Total No. of Questions : 12]

SEAT No. :

P2378

[Total No. of Pages :5

[5153]-1

T.E. (Civil)

STRUCTURAL ANALYSIS - II

(2008 Course) (Semester - I)

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

Instructions to the candidates:

1) ***Answers to the two Sections should be written in separate books.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of electronic pocket calculator is allowed.***
5) ***Assume suitable data, if necessary.***
6) ***Attempt Q. 1 or Q.2, Q.3 or Q. 4, Q.5 or Q.6 from Section - I and Q.7 or Q.8, Q.9 or Q.10, Q.11or Q.12 from Section - II.***

SECTION - I

Q1) a) Using Slope Deflection method, determine the support moments and hence Plot the BMD on tension side for the beam ABC if beam is loaded and Supported as narrated below.

Support A is fixed and support B and C are vertical roller.

Span AB = 3m, Span BC = 6m. Downward udl on span AB = 50 kN/m, Downward Concentrated load of 100 kN at the centre of span BC. EI = constant for span AB and BC. **[10]**

b) Analyze the continuous beam loaded and supported as shown in figure 1 (b) by slope - deflection method. The relative moment of Inertia values of all spans are indicated on the beam. Draw bending moment diagram.**[8]**

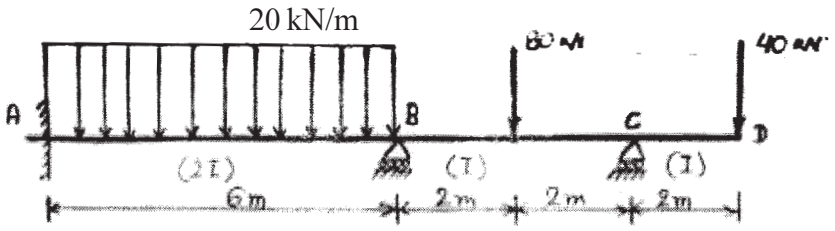


Fig. 1(b)

OR

P.T.O.

Q2) a) A continuous beam ABC consist of span AB=3m & BC = 4m, The ends A & C being fixed. AB & BC carry udl of intensity 4kN/m & 5kN/m. Respectively. Find support moments & draw BMD for the beam. The beam is of Uniform section throughout. By using slope deflection method. **[9]**

b) Analyze the continuous beam as shown in fig. by slope deflection method and draw SFD and BMD Refer Fig. 2 (b). **[9]**

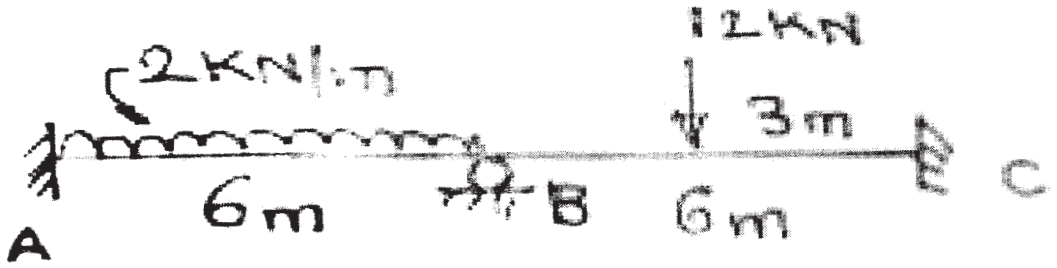


Fig. 2 (b)

Q3) a) Analyse the beam shown in Fig. 2 (b) by Moment Distