Seismic Refraction method of Soil Exploration. **[7]**

OR

Q2) Define Disturbed Sample and Undisturbed Sample. State the factors affecting on Sample Disturbance **[7]**

Q3) Differentiate between Local shear failure and General shear failure. **[6]**

OR

Q4) Differentiate between Terzaghi's Bearing Capacity Theory and Meyerhof's Bearing Capacity Theory. **[6]**

Q5) Define i) Immediate Settlement ii) Consolidation Settlement iii) Secondary Settlement with variation of settlement with time. **[7]**

OR

Q6) Explain with neat sketch laboratory one dimensional consolidation test **[7]**

P.T.O.

Q7) a) Write short note on i) End Bearing Pile. ii) Friction Pile **[6]**

b) Explain with neat sketch various component of well foundation. **[6]**

c) Discuss the necessity of pile foundation. **[4]**

OR

Q8) a) Define Negative Skin Friction and state the situation where Negative Skin Friction can be anticipated. **[6]**

b) Draw the neat sketch with application i) Open Caisson ii) Box Caisson iii) Pneumatic Caisson. **[6]**

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

Q9) a) Write short note on i) Earth fill coffer dam. ii) Rockfill Cofferdam. **[6]**

b) List out the various techniques of Ground soil improvement. Explain any one. **[6]**

c) Explain any four engineering problem associated with black cotton soil. **[4]**

OR

Q10)a) Write short note on i) Bored Pile ii) Under reamed Pile. **[6]**

b) Plot the Pressure Distribution diagram for i) Cantilever Sheet Pile ii) Anchor Sheet Pile. **[6]**

c) State the characteristic of Black Cotton soil. **[4]**

Q11)a) State the various function of geosynthetic materials and explain any two function with suitable example **[7]**

b) What is liquefaction? Discuss the effect of liquefaction. **[6]**

c) Write a short note on classification of Geosynthetic material. Explain any one. **[5]**

OR

Q12)a) Write down the application of geosynthetic material in different area with suitable example with sketch. **[7]**

b) Define the term i) Earthquake ii) Epicenter iii) Focus iv) Magnitude. **[6]**

c) Differentiate between P-wave and S-wave. **[5]**

Total No. of Questions : 12]

SEAT No. :

P3246

[Total No. of Pages : 6

[5353] - 109
T.E. (Civil) (Semester - II)
STRUCTURAL DESIGN - II
(2012 Pattern)

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

Instructions

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) ***IS - 456 - 2000 and non programmable calculator are allowed in the examination.***
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) Explain the term partial safety factors in limit state method and why these are called as partial? **[3]**

b) Compare under reinforced section with over reinforced section **[3]**

OR

Q2) A doubly reinforced RC section 300 mm X 450 mm overall is reinforced with 5 no 20 mm diameter bars on tension side and 3 no 20 mm diameter of 20 mm diameter bars on compression side. The clear cover is 25mm for both the reinforcement. Calculate the moment of resistance of this section using WSM approach. Use M20 grade of concrete and Fe 250 grade of steel. **[6]**

Q3) Derive the design constants: k =Neutral axis constant, R = Moment of resistance constant and pt = % steel constant for a singly reinforced balanced section having concrete grade as M20 and steel grade as Fe 415. Use LSM approach.**[8]**

OR

Q4) Calculate the ultimate moment of resistance of L - beam for the following data: **[8]**

P.T.O.

Width of flange, d_f = 1200mm

Depth of slab, D_f = 100mm

Width of web, b_w = 300 mm

Effective depth, d = 600 mm

Area of tension reinforcement, A_{st}, = 5 no 25 mm diameter bar

Grade of concrete = M 20

Grade of steel = Fe 500

Q5) In a multistoried commercial building, a cantilever porch of size 2.4 m wide and 5.2 m long is to be provided at a height of 2.2 m above the floor level. This porch slab which overhangs 2.4 m beyond the face of beam is to be cast in flush with bottom face (soffit) of beam. Design this porch slab. Take live load = 1 kN/m^2, floor finish = l kN/m^2. Use M20 grade of concrete and Fe 250 steel. Draw neat sketches showing details of reinforcement. **[6]**

OR

Q6) A R.C. slab is to be provided for a room measuring 5.2 m X 4.7 m. The slab is to be casted monolithically over the 300 mm wide beam with corners of slab held down. The slab carries live load of 3.5 kN/m^2 and floor finish of 1 kN/m^2. Design a RC slab using M20 grade of concrete and Fe 415 grade of steel. Also show details of reinforcement. **[6]**

Q7) a) Explain following with reasons: **[4]**

i) Why minimum shear reinforcement is required to be provided in beams?

ii) Why IS: 456 - 200 specifies an upper limit on maximum value of τ_c?

b) A rectangular RC beam is 230 mm X 400 mm effective. At a particular section it has 0.9% tension steel and is provided with 8 mm ϕ, 2 - legged vertical stirrups @ 150 mm c/c. Calculate shear resistance of stirrups, shear resisted by concrete and total shear resistance of cross section. Use M20 grade of concrete and Fe 250 steel. **[10]**

OR

Q8) A rectangular RC beam 230 mm X 600 mm overall is subjected to factored sagging bending moment of 60 kNm, factored shear force of 45 kN and factored twisting moment of 18 kNm. Design the reinforcement for given section using M20 grade of concrete and Fe 250 steel. Assume effective cove as 35 mm. **[14]**

Q9) Design a Continuous beam ABCD (AB = BC = CD 4.0 m) for flexure and shear using IS code method for following data: **[18]**

Dead load=20 kN/m

Live load = 15 kN/m

Grade of concrete = M 20

Grade of steel = Fe 415

Also detail the reinforcement.

OR

Q10)a) What are advantages of redistribution of moments? **[4]**

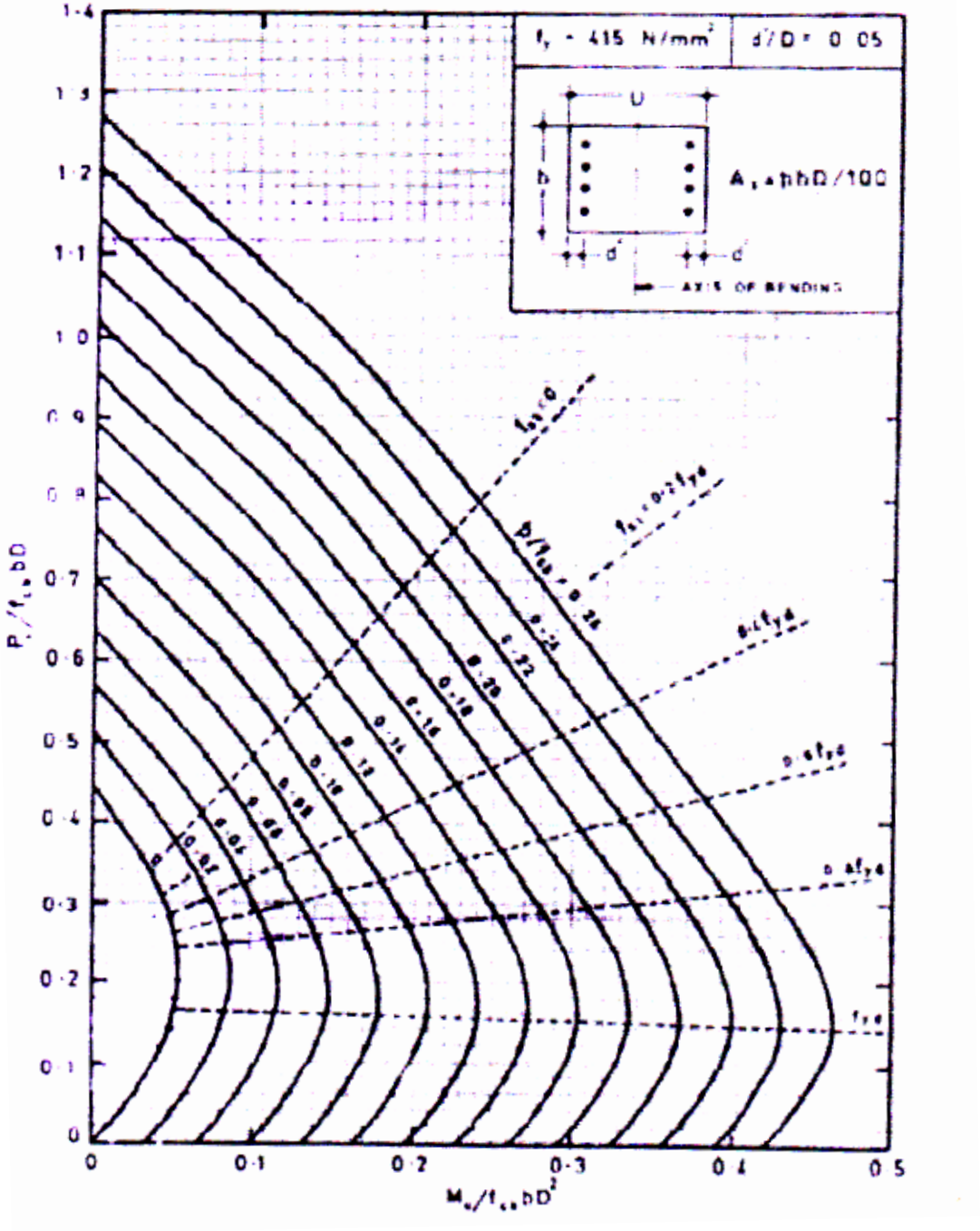
b) A rectangular RC beam 300 mm X 600 mm overall is fixed at one end and simply supported at the other end. It has a span of 6 m. It carries working superimposed load (exclusive of self weight) of 42 kN/m. Design the reinforcement at fixed support and near mid-span for following two cases: a) without allowing redistribution of moment; b) allowing 30% redistribution of moments. Use M20 grade of concrete. Fe 415 steel and effective cover of 35 mm. **[14]**

Q11)Design a short RC column of 3.00 m effective length to resists an axial ultimate load of 1500 kN. Also design footing for this column if safe bearing capacity of soil is 200 kN/m^2. Show detail design calculations and reinforcement details in plan as well as in sectional elevation. Use M20 concrete and Fe 250 steel.**[18]**

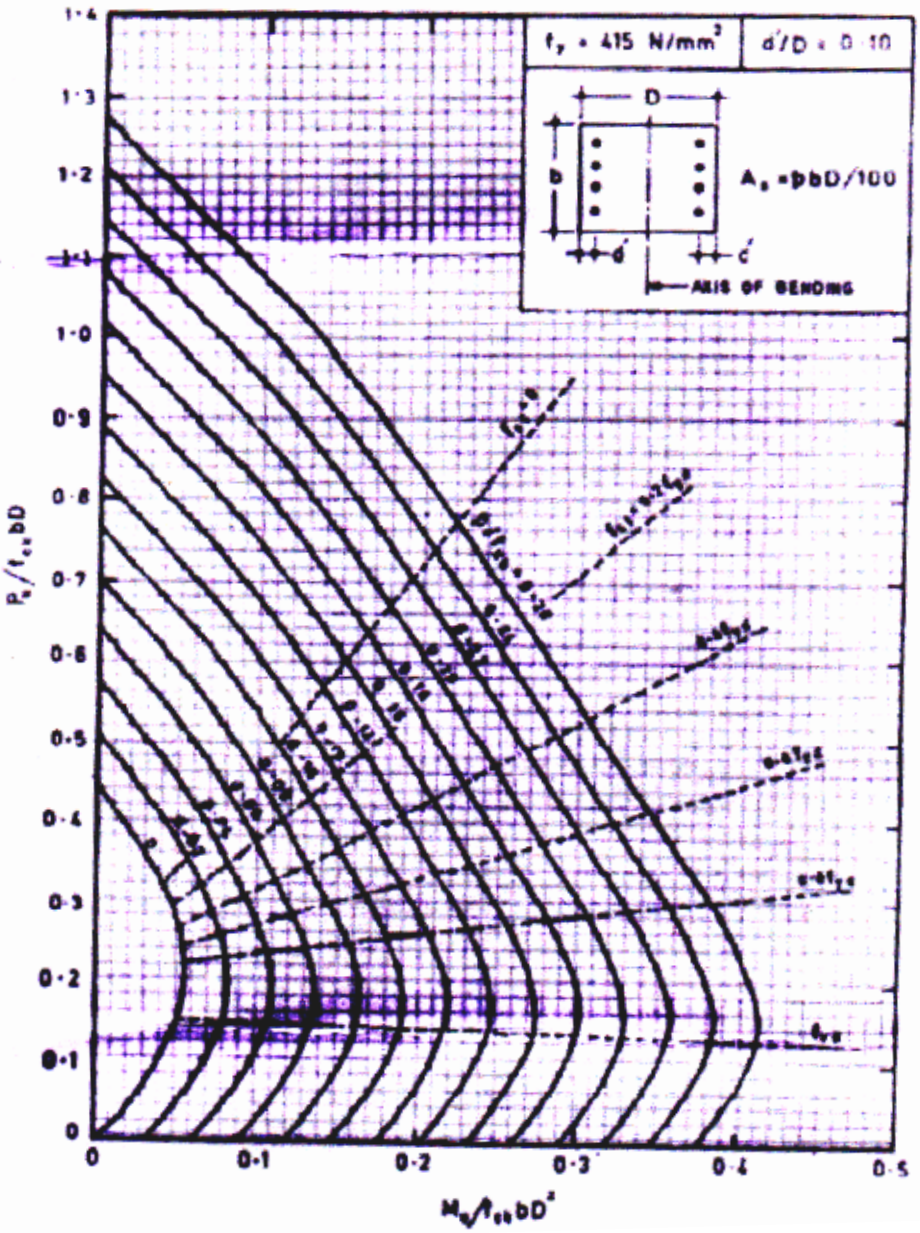
OR

Q12)Design a short RC column of rectangular section to carry to carry an ultimate load of 750kN and ultimate moment of 100 kNm acting along an axis bisecting the depth of the column, Assume effective length of column as 4. 5 m and width of column as 300 mm. Use M20 grade of concrete and Fe 415 steel. Provide equal reinforcement on both sides. Also design footing for this column if safe bearing capacity of soil is 200 kN'm^2. Show detail design calculation and reinforcement details in plan as well as in sectional elevation. **[18]**

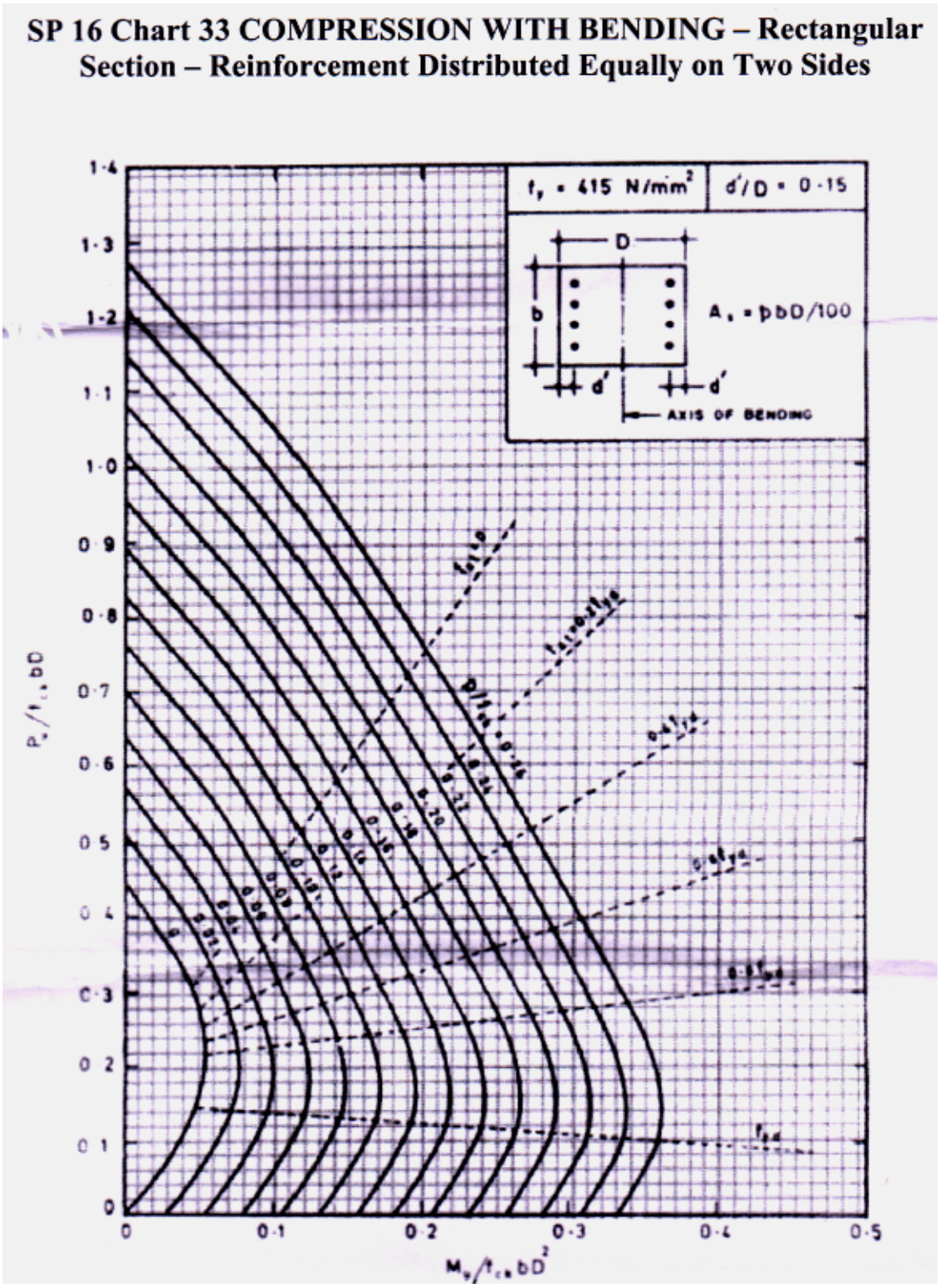
SP 16 Chart 31 COMPRESSION WITH BENDING – Rectangular Section – Reinforcement Distributed Equally on Two Sides



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



SP 16 Chart 33 COMPRESSION WITH BENDING – Rectangular Section – Reinforcement Distributed Equally on Two Sides



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Total No. of Questions : 10]

SEAT No. : ____

P3247

[Total No. of Pages : 3

[5353] - 110
T.E. (Civil) End Semester
ENVIRONMENTAL ENGINEERING - I
(2012 Pattern)

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, and Q.9or Q.10***
2) ***Figures to the right indicates full marks***
3) ***Draw neat figures wherever necessary***
4) ***Assume necessary data***
5) ***Use of scientific calculators is allowed***

Q1) a) Write working principle of cyclone and draw a schematic sketch of multi cyclone and write its application to control particulate matter. **[1+2+2]**

b) Enlist sources of noise pollution and define sound pressure, sound intensity. **[3+2]**

OR

Q2) a) Write and explain factors affecting rate of demand. **[5]**

b) Write working principle of settling chamber and draw its schematic diagram and write its advantages to control particulate matter. **[1+2+2]**

Q3) a) Water has to be supplied to a town with one 200000 population at the rate of 150 1/c/d from a river, 2 km away. The difference in elevation between the lowest water level in the sump and service reservoir is 30 m. Determine the size of the main and head loss. Maximum demand is 1.8 times of average demand. Pumps are working for 12 hours per day to supply water, flow through velocity is 1.5 m/s C_H = 120. **[5]**

b) Define design period and write data to be collected for water supply scheme. **[5]**

OR

P.T.O.

Q4) a) A circular sedimentation tank fitted with standard mechanical sludge removal equipment is to handle 3 MLD of raw water. If the detention period of the tank is 4 hours and the depth of the tank is 3 m. What should be the diameter of the tank? **[5]**

b) Draw the schematic sketch of river intake and canal intake. **[5]**

Q5) a) What are the factors on which dose of coagulants depends? Explain how the optimum coagulant dose is determined? **[6]**

b) Design a circular flocculator for a design discharge of 3 MLD with mechanical paddle and detention period of 30 minutes. Depth of basin is 3 m,area of paddles is 20 % of vertical cross section. **[6]**

c) Write working principle of pressure filter, draw its schematic sketch and write its advantages. **[6]**

OR

Q6) a) A filter unit is 4 m by 9m. After filtering 10000m^3/d in 24 hour period, the filter water is backwashed at a rate of 10 lit/m^2/ sec for 30 minutes. Calculate the average filtration rate, quantity and percentage of treated water used in washing and the rate of wash water flow in each trough. Assume 4 troughs. **[8]**

b) Explain the theory of coagulation. Give the chemical equation of coagulation by alum. **[6]**

c) Differentiate between slow sand filter and rapid sand filter. **[4]**

Q7) a) Define break point chlorination and explain how it is determined. **[6]**

b) Explain hardness removal by zeolite process. **[5]**

c) Explain removal of colour and odour by adsorption phenomena. **[5]**

OR

Q8) a) The water works of a town of population 200000 has to meet its water demand at the rate of 150 lit/c/d. If the disinfection is to be done by bleaching powder having 45% available chlorine, determine the quantity of bleaching powder required per year. The required dose of chlorine at the water work is 0.3 ppm for disinfection. **[6]**

b) Write principle, advantages and disadvantages of electro dialysis for demineralization of water. **[6]**

c) Write factors affecting disinfection. **[4]**

Q9) a) Deigned demand of town is 3 MLD. It is pumped into an elevated service reservoir at a uniform rate from 5am to 9 am & 5pm to 9pm. The variation in consumption of water is given below. **[8]**

Period	5am to 9am	9 am to 5pm	5pmto 9pm	9pm to 12am	12am to 5am
Consumption	40%	15%	30%	10%	05%

Determine the balancing capacity of the reservoir.

b) Draw a flowchart of package water treatment plant and write its advantages. **[4]**

c) Write difference between continuous and intermittent system. **[4]**

OR

Q10)a) Calculate the storage capacity and dimensions of the tank to store rain water for the given data: **[6]**

Terrace area 200 m^2, average annual rainfall = 720 mm and runoff coefficient = 0.8.

Consider Length = 2 x width and depth = 2 m.

b) Write methods to detect the wastage of water and its prevention. **[6]**

c) Draw a schematic sketch of rooftop rain water harvesting system and write its components. **[4]**

Total No. of Questions : 10]

SEAT No. :

P3248

[Total No. of Pages : 7

[5353] - 111
T.E. (Mechanical)
DESIGN OF MACHINE ELEMENTS - I
(2012 Pattern) (Semester - I)

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

Instructions to the candidates:

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

Q1) a) Define the term 'draw' of the cotter. State the assumptions made in the design of cotter joint and discuss in brief modes of failure of the elements in cotter joint. **[6]**

b) What is standardization? State the standards used in specifying (any three) **[4]**

i) Materials, chemical composition, mechanical properties & heat treatments.

ii) Shapes & dimensions of commonly used machine elements.

iii) Fit, tolerances & surface finish.

iv) Testing of products.

OR

Q2) a) Discuss an applicability of **[4]**

i) Saddle keys

ii) Sunk keys

iii) Feather key

iv) Woodruff key

b) A cantilever beam is loaded as shown in fig. 2 (b) below. Ultimate tensile strength and yield strength in tension for the beam material are 0.6 GPa and 0.38 GPa respectively. Load F varies from - 50 N to +150 N. Take factor of safety as 2. The notch sensitivity factor at the fillet is 0.9. Determine the diameter 'd' of the beam at the fillet cross-section using Gerber parabola as failure criteria. **[6]**

P.T.O.

Use $K_a = 0.77$

$K_b = 0.85$

$K_c = 0.897$

$K_t = 1.44$ (at fillet section)

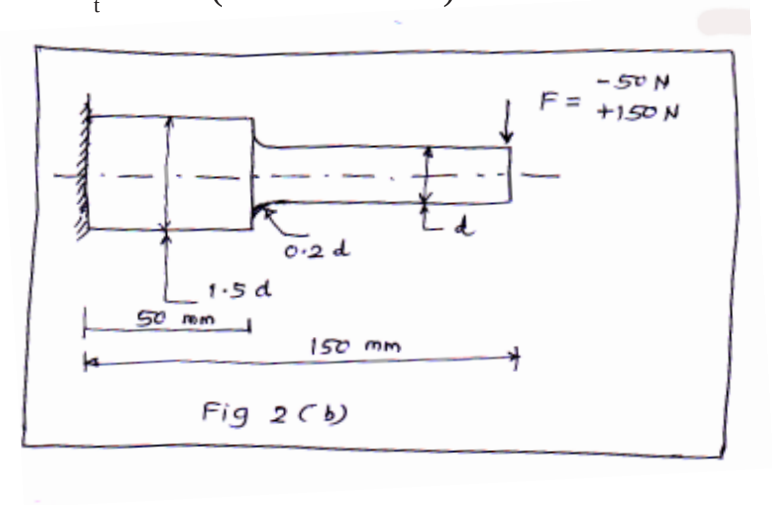


Fig 2 (b)

Q3) a) What is coupling? Discuss the requirements, the good coupling should satisfy. State the applicability of **[4]**

i) Rigid coupling

ii) Flexible coupling

iii) Oldham coupling

iv) Hooke's coupling

b) A solid shaft of diameter D is used to transmit power. It is required to replace the solid shaft by a hollow shaft of the same material and equally strong in torsion due to modification of the existing transmission system. The weight of the hollow shaft per meter length should be half of the solid shaft. Determine the outer diameter of the hollow shaft in terms of 'D'. **[6]**

OR

Q4) a) A steel bar 50 mm in diameter is subjected to a reversed bending stress of 250 N/mm^2. The bar material is 40 C 8 for which σ_{ut} = 0.6 GPa. Calculate the life of bar for a reliability of 90%.

Use : $K_a = 0.44$

$K_b = 0.85$

$K_c = 0.897$ **[6]**

b) State the material grades of alloy steels used for making transmission shafts. Discuss the maximum shear stress theory used to determine the outer diameter of the hollow shaft. **[4]**

Q5) a) State and explain various forms of threads, with their advantages & disadvantages. **[6]**

b) Derive an equation for efficiency of the trapezoidal threads. **[4]**

c) The tool holder is pulled by means of an operating nut mounted on a screw in a machine tool application.

The travel of tool holder at a (speed) = 5 m/min.

The screw has single start square threads of 48 mm nominal diameter and 8mm pitch.The operating nut exerts a force of 0.5 kN to drive the tool holder.

The mean radius of the friction collar is 40mm. The coefficient of friction at thread and collar surfaces is 0.15. Calculate **[8]**

i) Total torque required

ii) The rpm of screw

iii) Power required to drive the screw

iv) Overall efficiency of the mechanism.

OR

Q6) a) Derive an equation for maximum efficiency of square threaded screw. Also discuss the factors on which the efficiency depends. **[8]**

b) It is required to design a double - start screw with square threads for the C - clamp as shown in fig. 6 (b). The maximum force exerted by the clamp is 5000N. **[10]**

i) Operator force a the ball handle of the hand wheel = 250N

ii) σ_{yt} of screw material = 330 N/mm^2

iii) σ_{ut} of nut material = 200 N/mm^2

iv) Factor of safety = 2

v) Collar inner diameter = 6 mm

Collar outer diameter = 17 mm

vi) Coefficient of friction at screw = 0.15

vii) Coefficient of friction at collar = 0.17

viii) Unit bearing pressure between nut & screw = 15 N/mm^2

Determine i) Stresses at section A – A & B – B

ii) Length of nut

iii) Total torque required

iv) Radius of ball handle (R_m)

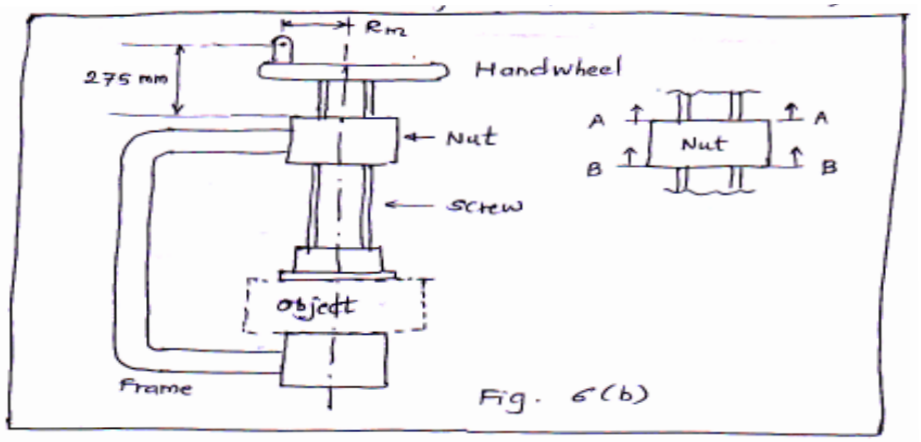


Fig. 6(b)

Q7) a) 'Thread rolling is superior to thread cutting' . Explain **[4]**

b) Explain the failure of transverse fillet weld. **[4]**

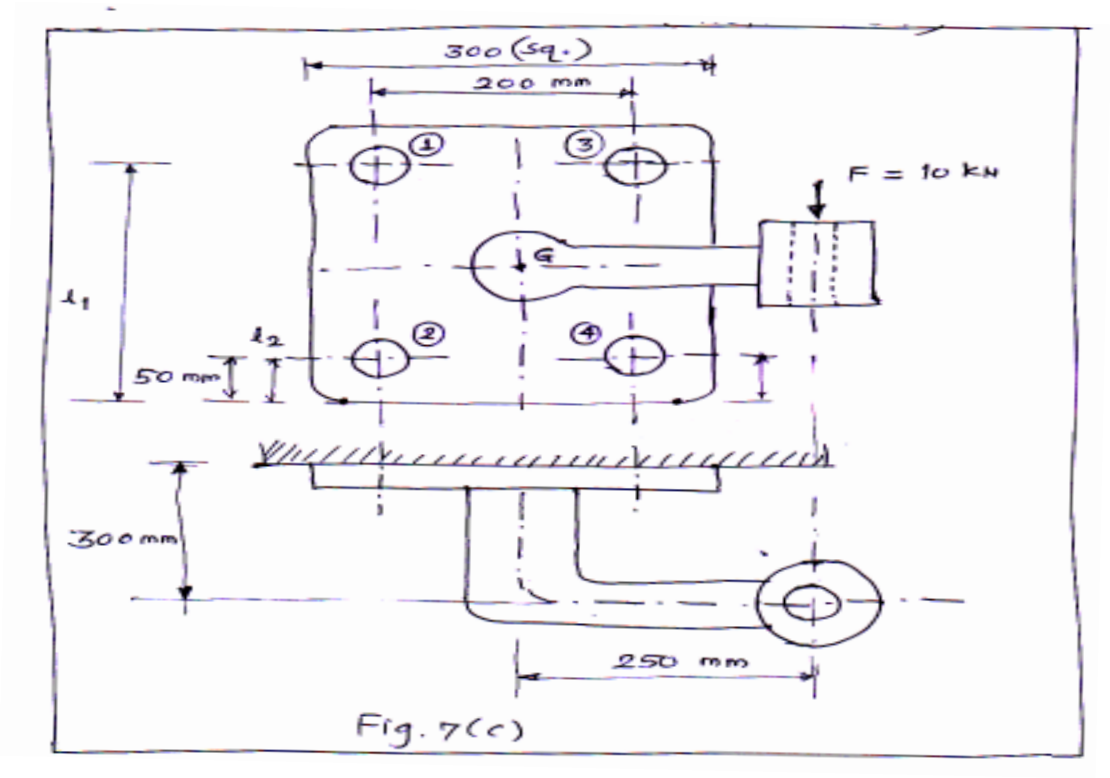
c) A rigid bracket subjected to a vertical force of 10kN is as shown in Fig. 7(c). It is fastened to a vertical wall by means of four identical bolts. Determine the bolt sizes by maximum shear stress theory .The maximum permissible shear stress in any bolt is limited to 50 MPa. (Refer Table 1)

Table 1: Basic dimensions for ISO metric screw

Threads (Coarse series)

Designation	Nominal dia. (mm)	Pitch P (mm)	Pitch dia. (mm)	Minor dia. dc(mm)	Tensile stress area (mm^2)
M10	10	1.50	9.026	8.160	58.00
M12	12	1.75	10.863	9.853	84.30
M16	16	2.00	14.701	13.546	157.00
M20	20	2.50	18.376	16.933	245.00

[8]

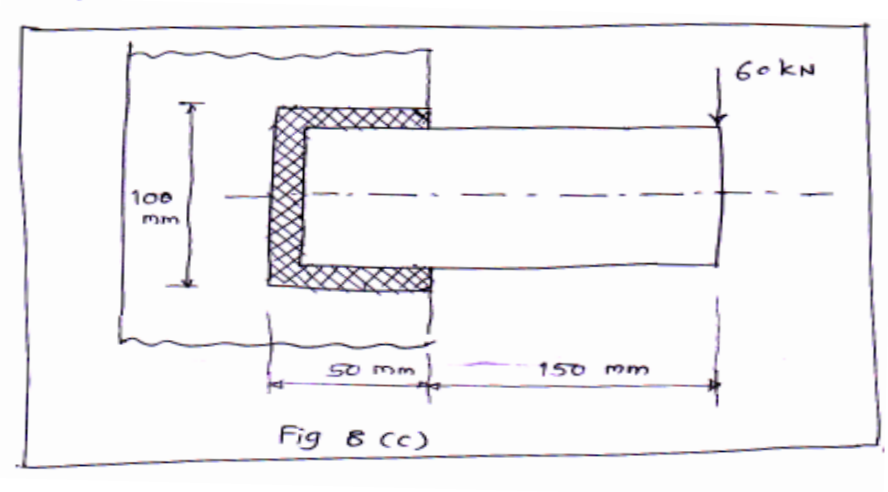


OR

Q8) a) Explain the design of bolted connection subjected to eccentric load perpendicular to axis of bolt. **[6]**

b) State the types of butt joints. **[2]**

c) A welded connection as shown in fig. 8(c) is subjected to an eccentric force of 60kN in the plane of the welds. Determine the size of the welds, if the permissible shear stress for the weld is 100 MPa. Assume static conditions. **[8]**



Q9) a) Explain following terms **[4]**

i) Spring index

ii) Free length of spring

iii) Spring stiffness

iv) Stress factor

b) State the objectives of series and parallel combinations of springs. **[4]**

c) It is required to design a helical compression spring subjected to a maximum force of 1250 N. **[8]**

- The deflection of spring
  (Corresponding to maximum force) = 30mm
- Spring index = 6
- Spring wire material : Patented & cold drawn steel wire.
- Ultimate tensile strength of spring material = 1.09 GPa
- Modulus of rigidity of spring material = 81.37 GPa
- Permissible shear stress for spring wire = 50% of σ_{ut}

Calculate

i) Wire diameter

ii) Mean coil diameter

iii) Number of active coils

iv) Total number of coils

v) Free length of spring

vi) Pitch of the coils

Draw sketch of spring with dimensions

OR

Q10)a) Explain the phenomenon of 'Surge' in spring with an example. Also discuss the ways to avoid surge. **[4]**

b) Discuss the phenomenon of pre - stressing leaves of leaf spring. State it's importance. **[4]**

c) A single plate clutch consists of two pairs of friction surfaces, one between the friction lining and the pressure plate and the other between the friction lining and the flywheel as shown in the Fig. 10(c). Eight identical helical compression springs, arranged in parallel, provide the required axial thrust on the friction surface. The total spring force exerted by all the springs is 2.4 kN and the corresponding deflection of each spring is approximately 15mm.The spring index can be taken as 8. The spring material is patented and cold drawn steel wire with ultimate tensile strength of 1.39 GPa and modulus of rigidity of 81.37 GPa. The permissible shear stress for the spring is 30% of the ultimate tensile strength. Calculate **[8]**

i) Wire diameter
ii) Mean coil diameter
iii) Number of active coils
iv) Total number of coils
v) Solid length
vi) Free length
vii) Pitch of the coil
viii) Required stiffness of the spring
ix) The actual stiffness of the spring

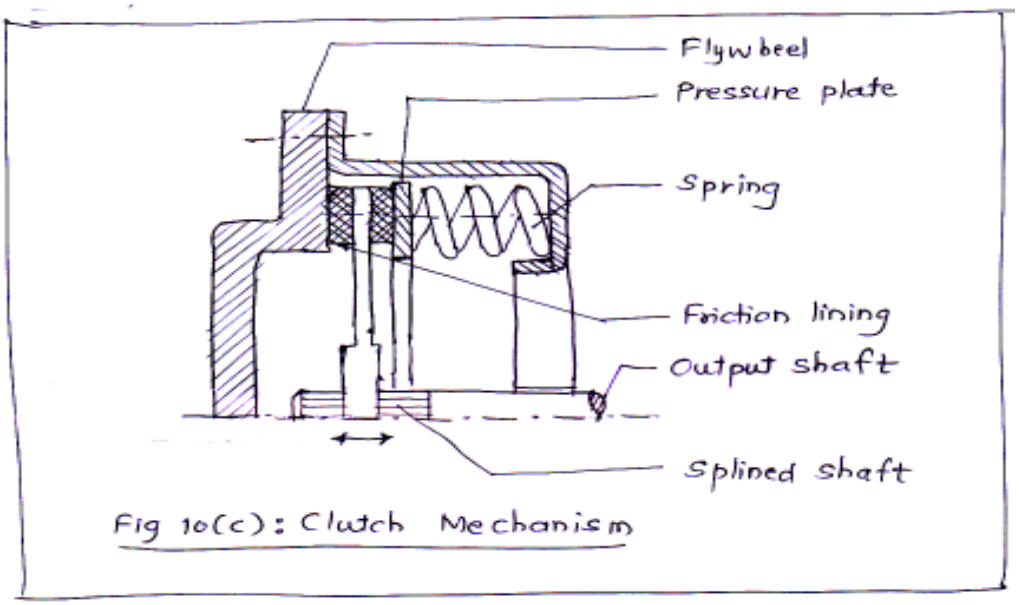


Fig 10(c): Clutch Mechanism

Total No. of Questions : 10]

SEAT No. : ____

P3249

[Total No. of Pages : 4

[5353] - 112
T.E. (Mechanical)
HEAT TRANSFER
(End Semester)
(2012 Pattern)

Time :2½ Hours] ***[Max. Marks :70***

Instructions to the candidates:

1) ***Solve Q.1 or Q.2. Q.3 or Q.4, Q5. or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Draw Neat diagrams wherever necessary.***
3) ***Use of scientific calculator is allowed.***
4) ***Assume suitable data where ever necessary.***
3) ***Figures to the right indicate full marks.***

Q1) a) A chemical reactor vessel of spherical shape of outside redius of 0.5 m has to loose heat at the rate of 650w in order to maintain the temperature of the chemical. The surface temperature of vessel is 125°C. The surrounding is at 113°C. If the heat loss is by both convection and radiation, determine the value of convective heat transfer coefficient required. Assume $\varepsilon = 0.55$ **[6]**

b) Derive an expression for critical radius of insulation for cylinder. **[4]**

OR

Q2) a) Write 3D Heat conduction equation in cartesian co-ordinates and reduce it to fouriers equation, poissons equation and laplace equation. **[6]**

b) What is an insulating material? Give four examples of insulating materials **[4]**

Q3) a) Consider a solid sphere of radius 2cm, in which internal energy is generated uniformly at constant rate of 2×10^8 w/m^3 conductivity of cylinder material is 30 w/mk and its outer surface is maintained at 100°C. Calculate centre temperature and heat flux at the surface of the sphere. Derive the expressions you use. **[6]**

b) Write a note on temperature boundary condition and heat flux boundary condition. **[4]**

P.T.O.

OR

Q4) a) A cylindrical fin is 3mm in diameter and 3cm long. Calculate the value of the temperature at fin tip if the fin is made of. **[6]**

i) Copper (k = 350 w/mk) and

ii) Teflon (k = 0.35 w/mk)

Assume the heat loss from fin tip is negligible.

Take h = 10 w/m^2k, Tbase = 120°C.

Surrounding fluid temperature is 20°C

b) Steel balls of 12mm diameter are annealed by heating to 877°C and then slowly cooling to 127°C in an environment where temperature is 52°C. The heat transfer coefficient is $20w/m^2k$. Calculate the time required by the balls to reach the desired temperature. Use following properties, for steel. Density = 7800 kg/m^3, Cp = 600 J/kg k, K = 40 w/mk **[4]**

Q5) a) Explain the following with their applicability. **[8]**

i) Nusselt number

ii) Grashoff's Number

iii) Rayleigh number

iv) Prandtl number

b) Liquid mercury flows at a rate of 1.6 kg/sec through a copper tube of 20mm diameter. The mercury enters the tube at 15°C and leaves at 35°C. Calculate the tube length if the tube wall temperature is 50°C. The properties of mercury at 25°C are. **[8]**

ρ = 13582 kg/m^3. C_β = 140 J/kg k, k = 8.69 w/mk, $\nu = 1.5\times10^{-7} m^2/s$

Pr = 0.0248

Use $Nu = 7 + 0.025 (Re\ Pr)^{0.8}$

OR

Q6) a) A rectangular plate of length 7 cm and width 4cm is maintained at 115°C. It is exposed to still air at 25°C on both sides. Calculate convective heat transfer rate if smaller side of the plate is held vertical compare heat transfer when larger side is held vertical. **[8]**

Use correlation $Nu = 0.59 (Gr.\ Pr)^{0.25}$

For air, at 70°C , k = 0.03 w/mk , Pr = 0.697;

Kinematic viscosity $\nu = 2.076 \times 10^{-6}\ m^2/s$

b) Explain the concept of thermal boundary layer. **[4]**

c) Show with neat sketch direction of natural convection Fluid flow (Development of thermal boundary layer) when **[4]**

i) Plate is kept vertical and surrounding fluid temperature is higher than plate.

ii) Cylinder is kept vertical and surrounding fluid temperature is lower than cylinder.

Q7) a) Two large parallel planes 'A' and 'D' are maintained at temperature of 1500k and 600k respectively $\varepsilon_A = 0.9$ & $\varepsilon_D = 0.4$ Two radiation shields 'B' with emissivity = 0.5 and 'C' with emissivity = 0.2 are inserted in between them such that A,B, C and D are placed one after the other. Calculate. **[10]**

i) Heat transfer rate without radiation shields

ii) Heat transfer rate with radiation shields.

iii) Temperature attained by planes 'B' and 'C'

b) State and explain any 4 properties/ rules of radiation shape factor. **[6]**

OR

Q8) a) If the shape factor between two adjacent sides of rectangular room is 0.22, find the shape factor between opposite faces. **[4]**

b) Define radiosity and irradiation. **[4]**

c) i) Differentiate between filmwise and dropwise condensation. **[8]**

ii) Design criteria for Heat exchanger

Q9) a) Derive the expression for effectiveness of parallel flow heat exchanger by using NTU method using standard notations. **[9]**

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. Calculate the size of heat exchanger required. Overall heat transfer coefficient is 125 w/m^2°C. Take specific heat for water as 4180 J/kg °C. **[9]**

OR

Q10)a) Hot air at 66°C is cooled up to 38°C by means of cold air entering at 15.5°C. Mass flow rates of hot and cold air are 1.25 kg/s and 1.6kg/s respectively sp. heat of hot and cold air = 1.05kJ/kg k U = 80 w/m^2k. Find the area of the heat exchanger for parallel flow configuration.

If the same exchanger is operated in counter flow mode, find the exit temperatures of both the fluids. **[12]**

b) Explain 'Film boiling 'Phenomenon in pool boiling process and show this region on the pool boiling curve. **[6]**

Total No. of Questions : 10]

SEAT No. : ____

P3250

[Total No. of Pages : 4

[5353] - 113
T.E. Mechanical/Auto/ Mech S/W
THEORY OF MACHINES - II

Time :2½ hours] ***[Max. Marks :70***

Instructions to the candidates:

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

Q1) a) What is rack shift? Explain why it is done? **[4]**

b) The addendum on each wheel of two mating gears is to be such that the line of contact on each side of the pitch point is half the maximum possible length. The number of teeth on the two gears is 24 and 48. The teeth are of 20° pressure angle involute with a module of 12 mm. Determine the addendum for the pinion and gear also find the contact ratio. **[6]**

OR

Q2) a) The annalus of an epicyclic gear train rotates at 300 rpm about the axis of fixed sun which has 80 teeth. The three armed spider is driven at 180 rpm. Determine the number of teeth required on the planet. **[6]**

b) Explain the force analysis of a worm and worm wheel. **[4]**

Q3) a) State true or false and justify your answer (any 3) **[6]**

i) If the length of path of contact is more, the efficiency is more.

ii) For higher pressure angles, the performance of the gear improves.

iii) If the input and output torques in an epicyclic gear train acts in same direction, the holding toque also acts in same direction.

iv) Contact ratio of spiral gear is greater than the spur gear.

v) Cycloidal profile is chosen for power transmission applications.

P.T.O.

b) The center distance between the meshing gears is 150 mm and the angle between the shaft axes is 60°. The gear ratio is 2 and the normal circular pith is 10 mm. The driven gear has a helix angle of 25° determine the number of teeth on each wheel. **[4]**

OR

Q4) a) What is the significance of helix angle in the worm gears? **[4]**

b) Obtain an expression for minimum number of teeth to avoid interference in a rack and pinion. **[6]**

Q5) a) Compare stepped and step less regulation of speeds. **[4]**

b) A 2.2 tonne racing car has a wheel base of 2.4 m and a track of 1.4 m. The centre of mass of the car lies at 0.6 m above the ground and 1.4 m from the rear axle. The equivalent mass of engine parts is 140 kg with a radius of gyration of 150mm. The back axle ratio is 5. The engine shaft and flywheel rotate clockwise when viewed from the front. Each wheel has a diameter of 0.8 m and a moment of inertia of 0.7 kg m^2. Determine the load distribution on the wheels when the car is rounding a curve of 100 m radius at a speed of 72 km/hour to the (i) left and (ii) right. **[12]**

OR

Q6) a) The turbine rotor of a ship has a mass of 2.2 tonnes and rotate at 1800 rpm clockwise when viewed from the aft. The radius of gyration of the rotor is 320 mm. Determine the gyroscopic couple and its effect when the **[12]**

i) Ship turns right at a radius 250 m with a speed of 25 km/hour.

ii) Ship pitches with bow rising at an angular velocity 0.8 rad/s

iii) Ship rolls at an angular velocity of 0.1 rad/s.

b) Explain what is Self-tightening effect in conical displaceable variators?**[4]**

Q7) a) An umbrella mechanism is to be designed for the following relationships between the input and output parameters. **[12]**

- The displacements of the slider 10 mm, 20 mm, and 40 mm from the initial position Initial position of slider 100 mm from crank centre
- The corresponding angular displacements of the output crank are 20°, 40° and 75° from initial position (i.e. 20° with respect to axis of slider).

Use Inversion method to determine the dimensions of the basic mechanism.

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

i) Accuracy points.

ii) Structural error

iii) Function generation

iv) Pole and relative pole.

OR

Q8) a) Explain Function generation using Relative Pole method for slider crank mechanism to coordinate three positions of slider and crank. **[8]**

b) Design a four link mechanism to coordinate three positions of the input and output link for the following angular displacements of the input and output links. Assume the following data: Initial positions of the crank and rocker are 0° and 50° with respect to horizontal; **[8]**

$\theta_{12} = 35° \phi_{12} = 50° : \theta_{13} = 80° : \phi_{13} = 80°$

Take length of fixed link 100mm and length of the rocker 45 mm.

Q9) a) Design a cam profile to operate an inline roller follower using following data **[14]**

- Base circle of radius of the cam: 30 mm
- Radius of the roller: 10mm
- Maximum lift of the follower: 40 mm
- Angle of ascent: 120°
- Angle of dwell: 30°
- Angle of descent: 80°
- Motion of follower during Ascent: SHM
- The follower immediately falls by 10mm at the end of dwell in highest position and further descents with Cycloidal motion by 30 mm.

The cam rotates at uniform speed in clockwise direction. Also draw the pitch circle for the cam designed.

b) Explain what is Undercutting of cams? **[4]**

OR

Q10)a) Explain the following advanced cam curves. Mention the application of each. **[6]**

- Simple polynomial cam
- 3-4-5 polynomial cam

b) Derive and expression for the cam jump of an eccentric cam operating a flat faced follower. **[6]**

c) Explain the effect on the cam profile by varying **[6]**

i) Base Circle Diameter and

ii) Pressure angle

Total No. of Questions : 9]

SEAT No. :

P3251

[Total No. of Pages : 2

[5353] - 114
T.E. (Mechanical)
METROLOGY AND QUALITY CONTROL
(2012 Pattern)

Time :2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

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

Q1) a) Explain traceability, selective assembly and interchangeability. **[6]**

b) Explain different types of errors in measurement. **[4]**

OR

Q2) a) State different types of comparators, explain sigma comparator in detail. **[5]**

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

Q3) a) Explain different types of errors in Gear measurement. **[4]**

b) Explain two wire method in thread measurement. **[6]**

OR

Q4) a) Explain quality costs in details. **[5]**

b) State Taylor's principle of gauge design, Draw progressive type plug and snap gauge. **[5]**

Q5) a) What do you mean by PDCA and PDSA? Explain. **[8]**

b) Explain in details Seven New quality control tools. **[8]**

P.T.O.

OR

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

i) Zero Defect

ii) Kanban

iii) Six sigma

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

Q7) a) Ten samples of parts were taken from a production line for 100% inspection, each sample containing 300 parts. The total number of defective was 350. Compute upper and lower control limit. **[5]**

b) Explain analysis of out of control condition referring control charts. **[5]**

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

OR

Q8) a) A new process is started and the sum of sample standard deviations for 25 subgroups of size 4 is 750. If the specifications are 700 ± 80, what is process capability index? What action would you recommend? Take for four samples factor for center line = C4 = 0.9213. **[6]**

b) Ten castings were inspected in order to locate defects in them. After inspection total 37 defects were found. Compute control limit for C chart. **[4]**

c) Write note on PPAP and OC curve. **[8]**

Q9) Write a short note on (any four) **[16]**

a) Cause and Effect diagram.

b) Pareto diagram.

c) Kaizen

d) TPM

e) 5 S

f) JIT

Total No. of Questions : 8]

SEAT No. :

P3252

[Total No. of Pages : 4

[5353] - 115
T.E. (Mechanical)
HYDRAULICS AND PNEUMATICS
(2012 Pattern)

Time :2½ hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Answer Q.1OR Q2, 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) ***Use of electronic pocket calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Draw ISO symbols for the following components: **[6]**

i) 4x3 pneumatically double pilot operated DCV

ii) Pressure compensated flow control valve

iii) Gas loaded accumulator

iv) Counterbalance valve with bypass & check valve

v) Quick Exhaust valve

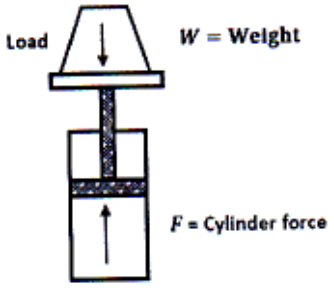
vi) Bi-directional fixed displacement hydraulic motor

b) Classify pumps used in fluid power applications. **[6]**

c) A 6000 N weight is to be lifted upward in a vertical direction for the system shown in Figure 1c. Find the cylinder force required to **[8]**

i) Move the weight at a constant velocity of 1.75 m/s.

ii) Accelerate the weight from zero velocity to 1.75 m/s in 0.5 s.



(Figure 1c)

P.T.O.

OR

Q2) a) Differentiate between hydraulics and pneumatics. **[6]**

b) What are the functions of reservoirs? Draw a neat sketch of standard reservoir showing its Internal and External features. **[6]**

c) With neat diagrams, explain what is a double rod end and telescopic cylinder. State their applications. **[8]**

Q3) a) Explain with neat sketch working of pressure reducing valve. Draw an ISO symbol of it. **[6]**

b) Draw a bleed off circuit for speed control and label the components. **[6]**

c) Draw a neat sketch of Riveting circuit and label the components. **[6]**

OR

Q4) a) Differentiate between 'closed centre' and 'tandem centre' valve position of directional control valve (DCV) with respect to ISO symbol, importance and applications. **[6]**

b) Draw regenerative circuit with a neat sketch. State its advantages. **[6]**

c) Draw a hydraulic circuit for cylinder synchronization with two cylinders connected in series. State if it will give perfect synchronization. **[6]**

Q5) a) Draw and explain throttle-out circuit used in pneumatics. **[6]**

b) Can we use atmospheric air directly in pneumatic systems? If no, why? What should be done to make use of it? **[6]**

c) State any two applications of pneumatics in low-cost automation **[4]**

OR

Q6) a) Draw a typical circuit showing the application of Shuttle Valve. **[6]**

b) Sketch compressed air generation and distribution system **[6]**

c) State any two applications in industry requiring vacuum for their operation **[4]**

Q7) In a special purpose machine hydraulic system is used for **[16]**

a) Clamping the job

b) Moving the machine bed during machining operation

The clamping force required to be developed by each of the four clamp cylinders is 1kN. The bed is to be moved against an effective load of 10kN.

Feed rate required is between 1 m/min to 3.5 m/min. The bed movement is 100cm.

Assume a suitable sequence of operations, and draw a simple hydraulic circuit which will fulfill these requirements. Select different components from the data given. Specify ratings of the components in case it is not available in the given data.

OR

Q8) a) Sequential operations of two pneumatic cylinders are required as follows: **[10]**

i) Cylinder A extends

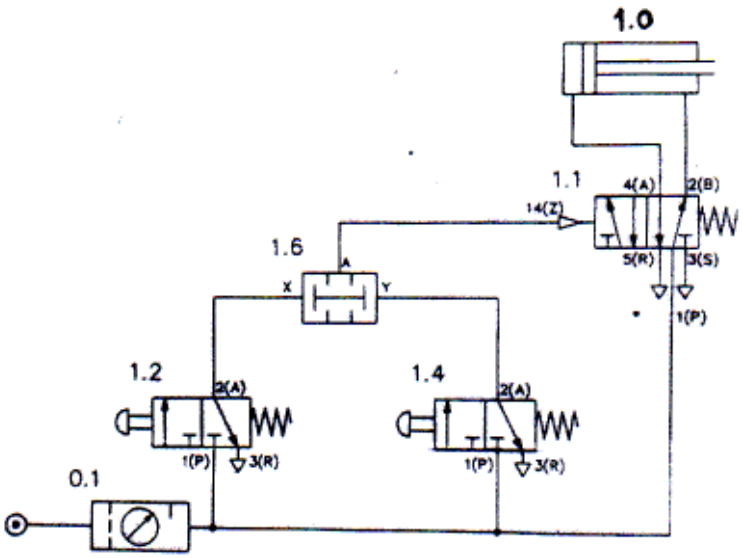
ii) Cylinder B extends

iii) Cylinder A retracts

iv) Cylinder B retracts

Develop a pneumatic circuit using pilot operated 4/2 DCV and roller operated valves. (Do not use sequence valves)

b) Label the components and analyze the circuit shown in Figure 8b. **[6]**



(Figure 8b)

DATA

1. **Suction Strainer :**

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

2. **Pressure Gauge :**

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

3. **Vane Pump :**

Model	Delivery in / pm		
	at 0 bar	at 35 bar	at 70 bar
P_1	8.5	7.1	5.3
P_2	12.9	11.4	9.5
P_3	17.6	16.1	14.3
P_4	25.1	23.8	22.4
P_5	39.0	37.5	35.6

4. **Relief Valve :**

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

5. **Flow control Valve :**

Model	Working Pressure (bar)	Flow Range (/pm)
F_1	70	0-4.1
F_2	105	0-4.9
F_3	105	0-16.3
F_4	70	0-24.6

6. **Directional Control Valve :**

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

7. **Check Valve :**

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

8. **Pilot Operated Check Valve :**

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

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

Model	Bore dia. (mm.)	Rod dia (mm)
A_1	25	12.5
A_2	40	16
A_3	50	35
A_4	75	45
A_5	100	50

10. **Oil Reservoirs :**

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

Total No. of Questions : 12]

SEAT No. :

P3253

[Total No. of Pages : 3

[5353] - 116
T.E. (Mechanical / Automobile) (Semester - II)
NUMERICAL METHODS AND OPTIMIZATION
(2012 Pattern)

Time :2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.***
2) ***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) Moment at a point in a cantilever carrying a uniformly distributed load is, $M = \frac{Pl^2}{2}$, where P is the intensity of UDL and l is the distance. If the error in the calculation of P is 0.0 1 kN/m and l is 0.02 m, find the error in calculation of M at l = 3.5 and P = 2 kN/m. **[6]**

OR

Q2) Using five iteration of bi-section method determine root of the following equation **[6]**

$f(x) = x^3 - x^2 - x - 1 = 0$ Take initial guess $x_1 = 1.7$ and $x_2 = 1.9$.

Q3) Draw the flowchart for Gauss elimination method. **[6]**

OR

Q4) Using Gauss - Seidal method solve the following set to simultaneous equations. Solve upto four iterations. **[6]**

$x_1 + 20x_2 + 9x_3 = -23$

$2x_1 - 7x_2 - 20x_3 = -57$

$20x_1 + 2x_2 + 6x_3 = 28$

P.T.O.

Q5) a) Minimize $Z = 80x_1 + 120x_2$ **[5]**

Subject to $x_1 + x_2 \leq 9$

$x_1 \geq 2$

$x_2 \geq 3$

$20x_1 + 50x_2 \leq 300$

$x_1, x_2 \geq 0$

(Use graphical method)

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

OR

Q6) Maximize $Z = 50{,}000x_1 + 12{,}000x_2$

Subject to $75x_1 + 15x_2 \leq 1000$

$100x_1 + 30x_2 \leq 1500$

$45x_1 + 10x_2 \leq 750$

And $x_1, x_2 \geq 0$

(Use simplex method) **[8]**

Q7) a) Using the following points, fit a polynomial using Lagrange's method and find the value of y at $x = 2.7$ **[8]**

(2.10,5.14) (2.50,6.78) (3.10,10.29) (3.50,13.58)

b) Determine the values of a and b so that the equation $y = ax^b$ best fits the following data by the method of least squares. **[8]**

x	25	20	12	9	7	5
y	0.22	0.2	0.15	0.13	0.12	0.1

OR

Q8) a) Using the method of least square, fit the curve $y = ax^2 + \frac{b}{x}$ to the following data. **[8]**

x	1	2	3	4
y	–1.51	0.99	8.88	7.66

b) Draw the flowchart for Newton's forward difference interpolation. **[8]**

Q9) a) Use Simpson's 1/3rd rule to find $\int_0^{0.8} (\log_e (x+1) + \sin (2x)).dx$ where x is in radians. Divide the entire interval in 8 strips. **[8]**

b) Find $\int_0^1 \int_0^1 e^{(x+2y)} dx.dy$, using Simpson's 1/3rd rule. Take $h = k = 0.5$. **[8]**

OR

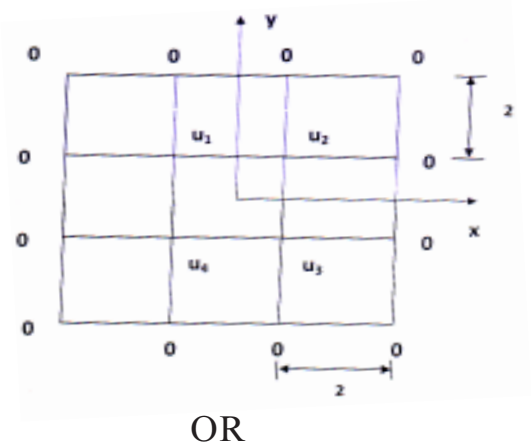
Q10)a) Draw flowchart for Gauss Legendre 2 point and 3 point method. **[8]**

b) Use Trapezoidal rule with four steps to estimate the rule of integral

$$\int_0^2 \frac{x}{\sqrt{2+x^2}} dx$$ **[8]**

Q11)a) Solve the differential equation $\frac{dy}{dx} = \sqrt{(x+\sqrt{y})}$ using Euler's method under the boundary conditions $x = 2$ and $y = 4$ find y at $x = 2.5$ in 10 steps. **[8]**

b) Solve the equation $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = \frac{1}{xy}$ corresponding to grid shown in following fig **[10]**



OR

Q12)a) Write down step by step procedure for solution of PDE of Laplace equation and develop a flowchart to write a program. **[8]**

b) Initial temperature within an insulated cylindrical metal rod of 4 cm length is given by, $T = 50 (4 - x)$, $0 \le x \le 4$, where x is distance from one end in cm. Both the ends are maintained at 0°C. Find the temperature as a function of x and t ($0 \le t \le 1.5$) if the heat flow is governed by

$$\frac{\partial T}{\partial y} = 2\frac{\partial^2 T}{\partial x^2}. \Delta x = 1, \Delta t = 0.25$$ **[10]**

Total No. of Questions : 10]

SEAT No. :

P3254

[Total No. of Pages : 5

[5353] - 117
T.E. (Mechanical) (Semester - II)
DESIGN OF MACHINE ELEMENTS - II
(2012 Pattern)

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

Instructions to the candidates:

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

Q1) a) What are the desirable properties of gear materials? State the suitable materials for various working conditions. **[4]**

b) A pair of spur gears with 20° pressure angle consists of 25 teeth pinion meshing with a 60 teeth gear. The module is 5 mm, while the facewidth is 45mm. The pinion rotates at 500 rpm. The gears are made of steel and neat treated to a surface hardness of 220 BHN. Assume that dynamic load is accounted by means of velocity factor. The service factor & factor of safety are 1.75 & 2 respectively. calculate:

i) Wear strength of gears.

ii) The static load the gears can transmit without pitting; and

iii) Rated power that can be trasmitted by gears.

$$y = 0.484 - \frac{2.87}{2}, k = 0.16\ [\text{BHN}/100]^2$$ **[6]**

OR

Q2) a) Explain the following. **[4]**

i) Herringbone helical gear

ii) Double helical gear

iii) Crossed helical gear

iv) Applications of crossed helical gear

P.T.O.

b) A pair of parallel helical gears consist of a 35 teeth pinion meshing with a 70 teeth gear. Power transmitted is 20kw at 720 rpm. Normal module is 5mm & facewidth is 50mm.The centre distance is 285mm. Normal pressure angle is 20°. The ultimate tensile strength of gear material is 600N/mm^2 & hardness is 300BHN. Service factor is 1.25. & the factor of safety is 2.

Calculate:

i) The helix angle;

ii) The beam strength;

iii) Wear strength

iv) Effective load, $\gamma = 0.484 - 2.87/2'$,& $CV = \frac{5.6}{5.6 + \sqrt{V}}$ **[6]**

Q3) a) A ball bearing subjected to a radial load of 3000N is expected to have a satisfactory life of 10000 hrs at 720 rpm with a reliability of 95%. Calculate the dynamic load carrying capacity of the bearing, so that it can be selected from a manufacturers catalog based on 90% reliability if there are four such bearings each with a reliability of 95% in a system, what is the reliability of complete system. **[6]**

b) Explain following types of bevel gears

i) Miter gear;

ii) Crown gear;

iii) Skew bevel gear

iv) Hypoid gear **[4]**

OR

Q4) a) Write a note on mounting of bearings with neat sketches. **[4]**

b) Derive the expression for beam strength of bevel gears. **[6]**

Q5) a) What are single - enveloping and double - enveloping worm gear drives? What are the applications of these gears. **[4]**

b) A pair of worm gears is designated as 2/54/10/5

Calculate:

i) The centre distance

ii) The speed reduction

iii) The dimensions of the worm and,

iv) The dimensions of the worm wheel **[8]**

c) How materials are selected for worm gearing? State the possible materials. **[4]**

OR

Q6) a) A pair of worm & worm wheel is designated as 1/30/10/10.The input speed of the worm is 1200 rpm. The worm wheel is made of centifugally cast phorsphor bronze and the worm is made of case - hardened carbon steel 14C6. Determine the power transmitting capacity based on the beam strength and also on wear strength. Use enpressions for beam & wear strength as per

1443 - 1974. Use following data.

Sb_1 = 28.2 for Case - hardened steel,

Sb_2 = 7.0 for phosphot - bronze

Xb_1 = 0.25 for 1200 rpm

Xb_2 = 0.48 for 40 rpm

Yz = 1.143

Sc_1 = 4.93 for case - hardened steel

Sc_2 = 1.55 for phosphor - bronze

Xc_1 = 0.112

Xc_2 = 0.26 **[12]**

b) Explain the force analysis in worm geaning. **[4]**

Q7) a) It is required to select a flat belt drive to connect two transmission shafts rotating at 800 and 400 rpm respectively. The centre distance between shafts is 3m and the helt drive is open - type. The power transmitted by the belt is 30KW and load correction factor is 1.3 The belt should operate at a velocity between 17.8 to 22.9 m/s. The power transmitting capacity of the belt per mm width per ply at 180° arc of contact and at a belt velocity of 5.08 m/s is 0.0 147 KW. Select preferred pully dimensions & specify the belt (i - e length, width, no of plies etc). Arc of contact factor = 1.08. **[12]**

b) Write a short note on polygonal effect in chain drives. **[4]**

OR

Q8) a) Explain the following with neat sketches.

i) Lay of wire ropes.

ii) Stresses developed in wire ropes. **[4]**

b) The following data is given for an open - type V - belt drive.

diameter of driving pulley = 200mm

diameter of driven pulley = 600 mm

groove angle for sheaves = 34°

mass of belt = 0.5kg/m

man. permissible tension in belt = 500N

co-efficient of friction = 0.2

contact angle for smallet pulley = 157°

speed of smaller pulley = 1440 rpm

power to be transmitted = 10 KW.

How many V - belts should be used, assuming each belt takes its proportional part of the load. **[12]**

Q9) a) Explain how pressure development takes place in hydrodynamic bearing with the help of neat sketches. Write basic Reynolds equation. **[6]**

b) A hardened and ground journal, 50 mm in diameter rotates at 1440 rpm in a lathe turned bronze bushing which is 50 mm long.

The data of machining as follows:

Part	Machining method	Surface roushess (c/a)
Shaft	grinding	0.8 μm
Bearing	turning/ boaring	1.6 μm

The minimum oil film thickness is 5 times the sum of surface roughness (c/a) values. The class of fit is H8 d8 and the viscosity of the lubricant is 18cp. Petermine the maximum radial load that the journal can carry & still operate under hydrodynamic conditions. Use following data:

limits of tolerances for H8 : 0.00 to + 38 μm

d8 : –80 μm to – 119 μm

[12]

OR

Q10)a) Derive the expression of temperature rise in a hydrodynamic bearing.**[6]**

b) The following data is given for 360° hydrodynamic bearing:

radial load = 5KN
journal diameter = 50mm
bearing length = 50mm
viscosity of oil = 20 mpas

Specify the radial clearance that need to be provided So that when journal is rotating at 2880 rpm, the minimum oil film thickness is 30 μm. Evaluate corresponding co-efficient of friction & total oil flow. (Refer table 1 for data)

[12]

Table - 1

$\left(\frac{1}{d}\right)$	E	$\left(\frac{ho}{c}\right)$	S	ϕ	$\left(\frac{r}{c}\right)f$	$\left(\frac{Q}{r\,c\,n_s 1}\right)$	$\left(\frac{Q_s}{Q}\right)$	$\left(\frac{P}{P_{max}}\right)$
∞	0	1.0	∞	(70.92)	∞	π	0	–
	0.1	0.9	0.240	69.10	4.80	3.03	0	0.826
	0.2	0.8	0.123	67.26	2.57	2.83	0	0.814
	0.4	0.6	0.0626	61.94	1.52	2.26	0	0.764
	0.6	0.4	0.0389	54.31	1.20	1.56	0	0.667
	0.8	0.2	0.021	42.22	0.961	0.760	0	0.495
	0.9	0.1	0.0115	31.62	0.756	0.411	0	0.358
	0.97	0.03	–	–	–	–	0	–
	1.0	0	0	0	0	0	0	0
1	0	1.0	∞	(85)	∞	π	0	–
	0.1	0.9	1.33	79.5	26.4	3.37	0.150	0.540
	0.2	0.8	0.631	74.02	12.8	3.59	0280	0.529
	0.4	0.6	0.264	63.10	5.79	3.99	0.497	0.484
	0.6	0.4	0.121	50.58	3.22	4.33	0.680	0.415
	0.8	0.2	0.0446	36.24	1.70	4.62	0.842	0.313
	0.9	0.1	0.0188	26.45	1.05	4.74	0.919	0.247
	0.97	0.03	0.00474	15.47	0.514	4.82	0.973	0.152
	1.0	0	0	0	0	0	1.0	0

Total No. of Questions : 10]

SEAT No. :

P3255

[Total No. of Pages : 4

[5353] - 118
T.E. (Mechanical Engineering) (Semester - II)
TURBO MACHINES
(2012 Pattern)

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 non programmable scientific calculator is allowed.***
4) ***Assume data wherever necessary and mention it.***
5) ***Draw neat and suitable figures wherever necessary.***

Q1) a) A Pelton turbine running at 720 rpm uses 300 kg of water per second. If the head available is 425 m. The bucket deflects the jet through 165 deg. Determine the hydraulic efficiency. Also find the diameter of the runner and jet. Assume Cv = 0.97, the velocity of the bucket is 0.46 of the jet speed and blade velocity co. of 0.9. **[6]**

b) What is the location of cavitation in reaction turbine and discuss about it in brief. **[4]**

OR

Q2) a) Explain why governing is important in the turbines. **[4]**

b) A jet of water having a velocity of 30m/s enters on the series of moving vanes having velocity 15 m/s. The jet makes 30 deg. To the direction of motion of vane at inlet and leaves the vanes with 5 m/s at an angle of 60 deg. Draw the velocity triangles and find: i. vane tip angle at inlet and outlet for shock less flow, ii. Work done per kg of water **[6]**

Q3) a) Draw neat sketch of Francis turbine and label it. **[4]**

b) A Parsons reaction turbine at 400 rpm develops 5 MW using 6 kg/kW-hr of the steam. The exit angle of the blade is 20 deg. And the velocity of the steam is 1.35 times the blade velocity and pressure at exit is 1.2 bar and the dryness fractions is 0.95. Calculate for this 1. A suitable blade height, assuming Dm / hb = 12, where Dm-mean diameter and hb is blade height. **[6]**

OR

P.T.O.

Q4) a) A Kaplan turbine runner has outer diameter of 4.5 m and the diameter of the hub is 2m. lt is required ton develop 20.6 MW when running at 150 rpm, under a head of 21m . Assuming hydraulic efficiency of 94% and overall efficiency of 88%, determine the runner vane angle at inlet and exit at the mean diameter of the vane. **[6]**

b) Define following terms: nozzle efficiency, stage efficiency, blade efficiency, coefficient of discharge. **[4]**

Q5) a) Explain following heads in centrifugal pump **[8]**

i) Suction lift

ii) Delivery lift

iii) Centrifugal head

iv) Manometric head

b) The impeller of the centrifugal pump has an outer diameter of 250mm and an effective area of the $0.017m^2$.The blades are bent backward so that the direction of outlet relative velocity makes an angle of 148 deg with the tangent drawn in the direction of impeller rotation. The diameters of suction and delivery pipes are 150mm and 100mm respectively. The pump delivers $0.031\ m^3/s$ at 1450 rpm when suction and delivery lifts are 4.6m and 18m respectively. The head losses in the suction and delivery pipes are 2m and 2.9m respectively. The motor driving the pump delivers 10kW. Assuming that water enters the pump without shock and whirl Determine: 1. Manometric efficiency and 2.The overall Efficiency of the pump. **[8]**

OR

Q6) a) A centrifugal pump running at 800rpm is working against a total head of 20.2m. The external diameter of the impeller is 480mm and outlet width 60mm. lf the vanes angle at outlet is 40 deg and Manometric efficiency is 70%, Determine: i) Flow velocity at outlet ii) Absolute velocity of water leaving the vane iii)Angle made by the absolute velocity at outlet with direction of motion at outlet and iv)Rate of flow through pump. **[8]**

b) Discuss the significance of the effect of outlet blade angle on performance of centrifugal pump. **[8]**

Q7) a) Classify centrifugal compressor and discuss its applications. **[4]**

b) Differentiate between centrifugal and axial flow compressors. **[4]**

c) A gas compressor compresses the gas at the rate of 2Kg/s from inlet static pressure of 1 bar to a static pressure of 4bar.The power input to a compressor is 400kW.The velocity of air at entry to the impeller blades is 100m/s and at exit of the impeller is 160m/s. Determine the stagnation pressures and temperatures at inlet and exit of the compressor, diameter of the suction pipe required and adiabatic efficiency based on the static and total values. Assume $\gamma = 1.4$, Cp=1.05 kJ/kgK and R=300Nm/kgK. The temperature at inlet of the impeller is taken as 280 K. **[10]**

OR

Q8) a) A centrifugal compressor delivers 10 m^3/s of air when running at 10000 rpm. The air is drawn in at 1 bar and 300K and delivered at 4 bar. The isentropic efficiency is 80%.The blades are radial at outlet and constant flow velocity is 64 m/s. The outer dia. Of the impeller is twice the inner dia. And slip factor may be taken as 0.9. Calculate l.Temperature of air at outlet of impeller 2. Power required driving the compressor 3. Impeller diameters at inlet and outlet 4.Impeller blade angle at inlet 5. Diffuser blade angle at inlet. **[10]**

b) Discuss the performance characteristic curves of the centrifugal compressor. **[8]**

Q9) a) Show that for 50% Degree of Reaction of axial flow compressors blades are symmetrical. **[8]**

b) An axial compressor stage has following data; temperature 300 K and pressure 1 bar at entry, degree of reaction 50%, mean blade ring diameter 36 cm, rotational speed 18000 rpm. blade height at entry 6 cm, air angles at rotor and stator exit 250,axial velocity 180m/s, work done factor 0.88, mechanical efficiency 96.7 %, Determine 1) Air angles at the rotor and stator entry 2) The mass flow rate of air 3) The power required to drive the compressor 4) The loading coefficient, assume R = 287 J/kgK. **[8]**

OR

Q10)a) Draw neat sketch of axial flow compressor and Explain flow processes through Axial flow compressor with h-S diagram for single stage. **[8]**

b) An eight stage axial flow compressor takes in air at a temperature of 293k at the rate of 3 kg/sec. The pressure ratio is 6 and isentropic efficiency is 0.89. The compressor is designed for 50 % reaction. The blade speed for each stage may be assumed to be constant as 180 m/sec and the flow velocity is 100 m/sec. Determine the power required to drive the compressor and the direction of air at entry and exit from the rotor and stator. Assume that the total work is equally shared between the stages. Assume $\gamma = 1.4$ and $Cp = 1.005$kJ/kg K. **[8]**

Total No. of Questions : 10]

SEAT No. :

P3256

[Total No. of Pages : 3

[5353] - 119

T.E. (Mechanical)

MECHATRONICS

(2012 Pattern) (End Semester)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
4) ***Assume suitable data, if necessary.***

Q1) a) What is digital optical encoder? Explain the working of incremental encoder with a neat sketch. **[6]**

b) Compare open loop control system and closed loop control system. **[4]**

OR

Q2) a) Explain the working of servo motor with suitable sketch. **[6]**

b) State the applications of mechatronics systems used in household and automotive. **[4]**

Q3) a) Define transfer function. **[2]**

b) Define the following terms :- **[8]**

i) Bit width

ii) Aliasing

iii) DAQ system

iv) Sampling theorem.

P.T.O

OR

Q4) a) State the advantages and disadvantages of open loop control system. **[2]**

b) Explain analog to digital converter with suitable diagram. **[8]**

Q5) a) What are the criteria that need to be considered for selection of PLC. **[4]**

b) Draw the ladder logic program for AND, OR & NOR logic gates. **[9]**

c) Explain latch circuit with ladder program. **[3]**

OR

Q6) a) Explain the basic structure of PLC with suitable block diagram. **[8]**

b) Draw the ladder logic program for NAND and exclusive or (XOR) logic gate. **[8]**

Q7) a) Explain the building blocks of mechanical system with suitable example. **[8]**

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

i) Rise time

ii) damping factor

iii) Overshoot

iv) Damping frequency.

OR

Q8) a) Explain the building blocks of thermal system with suitable example. **[8]**

b) Differentiate between time domain analysis & frequency domian analysis. **[8]**

Q9) a) Explain the proportimal control mode. State its characteristics. **[8]**

b) Explain the turn PID tuning and explain the steps for manual PID tuning. **[8]**

c) Define steady state error **[2]**

OR

Q10)a) Explain derivative control mode. State its charateristics. **[8]**

b) Explain PI control mode, stating its characteristics. **[8]**

c) Define delay time. **[2]**

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Total No. of Questions : 10]

SEAT No. :

P 3258

[Total No. of Pages : 3

[5353] - 123

TE (Mechanical S/W) (Semester - I)

MECHATRONICS

(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.*
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 a suitable diagram and explain the construction as well as the working of a optical encoder. **[6]**

b) From the block diagram in Figure 1, determine the transfer function:Y/X. **[4]**

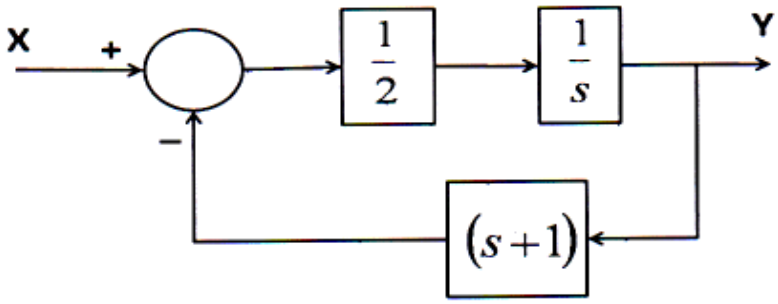

Figure 1

OR

Q2) a) A potentiometer, used to measure the angular position of a motor. has 750 turns of wire. The input range is from -150° to +150°. The output range is from 0 to 10 Volts. Determine: **[6]**

i) The sensitivity

ii) The average resolution

b) Using a suitable block diagram, explain the application of a closed loop control system in temperature control in a microwave. **[4]**

P.T.O

Q3) a) Draw suitable diagrams and explain the construction, working and performance characteristics of a two stage Current Amplifier. **[8]**

b) Define "Transfer Function" and discuss its importance in the context of control of a Mechatronic system. **[2]**

OR

Q4) a) Draw the flowchart and explain the working of the 4 bit SAR type Analog to Digital converter. **[8]**

b) List two important advantages of a closed loop control system. **[2]**

Q5) a) Given four normally open switches (P1, P2. S1 and S2). with DC motor (M) **[10]**

write a PLC program to satisfy following objectives :

i) When P1 (Start Button) is pushed the Cycle shall start. The cycle shall continue to remain On until P2 (Stop Button) is pushed.

ii) When Sl is pushed and S2 is not pushed then Motor is ON clockwise direction

iii) When S2 is pushed and S1 is not pushed then Motor is ON in counter clockwise direction.

iv) When P2 is pushed the program stops.

b) Draw a suitable block diagram and explain the architecture of the SCADA system. **[6]**

OR

Q6) a) Draw a suitable block diagram and explain the architecture of PLC. **[8]**

b) List the criterion for the selection of a PLC and explain any three criterions in details. **[8]**

Q7) a) For the system in Figure 2, assume M = mass = lkg, k = stiffness = 2 N/m and d = damping = 0.5 Ns/m. Also, F = force input in N and y = displacement output in m. **[10]**

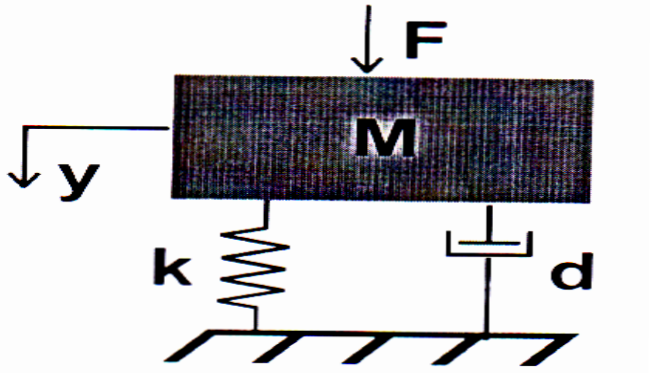

Figure 2

For this system:

i) Determine the transfer function: y(s)/F(s).

ii) Identify the location of the Poles and Zeros and

iii) Comment on the stability of the system.

b) Using the values of the natural frequency = ω_n=1.414 and the damping factor = ζ= 0.177, estimate the values for percentage overshoot & 2% settling time. **[6]**

OR

Q8) a) Using four distinct points, compare, in detail, between Time Domain and Frequency Domain techniques for analysis of a system. **[8]**

b) Draw suitable sketch to depict the unit step response of a second order system when : **[8]**

i) System poles are negative and real

ii) System poles are complex conjugate pair with negative real part

iii) System poles are positive and real

iv) System poles are a imaginary pair with no real part

Q9) a) The equation of error is $e = 0.5t + 0.03t^2$. With $K_P = 5$, $K_D = 0.5$ and $p(0) = 50$ % , sketch the graph of the controller output vs time for a Proportional plus Derivative controller (in series form) from t = 0 to t = 2 sec. **[10]**

b) Draw a block diagram of PID control and discuss, in detail, the advantages and disadvantages offered, independently, by Proportional, Integral and Derivative controllers. **[8]**

OR

Q10)a) Draw a suitable block diagram and derive the transfer function of the Proportional Integral Derivative (PID) controller in series form. Also, discuss the significance of the Integral and the Derivate term in the PID controller. **[10]**

b) Discuss the role of transient specifications W.R.T the performance of the PID controller. **[8]**

Total No. of Questions : 12]

SEAT No. :

P 3259

[Total No. of Pages : 3

[5353] - 124

T.E. (Mechanical Sandwich) (Semester - I)

NUMERICAL METHODS & COMPUTATIONAL TECHNIQUES

(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 side indicate full marks.***
3) ***Use of calculators is allowed.***
4) ***Assume suitable data if necessary.***

Q1) Find root of $e^{-x} - x = 0$ correct to four decimal places using Newton Raphson method consider starting point as $x = 0$. **[6]**

OR

Q2) Evaluate $\int_2^4 (1 + x^4)$ using Gauss Quadrature 2 Point Formula **[6]**

Q3) Find the value of y at x = 310 using Lagrange's Interpolation. **[6]**

x	300	304	305	307
y	2.4771	2.4829	2.4843	2.4871

OR

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

a) Inverse interpolation

b) Cubic Spline Interpolation.

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

$$10x - 2y - 2z = 6$$
$$-x + 10y - 2z = 7$$
$$-x - y + 10z = 8$$

P.T.O

OR

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

$$2x + y + z = 10$$
$$3x + 2y + 3z = 18$$
$$x + 4y + 9z = 16$$

Q7) a) Fit a straight line through following set of points. **[8]**

x	1	3	5	7	9
y	1.5	2.8	4	4.7	6

b) Explain relative error and round-off error with suitable example. **[4]**

c) Explain error propagation with suitable example. **[4]**

OR

Q8) a) Explain Least Square Method and derive equation to fit a straight line through given set of points. **[8]**

b) Pressure and volume of a gas are related by the equation $PV^a = b$, where 'a' and 'b' are constants. Fit this equation to the following set of data. **[8]**

P	0.5	1.0	1.5	2.0	2.5
V	1.62	1.0	0.75	0.62	0.52

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) Draw flow chart for 'Predictor - Corrector Method'. **[8]**

b) Given $\frac{dy}{dx} = \log_{10}(x^2 + y)$, find y (0.4) with step size of 0.2, using Modified Euler's order method for accuracy of 0.001. With initial condition as y (0) = 1 **[8]**

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

b) Solve the partial differential equation. **[10]**

$\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = -10(x^2 + y^2 + 10)$ over the square with x = y = 0 and x = y = 3, with u = 0 on the boundary and mesh length 1.

OR

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. :

P 3260

[Total No. of Pages : 3

[5353] - 125

TE (Mechanical Sandwich Engineering)

MACHINE DESIGN

(2012 Pattern)

Time : 3 Hour] *[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.***

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

b) Explain in detail Gerber Approach? **[4]**

OR

Q2) a) Explain design of flange coupling? **[6]**

b) What are the factors that affect the endurance limit of machine part? **[4]**

Q3) a) Write the forms of threads in Power Screw? **[4]**

b) Derive an expression for springs in parallel? **[6]**

OR

Q4) a) Write at least four types weld symbols with sketch? **[4]**

b) A double threaded power screw with ISO metric trapezoidal threads is used to raise a load of 600KN. The nominal diameter is 150mm and pitch is 12mm. The coefficient of friction at screw threads is 0.35. Neglecting collar friction. Calculate i) Torques to raise the load. **[6]**

P.T.O

Q5) a) The following data is given for a pair of spur gear with 20degree of full depth involute teeth. Number of teeth on pinion = 28, Number of teeth on gear =84, Speed of pinion=l400rpm, Module = 4 mm, Service factor 1.5 Face width=25mm. Both the gears made up of steel with an Ultimate tensile strength =750N/mm^2 Using the velocity factor to account for the dynamic load calculate (i) Beam strength, (ii) Velocity Factor **[12]**

b) Write force analysis of spur gears? **[6]**

OR

Q6) a) Design a pair of helical gears to transmit 40kW power at a speed reduction ratio of 4:1. The input shaft rotates at 1400 rpm. Take helix and pressure angles equal to 25° and 20° respectively. The number of teeth on the pinion may be taken as 40. **[12]**

b) With neat sketch explain beam strength equation of Helical gear? **[6]**

Q7) a) Derive equation for dynamic load carrying capacity of bearing. **[6]**

b) A single row deep groove ball bearing has a dynamic load capacity of 80000N and operates on following work cycle.

i) Radial load 8000N at 500rpm for 25% of the time.

ii) Radial load 5000N at 600rpm for 50% of the time.

iii) Radial load 10000N at 400rpm for 25% of the time.

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

OR

Q8) a) Explain in detail Lubrication and mounting of bearings? **[6]**

b) Derive an expression for load life relationship? **[10]**

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

b) A pulley of 1200 diameter is driven by an open type of flat belt from 10 KW at 1440 rpm electric motor. The pulley on motor shaft is 150mm diameter and centre distance between the two shaft is 1.5m. The allowable tensile stress for the belt material is 3 N/mm^2 and coefficient of friction between belt and pulley is 170mm. Determine

i) The thickness of the belt

ii) The length of the belt

iii) The initial tension required in belt. **[12]**

OR

Q10) a) Write equation of open and cross belt with neat sketch? **[4]**

b) A workshop crane is lifting a load of 20kN through a wire rope and a hook. The weight of the hook etc is 15kN. The rope drum diameter may be taken as 30 times the diameter of the rope. The load is to be lifted with an acceleration of I m/s^2. Calculate the diameter of the wire rope. Take a factor of safety of 6 and Young's modulus for the wire rope 80 kN/mm^2 . The ultimate stress may be taken as 1600 MPa. The cross-sectional area of the wire rope may be taken as 0.28 times the square of the wire rope diameter. **[12]**

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Total No. of Questions : 12]

SEAT No. :

P 3261

[Total No. of Pages : 2

[5353] - 126

T.E. (Mechanical Sandwich)

MATERIALS AND MANUFACTURING ENGINEERING (2012 Pattern) (Self Study - I)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) Classify the composites based on matrix materials. **[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. **[8]**

Q3) a) Write a note on "Magnetic 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) Discuss the technological advantages of nano and Bio materials. **[8]**

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

Q5) Differentiate between:

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

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

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

P.T.O

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 is anodizing? State advantages and limitations. **[6]**

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

SECTION - II

Q7) a) Discuss the various steps involved in P/M with importance of each step in controlling the properties of final sintered components. **[8]**

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

OR

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

b) Discuss Tribological impact and important applications of Powder Metallurgy. **[8]**

Q9) a) How do you classify CNC machines? Compare open loop and closed loop control system in CNC with block diagram. **[8]**

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

OR

Q10)a) Write any eight M codes and their functions. **[8]**

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

Q11 a) How do you specify broaching machine? **[6]**

b) Explain the working principle of Gear shaping. **[6]**

c) Which are the various threading methods? Discuss any one. **[6]**

OR

Q12)a) Differentiate between Pull type and Push type broaching and broaches. **[6]**

b) Explain various gear finishing methods with example. **[6]**

c) Write a note on Thread rolling. **[6]**

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Total No. of Questions : 12]

SEAT No. :

P 3262

[Total No. of Pages : 2

[5353] - 127

T.E. (Mechanical - Sandwich)

INDUSTRIAL ENGINEERING AND PRODUCTION MANAGEMENT

(2012 Pattern)

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

Instructions to the candidates:

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

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]**

P.T.O

OR

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

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

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. :

P 3263

[Total No. of Pages : 3

[5353] - 134

TE (Automobile Engineering) (Semester - I)

DESIGN OF MACHINE ELEMENTS

(2012 Pattern)

Time : 3 Hour] *[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 indicates full marks.***
4) ***Use of electronic pocket calculator is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) a) Explain the general design procedure. **[6]**

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

OR

Q.2) a) What are the factors to be considered while designing a machine element? **[6]**

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

Q3) a) Derive an expression for torque required to raise the load in power screws. **[8]**

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

OR

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

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

P.T.O

Q5) a) A simply supported beam has a concentrated load at the center. The load fluctuates from P to 4P. The span of the beam is 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 500Kg is being lowered by means of steel wire rope having cross sectional area 250mm^2. The velocity of weight is 0.5m/sec. When the length of extended rope is 20m, the sheave gets stuck up. Determine the stress induced in the rope due to sudden stoppage of sheave. Take E=0.8 × 10^6 Mpa. **[6]**

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

b) The following data is given for a 360° hydrodynamic bearing. Radial load = 3.2KN, Journal speed = l490 rpm, journal diameter=50mm, bearing length = 50mm, radial clearance = 0.05mm, viscosity of lubricant = 25cP. Assuming that the total heat generated in the bearing is carried by the total flow in the bearing. Calculate (i) coefficient of friction (ii) power lost in friction (iii) minimum oil film thickness (iv)flow requirement in Lit/min (v) temperature rise. **[10]**

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

b) The bearing of a system carries a radial load of 3000N and axial load of 1000N. The angular speed of shaft is 60 rad/sec. The bearing has to operate 8 hrs/day. Dynamic capacity of bearing is 27070 N. Take radial factor as 0.56, thrust factor as 1.71 and rotating factor as 1.Wheather the design is safe for bearing? **[10]**

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

b) Design spur gear set to transmit 20 KW at 900rpm of pinion. The transmission ratio is 3. Take 20° FDI, Z_1=18, σ_d=193.2Mpa, BHN=250 for pinion and σ_d=47.l 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) A motor shaft running at 1440 rpm to transmit 15 KW of power to a low speed shaft with a speed reduction through helical gears having helix angle 25°, transmission ratio is 3:1. The teeth are 20°FDI system and the pinion have 25 teeth. σ_d=193.2Mpa, BHN=250 for pinion and σ_d=138.3Mpa, BHN=180 gear. Design gear set.

Y= π (0.154-0.912/Z_e), C_V = 6.1/6.1+V **[12]**

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Total No. of Questions : 10]

SEAT No. :

P 3264

[Total No. of Pages : 2

[5353] - 135

TE (Automobile Engineering)

AUTOMOTIVE ELECTRICAL AND ELECTRONICS

(2012 Pattern) (Semester - I)

Time : 2½ Hours] ***[Max. Marks :70***

Instructions to the candidates:

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

Q1) a) Explain electromagnetic compatibility & interference. **[5]**

b) Write a short note on CAN bus **[5]**

OR

Q2) a) Compare Lead Acid battery with alkaline battery. **[5]**

b) Explain any two types of battery tests. **[5]**

Q3) a) Explain working of thermostatic type fuel gauge with neat diagram **[5]**

b) Explain working of Fog Lamp. **[5]**

OR

Q4) a) Explain current and voltage regulator with the help of neat diagram. **[5]**

b) Enlist the troubles of the ignition system which are likely to be encountered while running the vehicle and their remedies. **[5]**

Q5) a) Classify the air flow sensors based on their working principles. Explain working of any one of them. **[10]**

P.T.O

b) List out the various sensors used for electronically controlling the engine. Explain Throttle Position Sensor with neat figure **[8]**

OR

Q6) a) Explain working of Negative Temperature Coefficient (NTC) hermistor. **[8]**

b) Enlist the types of actuators used in engine. Explain any one motor based engine actuator. **[10]**

Q7) a) Enlist & Describe the components of fuel injection system. **[8]**

b) What is meant by closed loop control of engine? When the engine control switches from open loop to closed loop? Explain in detail. **[8]**

OR

Q8) a) Explain Working of ECU with neat figure. **[8]**

b) What is meant by idle speed control? Explain it with neat figure **[8]**

Q9) a) Explain electric power steering with neat figure. **[8]**

b) What is meant by Collision Avoidance? Explain it with block diagram. **[8]**

OR

Q10) a) Explain ABS with layout. **[8]**

b) Write a short note on GPS in Vehicle. **[8]**

Total No. of Questions : 10]

SEAT No. :

P 3265

[Total No. of Pages : 4

[5353] - 138

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

DESIGN OF ENGINE COMPONENTS

(2012 Pattern)

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

Instructions to the candidates:

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

Q1) a) Differentiate between water & air cooling system? **[4]**

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

OR

Q2) a) Describe the different types of radiator matrix commonly used. What are their relative advantages and disadvantages? **[4]**

b) If 42.5 kW engine has a mechanical efficiency of 85%. Find the indicated power & frictional power. If the frictional power is assumed to be constant with load, what will be the mechanical efficiency at 60% of load? **[6]**

Q3) a) Explain Mist lubrication system. **[2]**

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

Cylinder bore = 250mm

Material of piston rings = Grey cast iron

Allowable tensile stress 100 N/mm^2

Allowable radial pressure on cylinder wall = 0.03 MPa

Thickness of piston head = 42mm

Number of piston rings = 4

Design piston rings and piston barrel.

P.T.O

OR

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

b) Determine the dimensions of cross section of the connecting rod for a diesel engine with following data: **[8]**

Cylinder bore = 100mm

Length of connecting rod = 350mm

Maximum gas pressure = 4MPa

Factor of safety = 6

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

b) The cylinder of a four stroke diesel engine has the following specifications: **[12]**

Brake power = 7.5k W. speed= 1400 rpm.

indicated mean effective pressure = 0.35 MPa.

mechanical efficiency = 80%,

Maximum gas pressure = 3.5MPa.

The cylinder liner and head are made of grey cast iron **FG** 260

(Sut = 260 N/mm^2 and $\mu = 0.25$). The studs are made of plain

carbon steel 40 C8 (Syt = 380N/mm^2) The factor of safety for all

parts is 6. Calculate:

i) Bore and length of the cylinder liner

ii) Thickness of the cylinder liner

iii) Thickness of the cylinder head

iv) Size, number and pitch of studs

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

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

OR

Q6) a) Design an exhaust valve for a horizontal diesel engine using the following data: Cylinder bore = 150mm, length of stroke = 275mm,engine speed = 500 rpm, maximum gas pressure = 3.5 MPa, seat angle = 45°. Calculate: **[8]**

i) Diameter of the valve port

ii) Thickness of the valve head

iii) Diameter of the valve stem

iv) Maximum lift of the valve

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

b) The Cylinder of four stoke diesel engine has the following specification, Cylinder bore = l50mm, **[8]**

Maximum gas pressure = 3.5 N/mm^2,

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

Factor of Safety = 5,

Poisson's ratio = 0.25,

Determine thickness of the wall & net circumferential stresses in

the cylinder wall.

Q7) a) Explain vacuum gauge test **[8]**

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

OR

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

a) Cylinder leakage test

b) Cylinder compression test

c) Mechanical fuel pump testing.

d) Cylinder power balance

Q9) a) Explain Advanced Turbulent Flow Induction Technology (ATFT) **[9]**

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

OR

Q10)a) Explain the Variable Timing Control (VTC) **[9]**

b) Write a note on Wankel Engine & Dual fuel engine. **[9]**

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Total No. of Questions : 10]

SEAT No. :

P 3266

[Total No. of Pages : 2

[5353] - 139

TE (Automobile Engineering)

AUTOMOTIVE TRANSMISSION

(2012 Pattern) (Semester - II)

Time : 2½ Hour] *[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.***

Q1) a) With layout of front engine all wheel drive Explain the working **[5]**

b) What are the difference between fully forward and semi forward? **[5]**

OR

Q2) a) What are the functions and requirement of clutch? **[5]**

b) With neat sketch explain centrifugal clutch. **[5]**

Q3) a) Explain construction working of single plate clutch. Give application **[5]**

b) Write a note on synchronizing unit. **[5]**

OR

Q4) a) Classify different types of universal joint. Explain any one with its function. **[5]**

b) Explain the construction working of Hotchkiss drive. **[5]**

Q5) a) What is final drive? Classify final drive and explain any one of them with diagram. **[10]**

b) Give difference between semi floating and fully floating. **[8]**

OR

Q6) a) What is a need of differential? Explain construction working of differential. **[10]**

b) Explain Types of loads acting on rear axle. **[5]**

c) Write a note on final drive lubrication. **[3]**

Q7) a) Explain construction working of fluid flywheel with neat sketch. **[8]**

b) Explain Simple Epicyclic gear train with gear ratios. **[8]**

P.T.O

OR

Q8) a) Explain construction working of torque converter with neat sketch. **[8]**

b) Explain construction working Wilson epicyclic gear train. **[8]**

Q9) a) Explain continuously variable transmission with neat sketch. Write advantages and disadvantages. **[8]**

b) Explain semi automatic transmission. **[8]**

OR

Q10)a) Explain construction working of Hydramatic transmission. **[8]**

b) Give comparisons between manual and automatic transmission. **[8]**

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Total No. of Questions : 9]

SEAT No. :

P 3267

[Total No. of Pages : 2

[5353] - 140

T.E. (Automobile)

AUTOMOTIVE AERODYNAMICS AND BODY ENGINEERING

(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) ***Use of Logarithmic tables, silde rule, electronic pocket calculator is allowed.***
4) ***Assume suitable data, if necessary.***
5) ***Question 9 is compulsory.***

Q1) a) What is the effect of fastener? **[4]**

b) What are the resistances to vehicle motion? **[6]**

OR

Q2) a) Explain the term boat failing. **[4]**

b) Write a short note on various body optimization techniques for minimum drag. **[6]**

Q3) a) Describe various strategies for aerodynamic development of car. **[4]**

b) Write a short note on dirt accumulation on vehicle. **[6]**

OR

Q4) a) Write a note on climatic wind tunnel. **[4]**

b) Describe different types of flow visualization techniques in wind tunnel simulation. **[6]**

P.T.O

Q5) a) Draw and Explain, **[10]**

i) Front assembly, ii) Roof Assembly,

iii) Under floor, iv) Bonnet.

b) Explain conventional & integral type construction in brief. **[6]**

OR

Q6) a) Draw and Explain, **[10]**

i) Seating dimensions for bus, ii) Seating layouts for bus,

iii) Emergency door location, iv) Luggage space location.

b) Write a short note on driver's visibility. **[6]**

Q7) a) Write a short note on tipper body construction. **[8]**

b) Write a short note on driver cabin design with a suitable sketch. **[8]**

OR

Q8) a) Explain in brief about Tanker body construction. **[8]**

b) What are the flat platform, drop side, fixed side type of body? **[8]**

Q9) Solve any three from the following. **[3 × 6 = 18]**

a) Write a short note on shear panel method.

b) Explain in brief about symmetric & asymmetric vertical loads in car.

c) Write a note on types of seat used in automobiles.

d) Write a short note on Air bags.

e) Design a Luxury bus structure with seating layout.

Total No. of Questions : 8]

SEAT No. :

P 3268

[Total No. of Pages : 2

[5353] - 141

TE (Electronics)

ELECTRICAL MACHINES & POWER DEVICES (304201)

(2012 Pattern)

Time : 2.30 Hour] *[Max. Marks :70*

Instructions to the candidates:

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

Q1) a) Draw and explain switching characteristics of Power diode in detail. **[6]**

b) Write a short note on: Different cooling methods for power devices. **[8]**

c) Compare SCR. TRIAC and GTO in detail. **[6]**

OR

Q2) a) With the help of basic structure, explain the operation of power BJT.**[6]**

b) Draw and explain construction, operation & V-I characteristic of TRIAC **[8]**

c) What is the concept of thermal resistance? Explain its model in detail.**[6]**

Q3) a) Explain the different methods of excitation for d.c. machines in detail.**[6]**

b) Explain the significance of back emf and derive the back emf equation & power equation of d.c. motor. **[6]**

c) A 20KW. 200V shunt generator has an armature resistance of 0.05 ohm and shunt field resistance of 200 ohm. Calculate the power developed in the armature when it delivers rated output. **[4]**

OR

P.T.O

Q4) a) Distinguish between self excited and separately excited DC generator. **[4]**

b) Write a short note on: Three-point stator for d.c. motor. **[6]**

c) A 6 pole dc motor has a wave connected armature with 87 slots, each slot containing 6 conductors. The flux per pole is 20mWb and armature resistance of 0.13 ohm when the motor is connected to 240V supply and the armature draws a current of 80A driving a load of 15 KW. Calculate

i) Speed ii) armature torque

iii) shaft torque **[6]**

Q5) a) Compare Squirrel cage and Wound rotor in detail. **[6]**

b) Explain the principle of operation of a 3-phase induction motor in detail. **[8]**

c) A 4-pole, 3 phase induction motor is supplied from 50Hz supply. Determine its synchronous speed on full load, its speed is observed to be 1410 rpm. Calculate its full load slip. **[4]**

OR

Q6) a) Explain the torque-slip characteristic of a three phase induction motor in detail. **[8]**

b) A 3 phase, 4 pole, 50Hz, star connected induction motor running on full load develops a useful torque of 300 N-m. The rotor emf is completing 120 cycles per minute. If torque lost in friction is 50Nm, Calculate: **[10]**

i) Slip ii) Net output power

iii) Rotor copper loss per phase

iv) Rotor efficiency

v) Rotor resistance per phase if rotor current is 60A

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

b) Explain the operation of a variable reluctance motor. **[8]**

OR

Q8) a) Write a short note on: a.c. servomotor, **[8]**

b) Explain the construction and working principle of SRM in detail. **[8]**

Total No. of Questions : 8]

SEAT No. :

P 3269

[Total No. of Pages : 2

[5353] - 142

T.E. (Electronics) (Semester - I)

DATA COMMUNICATION

(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 whenever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain the different types of transmission media. **[6]**

b) Explain the properties of various line formats? Compare RZ, NRZ formats on the basis of above properties along with their merits and demerits. **[7]**

c) Explain FEC and ARQ systems of error control. Also explain

i) Stop and wait ARQ ii) Go back N ARQ

iii) Selective Repeat ARQ with neat Diagram. **[7]**

OR

Q2) a) Draw and Explain layered architecture of OSI Model. **[6]**

b) Explain inter symbol interference (ISI) and also how the Eye pattern is used to interpret the ISI. **[8]**

c) Explain in brief all the different types of error correcting techniques. **[6]**

Q3) a) What steps are involved in Huffman coding procedure? Evaluate the performance of Humman code over Shannon Fano code for large message eansemble with equal probabilities. **[8]**

P.T.O.

b) Apply the Huffman coding procedure for the following message ensemble. Also determine its efficiency **[8]**

X	X1	X2	X3	X4	X5	X6
P	0.4	0.28	0.12	0.08	0.08	0.04

OR

Q4) a) State and explain all the three Shannon's theorems of information theory. **[8]**

b) An analog signal is band limited to BHz and sampled at Nyquist rate. The samples are quantized into 4 levels. Each level represents one message. Thus there are 4 messages. The probabilities of occurrence of these messages are p1 = p4 = 1/8 and p2 = p3 = 3/8. Find out information rate of source. **[8]**

Q5) a) Derive the expression of Error probability of PSK. **[8]**

b) In digital CW communication, the bit rate of NRZ data stream is 1 Mbps, and carrier frequency is 100 Hz. Compute the symbol rate of transmission and the bandwidth requirement of the channel for

i) BPSK system.

ii) QPSK system. **[8]**

OR

Q6) a) Explain with the help of neat block diagram 16 bit QAM transmitter and receiver. Also give the mathematical analysis. **[8]**

b) Explain the working of DPSK transmitter and receiver **[8]**

Q7) a) Explain the working of DS-SS transmitter and receiver. **[9]**

b) A PN sequence is generated using a feedback shift register of length m = 4, the chip rate is 107 chips/sec. Find the following parameters :

i) PN sequence length

ii) Chip duration of the PN sequence

iii) PN sequence period. **[9]**

OR

Q8) a) Explain working principle of slotted ALOHA, ALOHA, CSMA and CSMA/CD. **[9]**

b) Draw and explain the block diagram of FH-SS transmitter and receiver. **[9]**

Total No. of Questions : 8]

SEAT No. :

P 3270

[Total No. of Pages : 2

[5353] - 143

TE (Electronics Engineering)

MICROCONTROLLERS AND APPLICATIONS

(2012 Pattern) (End Semester)

Time : 2½ Hour] ***[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) Explain software debugging tools. Explain any one IDE with its features. **[6]**

b) Explain SCON register in detail. Also calculate the hexadecimal count in TH1 when baud rate of the controller is 1200. **[6]**

c) What different way CPU clock frequency can be derived in PIC 18FXXX controller? **[6]**

OR

Q2) a) Explain architecture of 8051 microcontroller with suitable block diagram. **[6]**

b) Differentiate between microprocessor and microcontroller with general architecture & features. **[6]**

c) What are the power down modes of PIC 18FXXX? How does clock frequency affect the performance of microcontroller? **[6]**

Q3) a) Write a program to generate a delay of 10 sec using Timer l. Also calculate TMRCON0, TMR0H. TMR0L value for the same? Assume that XTAL= 4MHz **[9]**

b) Write a program to generate a PWM waveform of 14 KHz with 70% duty cycle. Assume XTAL = 4MHz **[9]**

OR

P.T.O

Q4) a) Draw an interfacing diagram of 16×2 LCD with PIC 18Fxxx and write embedded C program for displaying "I AM STUDENT" message on the first line. (using Busy flag) **[9]**

b) Draw an interfacing diagram of 16 LED's interfaced to PORTD & PORTB and also write an embedded C program for chasing LED left to right and then right to left. **[9]**

Q5) a) Explain the MSSP structure with respect to Master IIC mode **[9]**

b) Draw and explain the Device addressing in SPI bus protocol. What are the advantage of SPI over IIC bus. **[9]**

OR

Q6) a) Explain UART bus interfacing with PIC18FXXX. Also write embedded c program to read data from UART. **[9]**

b) Draw and explain Interfacing of temperature sensor with PIC18FXXX? Also write embedded C program to display temperature on LCD. **[9]**

Q7) a) Describe with diagram and write algorithm for measuring 0 - 45 DC voltage using PIC l8FXXX. **[8]**

b) Explain with suitable example applications of PWM in industrial drives. Also write algorithm for the same **[8]**

OR

Q8) a) Write a short note on data acquisition system. **[8]**

b) Draw a diagram and explain how speed of DC motor can be calculated. Write algorithm **[8]**

Total No. of Questions : 8]

SEAT No. :

P 3271

[Total No. of Pages : 3

[5353] - 144

TE (Electronics)

ELECTROMAGNETICS & WAVE PROPAGATION

(2012 Pattern) (Semester - I)

Time : 2½ Hour] *[Max. Marks :70*

Instructions to the candidates:

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

Q1) a) Derive an expression for electric field intensity at general point p due to infinite line charge distribution having line charge density ρl **[7]**

b) Derive an expression for the capacitance of parallel plate capacitor. **[6]**

c) Given points are A (1,2,4), B (-2,-1,3) & c (3,1,-2) Let differential current element with I = 6A & $|\bar{d}L| = 10^{-4}$ m be located at A the direction of $\bar{L}$ is from A to B find $\overline{dH}$ at point C. **[7]**

OR

Q2) a) Determine Electric flux density $\bar{D}$ at (4,0,3) if there is a point charge –5π mc at (4,0,0) & a line charge 3π mc/m along y axis **[8]**

b) Defind current density & derive the continuity equation to find current **[6]**

c) Derive the equation for ampere's circuital law. **[6]**

Q3) a) Determine boundary conditions for time varying field. **[8]**

b) In material for which σ = 5.0 s/m & Er = 1, the electric field intensity is $E=250 \sin^{10} t$ V/m. Find conduction & displacement current densities & frequency at which both have equal magnitude. **[6]**

P.T.O

c) Write maxwell's equations in point form & integral form for the free space. **[4]**

OR

Q4) a) IF $\overline{D} = 10x\ a\bar{x} - 4y\ a\bar{y} + kz\, a\bar{z}\ \mu c/m^2$ & $\bar{B} = 2a\bar{y}\ mT$, Find value of K to satisfy the maxwell's equations for region $\sigma = 0$ & $\rho v = 0$ **[6]**

b) State & derive poynting theorem **[8]**

c) Define & explain faraday's law. **[4]**

Q5) a) Define skin depth or depth of penetration derive the expression for the same. Explain why uniform plane wave can not travel large distance through conductor. **[8]**

b) Determine amplitudes of reflected & transmitted fields (electric & magnetic both) at the interface of two regions, if Ei = 1.5 mV/m in region 1 for which $\in_{r1} = 8.5$, $\mu_{r1} = 1$ & $\sigma_1 = 0$ & region 2 is free space (Normal incidence) **[8]**

OR

Q6) a) Define polarization & explain different types of polarization of uniform plane wave **[8]**

b) A 300 MHz uniform plane wave propagates through fresh water for which $\sigma = 0, \mu_r = 1 \& \in_r = 78$. Calculate

i) attenuation constant. ii) Phase constant

iii) Wavelength iv) Impedance **[8]**

Q7) a) Derive the friis transmission equation **[8]**

b) Explain in brief modes of propagation of radio waves. **[8]**

OR

Q8) a) Explain refraction in atmospheric duct & tropospheric scatter propagation. **[8]**

b) Explain the following terms **[8]**

i) Fading

ii) Multipath delay spread

iii) Coherence Bandwidth

iv) Coherence time

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Total No. of Questions : 8]

SEAT No. : ____

P 3272

[Total No. of Pages : 4

[5353] - 145

TE (Electronics)

NETWORK SYNTHESIS

(2012 Pattern)

Time : 2:30 Hours] ***[Max. Marks :70***

Instructions to the candidates:

Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.

Q1 a) Synthesize function using Foster forms. **[6]**

$$Z(s) = \frac{s(s^2+4)}{2(s^2+1)(s^2+9)}$$

b) Realize network function, with 1 Ω termination. **[6]**

$$Z(s) = \frac{1}{(s^3+3s^2+3s+2)}$$

c) Prove that $\frac{V_2}{V_g} = \frac{1}{2}\frac{R-Z_a}{R+Z_a}$ of constant resistance lattice, whose source and load impedance are equal to R. **[8]**

OR

Q2) a) Explain elementary synthesis concepts **[6]**

i) Removal of pole at infinity

ii) Removal of pole at origin

iii) Removal of conjugate imaginary poles

b) Determine range of K in P (s) so that given polynomials are hurwitz. **[6]**

i) $P(s) = s^3 + 20s^2 + 5s + 10K$

ii) $P(s) = s^4 + 25s^3 + 15s^2 + 20s + K$

P.T.O

c) Test whether following functions are positive real function or not. **[8]**

i) $F(s) = \dfrac{3s^2 + 5}{s^3 + s}$

ii) $P(s) = \dfrac{2s^2 + 2s + 1}{s^3 + 2s^2 + s + 2}$

Q3) a) Explain frequency and impedance scaling with suitable example. **[6]**

b) State properties of Butterworth approximation. **[4]**

c) Determine transfer function of Chebyshev low pass filter to meet the following specification. **[6]**

i) $1dB$ ripple in the pass band

ii) Cut off frequency $\omega_c = 10 \times 10^5$ *rad/sec*

iii) The magnitude must be down to $25d$ B at $\omega = 3 \times 10^6$ *rad/sec*

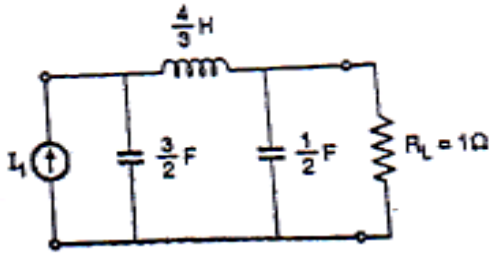
OR

Q4) a) Comparer Butterworth and Chebyshev Approximation Techniques. **[4]**

b) Determine transfer function and realize low pass Butterworth approximation filter whose requirements are cheracterized by, **[6]**

$A_{max} = 1dB$, $A_{min} = 30dB$, $\omega_s = 350 rad/sec$

c) Normalized third order low pass filter is shown below in figure **[6]**



Design c ; cut off frequency $\omega_c = 10^6$ *rad / sec* and the impedance load of 500Ω

Q5) a) Design 2nd order Sallen and key high pass Butterworth filter having

cutoff frequency of $300H_z$ **[4]**

b) Explain the different biquad feedback topologies used in active filter designing and list the important observations **[6]**

c) Synthesize the following high pass filter function using RC-CR transformation. **[6]**

$$H(s) = \frac{Ks^3}{S^2 + s + 36}$$

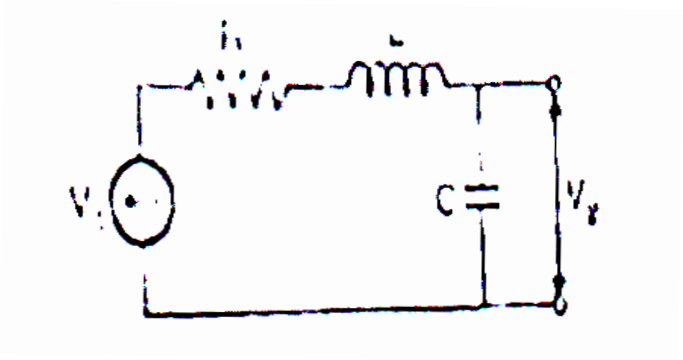
OR

Q6) a) Differentiate between passive and active filters. **[4]**

b) Synthesize 2nd order active low pass Butterworth filter to have a cut off frequency of 159.15KHz then using RC-CR transformation, realize with same cut off frequency. **[6]**

c) What are the advantages and disadvantages of Active filter? **[6]**

Q7) a) For the series RLC circuit shown in figure, 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 obtained result. **[6]**



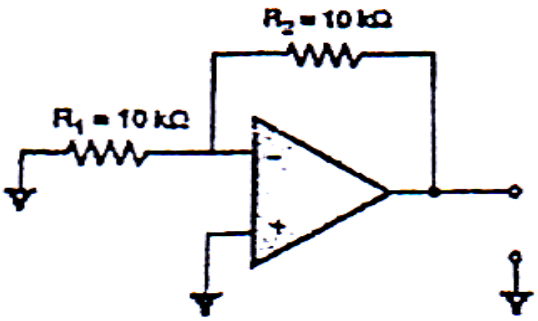
b) Prove the following sensitivity relationships **[6]**

i) $S_x^{P^n} = nS_x^P$

ii) $S_{\sqrt{x}}^P = 2S_x^P$

iii) $S_x^{y+c} = \frac{y}{y+c} S_x^y$

c) The op-amp used in the inverting circuit in figure, has an input bias curren of 600nA and an input offset current that canrange between ±100nA. Find the resulting maximum output offset voltage. **[6]**



OR

Q8) 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) Input bias current

iii) Slew rate

iv) CMRR

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Total No. of Questions : 8]

SEAT No. :

P 3273

[Total No. of Pages : 2

[5353] - 146

TE (Electronics Engineering)

INSTRUMENTATION SYSTEMS

(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) ***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 following static characteristics of instrument in brief

i) Accuracy ii) Precision

iii) Resolution **[6]**

b) Explain the working of L.V.D.T and draw its input output characteristics. **[8]**

c) Explain the working of ultrasonic level sensor **[6]**

OR

Q2) a) Draw the block diagram of measuring instrument and explain the function of each block **[6]**

b) Explain the working of absolute optical encoder and incremental optical encoder. **[8]**

c) Explain principle of thermocouple and the method of cold junction compensation. **[6]**

Q3) a) Draw the block diagram of LM75 temperature sensor and explain its working . **[8]**

b) Elaborate the steps in bulk micromachining. **[8]**

OR

Q4) a) Draw the block diagram of smart sensor and explain its functioning. **[8]**

b) Explain the principle and working of Hall effect sensor for thickness measurement. **[8]**

P.T.O

Q5) a) Draw the diagram of IEEE 488 bus and explain the same in detail. **[10]**

b) Draw the circuit diagram of voltage to current convertes and explain its working. **[8]**

OR

Q6) a) Write a note on HART protocol. **[10]**

b) Draw the diagram of electro pneumatic (Etop) convertes and explain its working. **[8]**

Q7) Write short notes on **[16]**

i) Solenoid valve ii) stepper motor

OR

Q8) Write short notes on **[16]**

i) Hydraulic actuator

ii) Ac servomotor

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Total No. of Questions : 10]

SEAT No. :

P 3274

[Total No. of Pages : 3

[5353] - 147

TE (Electronics) Endsem

DISCRETE TIME SIGNAL PROCESSING

(2012 Pattern)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Answer the Q.No.1 or Q.No.2, Q.3 or Q.4 and Q.5 or Q.6, and Q.7 or Q.8 and Q.9 or Q.10***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Assume suitable data, if necessary.***

Q1) a) State the mathematical model used to represent a DT. System Define these model with mathematical form. **[5]**

b) Perform circular convolution of following sequences using DFT-IDFT method. **[5]**

i) $X_1(n) = \{1,2,3,4\}$

ii) $X_2(n) = \{2,1,1,2\}$

OR

Q2) a) Obtain 4 pint DFT for a sequence x(n) = {1,-2,2,1} and plot the magnitude spectrum. **[5]**

b) Obtain ZT of a DT signal using ZT properties where,

x(n) = 2n.u(n-1) **[5]**

Q3) a) What is the significance of 'N' in N point DFT? Define N point DFT by means of twiddle factor W and Compute twiddle factor for N = 4 **[5]**

b) Why the problem of aliasing is observed during the sampling process? Derive the relationship between analog frequency F and DT frequency f. **[5]**

OR

Q4) a) Compute inverse Z transform of the following.

$X(Z) = \{Z^2 / (Z - 1)(Z - 0.2)\}$ **[5]**

b) Draw a Poles Zero plot for a system described as-

y (n) = x (n) -x (n-1) + 0.2y (n-1) + 0.15 y (n-2) **[5]**

P.T.O

Q5) a) Explain impulse invariance method of IIR filter design. **[6]**

b) The system function of analog filter is given by, $H_a(S) = \dfrac{s+0.1}{(s+0.1)\hat{}2+9}$

Design IIR Filter using impulse invariance method. **[6]**

c) What is wrapping effect? What is its effect on magnitude and phase response? **[4]**

OR

Q6) a) Compare Impulse variance & BLT. **[4]**

b) Discuss Design steps of IIR filter using bilinear transform method. How frequency response is obtained? **[6]**

c) An IIR low pass filter is required to meet the following specification : **[6]**

Passband peak to peak ripple :	≤ 1dB
Passband edge :	1.2 kHz
Stopband attenuation :	≥ 40 dB
Stopband edge :	2.5kHz
Sample rate :	8 kHz

The filter is to be designed by performing BLT on an analog system function of required order butterworth filter so as to meet the specifications in the implementation.

Q7) a) Explain important feature of window function. **[4]**

b) Using frequency sampling method, design a band pass filter with the following specifications. **[8]**

Sampling frequency = 8000Hz

Cutoff frequencies Fcl = 1000 Hz

F_{c_2} = 3000 Hz

Determine the filter coefficient for N = 7.

c) The impulse response of a system h(n) = a^n u(n), a ≠ 0. Determine a & sketch pole zero plot for this system to act as : **[5]**

i) Stable Low pass filter ii) Stable High pass filter

OR

Q8) a) Explain Gibb's Phenomenon. **[4]**

b) If transfer function of FIR LPF is $H(z) = 1 + 2Z^{-1} + 3Z^{-2} + 2Z^{-3} + Z^{-4}$ Show That

i) Impulse Response h(n) is Symmetry. **[5]**

ii) Phase Delay τ_p and Group delay τ_g are constant.

c) Design a FIR digital filter to approximate an ideal LPF with passband gain of unity, Cut off frequency of 850 Hz. And working at sampling frequency of 5000Hz. The Length of impulse response should be 5. Use Rectangular & hamming window. **[8]**

Q9) a) Explain sampling rate conversion by rational factor 1/D. **[3]**

b) Name two methods of sampling rate conversion with advantages & limitations. **[4]**

c) Draw the block schematic for decimator and explain the need for a filter.

Derive the expression for decimated output signal i.e. y(m) and draw the spectrum of the signal after filtering and after decimation process. **[10]**

OR

Q10)a) Explain pipelining concept. Also explain MAC, ALU and Barrel shifter unit of DSP Processor. **[12]**

b) Explain the application of DSP processor in Speech processing. **[5]**

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Total No. of Questions : 10]

SEAT No. :

P 3275

[Total No. of Pages : 2

[5353] - 148

T.E. (Electronics Engineering)

EMBEDDED PROCESSORS

(2012 Pattern)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Answers the Q.1 or Q.2 Q.3 or Q.4, Q.5 or Q.6***
2) ***Answer any four questions.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Use of calculator is allowed.***
6) ***Assume suitable dada if necessary.***

Q1) a) What are the diffrent operating modes of ARM7? **[4]**

b) Compare ARM7, ARM9, ARM11. List the application of these processors **[4]**

c) Explain role of MAC unit in ARM processor with suitable example. **[2]**

OR

Q2) a) Explain bits and its function in CPSR? what is need of SPSR? **[4]**

b) What are the privileged and non privileged mode of operation of ARM processor? Explain in details. **[4]**

c) Explain following ARM instructions. (assume suitable data)

i) MULS R0,R1,R2 ii) LDR R0, [R1, #4] **[2]**

Q3) a) Explain the significance of PLLO f PLLl in (ARM7) LPC 2148 with suitable diagram **[4]**

b) Draw interfacing of GLCD 128 × 64 to LPC 2148. and write algorithml flowchart for the same **[6]**

OR

Q4) a) What is need of prescaler? Explain the working of hmer prescaler in LPC2148? **[4]**

P.T.O

b) Draw inter facing of LED's to PO.16 - PO.23 of LPC2148 and pulled up s/w to p1.16 – p1.17.Write a program to chase the LED's right to left & vice versa whenever s/w is pressed. **[6]**

Q5) a) What are the improvements of ARM cortex M_3 over ARM7? Draw ARM cortex M_3 architecture. **[8]**

b) Descirbe thread and handler modes with suitable diagram. Write the features of LPC1768. **[8]**

OR

Q6) a) What are the diffrent features of operating system needed while developing complex application? **[6]**

b) Explain EMSIS standard with structure in details. State the important of firmware in embedded system **[10]**

Q7) a) Interface 7 Segment display with LPC 2148 and write a program to display 0-9 number on it. **[8]**

b) How NVIC differs from VIC? Explain features of NVIC in LPC 1768.**[8]**

OR

Q8) a) Draw architecture of LPC 1768. Explain system. control block of LPC 1798 **[8]**

b) Draw and explain interfacing of DC motor using pwm with LPC 1768, also write program for the same. **[8]**

Q9) a) Explain diffrent self test conditions in CAN **[6]**

b) Write short notes on the following (any two) **[12]**

i) CAN ii) USB

iii) Ethernet

Q10)a) Draw interfacing diagram of TFT LCD with LPC 1768. Write algorith for the same. **[10]**

b) Draw and explain interfacing of USB using USB device mode with LPC1768. **[8]**

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Total No. of Questions : 8]

SEAT No. :

P 3276

[Total No. of Pages : 2

[5353] - 149

T.E. (Electronics)

POWER ELECTRONICS & APPLICATIONS

(2012 Pattern)

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 and 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) 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]**

OR

Q2) 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%. Determine i) Average output voltage ii) RMS output voltage iii) Chopping efficiency **[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) What is mean by MPPT? Explain in detail? **[6]**

b) Write a note on: Solar Cell in detail. **[8]**

c) Explain different types of inverters used in stand-alone PV System? **[4]**

OR

Q6) a) With the help of neat diagram, application of Stand-alone PV System? **[8]**

b) Write a note on: Grid connected PV System. **[6]**

c) Explain different types of generators used for variable speed wind turbines? **[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 : 12]

SEAT No. :

P3277

[Total No. of Pages : 2

[5353] - 150

T.E. (Electronics Engineering)

INDUSTRIAL MANAGEMENT

(2012 Pattern)

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, Q11 or Q12.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume suitable data if necessary.***

Q1) a) State principles of "Organizing". **[4]**

b) Distinguish between Administration & Management **[4]**

OR

Q2) a) State advantages and disadvantages of Globalization. **[4]**

b) What are different forms of business organization. Give their features **[4]**

Q3) a) Write the definition of Quality given by different authors. **[5]**

b) Write objective of Quality Circle. **[3]**

OR

Q4) a) Explain quality management tools. **[5]**

b) Explain importance of Six Sigma. **[3]**

Q5) a) Explain Cost Benefit Analysis with neat diagram. **[5]**

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

P.T.O

OR

Q6) a) What is need of Project Management? **[4]**

b) Short note on "Project Crashing" **[4]**

Q7) a) What are objective and challenges of HR professionals? **[6]**

b) How carrier planning plays an important role in organizational development. **[5]**

c) What are objective of training. **[5]**

OR

Q8) a) Define Talent Acquisition. Write procedure of talent acquisition. **[8]**

b) What are objectives of human resource management? **[8]**

Q9) a) write a short note on **[8]**

1) Cooperative Society

2) Proprietorship

b) What is Entrepreneurship? State the characteristic of entrepreneurship. **[8]**

OR

Q10)a) What is women entrepreneurship. **[6]**

b) Explain different sources of finance in detail. **[6]**

c) What are different types of business? **[4]**

Q11)a) State & explain different types of Information System **[6]**

b) What is E commerce? Explain the types of E commerce **[8]**

OR

Q12)a) Explain in detail ERP & BPR. **[6]**

b) Short note on decision making model. **[8]**

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Total No. of Questions : 8]

SEAT No. :

P 3278

[Total No. of Pages : 3

[5353] - 151

TE (E & TC) Electronics

DIGITAL COMMUNICATION

(2012 Pattern)

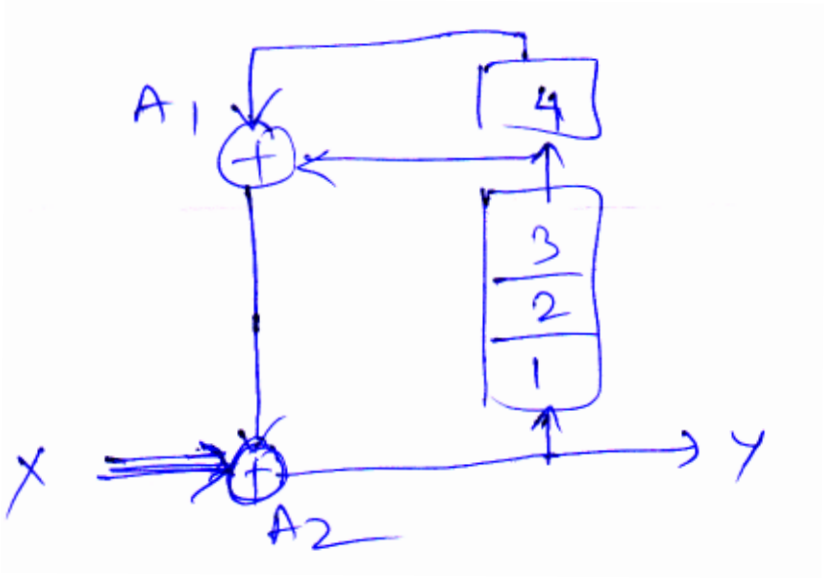
Time : 2½ Hour] *[Max. Marks :70*

Instructions to the candidates:

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

Q1) a) The signal x (t) = 2 cos 200πt + 6 cos 180 πt is ideally sampled at a frequency of 150 samples per second. The sampled version xδ(t) is passed through a unit gain ideal LPF with a cut off frequency of 110Hz.What frequency components will be present in the o/p of the LPF write down the expression for its o/p signal. **[8]**

b) Assuming the initial contents of all the shift registers of the scrambler of fig. given to be zero. Find the o/p sequence yforan input sequence x given by x = 10101011 11 11.



A_1 & A_2 are modulo 2 adders **[6]**

P.T.O

c) What do you understand from the statement : 'When a stationary random process is applied as input to an LTI system the input and output processes are jointly stationary? **[6]**

OR

Q2) a) Derive an expression for SNR of PCM **[6]**

b) For CCIT hierarchy, assume that the first level multiplexer is a synchronous voice PCM bank with 30 input signals. The output bit rate of this multiplexer is 2.048 mb/sec. Find the number of frames transmitted per second. **[8]**

c) Find the auto correlation for the given random process, x(t) = A sin (Wt + ϕ) where ϕ is uniformly distributed in the range of 0 to 2π. **[6]**

Q3) a) Sketch signal space representation of 8 QAM Find euclidian distance for the same. **[8]**

b) In a binary transmission, one of the messages is represented by a rectangular pulse x (t). An other message is transmitted by the absense of the pulse. Evaluate the SNR at t = T. Assuming white noise with psd equal to $N_o/2$. Also sketch the impulse response of the matched filter and o/p of the matched filter. **[8]**

OR

Q4) a) Explain likelihood ratio test in detection theory. **[8]**

b) Explain gram - schmidt procedure for orthogonalization. **[8]**

Q5) a) Explain with the help of block diagram FSK transmitter and receiver. **[10]**

b) A channel has 80 dB transmission loss and white noise with two sided PSD of 0.5×10^{-10} W/H_2 Binary data is to be transmitted over this channel at a bit rate of 10^5 bits/sec. The BER is not to exceed 10^{-4} find the transmitted power needed for DPSK modulation. **[8]**

OR

Q6) a) For the input binary sequence 1100110011 sketch all the waveforms for generation of QPSK signal. **[10]**

b) For an FSK system, the following data are observed. Transmitted binary data rate = 2.5×10^6 bps PSD of noise is 10^{-20}W/H_2. Amplitude of received signal = 1μV. Determine the Average probability of symbol error assuming coherent detection. [Given erfc (2.2) = 1.84×10^{-3}] **[8]**

Q7) a) Explain with the help of Block diagram FHSS transmitter and receiver. **[8]**

b) In a DSSS - CDMA system, the data rate fb = 6kbps and the chip rate fc = 12 mbps. What is the jamming margin if an output SNR of 10 dB is required for a pe = 10^{-5}? Assume a system loss of 1.5 dB owing to imperfections in tracking and detection. **[8]**

OR

Q8) a) Define following terms.

i) Jamming margin

ii) Chip Rate

iii) Processing gain **[8]**

b) A four bit shift register with feed back connections taken from the outputs of stages 4 and 1 through a modulo - 2 adder, is used for PN sequence generation. Assuming the initial contents of the shift register - to be 1000. Determine the o/p sequence. What is the length of the sequence? Draw the diagram of PN sequence generator. **[8]**

Total No. of Questions : 10]

SEAT No. : ____

P 3279

[Total No. of Pages : 3

[5353] - 152

TE (E & TC) (Engg.) (Semester - I)

DIGITAL SIGNAL PROCESSING

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

Q1) a) What are the advantages of Digital signal processing over analog signal processing. **[4]**

b) Check the orthogonality of the vectors. **[4]**

$$A1 = (1,3,2)^T \; A2 = (3,-1,0)^T \; A3 = \left(\frac{1}{3}, 1, -\frac{5}{3}\right)^T$$

c) State and prove any two properties of Z transform **[2]**

OR

Q2) a) Compute 4 point DFT of a sequence x(n) = {0,1,2,3} using Decimation In Time FFT algorithm **[4]**

b) Compute the circular convolution of the following sequences **[4]**

x(n) = {4,3,2,1} h(n) = {2,1,2,1}

c) Write a note on, "Overlap and save method" **[2]**

Q3) a) What is the relationship between DFT and DTFT **[3]**

b) Compute the IDFT of the following sequence **[4]**

X (k) = {4,1-j,-2, 1+ j}

c) By using partial fraction method find the Inverse Z transform of **[3]**

$$x(z) = \frac{z}{(z+2)(z-1)}$$

P.T.O

OR

Q4) a) Show that the computational complexity is reduced if 64 point DFT is computed using Radix -2 DIT FFT algorithm **[3]**

b) Compute the z transform and draw ROC of the following sequences **[4]**

i) $x(n) = a^n u(n) \quad for \ \ n \geq 0$

ii) $x(n) = 2^n u(n) + 3^n u(-n-1)$

c) State the properties of Region of convergence **[3]**

Q5) a) The system transfer function of analog filter is given by **[8]**

$$H(s) = \frac{s + 0.1}{(s + 0.1)^2 + 9}$$

using Impulse Invariance method determine H (z) Assume T = 1Sec

b) Compare Bilinear transformation and Impulse Invariance method **[6]**

c) Show the mapping between analog and Digital frequencies **[4]**

OR

Q6) a) Obtain direct form I, Direct Form II, Cascade and Parallel form realization of a system described by **[10]**

y(n) = 0.75y (n-1) - 0.25 y(n-2) + x (n) + 2x (n-1) - x (n-2)

b) A digital filter has specifications as :

Passband frequency = Wp = 0.4Π, Stopband frequency = Ws = 0.6Π

What the corresponding specifications are for pass band and stop frequencies in analog domain if **[6]**

i) Impulse Invariance Technique is used for designing

ii) Bilinear Transformation method is used for designing

c) Compare Rectangular window with Hanning window **[2]**

Q7) a) State the characteristics of FIR filter **[6]**

b) Design a linear phase FIR low pass filter with cut off frequency fo 0.5 rad/sample by taking 11 samples of ideal frequency response **[10]**

OR

Q8) a) The frequency characteristics of ideal low pass filter is given as **[10]**

$$H(w) = 1 \quad for -\frac{\pi}{2} \le w \le \frac{\pi}{2}$$

$$= 0 \quad for \frac{\pi}{2} \le w \le \pi$$

Design digital FIR filter using fourier series method

i) Find the value of h (n) for N = 9

ii) Find the system function H(Z)

b) Realize the linear phase FIR Filter **[6]**

y(n) = x(n) + 2 x(n-1) + 2x(n-2) + x(n-3)

Q9) a) Explain the application of DSP in Voice processing **[6]**

b) Design a two stage decimator for the following specifications : **[10]**

Sampling rate of an input signal = 20 KHZ

Down sampler D = 80

Passband = 0 to 40 Hz

Transition band = 40 to 50 Hz

Passband ripple = 0.02

Stopband ripple = 0.002

OR

Q10)a) Explain important salient features of TMS320C 6713 DSP processor and draw its functional block diagram. **[8]**

b) Explain the necessity of Barrel shifter **[4]**

c) Compare DSP processors with Microprocessors **[4]**

Total No. of Questions : 8]

SEAT No. :

P 3280

[Total No. of Pages : 2

[5353] - 153

T.E. (E&TC) (Semester - I)

MICROCONTROLLER AND APPLICATIONS

(2012 Pattern)

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 indicate full marks.***
4) ***Use of Calculator is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) a) Differentiate RS232 and RS485 Serial Communication Protocol. **[6]**

b) Explain the programming model of 8051. **[6]**

c) Explain with example function of ALU in PIC for transfer of data. **[8]**

OR

Q2) a) Explain in depth use of I2C protocol and state any two difference between 12C and SPI. **[6]**

b) Explain different addressing modes with example. **[6]**

c) State features of PIC, draw and explain the data memory organization. **[8]**

OR

Q3) a) Draw and explain the port structure of PIC with different registers used in programming. **[8]**

b) Explain in detail PWM mode in PIC. **[8]**

OR

Q4) a) Differentiate between operating functions of Timer 0, 1 and 2 of PIC. Draw and explain functional diagram of Timer() of PIC. **[8]**

P.T.O

b) Draw an interfacing diagram to display 'GANESH' on 4th position in line one and 'SPPU' at 5th position on second line, write an embedded C program. **[8]**

Q5) a) Explain the SPI mode of MSSP structure used for serial communication. **[8]**

b) Explain the use of PlC ADC to interface the motion sensors used for accepting the location and display on LCD. **[8]**

OR

Q6) a) Explain the use of BRG register for calculation of baud rate with UART block diagram. **[8]**

b) State features of RTC and draw an interfacing diagram with PIC, write an initialization program. **[8]**

Q7) a) Draw Generalized block diagram of DAS and state its features. **[8]**

b) Design a DC Motor controller circuit using PWM for motion control. **[10]**

OR

Q8) a) Design a frequency counter to display the pulses received from the tachometer. **[8]**

b) Design a DMM using PIC controller to display AC and DC values of electrical signals. **[10]**

Total No. of Questions : 8]

SEAT No. :

P 3281

[Total No. of Pages : 3

[5353] - 154

TE (E&TC)

ELECTROMAGNETICS AND TRANSMISSION LINES

(2012 Pattern)

Time : 2½ Hour] *[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 indicate full marks.***
3) ***Assume Suitable data if necessary.***

Q1) a) Derive an expression for potential gradient **[6]**

$(\bar{E} = -\nabla V)$

b) Derive boundary conditions for dielectric dielectric interface. **[7]**

c) State and prove stoke's theorem. **[7]**

OR

Q2) a) Evaluate both sides of divergence theorem for the field $\bar{D} = 2xy\ \bar{a}x + x^2\bar{a}y\ \ c/m^2$ and the rectangular parallelopiped formed by planes x = 0 and 1, y = 0 and 2, z = 0 and 3. **[8]**

b) Derive an expression for capacitance of a spherical capacitor **[6]**

c) State amperis circuital law and derive an expression for magnetic field intensity $\bar{H}$ using Amperis circuital law. **[6]**

Q3) a) Define : i) Conduction current density (Jc) **[8]**

ii) Displacement current density (JD)

and show that $\nabla \times \bar{H} = J_C + J_D$

P.T.O

b) Write time harmonic form of maxwell's equations in integral and point form. **[10]**

OR

Q4) a) What are uniform plane waves? Obtain the wave equation in free space in terms of $\bar{E}$ and $\bar{H}$. **[8]**

b) In free space, $\bar{E} = 50\cos(\omega t - \beta z)\bar{a}_x \, v/m$. Find the average power crossing a circular area of radius 2.5m in the plane z = 0. Assume Em = Hm n_0 and $n_0 = 120\pi$ **[10]**

Q5) a) A transmission line has characteristic impedance of 50Ω. Find the reflection coefficient, VSWR. if the line is terminated with : **[8]**

i) 50Ω ii) (75 + j75) Ω

iii) 0Ω iv) (75 + j40) Ω

b) Derive an expression for characteristic impedance (Z_0) and propagation constant (γ) in terms of primary constants of transmission. **[8]**

OR

Q6) a) Calculate the characteristic impedance, attenuation constant, phase constant of a transmission line, if the following measurments are made on the line. **[8]**

Zoc = 550 L - 60° Ω

Zsc = 500 L - 14° Ω

b) Derive equations for valtages and currents at any point on transmission line. **[8]**

Q7) a) What is standing wave ratio? Derive relationship between SWR and reflection coefficient. **[8]**

b) A lossless transmission line has Z_0 = 50Ω. length l = 30m, operating frequency 2MHz. The line is terminated with Z_L = 60 + j40Ω.If velocity is 0.6 × C on the line, where C is velocity of light, find reflection coefficient, VSWR using SMITH CHART. **[8]**

OR

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

i) Stub matching

ii) i/p impedance of open and short circuited line.

b) The VSWR on a lossless line is found to be 5, and successive voltage minima are 40 cm apart. The first voltage minima is observed to be 15cm from load. The length of a line is 160cm and characteristic impedance is 300Ω. Using SMITH CHART, find load impedance and sending end impedance. **[8]**

Total No. of Questions : 8]

SEAT No. :

P 3282

[Total No. of Pages : 2

[5353] - 155

T.E. (E&TC)

SYSTEM PROGRAMMING AND OPERATING SYSTEM

(2012 Pattern)

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

Q1) a) Explain the Analysis and the synthesis phase in a language processor. **[7]**

b) List and Explain advance macro facilities. **[7]**

c) List the code optimization techniques and explain any 2 with example. **[6]**

OR

Q2) a) Explain terms: preprocessor, translators, linkers and loaders. **[7]**

b) List the different loader schemes. Explain any 2 loader schemes. **[7]**

c) Explain different types of statements in assembly language. **[6]**

Q3) a) Explain the Bankers Algorithm for deadlock avoidance with example. **[6]**

b) Explain the Producer-Consumer and the Reader- Writer IPC problems. **[6]**

c) Draw the process state diagram and explain the process states. **[6]**

OR

P.T.O

Q4) a) Explain the difference between deadlock prevention and avoidance. Explain the reasons why deadlocks to occur. **[6]**

b) List and explain the types of operating systems. **[6]**

c) Explain with example the First Come First serve and the round robin process scheduling algorithms. **[6]**

Q5) a) Explain with example First In First Out Page replacement algorithm. **[6]**

b) List the design issues for paging systems and explain any 2. **[6]**

c) Compare paging and segmentation. **[4]**

OR

Q6) a) Explain the concept physical address, logical address, pages and page frames. Explain the process of deriving physical address from the logical address. **[6]**

b) Explain with example First Fit, Best Fit and Worst Fit memory allocation algorithms with examples. **[6]**

c) Compare internal and external fragmentation. **[4]**

Q7) a) Explain memory mapped I/O and direct memory access. **[6]**

b) Explain with diagram I/O software layers. **[6]**

c) Explain file access methods the file and directory operations. **[4]**

OR

Q8) a) Write short note on **[12]**

i) RAID disk and magnetic disk.

ii) Optical disks

iii) Linux Ext 2 file system

b) Explain the concept of i-node **[4]**

Total No. of Questions : 8]

SEAT No. :

P 3283

[Total No. of Pages : 3

[5353] - 156

T.E. (Electronics and Telecommunication Engineering)

INFORMATION THEORY AND CODING TECHNIQUES

(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 and 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) For following terms in information theory, state and explain mathematical expression and two properties. **[6]**

i) Entropy ii) Mutual information.

b) Explain JPEG image encoder and decoder **[6]**

c) Explain with example, significance of d_{min} for error detecting and correcting capability of LBC **[6]**

OR

Q2) a) Compute and compare average code word length, coding efficiency and variance for following symbols using Huffman and Shannon fano method of source coding [0.4, 0.35, 0.09, 0.16]. **[7]**

b) For a (6, 3) systematic LBC, three parity bits given as, **[7]**

$C_4 = d_1 + d_2$, $C_5 = d_2 + d_3$, $C_6 = d_1 + d_3$.

i) Determine generator matrix

ii) Construct code generated by this matrix

iii) Determine error capacity of the code

iv) Prepare syndrome decoding table.

c) Write Short Note on Golay code and single parity check code **[4]**

P.T.O

Q3) a) What are properties of finite field, explain any three property in detail **[6]**

b) For generating Polynomial $g(x) = 1 + x + x^3$. prepare generator matrix for (7,4) cyclic code. **[6]**

c) Explain with suitable example, circuit implementation of cyclic code **[6]**

OR

Q4) a) Find All elements of GF(8) with primitive polynomial and hence compute minimal polynomial for $\alpha^2 + \alpha + 1$ **[6]**

b) Explain Minimal Polynomial and Generating Polynomial **[6]**

c) Explain in detail **[6]**

i) FEC

ii) ARQ

Q5) a) Explain with suitable example i) State Diagram ii) Code Tree iii) Trellis Diagram iv) d_{free} **[8]**

b) With help of suitable convolution encoder diagram, state diagram and trellis diagram, explain Viterbi Decoding Algorithm in the Convolution Coding. **[9]**

OR

Q6) a) A convolution encoder has code rate 1/3, constraint length K= 4

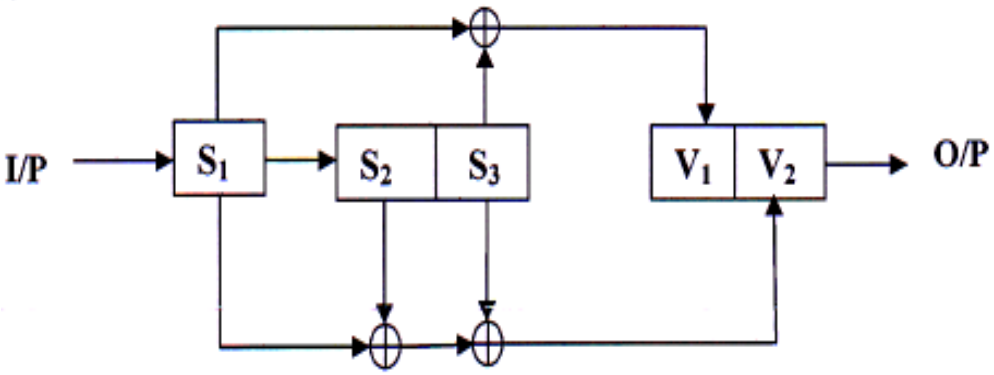
$g^1 = 1 + D + D^2 + D^3$, $g^2 = 1 + D^2 + D^3$, $g^3 = 1 + D + D^3$. **[9]**

i) Obtain State Table

ii) Draw the state diagram

iii) Trellis diagram.

b) For the convolution encoder shown in figure below. Sketch the state diagrams, Code Tree and trellis diagram. Find the output data sequence 10011. **[8]**



Q7) a) Write short notes on power and Bandwidth efficiency of TCM **[6]**

b) Write short notes on Shannon Hartley Theorem **[6]**

c) Explain with neat diagram, necessity of interleaver in turbo codes? **[5]**

OR

Q8) a) Explain the role of a Communication System Designer. What are the implications of Error Probability Plan and BW Efficiency Plan? **[7]**

b) Explain Euclidean distance, Asymptotic coding gain of trellis coded Modulation **[4]**

c) Explain with suitable example **[6]**

i) TURBO codes,

ii) LDPC

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Total No. of Questions : 8]

SEAT No. :

P 3284

[Total No. of Pages : 2

[5353] - 157

T.E. (E&TC)

ANTENNA AND WAVE PROPAGATION

(2012 Pattern)

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 Q8.***

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

Q1) a) Calculate the skip distance for flat earth with MUF of 10MHz. If wave is reflected from a height of 300km where maximum value of refractive index (n) is 0.9. **[8]**

b) Explain the following characteristics of wireless channel **[6]**

i) coherence band width ii) coherence time and

iii) fading.

c) Derive vector potential A for an magnetic current source J. **[6]**

OR

Q2) a) What is pointing vector? What is its significance? Derive an expression for pointing vector? **[6]**

b) Write a short note on structure of atmosphere. **[6]**

c) A lossless half wave dipole antenna of $(73 + j42.5)\Omega$ having directional gain of 1.15 dB is driven from 10 V, 50Ω generator. Determine electric field intensity at a distance 10km in a plane perpendicular to the antenna.**[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) Find the radiation efficiency of a single turn and eight —turn small circular loop at f = 100MHz.The radius of the loop is $\lambda/25$, the radius of the wire is $10^{-4}\ \lambda$ and the turns are spaced $4 \times 10^{-4}\ \lambda$ apart. Assume the wire is copper with a conductivity of 5.7×10^{7} (S/m) and antenna is radiating into free space. **[10]**

b) Give the comparison of far fields of small loop and short dipole. **[6]**

Q5) a) A broadside array of identical antennas consists of 8 isotropic radiators separated by distance $\lambda/2$.Find radiation field in a plane containing the line of array showing direction of maxima and null. **[8]**

b) Derive antenna array factor for N-element linear array taking the centre element as reference for N is odd and even. **[8]**

OR

Q6) a) Draw and explain the radiation pattern of an endfire array. **[8]**

b) Design a broadside Dolph - Tchbyschev array of 10 elements with half wave spacing (d) between the elements and with a major to minor lobe ratio of 26 dB. Calculate the excitation coefficient. **[8]**

Q7) Explain the following antennas with its structural details dimensions, radiation pattern, diagram, specifications, features and applications. **[18]**

a) Micro strip antenna

b) Lens antenna

c) Whip antenna

OR

Q8) a) Explain the working of Super turnstile antenna in detail. **[8]**

b) With the help of suitable diagram explain the operating principle of **[10]**

i) Rhombic antenna

ii) Slot antenna.

Total No. of Questions : 10]

SEAT No. : ____

P 3285

[Total No. of Pages : 2

[5353] - 158

TE (E & TC) (Semester - II)

EMBEDDED PROCESSOR

(2012 Pattern)

Time : 2:30 Hour] ***[Max. Marks :70***

Instructions to the candidates:

1) ***All questions are compulsory***
2) ***Figures to the right Indicate full marks.***

Q1) a) Explain any four modes of operation of ARM 7. **[4]**

b) Explain instructions:

i) CMP r0,r1 ii) ADD r0, r1, r1, LSL #1

iii) LDR r0,= 0 × 42 iv) MOVS r2,#10 **[4]**

c) Explain why ARM processors are used in embedded applications. **[2]**

OR

Q2) a) Explain memory map of LPC2148. **[4]**

b) Compare features of ARM7, ARM9 and ARM 11. **[4]**

c) State function of AHB and APB bus. **[2]**

Q3) a) Write an embedded C program for toggling LED'S connected to the port pin P1.16-P1.23 of LPC2148 also draw interfacing diagram for the same. **[6]**

b) Explain interfacing of SD card to LPC 2148. **[4]**

OR

Q4) a) List the features of timers and discuss the operation of any one timer of LPC2148. **[6]**

b) List the features of UART Block of LPC2148 and explain it. **[4]**

Q5) a) Draw and explain the block diagram of Cortex M3 **[8]**

b) What is CMSIS? Why it is needed? Explain its layered architecture **[8]**

OR

P.T.O

Q6) a) Compare ARM7 and Cortex M3 processors **[8]**

b) Explain why operating system is needed in embedded system? Also explain the desire features of operating system. **[8]**

Q7) a) Write a program to generate PWM wave of different duty cycle. **[8]**

b) Draw interfacing diagram to interface RGB LED to LPC1768 and write a program to display color on LED. **[8]**

OR

Q8) a) Explain all clock sources available in LPC 1768. **[8]**

b) Interface two 7 segment displays to LPC1768 and write a program to display number '23' on the display. **[8]**

Q9) a) State features of CAN protocol. Draw and explain frame format of CAN protocol **[9]**

b) Draw and explain interfacing of TFT with LPC 1768 **[9]**

OR

Q10)a) State features of ETHERNET protocol. Draw and explain frame format of ETHERNET protocol. **[9]**

b) Explain nested vector interrupt controller and bit band area of LPC1768. **[9]**

Total No. of Questions : 8]

SEAT No. :

P 3286

[Total No. of Pages : 2

[5353] - 159

T.E. (E & TC) (Semester - II)

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 diagram must be drawn whenever necessary.***
3) ***Figures to be right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) What are the different managerial levels? Elaborate on the different skills required at each level. **[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 Fayol's Management principle in detail. **[8]**

b) What do you understand by quality of design, conformance and performance? Explain in detail. **[8]**

c) Write short notes on CPM. **[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. :

P 3287

[Total No. of Pages : 2

[5353] - 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 and Q.7 or Q.8.***
2) ***Draw neat diagrams & waveforms wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of nonprogrammable calculator is allowed.***
5) ***Assume suitable data wherever necessary.***

Q1) a) Draw and Explain steady state characteristics of IGBT. **[7]**

b) Explain gate/base drive circuit for Power MOSFET. **[6]**

c) Draw neat circuit diagram and explain single phase full bridge inverter with R-L load. Explain the effect of FWD on the operation of it. **[7]**

OR

Q2) a) Explain with circuit diagram and waveforms three phase inverter with 180 degree conduction mode. **[7]**

b) Draw and Explain the Steady State characteristics of SCR. **[6]**

c) Draw the circuit diagram of three phase Semi converter with R - L load. Explain its operation. Draw the output voltage waveform. **[7]**

Q3) a) What is DC to DC converter? Explain 2 Quadrant 'Class C' Chopper with circuit diagram & waveforms. **[9]**

b) Draw the circuit diagram of single phase AC Voltage controller with R load. Explain its operation. Draw the waveform of output voltage. **[9]**

OR

P.T.O

Q4) a) In a dc chopper, the average load current is 30 Amps, chopping frequency is 250 Hz, supply voltage is 110 volts. Calculate the ON and OFF periods of the chopper if the load resistance is 2 ohms. **[8]**

b) Draw the block schematic of SMPS and explain its advantages over Linear Power Supply. **[10]**

Q5) a) Explain OFF-line UPS with neat block-diagram. State its specifications and applications. **[6]**

b) Explain with circuit diagram working of single phase Full Converter separately excited DC motor drive. Draw neat waveforms across load.**[10]**

OR

Q6) a) What are AC drives? Explain with block diagram, speed control technique of three phase Induction motor by using V/F method. **[8]**

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

i) Electronic ballast and

ii) Battery Charger

Q7) a) Explain SLR half bridge DC/DC converter with neat circuit diagram and Waveforms. **[8]**

b) What is EMI? Explain different sources and minimizing techniques of EMI. **[8]**

OR

Q8) a) Explain with circuit diagram and neat waveforms ZCS resonant converters. **[10]**

b) Explain over voltage and over current protection circuits. **[6]**

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Total No. of Questions : 10]

SEAT No. :

P 3288

[Total No. of Pages : 3

[5353] - 161

T.E. (Electrical) (Semester - I)

ADVANCED MICROCONTROLLER AND ITS APPLICATIONS

(2012 Pattern)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***

Q1) a) Compare RISC and CISC architectures. **[6]**

b) Draw the TOCON register and Explain the use of Pre-scalar. **[4]**

OR

Q2) a) With a neat diagram explain the internal RAM organization of PIC18F458 microcontroller. **[6]**

b) Draw the status register of PIC 18F458 and explain any one of its flag. **[4]**

Q3) a) Explain the following instruction **[6]**

i) MOVFF 0X01,0X05

ii) SETF f,a

b) Write a program in C language which will copy the contents of WREG to Port B continuously. **[4]**

OR

Q4) a) Write an assembly language program for PIC18f458 microcontroller to copy data from PORTB to PORTC. **[6]**

b) Explain any two tools used in application development using PIC microcontroller. **[4]**

P.T.O

Q5) a) Draw a neat diagram of interfacing of 16 × 2 LCD with PIC 18F458 microcontroller in 8 bit mode. Assume suitable port pins for interfacing. Explain the function of following pins in detail RS, R/W, and EN. **[8]**

b) List the steps that must be taken in programming PIC 18 microcontroller to transfer character bytes serially. **[8]**

OR

Q6) a) Write a program for PIC 18 microcontroller in C language to transfer a letter 'T' serially and continuously at a baud rate of 9600. Use BRGH = 0. **[8]**

b) With a neat diagram of interfacing of 4 × 4 keypad with PIC18F458 and flow chart,explain the method of key press detection. **[8]**

Q7) a) Using capture mode, write program in C language to measure the period of wave form fed to RC2 (CCP1) pin of Port C. Output the digital equivalent of the time period of wave form on Port B and Port D. Assume crystal frequency is 10MHz, Timer 1 without a pre scaler us used as a clock resource. **[9]**

b) Draw CCP1CON and list the steps involved in programming PIC microcontroller in Capture mode. **[8]**

OR

Q8) a) A stepper motor is interfaced with PIC18 microcontroller through lower nibble of Port B (RD0- RD3). Write program in C language to rotate the stepper motor in anticlockwise direction continuously. Assume the step angle of 1.8 degree's. Assume crystal frequency = 10 MHz. **[9]**

b) Draw CCP1CON and list the steps involved in programming PIC microcontroller in Compare mode. **[8]**

Q9) a) Explain in detail the functions of the following special function registers ADCON0, ADRESH and ADRESL of PIC 18 microcontroller. **[9]**

b) Draw a neat diagram of interfacing of DAC 0808 with PIC microcontroller and write a program for generation of square waveform using DAC. Assume **[8]**

i) Crystal frequency is 10MHz

ii) DAC 0808 is interfaced with PIC microcontroller through Port B.

OR

Q10) a) With the help on interfacing diagram and flowchart explain how PIC18 microcontroller can be used to measure temperature using LM35 sensor.**[9]**

b) Explain the steps involved in programming of A/D converter in PIC18F458 microcontroller using method of polling **[8]**

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Total No. of Questions : 10]

SEAT No. :

P3289

[Total No. of Pages : 3

[5353] - 162

T.E. (Electrical)

ELECTRICAL MACHINES - II

(2012 Pattern)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

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

Q1) a) Compare salient pole type construction with non-salient pole construction of alternator. **[4]**

b) A three phase 100KVA, 3300V, star connected alternator has effective resistance of 0.25Ω. A 50 A field current produces a 200 A short circuit current and 1050 V open circuit line voltage. Find the voltage regulation at unity and 0.8 power factor lagging. **[6]**

OR

Q2) a) Explain effect of armature reaction at leading power factor load condition for alternator. Draw phasor diagram. **[4]**

b) A three phase 415V, 50Hz salient pole alternator has delta connected stator winding. It supplies a load of 1000 A at 0.8 power factor lagging. The direct axis reactance is 0.09Ω and quadrature axis reactance is 0.068Ω. Determine emf of the alternator. Neglect armature resistance.**[6]**

Q3) a) Explain the working of synchronous condenser. **[4]**

b) Two identical three phase alternators are running in parallel and sharing a load of 1200 kW at 3300V and 0.8 power factor lagging. The field excitation of first machine is so adjusted that the armature current is 120 A at the lagging power factor. Find the armature current of second alternator. **[6]**

P.T.O

OR

Q4) a) Explain how mechanical power develops in synchronous motor. **[4]**

b) A three phase 415V star connected synchronous motor has an efficiency of 96% when drawing 25A current at full load and unity power factor. What will be the induced emf and total mechanical power developed at full load and 0.9 power factor leading? The synchronous inpedance is $(0.3 + j2)\ \Omega$. **[6]**

Q5) a) Explain construction and working of three phase induction voltage regulator. **[8]**

b) Explain the operation of three phase induction motor as Induction generator. State its advantages and applications. **[8]**

OR

Q6) a) Describe with neat diagram, construction and working of variable reluctance stepper motor. **[8]**

b) Describe with neat diagram construction and working of linear induction motor. State its applications. **[8]**

Q7) a) Explain the procedure to plot circle diagram of a.c. series motor. How full lood efficiency, torque scale and speed scale can be determined. **[10]**

b) Explain modifications necessary in the construction of d.c. series motor to operate satisfactorily on a.c. supply. **[6]**

OR

Q8) a) Compare compensated a.c. series motor with uncompensated a.c. series motor. **[8]**

b) Two pole uninersal motor operates on 230V a.c. supply drawing a current of 5.2A. It runs at 3900 rpm and draws a power of 300W. Calculate the maximum value of flux per pole. Assume armature resistance of 4.2Ω and number of conductors as 360. **[8]**

Q9) a) Explain double field revolving theory for single phase induction motor with suitable diagram. Also plot torque speed characteristics. **[8]**

b) A 4 pole, 220V, 50Hz single phase induction motor gave the following test results :

No load test : 220V, 4 A, 190W

Blocked rotor test : 85V, 9.5A, 400W

Find the equivalent circuit parameters with stator winding resistance being 3Ω. **[10]**

OR

Q10) a) With neat diagram explain the construction and working of resistance split phase single phase induction motor. Draw the phasor diagram. **[6]**

b) A 1/3 H.P., 230 V, 50 Hz single phase induction motor has the following parameters : **[12]**

R_1 = 1.5Ω, R_2 = 3Ω, X_1 = 2.5Ω, X_2 = 1.6Ω and X_m = 60Ω. The core losses of machine are 40W, the frictional and windage losses are 15W, the slip is 5%. Find for the motor :

i) Speed in rpm

ii) Stator current

iii) Stator power factor

iv) Input power

v) Output power and

vi) Efficiency

ⓘⓘⓘ

Total No. of Questions : 10]

SEAT No. :

P 3290

[Total No. of Pages : 2

[5353] - 163
TE (Electrical)
POWER ELECTRONICS
(2012 Pattern)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

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

Q1) a) Draw Turn On characteristics of SCR and mark t_d, t_r, t_s On it. **[5]**

b) Explain in details TRIAC modes of operation. In which modes TRAIC is sensitive? **[5]**

OR

Q2) a) Draw neat circuit diagram for a 1 phase semi controlled converter feeding R-L load at $\alpha = 60°$. Draw output voltage waveform showing devices conducting during one cycle of input ac voltage **[5]**

b) Explain the difference between SCR and GTO. **[5]**

Q3) a) For a 3 phase fully controlled Bridge converter feeding resistive load

i) Draw neat circuit diagram **[2]**

ii) Write the switching sequence of SCRS clearly **[2]**

iii) State expression for average D.C. output voltage **[1]**

b) For single phase A.C. voltage regulator with R L load

i) Draw circuit diagram **[2]**

ii) Draw output voltage waveform at firing angle 60 ° **[2]**

iii) Write formula for rms output voltage **[1]**

OR

Q4) a) Draw neat circuit diagram and explain working of single phase fully controlled rectifier feeding RL load with Free Wheeling Diode **[5]**

P.T.O

b) For single phase A.C. voltage regulator with R load

i) Draw circuit diagram **[2]**

ii) Draw output voltage waveform at firing angle 60° **[2]**

iii) Write formula for rms output voltage **[1]**

Q5) a) Draw and explain switching characteristics of MOSFET. **[8]**

b) Explain voltage control strategies of chopper with waveforms. **[8]**

OR

Q6) a) Explain output and Transfer characteristics of IGBT **[8]**

b) A chopper is operating on TRC principle at a frequency of 2 kHz on a 220 volt D.C. supply. If the load voltage is 170 volt, compute conduction and blocking period of thyristor in each cycle. **[8]**

Q7) a) Explain with neat circuit diagram single phase full bridge voltage source inverter and draw output voltage waveforms **[8]**

b) Explain Multiple pulse PWM technique for single phase VSI **[8]**

OR

Q8) a) Explain with neat circuit diagram single phase half bridge voltage source inverter and draw output voltage waveforms **[8]**

b) Explain sinusoidal pulse PWM technique for single phase VSI **[8]**

Q9) a) Explain working of three phase inverter in 120° mode of operation. For star connected load draw output voltage waveforms. Show devices conducting in each step. **[12]**

b) Compare between 120 deg and 180 deg mode of operation of 3 phase inverters. **[6]**

OR

Q10)a) Explain the concept of multilevel inverter. State its different types. **[6]**

b) Draw Cascaded bridge Multilevel inverter and explain its working. State applications. **[12]**

ⓘⓘⓘ

Total No. of Questions : 8]

SEAT No. :

P3291

[Total No. of Pages : 2

[5353]-164

T.E. ELECTRICAL (END SEM.)

ELECTRICAL INSTALLATION, MAINTENANCE AND TESTING

(2012 Pattern)

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

Unit I, II & III

Q1) a) Draw a neat tree chart showing different maintenance strategies. Explain each in brief. **[6]**

b) What are various abnormal operating conditions in induction motor and their causes? **[7]**

c) Explain the process of filtration of transformer oil with suitable diagram. **[7]**

OR

Q2) a) Explain planned and preventive maintenance of alternator. **[6]**

b) Explain process of condition monitoring of an On Load Tap changer (OLTC) used in power transformer. **[7]**

c) Write a short note on electrical signature analysis or motor current signature analysis used in condition monitoring of induction motor. **[7]**

Unit - IV

Q3) a) Describe the methods of cable fault location. **[8]**

b) Explain type test, routine test and special test carried on for testing of transformer. **[8]**

P.T.O

OR

Q4) a) Explain causes of failure of Power cables and remedial action for same. **[8]**

b) Explain testing of capacitor banks. **[8]**

Unit - V

Q5) a) State and derive Kelvin's Law for economic choice of conductor size. **[8]**

b) Derive and compare the following 3 overhead systems on the basis of volume requirement for conductor **[10]**

i) 1 phase 2 wire system and

ii) 3 phase 3 wire system

iii) 3 phase 4 wire systems

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. 25per 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 8.93gm/cm^3 and its specific resistance is 1.73×10^{-8} Ωm. **[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 with neat diagram plate earthing. **[8]**

OR

Q8) a) State the general factors that should be considered in estimation of HT or LT lines. **[8]**

b) Explain the following terms with their equivalent circuit **[8]**

i) Touch potential

ii) Step potential

Total No. of Questions : 10]

SEAT No. :

P3292

[Total No. of Pages : 2

[5353]-165

T.E. (Electrical)

INDUSTRIAL & TECHNOLOGY MANAGEMENT

(2012 Pattern)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Assume suitable data, wherever necessary.***

Q1) a) What is the role of government in macro economics? **[6]**

b) Explain organization and types of organization structure. **[4]**

OR

Q2) a) Explain the importance of technology management for national economy. **[6]**

b) Explain Pokka-Yoke quality circles. **[4]**

Q3) a) Write short note on Ishikawa Diagram. **[6]**

b) Define Marketing. Explain various functions of marketing. **[4]**

OR

Q4) a) Write short notes: **[6]**

i) Financial management

ii) Methods of costing

b) Explain the scope and importance of Online Marketing. **[4]**

Q5) a) Explain various theories of group formation. **[8]**

b) Explain the concept of Entrepreneurship. State the qualities of an Entrepreneur. **[6]**

c) Discuss Maslow's theory of hierarchy of needs. **[4]**

P.T.O

OR

Q6) a) Compare and contrast 'X & Y theory' and 'Herzberg's theory' of motivation. **[8]**

b) Define leadership. Explain qualities of a good leader. **[6]**

c) Differentiate between team and group. **[4]**

Q7) a) Write short note on stress management. **[6]**

b) Define training. Explain various methods for training of employees. **[6]**

c) Differentiate between recruitment and selection. **[4]**

OR

Q8) a) Define Human Resource Management. Explain importance and scope of Human Resource Management. **[6]**

b) What is performance appraisal? State the objectives and types of performance appraisal in details. **[6]**

c) What is the role of job description in man power planning? Explain. **[4]**

Q9) a) What are the different forms of intellectual property rights? **[6]**

b) Explain the patent format and structure. **[6]**

c) What is trademark? How trademark is registered? **[4]**

OR

Q10)a) State the criteria for securing patents. What are the guidelines of the common IPR policy on Patents? **[9]**

b) Explain in detail about copyright laws. **[7]**

Total No. of Questions : 10]

SEAT No. :

P3293

[Total No. of Pages : 3

[5353]-166

T.E. (ELECTRICAL) (Semester - II)

POWER SYSTEM - II

(2012 Pattern)

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) A 3 ph overhead transmission line has a total series impedance per phase of $200 \angle 80^\circ \Omega$ and total shunt admittance of $0.0013 \angle 90^\circ$ mho/ph. The line delivers a total load of 80 MW at 0.8 p.f. lag and 220kV between lines.

Determine the ABCD constants and sending end line voltage **[6]**

b) Explain different types of HVDC Links. **[4]**

OR

Q2) a) Explain the term compensation and list different methods of compensation? **[4]**

b) A three phase 132kV overhead line delivers a load of 50 MVA at 132 KV, and 0.8 p.f. lagging at its receiving end . The constants of the transmission line are: $A = D = 0.98 \angle 3^\circ$, $B = 1\,10 \angle 75^\circ \Omega$, **[6]**

Determine:

i) Sending end voltage and power angle.

ii) sending end active and reactive power

P.T.O

Q3) a) Explain the concept of disruptive critical voltage. Also explain visual critical voltage of corona **[5]**

b) Explain the constant ignition angle control method in detail **[5]**

OR

Q4) a) Prove that reactive power is proportional to voltage drop. **[4]**

b) Determine the

i) Critical disruptive voltage

ii) Visual critical voltage

iii) corona loss under foul weather condition for a 3Φ line 160km long, conductor diameter 1.036cm, 2.44m delta spacing, air temperature 26.67ºC, corresponding to an appropriate barometric pressure of 73.15cm, operating voltage 110KV at 50 Hz. Assume irregularity factor = 0.85. Assume Mv = 0.72. Disruptive voltage under foul weather = 0.8 x Fair weather value.

[6]

Q5) a) Explain the single line diagram, Impedance diagram and reactance diagram of a power system. **[8]**

b) Explain formation of Y - Bus using Bus Incidence matrix. **[8]**

OR

Q6) a) Derive static load flow equations for n bus system. **[8]**

b) Three generators are rated as follows: **[8]**

Generator 1: 100MVA, 33 KV, reactance = 10%

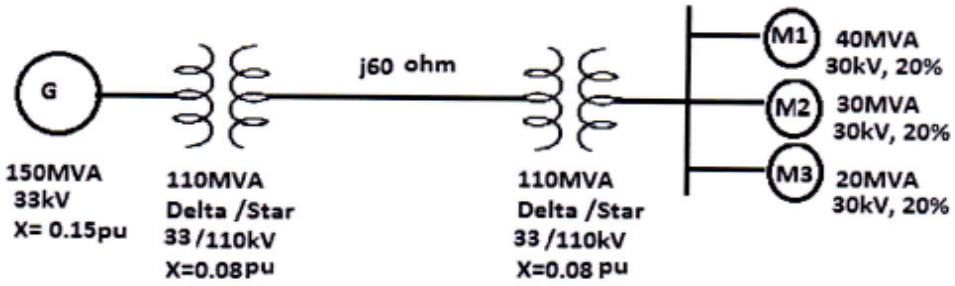
Generator 2: 150MVA, 32 KV, reactance = 8%

Generator 3: 110MVA, 30 KV, reactance = 12%

Choosing 200MVA & 35 KV as base quantities, compute per unit reactances of three generators referred to these base quantities. Draw reactance diagram and mark per unit reactances. The three generators are connected to common bus bars.

Q7) a) Write a short note on selection of circuit breaker. **[8]**

b) A 150MVA, 33kV, three phase generator has a reactance of 15%. The generator is connected to three, motors through transmission line and transformers as shown in the fig. Motors have rated input of 40 MVA, 30MVA, 20MVA at 30kV with 20% reactance each. If a three phase short circuit fault occurs at generator terminals. Find the fault current & fault MVA. **[8]**



OR

Q8) a) Explain in detail the sub-transient, transient and steady states of unloaded alternator under symmetrical fault condition. **[8]**

b) A 3Φ, 5 MVA, 6.6 KV alternator with a reactance of 8% is connected to a feeder of series impedance (0.12 + j0.48) Ω / phase/km. The transformer is rated at 3MVA, 6.6KV/33KV& has a reactance of 5%. Determine the fault current supplied by the generator operating under no-load condition. Symmetrical fault occurs at a point 15 km along the feeder. **[8]**

Q9) a) Derive the expression for fault current in case of L-L-G fault through a fault impedance of Z_f in terms of sequence. Draw the sequence network for this type of fault. **[9]**

b) A 3 phase, 37.5 MVA, 33 kV alternator having $X_1 = 0.18$ pu, $X_2 = 0.12$ pu and $X_0 = 0.1$ pu based on its rating is connected to a 33kV overhead line having $X_1 = 6.3$ Ω/ph, $X_2 = 6.3$ Ω/ph. and $X_0 = 12.6$ Ω/ph A single line to ground fault occur at remote end of the line. The alternator neutral is solidly grounded. Calculate fault current & Fault MVA. **[9]**

OR

*Q10)*a) Draw zero sequence diagrams for all types of combinations of transformers. **[9]**

b) For the three phase transmission line with self impedances Z_s and mutual impedance Z_M, show that $Z_1 = Z_2 = Z_s - Z_M$ and $Z_0 = Z_s + 2\,Z_M$ **[9]**

Total No. of Questions : 8]

SEAT No. :

P3294

[Total No. of Pages : 4

[5353]-167

T.E. (Electrical)

CONTROL SYSTEM - I

(2012 Pattern)

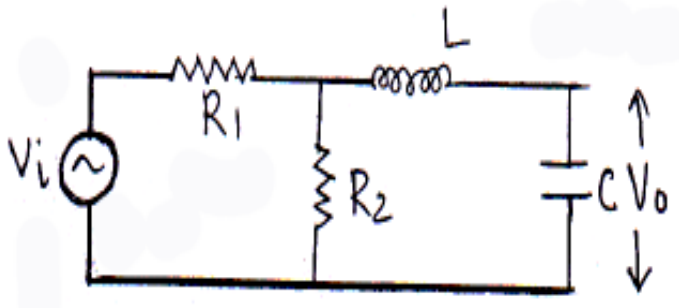
Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q. No.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.***

Q1) a) Draw and Explain different blocks of closed loop control system. **[5]**

b) Find the TF $G(S)=\frac{V0(S)}{V1(S)}$ for given network **[7]**



c) Closed loop TF of feedback control system is given by **[8]**

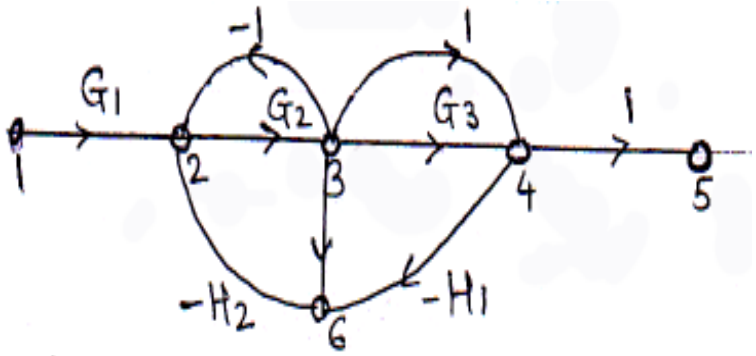
$$\frac{C(S)}{R(S)}=\frac{KS+b}{S^2+aS+b}$$

Determine OLTF. Show that the steady state error in the unit ramp response is given by $ess=\frac{a-k}{b}$

OR

P.T.O

Q2) a) Obtain transfer funtion C/R using Mason's gain formula **[7]**



b) Define pole and zeros of a TF.A system has poles at S = – 3, S = – 2 and S = 0 and zero at S = – 4. Sketch the pole zero plot and find TF of the system if the value of gain factor is 5. **[6]**

c) Derive the transfer function of DC servomotor. **[7]**

Q3) a) Explain stability analysis using routh stability criteria. **[6]**

b) Given a unity feedback system that has the forward path TF **[10]**

$$G(S)=\frac{K(S+2)}{(S^2+4S+13)}$$

do the following.

i) Sketch the root locus.

ii) Find the imaginary axis crossing.

iii) Find the gain, K at the jw axis crossing.

iv) Find break in point.

v) Find angle of departure from complex poles.

OR

Q4) a) State the advantages of Routh's stability criterion. **[6]**

b) For a unit feedback system having forward path TF. **[10]**

$$G(S)=\frac{K}{S(1+0.6S)(1+0.4S)}$$

Determine

i) Characteristic equation.

ii) Range of Value of K.

iii) Marginal Value of K.

iv) Frequency of sustained oscillation.

Q5) a) Explain the following term in context of Bode plot. **[6]**

i) Gain Margin.

ii) Phase Margin.

iii) Gain crossover frequency.

iv) Phase crossover frequency.

b) The open loop transfer function of an unity feedback system is given by **[12]**

$$G(S) = \frac{K}{S(1+0.02S)(1+0.04S)}$$

Draw the Bode plot. Find the Gain Margin and Phase Margin. Hence find the value of Open Loop gain so that system has Phase Margin of 45°.

OR

Q6) a) State and Explain Nyquist stability criteria. Explain Principle of argument. **[8]**

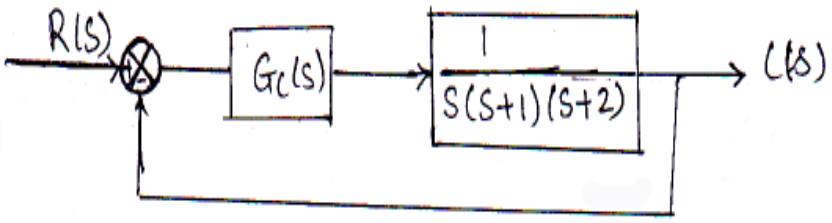
b) Construct Nyquist plot for a feedback system with OLTF is given by **[10]**

$$G(S)H(S) = \frac{2}{S(1-2S)}$$

Comment on stability.

Q7) a) What is the role of PID controller in a feedback System? **[6]**

b) For the system given below, design PID controller using ZN tunning control **[10]**



OR

Q8) a) Explain with block diagram, transfer function and characteristics of PI Controller. **[6]**

b) Design a PI controller so that the unity feedback system having open loop transfer function **[10]**

$$G(S)H(S) = \frac{5}{(S+1)(S+2)}$$

will have the damping ratio of 0.5 and natural frequency of oscillations will be 2 rad/sec.

Total No. of Questions : 12]

SEAT No. :

P3295

[Total No. of Pages : 3

[5353]-168

T.E. (Electrical) (Semester - II)

UTILIZATION OF ELECTRICAL ENERGY

(2012 Pattern)

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, or Q11 or Q12.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Use of scientific calculator is allowed.***
4) ***Assume suitable data if necessary'***

Q1) a) Define electric heating. State any three advantages of electric heating. **[4]**

b) A I5 kW, 220 V, single phase, resistance oven employs Nickel-Chrome wire for its heating elements. If the wire temperature is not to exceed 1000º C and the temperature of the charge is to be 600º C, calculate the diameter and length of wire. Assume radiating effiency to be 0.6 and emmissivity as 0.9. For Nickel-Chrome, resistivity is 1.016×10^{-6} ohm-meter. **[8]**

OR

Q2) a) Differentiate between Direct and indirect arc heating. **[4]**

b) The power required for dielectric heating of a slab of resin 150 cm2 in area and 2cm thick is 220 watts, frequency of 32 MHz. The material has relative permittivity of 5 and pf of 0.06 Determine the voltage necessary and current flowing through the material. If the voltage is limited to 620V, what will be the value of the frequency to obtain the same heating? **[8]**

Q3) a) State the need of electro-deposition. State the factors on which quality of electro- deposition depends. **[4]**

b) Explain the construction and working of- **[8]**

i) Relays.

ii) Contactors.

P.T.O

OR

Q4) a) Draw the electrical circuit used in window air conditioner. **[4]**

b) Explain the construction & working of Automatic water level controller using pilot & control devices. **[8]**

Q5) a) Define following terms w.r.t. illumination:- **[5]**

i) Depreciation factor,

ii) Coefficient of utilization,

iii) Space to Height ratio,

iv) Reflection factor

v) solid angle,

b) A drawing hall of 40 m × 25 m × 6 m is to be illuminated with metal filament gas filled lamps to an average illumination of 90 1m / m2, on a working plane 1 meter above the floor. Estimate suitable number, size and mounting height of lamps. Assume coefficient of utilization of 0.5, depreciation factor of 1.2 and space to height ratio of 1.2. **[6]**

Lamps wattage(watts)	200	300	500
Luminous Efficiency (Lm/w)	16	18	20

OR

Q6) a) Compare between Incandescent lamp & fluorescent lamp. **[5]**

b) A hall 30 m long and 12 m wide is to be illuminated and illumination required is 52 meter candles. Three types of lamps having outputs, as given below, are available: **[6]**

Lamps wattage(watts)	100	200	300
Lumens	1600	3600	4800

Calculate the number of lamps needed in each case to produce required illumination. Take a depreciation factor of 1.3 and coefficient of utilization 0.5. Assume a suitable mounting height and calculate space-height ratio of lamps.

Q7) a) State any four advantages of electric traction. **[4]**

b) Explain 3 phase low frequency A.C. systems &composite systems - Kando systems for electric traction. **[8]**

OR

Q8) a) Explain the working of pantograph. **[4]**

b) Draw a general block diagram for electric locomotive and explain the function of each part. **[8]**

Q9) a) Differentiate between Urban, Sub-urban, Main line services. **[4]**

b) An electric train has quadrilateral speed time curve with uniform acceleration from rest at 2 kmphps for 30 seconds, coasting for 50 seconds, braking period of 20 seconds. The train is moving with a uniform down gradient of 1% tractive resistance 40 newtons per ton, rotational inertia effect 10% of dead weight, Duration of stop 15 seconds and overall efficiency of transmission gear and motor as 75%. Calculate the specific energy consumption of run. **[8]**

OR

Q10)a) Compare between trapezoidal and quadrilateral speed-time curves. **[4]**

b) A speed time curve of a train consists of uniform acceleration of 6 kmphps for 21 sec, free running for 10 min. and uniform retardation of 6 kmphps for stopping the train. The stop time is 5 min. Calculate distance between the two stations, Average speed, and Schedule speed. **[8]**

Q11)a) Explain how DC series motor is suitable for traction. **[5]**

b) Explain how regenerative braking is used in electric traction. **[6]**

OR

Q12)a) What is transition? State different methods of transition. Explain bridge transition **[5]**

b) What is meant by route relay interlock? How it is achieved? **[6]**

Total No. of Questions : 8]

SEAT No. :

P3296

[Total No. of Pages : 3

[5353]-169

T.E. (Electrical)

DESIGN OF ELECTRICAL MACHINES

(2012 Pattern)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt 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) ***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 figures must be drawn wherever necessary.***

Q1) a) Derive output equation of single phase shell type transformer. **[5]**

b) Compare power transformer with distribution transformer in terms of design parameters. **[5]**

c) Write short notes on cross over and disc windings used in transformer. **[10]**

OR

Q2) a) What are different methods of cooling transformer? How transformers are classified based on cooling draw a diagram for each. **[6]**

b) A three phase slipring induction motor has a final steady temperature rise of 40°c when running at its rated output. Calculate its half hour rating for the same temperature rise if the copper loss at rated output is 1.25 times its constant loss. The heating time constant is 90 minutes. **[6]**

c) What types of forces are developed in transformer winding under short circuit condition? With a neat diagram explain any one in detail. **[8]**

Q3) a) Write note on double layer winding. Why double layer winding is used universally for armatures of three phase ac machines. **[8]**

b) Draw a mush winding diagram for 4 pole, 36 slot three phase induction motor armature. Use full pitched coil. Show connection for all three phases. **[10]**

P.T.O

OR

Q4) a) Derive output equation of three phase induction motor. **[8]**

b) Determine the main dimensions, turns per phase, area of conductor, number of slots of a 250 HP, 3 phase, 50Hz, 415v, 1450rpm delta connected slip ring induction motor having following data: B_{AV} = 0.5 Wb/m^2, ac = 30000 A/m, Efficiency = 90%, power factor = 0.9, winding factor = 0.955, current density = 3.5A/mm^2, the ration of core length to pole pitch = 1 and slots/pole/phase =5. **[10]**

Q5) a) What are the factors considered when estimating the length of the air gap of Induction motor? How these factors are affected by the air gap length. Why the length of the air gap should be as small as possible. **[8]**

b) Derive the expression of unbalanced magnetic pull in case of Induction motor. **[8]**

OR

Q6) a) State any four rules for selecting the number of rotor slots of three phase squirrel cage induction motor. **[4]**

b) During the stator design of a 3 phase, 30 kW, 400volts, 6 pole, 50Hz, delta connected squirrel cage induction motor following data has been obtained. Gross length of the stator = 0.17 m, Internal diameter of stator = 0.33 m, Number of stator slots = 45 Number of conductors per slot = 12. Based on the above design data design a suitable rotor. Assume suitable data. **[12]**

Q7) a) Why does skewing lowers the power factor and overload capacity. **[8]**

b) Estimate the magnetizing current of a 415V, three phase, 50Hz, 4 pole induction motor whose stator core diameter and length is 0.21m and 0.15m respectively. The effective air gap length is 0.5mm. The stator is delta connected with double layer winding with winding factor of 0.955 and gap contraction factor of 1.2; the stator has 4 slots per pole per phase having 28 conductors/slot. The ampere turns for the iron path may be taken as 45% of the air gap ampere turns. **[8]**

OR

Q8) a) Step by step write down the procedure to calculate the magnetizing component of no load current of three phase induction motor. **[8]**

b) Explain with neat sketches different types of leakage fluxes in an induction motor. **[8]**

Total No. of Questions : 10]

SEAT No. :

P4246

[Total No. of Pages : 2

[5353]-171
T.E. (Instrumentation & Control)
EMBEDDED SYSTEM DESING
(2012 Pattern)

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***

Q1) a) What are different sources of interrupts and their vector addresses in 8051? Explain the sequence of operation that takes place in 8051 when the interrupt occurs. **[6]**

b) Explain RAM memory organization of 8051 **[4]**

OR

Q2) a) Explain an three addressing modes of 8051 with examples **[6]**

b) Explain TMOD SFR of 8051 **[4]**

Q3) a) Write a program in assembly language to generate the delay of 60ms using timer of 8051. Assume f_{osc} = 12MHz. **[6]**

b) What is stack memory? Where it is located? Explain the PUSH instruction of 8051. **[4]**

OR

Q4) a) Explain the interfacing of ADC 0808 to the 8051 **[6]**

b) What is machine cycle time in 8051? Calculate 1machine cycle time if f_{osc} = 12MHz **[4]**

Q5) a) Explain the serial ADC interfacing to 8051 with neat interfacing diagram **[8]**

b) Draw the interfacing diagram of stepper motor to the 8051. Write the program to rotate the motor continuously in clockwise direction **[8]**

OR

Q6) a) Explain with the help of neat diagram interfacing of 8051 to serial EEPROM. **[8]**

b) Using 8051, design a temperature control system to maintain constant temperature. Draw the block diagram. Assume suitable data if required **[8]**

Q7) a) Explain with help of neat block diagram the architecture of Atmega8535 AVR microcontroller. **[8]**

b) Explain the following instructions of AVR microcontroller **[10]**

i) CPSE R19,R20

ii) BRNE ahead

iii) LD R20,X

iv) LDIR21,0 × 43

v) ADD R21,R22

OR

Q8) a) What are the features of Atmega8535 microcontroller? Compare 8051 & AVR microcontroller **[8]**

b) Explain the data and program memory organization of AVR microcontroller **[10]**

Q9) a) Draw the block diagram and explain the function timer/counter 0 of AVR with focus on the following **[10]**

i) Prescaler & clock sources

ii) Compare Unit

iii) Count Unit

b) How the Baud rate of 9600 is selected in Atmega8535 AVR microcontroller? **[6]**

OR

Q10)a) What are the features of ADC of Atmega 8535. Also write short note about pre scalers of ADC **[8]**

b) Explain the bits of UCSRA register **[8]**

RXC	TXC	UDRE	FE	DOR	PE	U2X	MPCM

Total No. of Questions : 10]

SEAT No. :

P3298

[Total No. of Pages : 2

[5353]-172

T.E. (Instrumentation & Control)

INSTRUMENTAL METHODS FOR CHEMICAL ANALYSIS

(2012 Pattern) (Semester - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain the Instrumentation of Voltametery. **[5]**

b) Explain principal and experimental setup of Potentiometry. **[5]**

OR

Q2) a) Explain principal and experimental setup of coulometey (any one). **[6]**

b) Define the concept Back Ground Correction. **[4]**

Q3) a) Compare the types of Filter photometer. **[5]**

b) Explain with neat sketch UV-Visible Spectrophotometer. **[5]**

OR

Q4) a) State the Laws of Photometery (Beer's Law & Lamberts Law). **[4]**

b) Explain the Instrumentation of Atomic Absorption Spectrophotometer (AAS). **[6]**

Q5) a) Explain the Instrumentation of Flame Photometer. List the applications of Flame photometer. **[8]**

b) Compare the different types of PLASMA. **[8]**

P.T.O

OR

Q6) a) What is Fluorescence? Explain the working of double beam flouriometer. **[8]**

b) Explain the principle and working of Fourier Transform Infrared Spectrophotometer (FTIR) with the help of suitable block diagram. **[8]**

Q7) a) Explain the Principle of Mass Spectrometer. And Time of Flight Mass Spectrometer. **[10]**

b) Explain Nuclear Magnetic Resonance Spectrometer (NMR) with a neat sketch. **[8]**

OR

Q8) a) Explain the block diagram of Gas Chromatography. List the GC detectors. **[8]**

b) Write a short note on **[2 × 5 = 10]**

i) NO_X Gas analyzer.

ii) CO Gas Analyzer

Q9) a) Explain the Instrumentation of High Pressure Liquid Chromatography (HPLC). **[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 GM tube. **[8]**

Total No. of Questions : 10]

SEAT No. :

P3299

[Total No. of Pages : 2

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T.E. (Instrumentation & Control) (Semester - I)

CONTROL SYSTEM COMPONENTS

(2012 Pattern) (End Semester)

Time : 2.30 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Draw neat sketches wherever necessary.***
2) ***Answer 05 questions.***
3) ***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.***
4) ***Assume suitable data.***

Q1) a) Draw and explain the use of a temperature switch. **[5]**

b) Draw & explain pressure relief valve. **[5]**

OR

Q2) a) Draw & Explain with neat diagram jogging of motor. **[5]**

b) Explain with diagram construction & working of a SSR. **[5]**

Q3) a) Explain with diagram low voltage & over temperature protection of motor. **[5]**

b) Draw and explain working of a 5/3 DCV. **[5]**

OR

Q4) a) Explain in detail Sequencing of motors. **[5]**

b) Draw and explain the pneumatic circuit for speed control of single acting cylinder. **[5]**

Q5) a) Enlist the types of hydraulic pumps. Explain any one in detail. **[10]**

b) Explain 4 components of hydraulic power supply. **[8]**

P.T.O

OR

Q6) a) Draw & explain meter- in & meter-out circuit in hydraulics. **[10]**

b) Explain in detail 4/2 DCV & 4/3 DCV in hydraulics. **[8]**

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

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

OR

Q8) a) Enlist the different types of fuses .Explain any one in detail. **[8]**

b) Explain the desirable characteristics of Fuses. **[8]**

Q9) a) Explain in detail purging system & its application in hazardous area **[8]**

b) Explain in Sealing & Immersion in hazardous area. **[8]**

OR

Q10)a) Explain in detail hazardous area classification & Explanation as per NEC standards. **[8]**

b) Explain in detail bi-stable amplifier & its application. **[8]**

Total No. of Questions : 10]

SEAT No. :

P3300

[Total No. of Pages : 3

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T.E. (Instrumentation & Control)

CONTROL SYSTEM DESIGN

(2012 Pattern)

Time : 2.30 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 Calculator is allowed.***
4) ***Assume suitable data if necessary.***

Q1) a) With block diagram explain difference between series and parallel compensation techniques. **[4]**

b) Draw the frequency response plots (bode plots) for lead, lag and Lag-lead compensator, show all specifications. **[6]**

OR

Q2) The open loop transfer function of unity feedback control system is given below $G(s) = \frac{2000K}{s(s+20)}$ It is desired that e_{ss} = 1% for unit ramp input and phase margin $\gamma \geq 45°$ Design phase lead compensator. **[10]**

Q3) a) Explain composite control actions. **[4]**

b) Explain Zeigler Nichols (Frequency response) method of controller tuning. **[6]**

OR

Q4) The forward path transfer function of unity feedback control systems is given as $G(s) = \frac{2}{(s+1)(0.2s+1)(0.1s+1)}$ if $e_{ss} \leq 0.075$ for unit ramp input, the dominant closed loop pole located at $-1.5 \pm 2j$. Design a PID controller. **[10]**

P.T.O

Q5) a) Obtain state model in three different canonical forms for system with transfer function. **[9]**

$$\frac{Y(s)}{U(s)} = \frac{s^2 + 3s + 25}{s^3 + 12s^2 + 47s + 60}$$

b) Convert following state model of system into transfer function **[9]**

$$\dot{x} = \begin{bmatrix} -2 & -3 \\ 4 & 2 \end{bmatrix} x + \begin{bmatrix} 3 \\ 5 \end{bmatrix} u \text{ and } y = [1 \quad 1]x$$

OR

Q6) a) Obtain state model in three different canonical forms for system with transfer function. $\frac{Y(s)}{U(s)} = \frac{160s + 640}{s^3 + 18s^2 + 192s + 640}$ **[9]**

b) Obtain transfer function f system of system which is described by following state model; $\dot{x}\begin{bmatrix} -5 & -1 \\ 3 & -1 \end{bmatrix} x + \begin{bmatrix} 2 \\ 5 \end{bmatrix} u \quad y = [1 \quad 2]x$ **[9]**

Q7) a) Determine state transition matrix using Laplace transform approach for following plant matrix $A = \begin{bmatrix} -3 & 1 \\ -2 & 0 \end{bmatrix}$. **[8]**

b) Determine controllability and observability of system of following state model

$$\dot{x} = \begin{bmatrix} 2 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 3 & 1 \end{bmatrix} x + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} u \text{ and } y = [1 \quad 1 \quad 1]x$$ **[8]**

OR

Q8) Obtain time response of following system with zero initial condition and unit step input.

$$\dot{x} = \begin{bmatrix} -3 & 1 \\ -2 & 0 \end{bmatrix} x + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u \text{ and } y = [1 \quad 0]x \; x(0) = \begin{bmatrix} 1 \\ -1 \end{bmatrix}$$ **[16]**

Q9) Find state feedback gain matrix for the system to place the desired closed loop poles at location s = – 3, -7. **[16]**

$$\dot{x} = \begin{bmatrix} 0 & 1 \\ -20 & -9 \end{bmatrix} x + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u \text{ and } y = [1 \;\; 0]x$$

OR

Q10) Design a Full order observer for the system defined by following state equation **[16]**

$$\dot{x} = \begin{bmatrix} -4 & 1 \\ 0 & -5 \end{bmatrix} x + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u \text{ and } y = [1 \;\; 0]x$$

Set of desired poles for the observer to be $s = -10, -20$.

Total No. of Questions : 10]

SEAT No. :

P3301

[Total No. of Pages : 2

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T.E. (Instrumentation & Control Engineering)

INDUSTRIAL ORGANIZATION AND MANAGEMENT

(2012 Pattern) (End Semester)

Time : 2½ hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q 10***
2) ***Neat diagrams should be drawn whenever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) Write short notes on -

a) Define business & explain the factors affecting the Business. **[5]**

b) Explain Ishikawa diagram with example. **[5]**

OR

Q2) a) Define management. Enlist & Explain any functions. **[5]**

b) How BCG matrix evaluates business environment? Explain with suitable example. **[5]**

Q3) a) What is EOQ Explain in Brief? **[5]**

b) Explain the process of Purchasing in detail. **[5]**

OR

Q4) Write Notes on

a) Statistical Process Control **[5]**

b) Effect of Pollution on Human Health. **[5]**

Q5) Explain following terms w.r.t. H. R. Management

a) Exploiting true potential of H.R. **[5]**

b) Staff Training & Development **[6]**

c) Manpower planning **[5]**

P.T.O

OR

Q6) a) Explain role of Top Level management **[8]**

b) Explain role of Appraisal Management. **[8]**

Q7) a) Explain Capital Structure in Detail. **[8]**

b) Explain different sources of Finance. How they are managed? **[8]**

OR

Q8) a) What is budget? Explain its objectives and types. **[8]**

b) Explain differences between Money market & Capital market **[8]**

Q9) a) What is ERP? Discuss its role in manufacturing Industry **[9]**

b) Explain Business Ethics in detail. **[9]**

OR

Q10) Write Note on

a) MIS **[6]**

b) Business Ethics **[6]**

c) e-business **[6]**

Total No. of Questions : 10]

SEAT No. :

P3303

[Total No. of Pages : 2

[5353]-177

T.E. (Instrumentation & Control)

PROCESS LOOP COMPONENTS

(2012 Pattern) (End Sem.)

Time : 2.30 Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Draw a typical level control loop and identify the controlled variable manipulated variable and the load variables. **[6]**

b) Explain the concept of two wire transmitter. **[4]**

OR

Q2) a) Define the following **[4]**

i) Process Lag

ii) Dead Time

b) Discuss the features of ON/OFF controller **[6]**

Q3) a) Explain the installation of DPT(Differential Pressure Transmitter) for steam, liquid and gas service **[6]**

b) Explain the concept of rate before reset **[4]**

OR

Q4) a) Explain Process reaction method of tuning **[6]**

b) Explain quarter amplitude criteria for tuning **[4]**

Q5) a) Compare relay based system with PLC (Programmable Logic Controller) based system **[8]**

b) List the functions of output module - **[8]**

P.T.O

OR

Q6) a) Draw PLC ladder diagram for alarm system monitoring 3 fault conditions. If any one of the fault occurs turn ON red light. If any 2 of the faults occur turn on hooter. If all three occur give alarm to safety department. **[8]**

b) List different PLC instructions **[8]**

Q7) a) Explain the features of Butterfly type control valve **[8]**

b) List various cases/conditions/applications were a valve positioner is required and explain any two condition **[10]**

OR

Q8) a) Explain the following with respect to control valve **[10]**

i) Valve plug

ii) Valve trim

iii) Diaphragm case assembly

iv) Guide

v) Stuffing box

b) Explain the features of Pneumatic actuators **[8]**

Q9) a) Write a short note on High pressure service valves **[8]**

b) Comment on, "Control valve a source of noise" **[8]**

OR

Q10)a) Discuss the effects of cavitation suggest remedies for the same **[8]**

b) Define valve coefficient. Write various equations of valve coefficient and give its significance **[8]**

Total No. of Questions : 10]

SEAT No. :

P3304

[Total No. of Pages : 2

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T.E. (Instrumentation & Control) (Semester - II)

UNIT OPERATIONS & POWER PLANT INSTRUMENTATION

(2012 Pattern)

Time : 2½ hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer three questions from section I and three questions from section II.***
2) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7or Q8, Q9 or Q10.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Assume Suitable data if necessary.***

Q1) a) What do you mean by unit process and unit operation? **[5]**

b) List Various Types of dryer. Explain any one type of dryer with neat sketch **[5]**

OR

Q2) a) Explain any one type of distillation coloumn with sketch. **[5]**

b) Explain forced circulation evaporator with neat sketch. **[5]**

Q3) a) What is Nuclear Reactor? Explain various parts of Nuclear reactor **[5]**

b) Explain Importance of control station in nuclear power plants **[5]**

OR

Q4) Explain the following terms (any two) **[10]**

a) Solar Power Generation

b) Hydro-electric Power Plant

Q5) a) Explain with neat sketch PV system **[8]**

b) "Fire tube boiler used in power plant are low cost & more fuel efficient", justify with suitable reason. **[8]**

P.T.O

OR

Q6) a) Write a short notes on "Air to fuel ration control" in Boiler **[6]**

b) Explain Swelling & Shrinkling effect in boiler. What is remedial measures for swelling & Shrinkling in boiler drum control system **[10]**

Q7) a) Explain with neat sketch measurement of vibration in steam turbine **[10]**

b) Write a short notes on "Turbine Instrumentation" **[8]**

OR

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

a) Thermal Stress Control

b) Shell temperature monitoring and control

c) Instrumentation for Boiler ancillaries

d) Heat Loss Method for boiler efficiency

Q9) a) Explain any one type of reactor used in Nuclear power plant with neat sketch **[8]**

b) Compare solar and nuclear power plant **[8]**

OR

Q10)a) Explain pollution monitoring system used in power plants **[8]**

b) Compare Thermal & Hydroelectric power plant **[8]**

Total No. of Questions : 10]

SEAT No. :

P3305

[Total No. of Pages : 2

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T.E. (Instrumentation & Control)

INSTRUMENT & SYSTEM DESIGN

(2012 Pattern)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7or Q8, Q9 or Q10.***
2) ***Neat circuit diagrams should be drawn whenever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume Suitable data if necessary.***

Q1) a) Define standard? Give 2 examples each of NEMA and IP standards. **[4]**

b) With a neat labelled diagram explain how AD594 can be used as a Set point controller. **[6]**

OR

Q2) a) What is 'ground'? State the different types of ground. **[4]**

b) State the features of XTR 110. Draw circuit diagrams indicating how its input and output current capacities can be increased. **[6]**

Q3) a) What is NEMA standard? Explain Type 1, Type2 and Type3 standards. **[5]**

b) With suitable waveforms explain the working of phase angle control IC 785. **[5]**

OR

Q4) a) Explain shot noise and thermal noise in detail. **[4]**

b) With the help of a neat labelled diagrams, explain how HCNR200 can be used for bipolar inputs. **[6]**

Q5) a) Compare Phase Comparator-I and Phase Comparator-II of CD4046 based on at least salient points of differentiation. **[4]**

P.T.O

b) State features of ICM7217 and explain functioning of following pins- **[8]**

i) CARRY/BORROW

ii) LOAD REGISTER/OFF

iii) EQUAL

iv) DISPLAY CONT.

v) SCAN

c) State the salient features of ULN2803. With the help of neat labelled diagrams explain any 2 types of load that can be driven by ULN2803.**[6]**

OR

Q6) a) Compare MCT2E with HCNR200 based on at least 4 salient points of differentiation. **[4]**

b) For ICL7107, explain working of the analog section with suitable waveforms. **[6]**

c) Explain working of Phase Comparator-II of CD4046 using state diagram and waveforms. **[8]**

Q7) a) Write a short note on - Types of PCBs. **[8]**

b) State and explain the different rules for the design of analog circuit PCBs. **[8]**

OR

Q8) a) Explain the design rule considerations for digital PCBs. **[8]**

b) Write a note on 'Soldering metals and Soldering Flux'. **[8]**

Q9) a) Explain the bath tub curve and associated periods in detail. **[8]**

b) What is distribution function in Probability theory? **[8]**

OR

Q10)a) Explain reliability, Exponential, Weibull and Gamma Distribution. **[8]**

b) Write a short note on - Maintainability and Availability. **[8]**

Total No. of Questions : 10]

SEAT No. :

P3306

[Total No. of Pages : 2

[5353]-180

T.E. (Instrumentation & Control) (Semester - II)

BIO-MEDICAL INSTRUMENTATION

(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 side indicate full marks.***
4) ***Assume Suitable data, if necessary.***

Q1) a) What are the different Physiological parameters of human body & list out the suitable transducers for its measurement.(Any 3) **[6]**

b) Define **[4]**

i) Motion Artifact

ii) Half cell potential

OR

Q2) a) List out the different Pre amplifier in biomedical applications. **[4]**

b) Define **[6]**

i) Polarizable Electrodes

ii) Non-Polarizable electrodes

Q3) a) Compare the Invasive and Non invasive blood pressure measurement techniques. **[5]**

b) Draw and explain the block diagram of Phonocardiogram. **[5]**

OR

Q4) a) Draw and explain the Vector cardiograph. **[5]**

b) Explain Electromagnetic blood flow meter. **[5]**

P.T.O

Q5) a) What is Electroencephalography? Explain with neat diagram EEG machine. **[10]**

b) How the Neuro muscular transmission system works in Human Brain? **[6]**

OR

Q6) a) Draw a neat labeled diagram of 10-20 electrode system and explain unipolar measurement in EEG and List out the Electrodes using in EEG. **[10]**

b) Elaborate on various waves in EEG along with its frequency and significance. **[6]**

Q7) a) What are Rods and cones in the Human vision system? Explain the function performed by each of them. **[8]**

b) Explain the Sound Conduction System in Human Ear. **[8]**

OR

Q8) a) What are three main section of Human auditory system? And Explain the function performed by them. **[8]**

b) Differentiate between speech and pure tone audiometer. **[8]**

Q9) a) What is spirogram? Explain various terms related to spirogram. **[10]**

b) Explain the mechanism of respiration. **[8]**

OR

Q10) a) Define the function of Ventilator. Explain with neat diagram any one type of Ventilator. **[10]**

b) Write a short note on oxygen gas analyzer **[8]**

Total No. of Questions : 8]

SEAT No. :

P3307

[Total No. of Pages : 3

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T.E. (Computer) (Semester - I)

THEORY OF COMPUTATION

(2012 Pattern)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Find the regular expression for the DFA shown in the fig A and fig B. **[6]**

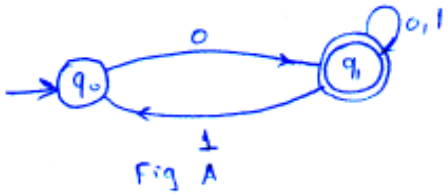


Fig A

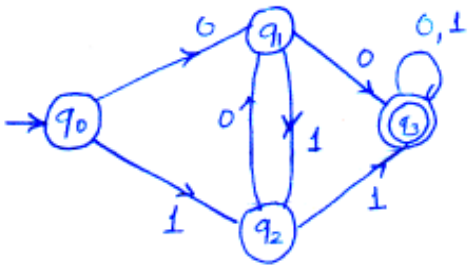


Fig. B

b) Define pumping Lemma. **[6]**

Show that the language given is not regular $L = \{ww^R | w \in \{a,b\}^*\}$

c) Define deterministic finite automata. **[8]**

Find the equivalent DFA for ∈ - NFA given in fig C.

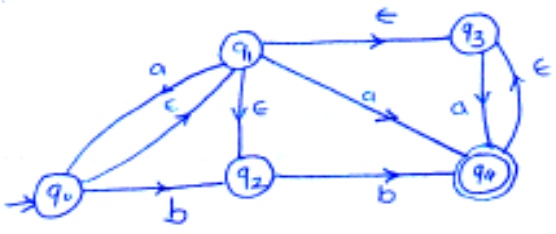


Fig. C

OR

P.T.O

OR

Q2) a) Define equivalence relation **[6]**

Whether the relation R = $\{(x, y) \rightarrow N | x \leq y\}$ is equivalence relation.

b) Define regular expression. **[6]**

Construct the context free grammar corresponding to regular expression

R = (0 + 1) 1* (1 + (01)*)

c) Convert the given grammar to equivalent CNF **[8]**

$S \rightarrow PQP$

$P \rightarrow OP | \in$

$Q \rightarrow 1Q | \in$

Q3) a) Define : Language accepted by Turing Machine Design the turing machine for checking well formedness of parenthesis. **[10]**

b) Write short notes on (any two): **[8]**

i) Universal Turing Machine

ii) Unelecidability

iii) Church Turing Machine

OR

Q4) a) What is Turing Machine? **[10]**

Design the turing machine which accepts set of all palindromes over {0,1}. Use ID representation to show acceptance of w = 10101.

b) What is Post Machine? Give the formal definition. Construct a post machine accepting a string for language a's & b's. **[8]**

Q5) a) Define Push Down Automata. **[8]**

Construct PDA that accepts

L = $\{a^i b^j c^k \mid i,j,k \geq 0 \ \& \ i + j = k\}$ throu final state.

b) Obtain CFG for the PDA given betow **[8]**

P = ({$q0,q1$}, {a,b}, {$a,b,z0$}, δ, $q0$, $z0$, ϕ) where δ is

$\delta(q0,a,z0) = \{(q0, az0)\}$ $\quad$ $\delta(q1,b,a) = (q1,\in)$

$\delta(q0,a,a) = \{(q0,aa)\}$ $\quad$ $\delta(q1, \in, z0) = (q1,\in)$

$\delta(q0,b,a) = \{(q1,\in)\}$

OR

Q6) a) Define **[8]**

i) Xlon Deterministic Pushdown Automata (XlPDA)

ii) Instantaneous Description of PDA with suitable example.

iii) Language Acceptance by different ways

b) Construct PDA equivalent to following CFG **[8]**

$S \rightarrow OBB$

$B \rightarrow 0S|1S|0$

Test if 010^4 is in language

Q7) a) What is SAT problem? Explain in detail. **[8]**

b) Elaborate on Tractable and Intractable problems. **[8]**

OR

Q8) a) Explain with suitable example - Node cover problem. **[8]**

b) Why do we need to reduce existing problem to NP complete problem, explain with example. **[8]**

Total No. of Questions : 10]

SEAT No. :

P3308

[Total No. of Pages : 2

[5353]-182

T.E. (Computer Engineering) (Semester - I)

OPERATING SYSTEM DESIGN

(2012 Pattern)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***

Q1) a) State and Explain file allocation methods. **[5]**

b) Explain *getblock*() algorithm. **[5]**

OR

Q2) a) Explain structure of regular files in UNIX System V. **[5]**

b) Explain *namei* algorithm. **[5]**

Q3) a) Draw and explain process state transition diagram with 9 different states. **[6]**

b) Explain context of a process. **[4]**

OR

Q4) a) Compare paging and segmentation in details. **[5]**

b) Explain Bankers Algorithm. **[5]**

Q5) a) What is Inter Process Communication? Explain process tracing and ptrace() system call. **[6]**

b) Write down a code snippet for client server communication (TCP/UDP) using sockets. **[10]**

P.T.O

OR

Q6) a) Explain System V IPC mechanisms in detail: **[8]**

i) Messages

ii) Shared Memory

iii) Semaphores

b) Explain following methods to tackle problems in multiprocessor architecture **[8]**

i) Using Master/Slave Processors

ii) Using Semaphores

Q7) a) Explain *make* utility with example. **[8]**

b) Explain *grep* and its variations with example. **[8]**

OR

Q8) a) Explain *awk* utility with example. **[8]**

b) Explain in detail, how to make USB bootable with any open source tool. **[8]**

Q9) a) Explain Real Time Systems and it's characteristics in details. **[6]**

b) Draw and explain Android OS Architecture. **[6]**

c) Explain in details : scheduling in Linux. **[6]**

OR

Q10)a) Write a short note on any four of the following: **[12]**

i) Palm OS

ii) Microsoft windows CE

iii) Securing handheld systems

iv) Frame of reference

v) Master Slave Architecture

b) What is embedded system? What are the characteristics of embedded system? List some examples. **[6]**

Total No. of Questions : 10]

SEAT No. :

P3309

[Total No. of Pages : 3

[5353]-183

T.E. (Computer Engineering) (Semester - I)

DATA COMMUNICATION & WIRELESS SENSOR NETWORKS

(2012 Pattern)

Time : 2.30Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q1 OR Q2, Q3 OR Q4 10 Marks each.***
2) ***Attempt Q5 OR Q6 16 Marks each.***
3) ***Attempt Q7 OR Q8 18 Marks each.***
4) ***Attempt Q9 OR Q10 16 Marks each.***
5) ***Neat diagrams must be drawn wherever necessary.***
6) ***Assume Suitable data if necessary.***
7) ***Figures to the right indicate full marks.***

Q1) a) "In Adaptive delta modulation quantization error increases as slope error reduces" State true or false with proper justification. **[6]**

b) How does Virtual Private Network work? Write applications of VPN. **[4]**

OR

Q2) a) Draw and Explain B8ZS, AMI line coding techniques in detail. **[6]**

b) Explain necessity of flow and error control protocols in Wireless Sensor Network. **[4]**

Q3) a) Three thousand six hundred reservation stations are available for use of single slotted ALOHA channel. The average station have 10 reservation request per hour. A slot has 125 μs. What is approximate channel load? **[6]**

b) "CSMA CD minimizes the recovery time post collision while CSMA CA reduces possibility of a collision" State true or false with justification. **[4]**

P.T.O

OR

Q4) a) Identify the difference between Ad hoc and cellular network. **[6]**

b) Write in detail applications of Wireless body Sensor Network in health domain. **[4]**

Q5) a) Design suitable criteria that decides selection of schedule or contention based protocols in MAC layer. **[8]**

b) Explain with neat diagram Sensor Medium Access Control Protocol in Wireless Sensor Network. **[8]**

OR

Q6) a) Discuss in detail design issues related to address and name management in Wireless Sensor Network **[8]**

b) Describe the necessity of low duty cycle protocols and wakeup concept in Wireless Sensor Network **[8]**

Q7) a) Explain the concept of "Information via Negotiation" in SPIN. **[8]**

b) Explain in detail data centric or attribute based routing protocol with example. **[5]**

c) Describe role of network layer in data dissemination and gathering. **[5]**

OR

Q8) a) "Low Energy Adaptive Clustering Hierarchy protocol improves lifetime of the Wireless Sensor Network" State True or False with Justification. **[8]**

b) With neat diagram explain working of Power Efficient Gathering in Sensor Information System protocol in Wireless Sensor Network. **[5]**

c) Compare proactive and reactive routing protocol design issues in Wireless Sensor Network **[5]**

Q9) a) "Tiny OS is application specific operating system for Wireless Sensor Network" Justify the statement with respective to architecture, design, issues, functions. **[8]**

b) Design role of Wireless Sensor Network in Internet of Things. **[8]**

OR

Q10)a) "Designing algorithms for Localization and positioning of Wireless Sensor Network in remote, disastrous region is challenging" Justify with example. **[8]**

b) Discuss necessity of big data solutions for Wireless Sensor Network **[4]**

c) Explain significance of anchor placement in Wireless Sensor Network **[4]**

Total No. of Questions : 10]

SEAT No. :

P3310

[Total No. of Pages : 2

[5353]-184

T.E. (Computer Engg.)

DATABASE MANAGEMENT SYSTEMS APPLICATIONS

(2012 Pattern) (Endsem)

Time : 2.30 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) Explain in detail the specialization and Generalization features of EER diagram with example. **[5]**

b) Differentiate between Relational database & NOSQL database. **[5]**

OR

Q2) a) What is a data model? Explain different data models in database. **[5]**

b) Explain the distinctions among the terms primary key, candidate key, and super key. **[5]**

Q3) a) Explain aggregation in MongoDB with suitable Example **[5]**

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

i) Serial Schedule

ii) Equivalent Schedule

OR

Q4) a) What is the requirement of atomicity property of transactions in relational databases? Explain with example. **[5]**

b) Write short note on query optimization in NOSQL databases. **[5]**

P.T.O

Q5) a) Explain Connectivity of JAVA with MongoDb Database using JDBC with example. **[8]**

b) Explain 2 tier and 3 tier architecture with example. **[8]**

OR

Q6) a) What is a parallel databases? Explain any two parallel architecture in detail. **[8]**

b) List the characteristics of Cassandra .Explain Cassandra architecture in detail. **[8]**

Q7) a) What is XML DTD? Explain with example. **[7]**

b) Explain various components of Hadoop with neat diagram. **[10]**

OR

Q8) a) Explain Xpath and Xquery with suitable example. **[7]**

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

c) What is JSON? Explain JSON schema with suitable example. **[5]**

Q9) a) What is a clustering? Explain any clustering algorithm in brief. **[5]**

b) Explain BIS Components in details **[7]**

c) Explain the difference between operational database and data ware house **[5]**

OR

Q10)a) Explain KDD process in data mining. **[5]**

b) Explain Association Rule Mining. Explain Apriori Algorithm with suitable example. **[7]**

c) Write a short note on **[5]**

i) Time series analysis

ii) Sequence Pattern Mining

Total No. of Questions : 8]

SEAT No. :

P4249

[Total No. of Pages : 2

[5353]-185

T.E. (Computer) (Semester - I)

COMPUTER FORENSIC AND CYBER APPLICATIONS

(2012 Pattern)

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 Q8.***
2) ***Neat diagram must be drawn whenever necessary.***
3) ***Assume suitable data if necessary.***
4) ***Figures to the right indicate full marks.***

Q1) a) Explain cyber crime Law with reference to United State Perspective. **[8]**

b) What is adaptive listening and Message passing in case of Sensor MAC? **[6]**

c) What is modus operandi? Explain with the motives behind it. **[6]**

OR

Q2) a) Compare circuit switchin and packet switching **[8]**

b) Explain the following in brief: **[12]**

i) Computer fraud and abuse act

ii) Best evidence and Hearsay

iii) Industrial Espionage investigations

iv) Comptuer intrusion

Q3) a) Whta is cyber stalking? Explain with suitble example **[8]**

b) What do you mean by hardware as a contraband and information as contraband? Also comment on Direct Vs Circumstantial evidence. **[8]**

OR

P.T.O.

Q4) a) How the attacker and Gender offender misuse internet? **[8]**

b) Explain any two types of computer investigations typically conducted in the corporate environment. **[8]**

Q5) a) Describe NTFS file system **[8]**

b) What is the role of mobile devices as source of evidence? Enlist the handling process? **[8]**

OR

Q6) a) Compare digital evidence on windows system & Unix systems. **[8]**

b) Explain in brief intellectual rights (IPR) **[8]**

Q7) a) What is the role of sniffer in evidence collection at physical layer? **[8]**

b) Enlist three common types of digital crime. How will you perform fraud detection in mobile and wirless network? **[10]**

OR

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

a) Forensic science to the networks

b) E-mail forgery and tracking

c) Victim behavior analysis

d) Digital evidence on physical and data-link layers.

Total No. of Questions : 10]

SEAT No. :

P3311

[Total No. of Pages : 2

[5353]-186

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

PRINCIPLES OF CONCURRENT AND DISTRIBUTED PROGRAMMING

(2012 Pattern)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Question 1 or 2, 3 or 4,5 or 6, 7or 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) Explain how to count task dependency. **[6]**

b) Write a note on MPI Java. **[4]**

OR

Q2) a) What are features of lisp? List and explain application of LISP. **[6]**

b) Explain the structure of YACC file. **[4]**

Q3) a) Explain following terms related to Concurrency and Synchronization in detail - **[6]**

i) Critical Section

ii) Mutual Exclusion

iii) Dead Lock

b) What is GPU? Explain the GPU architecture in detail. **[4]**

OR

Q4) a) Write a Java program for creating thread by implementing Runnable interface. **[6]**

b) Explain Neural Networks parallel programming architectures. **[4]**

P.T.O

Q5) a) Explain workstation model and workstation-server model with neat diagram. **[8]**

b) Explain following issues in design of Distributed Operating System - **[8]**

i) Performance

ii) Scalability

iii) Heterogeneity

iv) Security

OR

Q6) a) Explain various transparencies of a distributed system and how they are different from each other? Explain with example. **[8]**

b) Explain minicomputer and processor-pool model with neat diagram. **[8]**

Q7) a) Explain desktop virtualization and network virtualization. **[8]**

b) Explain requirements for paravirtualized Xen guest domains. **[8]**

OR

Q8) a) Explain the Xen virtual environment and hypervisor. **[8]**

b) Explain server and machine virtualization and storage virtualization. **[8]**

Q9) a) Explain problem decomposition using multi GPU with an example. **[8]**

b) Write and explain a CUDA program for Odd- Even Sort. **[10]**

OR

Q10)a) Explain various applications of cloud computing. **[8]**

b) Write and explain a CUDA program for multiplication of two matrices. **[10]**

Total No. of Questions : 10]

SEAT No. :

P3312

[Total No. of Pages : 2

[5353]-187

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

EMBEDDED OPERATING SYSTEMS

(2012 Pattern)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) What is deadlock? List the necessary conditions for a deadlock to occur. **[6]**

b) Name and explain two IPC methods. **[4]**

OR

Q2) a) Explain the important characteristics of BBB. **[4]**

b) Name and explain the different operating modes of ARM. **[6]**

Q3) a) Name and explain different standards and relevant bodies responsible for the growth of Linux. **[4]**

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

i) head.o

ii) main.o

OR

Q4) a) Name and explain kernel image components. **[6]**

b) What are the main categories of Linux kernel releases? **[4]**

P.T.O

Q5) a) What is flash memory? How it is different than ROM type of memory? **[4]**

b) Explain the term 'journaling'. Name and explain two file systems which use journaling. **[7]**

c) Explain the following Linux utilities used: **[6]**

i) mount

ii) mkfs

iii) fdisk

OR

Q6) a) Explain the features supported by bootloader when used for embedded systems. Also mention the challenges faced by the bootloader. **[8]**

b) What are the different types of device drivers? Explain lsmod and modprobe. **[6]**

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 JTAG probe? Mention its uses. **[4]**

OR

Q8) a) Explain interfacing of BBB with Stepper motor. **[7]**

b) How to debug Linux kernel code? **[6]**

c) What are Binary utilities? Name any two binary utilities. **[4]**

Q9) a) Explain bootloader in Android. **[5]**

b) How to port Linux on target board? **[5]**

c) What are the issues involved in preempting the Linux kernel? **[6]**

OR

Q10)a) Which Linux version supports real-time features? What are the real-time features of this Linux kernel? **[6]**

b) What are the types of real-time systems? **[4]**

c) How different latency periods affect the real-time process execution? **[6]**

Total No. of Questions : 8]

SEAT No. :

P3313

[Total No. of Pages : 2

[5353]-188

T.E. (Computer) (Semester - II)

COMPUTER NETWORKS

(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 side indicate full marks.***
3) ***Assume Suitable data, if necessary.***

Q1) a) What is need of DHCP? Explain working of DHCP in brief. **[7]**

b) Explain NA GALE'S algorithm and Clark's Algorithm for flow control **[7]**

c) Compare IPv4 and IPv6. **[6]**

OR

Q2) a) Describe domain name system in detail. **[7]**

b) Explain leaky bucket algorithm. Which quality parameter is ensured by leaky bucket algorithm? **[8]**

c) What is need of RARP? Explain working of RARP. **[5]**

Q3) a) Explain WAP Architecture with necessary diagram. **[8]**

b) Explain Architecture of IEEE 802.11. **[8]**

OR

Q4) a) Write a note on Wireless LAN Architecture. **[8]**

b) Write a short note on wireless standard IEEE 802.11(a/b/g/n/ac/ad). **[8]**

Q5) Write a short note on **[16]**

a) Delay tolerant networks.

b) Vehicular networks

P.T.O

OR

Q6) a) Explain VOIP Architecture with neat diagram. **[8]**

b) Explain implementation and Applications of VOIP. **[8]**

Q7) a) Write a note on **[16]**

i) GMPLS.

ii) ATM Protocol architecture

b) Explain need of ATM. **[2]**

OR

Q8) a) Write a note on Software defined network. **[8]**

b) Explain propagation of signals in optical fiber with diagram. **[6]**

c) Explain ATM traffic management. **[4]**

Total No. of Questions : 12]

SEAT No. :

P3314

[Total No. of Pages : 2

[5353]-189

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

SOFTWARE ENGINEERING

(2012 Pattern)

Time : 2.30 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Neat diagrams must be dravn wherever necessary.***
2) ***Figures to the right indicate full marks.***
3) ***Assume Suitable data if necessary.***
4) ***All questions are compulsory.***

Unit-I

Q1) What is meant by engineering the software? Why software processes are required? **[7]**

OR

Q2) What are the objectives of Personal Software Process (PSP) and Team Software Process (TSP)? **[7]**

Unit-II

Q3) What are requirements engineering tasks? How use cases can be used to model the requirements? **[7]**

OR

Q4) Explain the analysis model with its elements? How analysis classes are identified? **[7]**

Unit-III

Q5) What is the relationship between modularity & functional dependence? Explain with example. **[6]**

OR

Q6) What is the relationship between user model and design model? Explain with example. **[6]**

P.T.O

Unit-IV

Q7) a) Testing follows an Outward approach, starting at Component level and moves towards component integration. Justify with suitable example. **[9]**

b) Explain Condition testing and data flow testing with example. **[8]**

OR

Q8) a) What is the difference between test stub and driver? Define Cyclomatic Complexity? **[9]**

b) What categories of errors are traceable using Black Box testing? Explain in brief. **[8]**

Unit-V

Q9) a) Explain the change control mechanism in software configuration management with example. **[9]**

b) Compare software metric and measurement. State the measurement principles. **[8]**

OR

Q10)a) What is LOC - based estimation? Explain with a suitable example. **[9]**

b) What is Risk identification? What are the different categories of risks? **[8]**

Unit-VI

Q11)a) What is software quality and how it is measured? Give suitable example. **[8]**

b) What is Service oriented architecture (SOA)? How SOA helps software engineers? **[8]**

OR

Q12)a) What are characteristics and benefits of SOA? **[8]**

b) Differentiate the Object Constraints language and Z specification language? **[8]**

Total No. of Questions : 10]

SEAT No. :

P3315

[Total No. of Pages : 3

[5353]-190

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

DIGITAL SIGNAL PROCESSING APPLICATIONS

(2012 Pattern)

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

Q1) a) Classify DT systems as FIR and IIR systems. Express it by means of suitable mathematical form using convolution and difference equation. **[5]**

b) How DFT is different than Fourier Transform (FT)? How one can plot the magnitude spectrum of DFT? **[5]**

OR

Q2) a) State the sampling theorem and explain why the problem of aliasing observed during sampling process? **[5]**

b) Obtain the ZT of $x(n)=\left(\frac{1}{2}\right)^n u(n)$ Sketch the ROC. **[5]**

Q3) a) Derive the first stage of Radix-2 DIT FFT algorithm. **[5]**

b) Determine the inverse Z-transform using partial fraction expansion method. **[5]**

$$H(Z)=\frac{1}{1-1.5Z^{-1}-0.5Z^{-2}} \text{ if ROC : } |Z| > 1$$

OR

Q4) a) Compute 4 point Circular Convolution for DT signals **[5]**

$x_1(n)=u(n) - u(n - 3)$ $x_2(n) = 2\ \delta(n) - \delta(n - 2)$

P.T.O

b) State & Prove the Time Shifting and Time Reversal properties of Fourier Transform. **[5]**

Q5) a) What are filter structures? How the Direct form and Cascade form of FIR filters are obtained and realized? **[9]**

b) Realize the system described by following difference equation using direct form - I **[9]**

$y(n) = y(n - 1) - ½y(n - 2) + x(n) - x(n - l) + x(n - 2)$

OR

Q6) a) Obtain and realize Linear Phase FIR filter structure for a DT system **[9]**

$$y(n) = x(n) + \frac{1}{3}x(n-1) + \frac{1}{4}x(n-2) + \frac{1}{4}x(n-3) + \frac{1}{3}x(n-4) + x(n-5)$$

What are the advantages of this filter structure?

b) Derive the Direct Form-II IIR filter structure from system function H(Z) and represent it using multipliers, adders and delay elements **[9]**

Q7) a) Explain the features of SHARC DSP processor. List the number of DAGs with its capabilities and memory pointer registers supported by DAG. **[8]**

b) Explain applications of DSP with respective to following **[8]**

i) Telecommunication

ii) Biomedical

OR

Q8) a) Explain and compare following architectures with suitable block diagram. **[8]**

i) Von Neumann Architecture

ii) Hardvard Architecture

iii) Modified Hardvard Architecture

b) Draw and explain the SIMD (Single Instruction Multiple Data) architecture of SHARC DSP processor **[8]**

Q9) a) Draw and explain Human Speech Model in speech synthesis and recognition. **[8]**

b) How digital image is represented by means of digital computer? How gray scale image is different than color image? What is Histogram of an image? **[8]**

OR

Q10)a) What is Companding? What is its significance in audio processing? **[8]** What is the impact of data rate on sound quality?

b) With mathematical form, explain any two gray level transforms used for image enhancement **[8]**

Total No. of Questions : 10]

SEAT No. :

P3316

[Total No. of Pages : 2

[5353]-191

T.E. (Information Technology)

COMPUTER NETWORK TECHNOLOGY

(2012 Pattern) (End Semester)

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, 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 is count-to-infinity problem? Explain with suitable example. **[6]**

b) Why three timers are required in TCP management? Explain the use of each timer. **[4]**

OR

Q2) a) What are the three phases in mail transfer? **[6]**

b) Write short notes on ICMP **[4]**

Q3) a) Explain at least 8 important commands used in FTP. **[6]**

b) Explain the role of SMTP and POP protocols in transfer of e-mail message **[4]**

OR

Q4) a) A company is granted a site address 201.70.64.0. The company needs six subnets Design the subnets. **[6]**

b) Compare FTP and TFTP. **[4]**

Q5) a) Describe the IEEE 802.11 specifications w.r.t Physical & Mac layer CSMA/CA. **[8]**

b) Write the Specifications of Bluetooth , protocol stack & Profiles of IEEE 802.15 **[8]**

P.T.O

OR

Q6) a) State differences between IEEE 802.11 and 802.16 w.r.t. Physical Layer, Data Link Layer functionalities & protocols. **[8]**

b) Explain the architecture of 802.11. **[8]**

Q7) a) What are challenges for mobile ad hoc networks? **[8]**

b) Explain WSN applications with example. **[8]**

OR

Q8) a) Explain operating environment constraints in WSN. **[8]**

b) Explain STEM protocol with diagram. **[8]**

Q9) a) Describe Routing protocols AODV, DSDV **[10]**

b) What is PEGASIS. Explain with example. **[8]**

OR

Q10) Write short note on:-

a) Wi-Fi Offloads

100G Ethernet and its variants

Internet of Things (IoT) and Web of Things **[10]**

b) Describe Routing using DSR. **[8]**

Total No. of Questions : 10]

SEAT No. :

P3317

[Total No. of Pages : 4

[5353]-192

T.E. (I.T.)

THEORY OF COMPUTATION

(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) Consider the following ε-NFA **[6]**

	a	b	c	ε
p	{p}	{q}	{r}	ϕ
q	{q}	{r}	ϕ	{p}
r	{r}	ϕ	{p}	{q}

i) ε-closure of each state

ii) Give all strings of length 3 or less accepted by the automation.

iii) Convert the automation to DFA

b) Give RE for the following languages over $\Sigma = \{0,1\}$ **[4]**

i) The language of all strings containing at least two 0's.

ii) The language of all strings containing exactly two 0's.

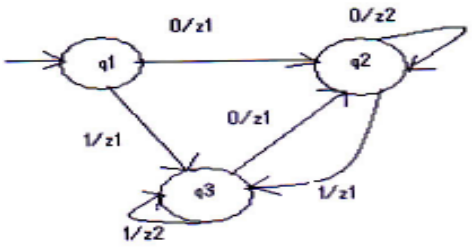
iii) The language of all strings containing every 0 followed by 11.

iv) The language of all strings not containing the substring 000.

OR

P.T.O

Q2) a) Construct Moore machine for given Melay machine. **[6]**



b) By using Pumping Lemma, prove that following language **[4]**

$L = \{a^{n!} \mid n> = 1\}$ is not regular.

Q3) a) Convert given CFG to GNF **[6]**

S -> AB

A -> BS|b

B -> SA|a

b) Consider CFG with productions **[4]**

S -> aB/bA

A -> a/aS/bAA

B -> b/bS/aBB

For string aaabbabbba

Find leftmost and rightmost derivation.

OR

Q4) a) Convert the following grammar to their equivalent CNF **[6]**

S -> PQP

P -> aP|ε

Q -> bQ|ε

b) Convert Left Linear Grammar to equivalent Right Linear Grammar. **[4]**

S -> C0|A0|B1

A -> Al|C0|B1|0

B -> B1|l

C -> A0

Q5) a) Write a note on closure properties of CFL's. **[4]**

b) Let L= $\{a^m b^n ; n < m\}$ Construct **[8]**

i) CFG accepting L

ii) PDA accepting L by empty store

iii) PDA accepting L by final state

c) Construct PDA equivalent to the following CFG **[6]**

S -> 0A1|0BA

A -> S01|0

B -> 1B|1

OR

Q6) a) Give CFG generating the language accepted by following PDA **[8]**

M = ({q0,q1},{a,b},{z0,X},δ,q0,z0,ϕ}, δ is given below

δ(q0, b, z0) = {(q0, Xz0)}

δ(q0, b, X) = {(q0, XX)}

δ(q0, a, X) ={(ql, X)}

δ(ql, b, X) = {(ql, ε)}

δ(ql, a, z0) = {(q0, z0)}

b) Design PM for L = $\{a^n b^n \mid n >= 0\}$. **[6]**

c) Compare the power of Post machine and Push down Automata. **[4]**

Q7) a) Design a Turing Machine to add two unary numbers. **[8]**

b) Explain Universal Turing machine. **[4]**

c) Differentiate between FA, PDA and TM. **[4]**

OR

Q8) a) Construct TM for obtaining 2's complement of a binary number. Simulate TM for any input. **[8]**

b) Write short note on Halting problem of TM. **[8]**

Q9) a) Explain Post Correspondence Problem with example. **[8]**

b) Explain recursive language and recursively enumerable language with suitable example. **[8]**

OR

Q10)a) Define decidability of problem. Describe undecidable problems for Context Free Grammar. **[8]**

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

i) Turing Reducibility

ii) Multitape TM

Total No. of Questions : 10]

SEAT No. :

P3318

[Total No. of Pages : 4

[5353]-193

T.E. (Information Technology) (Semester - I)

DATABASE MANAGEMENT SYSTEMS

(2012 Pattern)

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

Q1) a) Differentiate between logical and physical independency with suitable example. **[3]**

b) What is referential integrity? **[2]**

c) Relation R has eight attributes ABCDEFGH. Fields of R contain only atomic values. **[5]**

F={CH→G, A→BC, B→CFH, E→A, F→EG} is a set of functional dependencies (FDs) so that F + is exactly the set of FDs that hold for R. How many candidate keys does the relation R have?

OR

Q2) a) Draw an ER Diagram for wholesale dealers for audio, video consumer equipment from different manufacturing (BRAND), Customers are the various retail outlets(RETAILERS), wholesalers extends credit to OLD customers and special discounts are offered to NEW customers(retailers), ER Scope is restricted to details (queries on) of customers (retailers), products, stocks, and their discounts, credit offers etc. **[6]**

P.T.O

b) Consider the following database

Student (RollNo, Name, Address)

Subject (Sub_code, Sub_name)

Marks (Roll_no, Sub_code, Marks)

Write following queries in SQLusing two possible way (possible ways are Join, Nested quires, views)

Find average marks of each student, along with the name of student **[4]**

Q3) a) Differentiate between conflict and view serializability. Given precedence graph is the corresponding schedule, is it conflict serializable? **[4]**

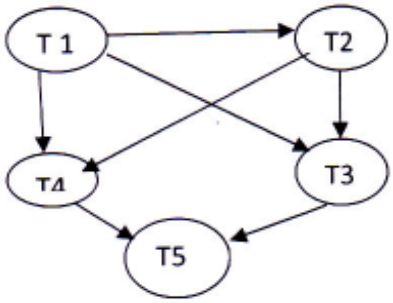


Fig 3.a.1

b) What is cursor? Why it is Needed? Explain different phases of cursors with example. **[6]**

OR

Q4) a) What is mean by concurrency? What types of anomalies were possible due to Concurrent executions? **[6]**

b) Explain the CRUD operation in MongoDB with suitable example. **[4]**

Q5) a) For the following query type, state which of the partitioning technique is best suited? **[3]**

i) Scanning the relation

Eg: select * from Student;

ii) Point queries

Select Roll_no, name, Percentage from Student, Marks where class = ‘ TE’;

iii) Range queries

Eg: Select Roll_no, Name, Percentage from student , Marks where Class In ('TE', 'BE');

b) What is fragment of relation? What are the main types of fragmentation? Why a fragmentation is useful concept in distributed database design? **[7]**

c) Write short note on: (any two) **[8]**

i) Parallel database architecture

ii) Centralized data base management system

iii) Replication of data in distributed database system

OR

Q6) a) Explain which database system architecture will you prefer for the following applications - support your answer with brief explanation **[6]**

i) Banking organization.

ii) Railway reservation system

iii) College admission system

b) Why distributed database is required? Draw an architecture of distributed database system? Explain various types of distributed database systems architecture. **[6]**

c) Discuss two tire and three tire client server architecture. **[6]**

Q7) a) Explain the following terms in XML with examples **[7]**

i) Documents

ii) Elements

iii) Nested/sub elements

iv) Attributes

v) Namespace

vi) DTD

vii) Schema

b) What are the different data types in JSON? Discuss about JSON object and ARRAY in details. **[5]**

c) Compare Hadoop and RDBMS from following perspectives: Volume of data, ACID property, Schema, Variety of data handling. **[4]**

OR

Q8) a) What is XML Schema? Give XML Schema for the following banking system: account (account_number, branch_name, balance)

Customer(customer_number, customer_street, customer_city), Depositor(customer_number, account_number) **[6]**

b) Draw and discuss Hadoop Master salve architecture (discussion should include name node, secondary name node, data node, job tracker, task tracker and their specific roles) **[6]**

c) Compare with suitable examples **[4]**

i) RDBMS and XML

ii) JSON and XML

Q9) a) i) Define Data warehouse. Why is it needed? Draw architecture of data warehouse?

ii) Compare OLTP and OLAP

[8]

b) Explain Knowledge Discovery Process in detail. **[8]**

OR

Q10)a) Write short note on: (any two) **[8]**

i) SQLite database

ii) Machine learning and big Data

iii) Data Mining

iv) Data warehouse conceptual models.

b) Why there is need for Mobile database? Draw and explain the architecture of Mobile database. **[8]**

Total No. of Questions : 10]

SEAT No. :

P3319

[Total No. of Pages : 2

[5353]-194

T.E. (Information Technology) (Semester - I)

SOFTWARE ENGINEERING

(2012 Pattern)

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, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn whenever necessary.***
3) ***Figures to the right side indicate full marks.***
5) ***Assume suitable data if necessary'***

Q1) a) Discuss any five software myths & realties. **[5]**

b) What is software? Explain different categories of software. **[5]**

OR

Q2) a) Explain layered technology of software Engineering. **[5]**

b) Write short note on Perspective process model. **[5]**

Q3) a) Discuss different Agile practices. **[5]**

b) What are elements of Design model? What are the elements of architectural design? Explain design principles. **[5]**

OR

Q4) a) Explain any eight issues consider for designing software. **[5]**

b) Explain in brief SCRUM roles. **[5]**

Q5) a) What is user story? which are 3 C's of user story ?Give an example **[8]**

b) What is architectural design? Which are the 5 different models to represent architectural design. [8]

P.T.O

OR

Q6) a) Write short note on Shneiderman's 8 golden rules **[8]**

b) Mention any 5 design principles. **[8]**

Q7) a) What is Fitt's Law? How is it used in UI design? **[8]**

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

i) Technology evolution

ii) Collaborative development

OR

Q8) a) Mention Thao mandel's Golden rules of user interface design **[8]**

b) Explain the steps for interface design with example of online student Registration. **[8]**

Q9) a) What is cleanroom software development? Expalin cleanroom software model in detail. **[9]**

b) What are the different Categories of CASE tools ? Explain with advantages and disadvantages. **[9]**

OR

Q10)a) i) Write short note on test driven development.

ii) What are challenges of Global Software Development?

[10]

b) What are the functions of software configuration management repository? How it works? **[8]**

Total No. of Questions : 10]

SEAT No. :

P3320

[Total No. of Pages : 2

[5353]-195

T.E. (Information Technology) (Semester - I)

WEB ENGINEERING & TECHNOLOGY

(2012 Pattern)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain the basic components of Web Application architecture with neat diagram. **[6]**

b) What is the key difference between Web Application and Web Engineering? **[2]**

OR

Q2) a) Explain different categories of Web application by giving suitable example. **[6]**

b) What is the role of the Information Architect? **[2]**

Q3) a) Explain 2 tier architecture for Web application. **[6]**

b) Identify and describe various servers used in internet communication. **[4]**

OR

Q4) a) What do you mean by CSS? Explain CSS box model in detail. **[4]**

b) You are appointed as a team Leader for a web based application for online admission process of first year engineering. Find out all the stake holder for this scenario and give a simple format of application form that will be displayed on screen. (Do not write any code.) **[6]**

P.T.O

Q5) a) Write a PHP script to display the squares of 1 to 10 numbers. **[8]**

b) What is session? List the session tracking techniques. How cookies are used to track the session? **[8]**

OR

Q6) a) Explain Java Script built in objects in detail. **[8]**

b) Discuss about string functions used in PHP with suitable example. **[8]**

Q7) a) Explain with appropriate example: **[8]**

i) XML

ii) DTD

b) What is JSP? Enlist advantages of JSP over CGI? **[8]**

OR

Q8) a) Explain the life cycle of servlet. **[8]**

b) Comment on: Relationship between HTML, SGML and XML. **[8]**

Q9) a) Explain the process of uploading data using FTP. **[6]**

b) Describe the process of website deployment in detail. **[6]**

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

i) Word Press

ii) Joomla.

OR

Q10)a) What is Word Press Caching and Why is it important? **[6]**

b) What accessibility guidelines should be followed while creating websites for individuals? **[6]**

c) Compare and contrast CMS development tools Drupal and Joomla. **[8]**

Total No. of Questions : 10]

SEAT No. :

P3321

[Total No. of Pages : 3

[5353]-196

T.E. (Information Technology)

DESIGN AND ANALYSIS OF ALGORITHMS

(2012 Pattern)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7or Q8, Q9 or Q10.***
2) ***Neat diagram must be drawn whenever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume Suitable data if necessary.***

Q1) a) Explain direct proof & proof by counter example techniques. **[4]**

b) Define following asymptotic notations : **[6]**

i) Theta

ii) Little oh

iii) Little Omega

OR

Q2) a) Setup a recurrence relation to compute n! and solve it. **[5]**

b) Consider the following letters with their probability. **[5]**

Character	a	b	c	d	e
Probability	0.5	0.25	0.125	0.625	0.031

Find out Huffman coding for a, b, c, d, e.

Q3) a) Show the steps in multiplying the following two integers using efficiency integer multiplication method 2101 × 1130. **[5]**

b) Explain the following terms with reference to Greedy Technique **[5]**

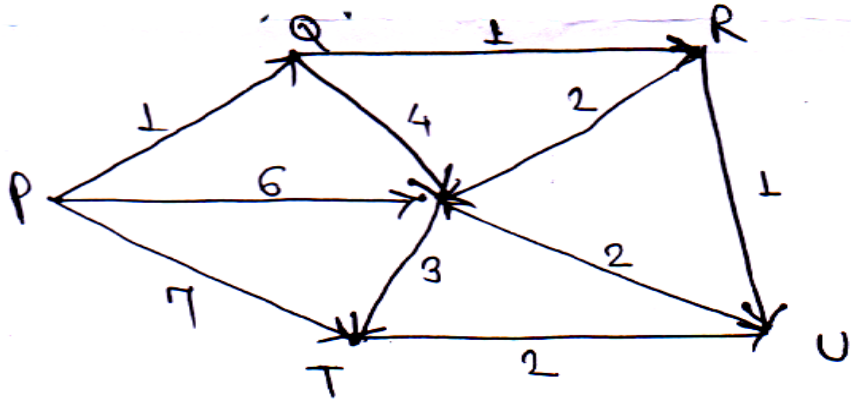
i) Feasible solution and optimal solution

ii) Subset paradigm and ordering paradigm

P.T.O.

OR

Q4) a) Apply Dijkstra's algorithm for finding all shortest paths from a single source 'p' in a given graph **[5]**



b) Explain the concept of divide and conquer technique. Write master theorem. **[5]**

Q5) a) Let w = {5, 10, 12, 13, 15, 18}, m = 30. Find all possible subsets of w that sum to m. Draw the portion of state space tree that is generated.**[8]**

b) Write a recursive backtracking algorithm for m-coloring of the graph.**[8]**

OR

Q6) a) What is m-colorability optimization problem? Explain with an example.**[8]**

b) Find all possible solutions for 5 queens' problem using backtracking method. **[8]**

Q7) What is travelling salesman problem? Find the solution of following travelling salesman problem using branch and bound method. **[18]**

∞	20	30	10	11
15	∞	16	4	2
3	5	∞	2	4
19	6	18	∞	3
16	4	7	16	∞

Cost Matrix

OR

Q8) a) What is LC Search? Explain in detail control abstraction for LC search. **[8]**

b) Solve the following instance of 0/1 knopsack problem by FIFO branch and bound approach. n = 4, M = 15 and $(P_1, P_2, P_3, P_4) = (10, 10, 12, 18)$; $(W_1, W_2, W_3, W_4) = (2, 4, 6, 9)$ **[10]**

Q9) a) What do you mean by P, NP, NP-Hard and NP-complete problems? Give an example of each category. **[8]**

b) Explain the need and significance of parallel algorithms. **[8]**

OR

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

i) Computational complexity

ii) Decision problems

iii) Deterministic and Non - determinstic classes

iv) Complexity classes

b) Explain the possible parallel computations using complete binary tree. **[8]**

Total No. of Questions : 10]

SEAT No. :

P3322

[Total No. of Pages : 4

[5353]-197

T.E. (IT) (Semester - II)

SYSTEMS PROGRAMMING

(2012 Pattern)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7or 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) Give the various data structures in the design of 2-pass macroprocessor. **[6]**

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

i) Assembler

ii) Macroprocessor

iii) Compiler

iv) Loader/Linker

OR

Q2) a) With the structure explain the different tables that would be generated as output of lexical analysis. **[4]**

b) What are the assembler directives? Explain how assembler directives LTORG, ORIGIN, START, END and EQU are processed with examples. **[6]**

Q3) a) For the following piece of assembly language code, show the contents of symbol table, literal table and pool-tab. Assume size of instruction equal to one. **[6]**

```
START 500
MULT BREG, A
```

P.T.O.

```
        MOVEM AREG , = '10'
LOOP    MOVER AREG, A
        MOVER CREG,B
        ADD CREG, = '1'
        SUB CREG,A
        LTORG
        ADD CREG,B'
NEXT    SUB AREG,='l'
        STOP
        ORIGIN 300
        MULT CREG, B
A       DS 1
BACK    EQU LOOP
B       DS 1
        END
```

b) Define loader and enlist the basic functions of loader. **[4]**

OR

Q4) a) Explain the phases of compiler w.r.t the following statement : **[8]**

R = (b*b–4*a*c)/(2*a)

b) Define the term forward reference in an assembler. **[2]**

Q5) a) Consider the grammar **[8]**

$E \rightarrow E\text{-}E$

$E \rightarrow E*E$

$E \rightarrow id$

Perform shift Reduce parsing of i/p string "id – id * id"

b) Explain LEX file structure. **[6]**

c) Compare bottom up and top down parser. **[4]**

OR

Q6) a) Consider the following grammar

$S \rightarrow iEtSS'/a$

$S' \rightarrow eS/e$

$E \rightarrow b$

Design a table driven predictive parser and parse the string 'ibtae'. **[8]**

b) Explain YACC file structure. **[5]**

c) With a neat diagram explain the classification of parsers. **[5]**

Q7) a) Define synthesized and inherited attributes. For the grammar given, **[8]**

$T \rightarrow FT'$

$T' \rightarrow *FT'/\in$

$F \rightarrow digit$

Draw the annotated parse tree for the expression 3*5*2 and list down the synthesized and inherited attributes.

b) Write the following expression in the form of postfix notation, Directed acyclic graph, quadruple and triple. **[8]**

a = b* (–c) + b*(–c)

OR

Q8) a) Draw the dependency graph for the example of 7 a. **[4]**

b) Translate the following C fragment into the three address code. **[6]**

```
int i,j,k;
int T[5][100];
j = 10; k = j–1;
for (i = 1; i < =5; i++)
{
    T[i] [j]=k*k;
    J=j+k
    T[i][j]=k*k–1;
}
```

c) What is the need for intermediate code generation?

Explain the different IC forms with examples. **[6]**

Q9) a) Optimize the following code **[8]**

```
i=1
j=1
t1=i * 80
t2=j*4
t3=t1+t2
t4=a[t3]
t5=j*80
t6=i*4
t7=t5+t6
t8=a[t7]
```

b) Write short note on activation record. **[4]**

c) Explain in brief run time storage allocation. **[4]**

OR

Q10)a) Generate three address code for **[8]**

```
while (a<c) and (b>d) do
{
If a =1 then c=c+1
Else while (a<=d) do
      A=a+3
}
```

b) Explain different storage allocation strategies. **[4]**

c) Explain various code generation issues. **[4]**

Total No. of Questions : 10]

SEAT No. :

P3323

[Total No. of Pages : 3

[5353]-198

T.E. (Information Technology) (Semester - II)

OPERATING SYSTEM

(2012 Pattern)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7or Q8, Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume Suitable data if necessary.***

Q1) a) Explain micro kernel design approach? How will you decide that your requirement meets the criteria For micro kernel design? **[5]**

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) Discuss multilevel Feedback queue scheduling in UNIX. **[5]**

Q3) a) For the table given below, draw a Gantt chart illustrating the process execution using non preemptive priority scheduling. A larger no indicates higher priority. Calculate average waiting time. **[5]**

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 fullfilled. **[5]**

b) Provide two programming examples in which multithreading provides better performance than a single-threaded solution. **[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.

i) FIFO

ii) OPTIMAL

iii) 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) Assume a disk with 200 tracks and the disk request queue has random requests in it as Follows: 98,183,37,122,14,124,65,67. Find the no of tracks traversed and average seek length If **[8]**

i) FCFS

ii) SSTF

iii) SCAN

iv) C-SCAN is used and initially head is at track no 53.

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 u r answer. **[6]**

c) What are different disk performance parameter? **[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. :

P3324

[Total No. of Pages : 2

[5353]-199

T.E. (Information Technology)

MULTIMEDIA TECHNOLOGIES

(2012 Pattern) (Semester - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Neat diagrams must be drawn wherever necessary.***

Q1) a) Explain different Multimedia blocks. **[5]**

b) Explain the Huffman coding with example. **[5]**

OR

Q2) a) Explain vector quantization technique. **[5]**

b) Solve below example with the Arithmatic Encoding method. Encode the message $\alpha_1\ \alpha_2\ \alpha_3\ \alpha_3\ \alpha_4$ **[5]**

Source Symbol	Probability
a_1	0.2
a_2	0.2
a_3	0.4
a_4	0.2

Q3) a) Sampling at the Nyquist rate can create a good approximation of the original wave.Justify. **[5]**

b) Write a short note on PCM Encoder. **[5]**

OR

Q4) a) Draw and explain different blocks of VOC file format. **[5]**

b) Explain the Fractal compression algorithm. **[5]**

P.T.O.

Q5) a) What is chroma subsampling,what are its types?Draw and explain. **[8]**

b) Comapre NTSC ,PAL and SECAM techniques. **[8]**

OR

Q6) a) Explain the concept of Motion estimation and compensation with diagram. **[8]**

b) What is MPEG 1 video?Expiain different types of frames? **[8]**

Q7) a) What are basic principles of animation?Explain any four in detail. **[8]**

b) What is OPEN GL? Explain OPEN GL rendering pipeline with key stages. **[8]**

OR

Q8) a) Explain stages in the Process of creating the animation. **[8]**

b) What is animation'?How it differs from the video? What are the applications of animation? Enlist some tools used to create the animation. **[8]**

Q9) a) What is virtual reality?Explain different applications of it. **[6]**

b) Explain the IGMP and RSVP (Resource ReSerVation Protocol) with example. **[6]**

c) What is IP multicast and M bone? **[6]**

OR

Q10)a) What are the broadcast schemes for video on demand?Explain any two. **[6]**

b) Draw and Explain android multimedia framework architecture? **[6]**

c) What is Open core and Open Max multimedia engine? **[6]**

Total No. of Questions : 10]

SEAT No. :

P3325

[Total No. of Pages : 3

[5353]-200

T.E. (Information Technology)

INFORMATION TECHNOLOGY PROJECT MANAGEMENT

(2012 Pattern) (Semester - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answers Question 1 or 2, 3 or 4, 5 or 6, 7 or 8 and 9 or 10.***
2) ***Neat diagrams must be drawn whenever necessary.***
3) ***Assume suitable data, if necessary.***

Q1) a) Explain in brief concept of management of technology. How it is interdisciplinary? **[4]**

b) List project scope management process and explain each in detail. **[6]**

OR

Q2) a) What is the role project manager in Information technology project? **[4]**

b) Define and explain the terms with example :- **[6]**

i) Activity or Task,

ii) Activity List,

iii) Activity attributes,

iv) Milestones,

v) Network diagram,

vi) Dependencies

Q3) a) What are the contents of proposal and contracts of IT projects? **[4]**

b) What are various tools and techniques for managing IT project teams? Explain with example. **[6]**

P.T.O.

OR

Q4) a) Cost estimation and management is traditionally weak area of information technology project management. True or False? Justify your answer. **[4]**

b) What is the goal of project communications management and how it can be achieved? **[6]**

Q5) a) List Broad categories of risk of information technology (IT) projects. Explain with example. **[8]**

b) Explain project risk management processes in detail. **[8]**

OR

Q6) a) What are Common Sources of Risk in Information Technology Projects? How to overcome them? **[8]**

b) List down and explain with example the response strategies for negative risks and positive risks. **[8]**

Q7) a) What are various quality attributes of IT projects? Explain attributes. **[8]**

b) Explain in detail the purpose of ISO 9000 in IT Projects. **[8]**

OR

Q8) a) What is the importance of six sigma in IT project management? **[8]**

b) Which tools are used to perform IT project quality assurance? How are they used. **[8]**

Q9) a) What is the purpose of business process reengineering? **[8]**

b) Write a short note on (Any 2) **[10]**

i) Supply Chain Management

ii) Enterprise Resource Planning

iii) SAP

OR

Q10)a) What are key success factors for international Information Technology projects ? **[8]**

b) Write a short note on (Any 2) **[10]**

i) Customer Relationship Management

ii) IP: patent and copyright

iii) Agile software development

Total No. of Questions : 10]

SEAT No. : ____

P3326

[Total No. of Pages : 3

[5353]-201

T.E. (Chemical Engineering) (End Semester)

MATHEMATICS

(2012 Pattern)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to candidates:

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

Q1) a) The bacteria concentration C in a reservoir varies as $C = 4e^{-2t} + e^{-0.1t}$. Using Newton Raphson method, calculate the time required for the bacteria concentration to be 0.5 accurate upto 4 decimal places. **[5]**

b) Explain the graphical interpretation of bisection method. **[5]**

OR

Q2) a) Solve the following equation using Gauss Elimination method. **[5]**

$$2x_1 - 3x_2 - 4x_3 = 11$$

$$9x_1 + 2x_2 - 8x_3 = 1.9$$

$$15x_1 - 8x_2 + 6x_3 = 14.7$$

b) What are the drawbacks of Elimination method. **[5]**

Q3) The following are the data from steam Table. **[10]**

Temperature°C	140	150	160	170
Pressure Kgf/cm^2	3.685	4.854	6.302	8.076

Using Newtons backward formula, find the pressure of steam for a temperature of 142°C.

P.T.O.

OR

Q4) In an attempt to understand the mechanism of the depolarization process in a fuel cell, an electro kinetic model for mixed oxygen-methanol current on platinum was developed in the laboratory. A very simplified model of the reaction developed suggests a functional relation in an integral form. To find the time required for 50% of the oxygen to be consumed, the time, *T(s)* is given by

$$T = -\int_{1.22\times10^{-6}}^{0.61\times10^{-6}} \left(\frac{6.73x + 4.3025\times10^{-7}}{2.316\times10^{-11}x} \right) dx$$

Use Simpson's 1/3 rule to find the time required for 50% of the oxygen to be consumed. **[10]**

Q5) a) Solve the following differential equation using modified Euler's method for the given boundary condition $\frac{dy}{dx} = \sqrt{x+y}$ y(0) =0.36 find y(0.2) upto accuracy of 0.001. **[8]**

b) Discuss errors induced by Eulers method. **[8]**

OR

Q6) a) Solve the differential equation $\frac{dy}{dx} = \frac{x+y}{\left(y^2 - \sqrt{xy}\right)}$ Using Eulers method under the boundry conditions x = 1.3 and y = 2.0. Find y at x = 1.8 in 5 steps. **[8]**

b) Using Runge-kutta 4th order method solve

$\frac{dy}{dx} - y = 0$. Given y(0) = 2, h = 0.1. Find y at x = 0.2. **[8]**

Q7) A steel plate of 750 × 750mm has its two adjacent sides maintained at 100 °C, while the two other sides are maintained at 100 °C, What will be the steady state temperature at interior points assuming a grid size of 250 mm. **[16]**

OR

Q8) Solve 100 $u_{xx} = u_u$ given that u (0, t) = 0, u (0.6,1) = 0, u (x, 0) = (5x – 1) and u_t (x, 0) = 0 by taking h = 0.2 and upto 5 times steps. **[16]**

Q9) a) What are the six steps of Optimization. **[9]**

b) Maximize $Z = 2x_1 + x_2$ **[9]**

Subject to $x_1 + 2x_2 \leq 10$

$x_1 + x_2 \leq 6$

$x_1 - x_2 \leq 2$

$x_1 - 2x_2 \leq 1$

$x_1, x_2 \geq 0$

OR

Q10)a) Explain numerical methods for optimizing a function of one variable.**[9]**

b) Explain scanning and bracketing procedure for optimization of unconstrained functions of one dimensional search. **[9]**

Total No. of Questions : 10]

SEAT No. :

P3327

[Total No. of Pages : 2

[5353]-202

T.E. (Chemical) (Semester - I)

MASS TRANSFER - I (Theory)

(2012 Pattern)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to 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) State & explain Ficks law of molecular Diffusion? **[4]**

b) Ammonia gas (A) is diffusing through a uniform tube 0.10 m long containing Nitrogen gas (B) at 101320 Pa pressure & 298 K. At point one PA_1 = 10130 Pa & at point two PA_2 = 5070 Pa. The diffusivity DAB = 0.000023 m^2/sec. Calculate the flux at steady state. (R = 8.314 KPa m^3/Kmol K) **[6]**

OR

Q2) a) Explain Diffusion mass transfer Operation? Differentiate between Molecular & Eddy Diffusion? **[5]**

b) Explain Choice of Solvent for Gas Absorption? **[5]**

Q3) a) What are the different theories of Mass-Transfer? Explain Two-Film Theory? **[5]**

b) Explain Absorption & Stripping? What is the significance of minimum L/G ratio for Absorption? **[5]**

OR

Q4) a) In an oxygen-Nitrogen mixture at 10 atm & 25 °C the concentration of oxygen at two places of 0.2cm apart are 10 & 20 volume % respectively. Calculate the rate of diffusion of oxygen expressed as gm/cm^2.hr for the case of unicomponent diffusion (Nitrogen is non diffusing). Value of diffusivity is 0.181 cm^2/sec.? **[6]**

b) Explain Wetted-Wall Column? **[4]**

Q5) a) Explain the Phase diagram for water & Pshychrometric Chart? **[8]**

b) Explain Adiabatic Saturation temperature? Derive Lewis Relation? **[8]**

P.T.O.

OR

Q6) a) Define following terms : **[10]**

i) Absolute Humidity

ii) Percentage Humidity

iii) Wet Bulb Temperature

iv) Dew point temperature

v) Humid Heat.

b) Explain Humidification & Dehumidification? **[6]**

Q7) a) Explain Flooding & Loading Conditions? **[8]**

b) What are the characteristics that tower packing should offer? Give the classification of packing's used in Packed column? **[8]**

OR

Q8) a) What are the different Gas-Liquid contacting device? Explain? **[8]**

b) Explain Tray tower Vs Packed towers? **[8]**

Q9) a) Explain mechanism of moisture movement within the solid during drying? **[6]**

b) A batch of solid for which the following table of data applies is to be dried from 25% to 6% (wet basis) moisture under conditions identical to those for which the data were Tabulated .The initial weight of the wet solid is 300 kg & the drying surface is 1 m^2/8 kg dry weight. Determine the time for drying? **[12]**

X Kg moisture/Kg dry solid	0.35	0.25	0.20	0.18	0.16	0.14	0.12	0.10	0.09	0.08	0.064
R Kg moisture / hr.m^2	0.3	0.3	0.3	0.266	0.239	0.208	0.18	0.15	0.097	0.07	0.25

OR

Q10)a) Explain Rate of Drying Curve in detail? **[8]**

b) A porous dry solid was dried under constant drying conditions in a batch dryer. It took 5 hrs to reduce the moisture from 30% to 10%. All the moisture content on dry basis. How long will it take to dry a sample of the above solid to dry from 36% to 6% under the same drying conditions? **[10]**

Total No. of Questions : 10]

SEAT No. :

P3328

[Total No. of Pages : 2

[5353]-203
T.E. (Chemical) (Semester - I)
INDUSTRIAL ORGANISATION AND MANAGEMENT
(2012 Pattern)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to candidates:

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

Q1) a) Explain Joint Stock Company with advantages and disadvantages. **[6]**

b) Write a note on Partnership Deed. **[4]**

OR

Q2) Explain in detail the various functions of manager. **[10]**

Q3) a) Explain different types of Wages. **[6]**

b) Explain in detail Merit Rating. **[4]**

OR

Q4) Explain in detail : **[10]**

a) Comparative Statement

b) Job Evaluation

Q5) a) Write an explanatory note on Marketing Mix. **[8]**

b) Explain any two Pricing Strategies in detail. **[8]**

OR

P.T.O.

Q6) a) What is sales forecasting? Explain the two types of sales forecasting in detail. **[8]**

b) Write an explanatory note on considering the importance of the advertising. **[8]**

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

i) ISO

ii) International Trade

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

OR

Q8) a) Explain Total Quality Management of a process industry. **[8]**

b) Explain in detail various factors affecting international trade. **[8]**

Q9) Write short notes on : **[18]**

a) FERA and FEMA

b) Monopolies Restrictive Trade Practices (MRTP)

c) Flow Chart and Flow Diagram

OR

Q10)a) Explain the term Agreement in Contract Act. Explain the various types of Contract according to enforceability, formation and performance. **[12]**

b) Write note on MRTP. **[6]**

Total No. of Questions : 10]

SEAT No. :

P3329

[Total No. of Pages : 2

[5353]-204
T.E. (Chemical)
CHEMICAL PROCESS TECHNOLOGY
(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.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) Explain Electrolytic process for chlorine - caustic soda production with engineering. **[10]**

OR

Q2) Explain Synthetic Ammonia process. Discuss engineering problems in details. **[10]**

Q3) Explain production of ethyl alcohol in details. **[10]**

OR

Q4) Discuss (any two). **[10]**

a) Recovery of Mg. Salt from sea water.

b) Production of dextrin.

c) Production of superphosphate.

Q5) a) Describe production of natural product glycerine. **[8]**

b) Explain procedure for destructive distillation of coal. **[8]**

OR

P.T.O.

Q6) a) Explain construction & Working of coke oven. **[8]**

b) Discuss production of soap & explain how cleaning action takes place. **[8]**

Q7) a) Explain production of Natural gas. Give its Engg. problems. **[6]**

b) Explain catalytic cracking process with fluidized bed & moving bed type. **[10]**

OR

Q8) a) Explain polymerization process in petroleum industry. **[8]**

b) Describe in brief about fuel cell. **[8]**

Q9) a) Explain production of Formaldehyde in detail. **[8]**

b) Discuss production of styrene. **[10]**

OR

Q10)a) Describe manufacturing of isopropyl benzene (cumene) with Engineering problems. **[8]**

b) Explain production of phenol by toluene oxidation. Also write end uses of phenol. **[10]**

Total No. of Questions : 10]

SEAT No. :

P3330

[Total No. of Pages : 3

[5353]-205
T.E. (Chemical)
CHEMICAL ENGINEERING THERMODYNAMICS - II
(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.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume Suitable data if necessary.***

Q1) The volume of a mixture of two organic liquids 1 and 2 is given by

$V = 110 - 17X_1 - 2.5X_1^2$. Where V is the volume in m^3/mole at 1 bar and 300K. Find expressions for V_1, V_2, and ΔV. **[10]**

OR

Q2) Show that the fugacity of a gas obeying Van der Waal's equation of state is given by **[10]**

$$\ln f = \frac{b}{v-b} - \frac{2a}{RTV} + \ln\left(\frac{RT}{V-b}\right)$$

Q3) a) The excess gibbs energy of a binary mixture at T and P is given by **[8]**

$G^E/RT = (-2.6X_1 - 1.8X_2)X_1X_2$.

Find expressions for γ_1 and γ_2.

b) Explain the Daltons law with its applicability in the context of VLE. **[2]**

OR

Q4) Assuming the validity of Raoults law, do the following calculations for the benzene(1)/ Toluene(2) system: **[10]**

a) given $x_1 = 0.33$ and T = 373.15 K find y_1 and P

b) given $y_1 = 0.33$ and T = 373.15 K find x_1 and P

c) given $x_1 = 0.33$ and P = 120 KPa find y_1 and T

d) given $y_1 = 0.33$ and T =120 KPa find x_1 and P

P.T.O.

Parameters for Antoine equation are :

Component	A	B	C
Benzene(1)	13.8594	2773.78	–53.08
Toluene (2)	14.0098	3103.01	–53.36

Q5) a) Derive the following expression for SLE : **[10]**

$$\psi_i = \exp \int_{T_{m_i}}^{T} \frac{H_i^l - H_i^s}{RT^2}$$

where $\psi_i \equiv f_i^s / f_i^l$

b) Write a note on osmotic equilibrium. **[6]**

OR

Q6) a) Explain following two methods of consistency tests for VLE data **[10]**

i) Using coexistence equation

ii) Using partial pressure data

b) Explain triple point and eutectic temperature with neat diagram. **[6]**

Q7) a) A system initially containing 2 mol C_2H_4 and 3 mol O_2 undergoes the reactions:

$$C_2H_4(g) + ½O_2(g) \longrightarrow \{(CH_2)_2\}O(g)$$

$$C_2H_4(g) + 3O_2(g) \longrightarrow 2CO_2(g) + 2H_2O(g)$$

Develop expressions for the mole fractions of the reacting species as functions of the reaction co-ordinates for the two reactions. **[10]**

b) A gas mixture consisting of 60% H_2, 20% N_2 and rest inert gas is passed over a suitable catalyst for the production of ammonia at 50 bar.

$l/2N_2 + 3/2H_2 \rightarrow NH_3$ $\qquad$ $Kp = 1.25 \times 10^{-2}$

Assuming ideal gas behaviour, determine the composition of the gases leaving the reactor. **[8]**

OR

Q8) a) The equilibrium constant at 420 K for the following reaction **[12]** $C_2H_4 + H_2O \rightarrow C_2H_5OH$, is 6.8×10^{-2} and the standard heat of reaction at 298K is -45.95×10^3J. The specific heat data is

	Cp, J/mol. K
Ethylene	$11.886+120.12\times10^{-3}T-36.649\times10^{-6}T^2$
Water	$30.475+9.652\times10^{-3}T+1.189\times10^{-6}T^2$
Ethanol	$29.358+166.9\times10^{-3}T-50.09\times10^{-6}T^2$

Formulate the general relationship for estimating the equilibrium constant and standard free energy change as functions of temperature.

b) Explain various methods used for the evaluation of equilibrium constant.**[6]**

Q9) a) Explain the phase rule and Duhem's theorem for reacting systems. **[7]**

b) A stoichiometric mixture of $N_{2(g)}$ and $H_{2(g)}$ at 100 bar and 800 K enter a catalytic reactor for the synthesis of ammonia. Assuming that the gas phase is ideal, estimate the degree of conversion and the equilibrium composition. The equilibrium constant for the reaction at 800K is 1.122×10^{-5}. **[9]**

OR

Q10)a) Calculate values of kp at 25°C and 800°C for the reaction **[10]**

$CO(g) + H_2O \text{-----} \rightarrow H_2(g) + CO_2(g)$

Using the following data at 298K and 1 bar. Make suitable assumptions.

Component	H_2	CO	H_2O	CO_2
ΔG^0_f, KJ/mole	0	–137.25	–228.59	–394.38
ΔH^0_f, KJ/mole	0	–116.52	–241.88	–392.51

b) Calculate the equilibrium constant for the following reaction using the data at 298 K. **[6]**

$H_2O(g) + CH_3OH(g) \rightarrow CO_2(g) + 3H_2(g)$

	H_2O	$CH_3OH(g)$	$CO_2(g)$	$H_2(g)$
Δg^0_f, kJ/mole	–228.57	–161.96	–394.36	0

Total No. of Questions : 10]

SEAT No. :

P3331

[Total No. of Pages : 2

[5353]-206

T.E. (Chemical Engineering) (Semester - IV)

CHEMICAL REACTION ENGINEERING - I

(2012 Pattern) (End Semester)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain classification of chemical reactions with suitable examples. **[6]**

b) Distinguish between homogeneous and heterogeneous reactions. **[4]**

OR

Q2) a) Milk is pasteurized if it is heated to 63 °C for 30 min, but if it is heated to 74°C it only needs 15 s for the same result. Find the activation energy of this sterilization process. **[6]**

b) Differential between single and multiple reactions. **[4]**

Q3) a) Explain integral and differential methods of analysis. **[6]**

b) Define molecularity and order of reaction. **[4]**

OR

Q4) In a reaction between NaOH and $CH_3COOC_2H_5$, the 0.5638 moles and 0.3 114 moles of NaOH and $CH_3COOC_2H_2$ were used respectively. With time the amount of reactants in reactor were found as follows. **[10]**

Time(t) hr	0	369	669	1010	1265
$CH_3COOC_2H_5$ (moles)	0.5638	0.4866	0.4467	0.4113	0.3879
NaOH (moles)	0.3144	0.2342	0.1943	0.1589	0.1354

Find reaction rate constant. Consider reaction is irreversible and second order reaction.

P.T.O.

Q5) a) Explain E, F and C curve and find the relationship between them. **[10]**

b) Write advantage and Disadvantages of a batch reactor. **[6]**

OR

Q6) a) Comment on the product distribution in Quantitative and Qualitative methods. **[10]**

b) Show that, $C_A = C_{A0} (1 – XA)$ **[6]**

Q7) Explain in detail effect of temperature on rate of reaction by following theories. **[16]**

a) Arrhenius law

b) Thermodynamics Approach

c) Collision theory

d) Transition state theory

OR

Q8) a) Explain in detail : **[8]**

i) Instantaneous yield

ii) Overall yield

b) Derive the performance equation for Batch reactor. **[8]**

Q9) Derive and discuss Tank in series model and Dispersion model. **[18]**

OR

Q10) Write short notes :

a) Segregation model **[5]**

b) Micro and Macro Mixing of fluids **[5]**

c) CSTR **[4]**

d) PFR **[4]**

Total No. of Questions : 10]

SEAT No. :

P3332

[Total No. of Pages : 2

[5353]-207
T.E. (Chemical) (End Semester)
TRANSPORT PHENOMENA
(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.***
4) ***Use of logarithmic tables slide rule Mollier charts electronic pocket calculator and steam tables is allowed.***

Q1) Derive the expression of momentum flux and velocity distribution for laminar flow of a liquid in a narrow slit formed by two vertical parallel walls separated by distance 2B. **[10]**

OR

Q2) Derive the expression of heat flux and temperature distribution for electrical heat source. **[10]**

Q3) A viscous fluid is flowing through the horizontal capillary tube. Find radius of capillary from following data : **[10]**

Length of capillary = 50.02 cm

Kinematic viscosity of fluid = 4.03×10^{-5} m^2/s

Density of fluid = 955.2 kg/m^3

Pressure drop across capillary tube = 4.829×10^5 N/m^2

Mass flow rate through tube = 2.997×10^{-3} kg/s

OR

Q4) a) Explain procedure to solve mass transfer problems. **[5]**

b) Explain Fourier's law of heat conduction and boundary conditions to solve heat transfer problems. **[5]**

P.T.O.

Q5) Derive Euler's equation of motion. **[18]**

OR

Q6) a) Derive continuity equation. **[12]**

b) Explain different types of derivatives used in equation of change. **[6]**

Q7) Derive Ergun equation for flow of fluid through packed bed. Explain its significance. **[16]**

OR

Q8) a) What pressure drop is needed for pumping water at 20 °C through a pipe of 25 cm diameter and 1234 m length at a rate of 1.97 m^3/s. The pipe is at the same elevation throughout and contains four standard radius 90° elbows and two 45° elbows. The resistance of a standard radius 90° elbows is roughly equivalent to that offered by a pipe whose length is 32 diameters, a 45° elbow, 15 diameters. Data: f = 0.0020 for hydrodynamically smooth pipe. **[8]**

b) Differentiate between flow in tubes and flow around spheres. **[8]**

Q9) a) Explain correlation of binary transfer coefficient in one phase. **[8]**

b) Explain Reynold's analogy. **[8]**

OR

Q10)a) Explain Chilton-Colburn analogy. **[8]**

b) Explain Martinnelli's analogy. **[8]**

Total No. of Questions : 10]

SEAT No. :

P3333

[Total No. of Pages : 3

[5353]-208
T.E. (Chemical Engineering) (End Semester)
CHEMICAL ENGINEERING DESIGN - I
(2012 Pattern)

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) A storage tank of diameter 20 m and height 12 m is to be constructed. The plates of size 6300 mm × 1800 mm in varying thickness are available for fabrication. Density of liquid to be stored is l000kg/m^3. Material of construction is carbon steel having permissible stress of 165 N/mm^2. Weld joint efficiency is 85% and corrosion allowance is 1.5 mm. Calculate total numbers of courses required and thickness of each course. **[6]**

b) Define wind girders with all required design calculations. **[4]**

OR

Q2) A tall vertical vessel 1.7 m in diameter and 15 m in high is to be provided with skirt supports. Weight of the vessel with all its attachments is 80,000 kg. Diameter of skirt is equal to diameter of the vessel. Height of skirt is 2.4 m.Wind pressure acting over vessel is 100 kg/m^2 seismic coefficient = 0.08, permissible tensile stress of skirt material = 960 kg/cm^2, permissible compressive stress is 1/3 of yield stress of material. Yield stress is 2400 kg/cm^2. Estimate the thickness of the skirt support. **[10]**

Q3) 1.2 kg/sec of an organic liquid is to be cooled from 45°C to 20°C. The organic liquid is cooled by chilled water supplied from a refrigeration unit at a temperature of 5 °C and can be heated upto 10 °C. Use tubes of 12 mmID and 2 mm wall thickness. Length of tubes is 1.5 m. Properties of organic liquid and water are: **[10]**

Properties	Organic liquid	Water
Specific heat, J/Kg K	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

P.T.O.

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.

OR

Q4) a) Discuss briefly on shell and tube side heat transfer coefficients in a shell and tube heat exchanger. **[4]**

b) What is temperature correction factor? How is it calculated? Why is it used in design of heat exchanger? **[6]**

Q5) a) In case of reboilers how the heat transfer coefficient is calculated for Pool boiling. Explain all the equations involved in the calculations. **[8]**

b) Explain the design methods for mixed vapor condensers and how the true temperature difference is evaluated in such cases? **[8]**

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 °C.

Data: Specific heat of feed = 4000 J/kg °C, Specific heat of product 3260 J/kg °C, Feed temperature = 18°C, BPR = 30°C, Density of boiling liquid = 1390 kg/ m^3. The liquid level in the evaporator is 1200 mm above the heating surface. **[8]**

b) Explain various methods of feeding for multiple effect evaporators. **[8]**

Q7) a) Toluene is continuously nitrated to mono-nitrotoluene in a cast iron vessel, 1 m diameter, fitted with a propeller agitator 0.3 m diameter, rotating at 2.5 Hz. The temperature is maintained at 310 K by circulating 0.5kg/sec cooling water through a stainless steel coil 25 mm OD and 22 mm ID, wound in form of a helix, 0.8m in diameter. The reacting material is having the same physical properties as 75% sulphuric acid. If the mean water temperature is 290 K, what is the overall heat transfer coefficient for desired heat transfer?

Properties:

Water- Thermal conductivity = 0.59 W/m K, Cp = 4180 J/kg K, viscosity = 1 .08 mN s/m^2, density = 998 kg/m^3

75% sulphuric acid- Thermal conductivity = 0.40 W/m K, Cp = 1880 J/kg K, viscosity = 6.5 mN s/m^2, density = 1666 kg/m^3, Viscosity at the surface = 8.6 mN s/m^2

Thermal conductivity of stainless steel is 15.9 W/m K, Dirt resistance at inside and outside surfaces are 0.0002 and 0.0004 m^2 K/W respectively. **[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) Discuss the power requirements calculation for agitation systems. **[8]**

Q9) a) Design a horizontal separator to separate 10,000 kg/h of liquid, density 962.0 kg/m^3, from 12,500 kg/h of vapor, density 23.6 kg/m^3. The vessel operating pressure will be 21 bars. **[8]**

b) Write about knockout drum, role of demister pad and reflux drum. **[8]**

OR

Q10)a) Explain the importance of column auxiliaries. **[6]**

b) Design a decanter to separate light oil from water. The oil is the dispersed phase. Oil flow rate is 1000 kg/h, density of oil is 900 kg/m^3 and viscosity of oil is 3 mNs/m^2. Water flow rate is 5000 kg/h, density of water is 1000 kg/m^3 and viscosity of water is 1 mN s/m^2. **[10]**

Total No. of Questions : 10]

SEAT No. :

P3334

[Total No. of Pages : 3

[5353]-209
T.E. (Chemical)
MASS TRANSFER - II (309351)
(2012 Pattern)

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) A 100 kmol of mixture containing 40% by mole of A (more volatile) and 60% by mole of B is flash distilled till the 35% of the feed is vaporized. Find the composition of the distillate and residue. Average relative volatility is 2.5. **[6]**

b) Explain extractive distillation. **[4]**

OR

Q2) a) A feed containing 50 mole% benzene and 50 mole% toluene is fractionated in a plate column to give a distillate containing 90 mole% benzene and a bottom product containing 90 mole% toluene. Feed to the column is 10,000 kg/day and is at its bubble point. The operating reflux ratio is 1.5 times the minimum. Overall plate efficiency is 75%. Determine the number of actual plates required and location of feed plate in the real column. Average value of relative volatility is 2.28. **[8]**

b) What is optimum reflux ratio? **[2]**

Q3) a) A mixture of 45 mole% A and 55 mole% B is to be fractionated to give a distillate containing 95% A and a bottom product containing 90% B. The feed is saturated vapour. A reflux ratio of 4 is used and the relative volatility is 2.2. Find the number of theoretical stages. **[7]**

b) What are the different conditions of feed to a distillation column? **[3]**

OR

Q4) a) A solution of nicotine in water containing 1.5% nicotine is to be extracted with kerosene at 293K. Water and kerosene are essentially immiscible. Equilibrium relation: Y = 0.9X, where Y = kg nicotine/kg kerosene, X = kg nicotine/kg water. **[6]**

P.T.O.

Determine the % extraction of nicotine if 100 kg of feed is to be extracted with

i) 150 kg of solvent in one stage

ii) 50 kg of solvent each in three crosscurrent stages.

b) Draw a binodal curve and explain it. **[4]**

Q5) a) Soyabean seeds containing 22% by weight of oil are to be extracted in a countercurrent plant and 85% of the oil is extracted as 45% solution in solvent. Fresh solvent is fed to the system and with every 2 kg insoluble solid 1 kg solution is removed. Find the number of equilibrium stages required and the amount of solvent required. **[10]**

b) Explain the functioning of a horizontal extractor. **[6]**

OR

Q6) a) Explain the triangular diagram in leaching and show the extract and raffinate curves. **[8]**

b) Write the material balance equations for batch single stage leaching process. **[8]**

Q7) a) Equilibrium water adsorbed by an adsorbent in contact with moist air is given by Y = 0.04 X, where Y = kg water / kg dry air and X = kg water adsorbed / kg silica gel. 0.5 kg adsorbent containing 5% moisture on dry basis is placed in a collapsible vessel in which there is 5 m^3 of moist air. The partial pressure of water vapour is 15 mmHg. The total pressure and temperature are 760 mmHg and 298 K respectively. Calculate the quantity of water adsorbed. **[8]**

b) Explain breakthough curve. **[8]**

OR

Q8) a) a solution is to be decolorized by treatment with an adsorptive carbon. The original solution has a color concentration of 9.6 measured on an arbitrary scale and it is desired to reduce color to 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) Explain the process of ion exchange with applications. **[6]**

Q9) a) Explain Mier's supersaturation theory. **[8]**

b) A batch of 500 kg of KC1 is dissolved in water to make a saturated solution at 350 K when the solubility is 30% by weight of KCI in water. The solution is cooled to 293 K when the solubility is 25.4% by weight. Determine the quantity of crystals obtained if 3.5% of the original water is lost by evaporation. Also determine the capacity of the vessel if the density of feed is 1200 kg/m^3 and the volume of the vessel is 1.2 times the volume of the solution. **[6]**

c) Explain molecular weight cut-off in membranes. **[4]**

OR

Q10)a) Explain the working of Oslo crystallizer. **[8]**

b) What are composite membranes? What are the different types of membrane modules? **[10]**

Total No. of Questions : 10]

SEAT No. :

P3335

[Total No. of Pages : 2

[5353]-210
T.E. (Chemical) (End Semester)
PROCESS INSTRUMENTATION & CONTROL
(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) ***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 importance of Instrumentation in the process industries. **[6]**

b) Explain functional elements of instruments. **[4]**

OR

Q2) a) Explain static and dynamic characteristics of measuring instruments. **[7]**

b) Difference between analog and digital Instruments. **[3]**

Q3) a) Explain with diagram, construction and working diaphragm. **[5]**

b) Describe working of LVDT. **[5]**

OR

Q4) Write short notes on : **[10]**

a) Thermister

b) RTD

Q5) a) Explain the principle, construction and working of orifice meter. **[10]**

b) Explain construction and working of Rotameter. **[6]**

OR

Q6) a) Explain classification of level measuring instruments. **[10]**

b) Explain with diagram sight Glass method. **[6]**

P.T.O.

Q7) Write short notes on : **[16]**

a) HPLC

b) Refractometry

OR

Q8) a) Explain principle, construction and working of Gas chromatography. **[10]**

b) Explain pH meter in detail. **[6]**

Q9) a) Give classification of process variable with respect to process control. **[8]**

b) With the help of block diagram explain working of feed back control system. **[10]**

OR

Q10)a) Derive transfer function of mercury thermometer and obtain time domain equation for the process if input is given a step change. **[12]**

b) Explain Servo and regulatory problem. **[06]**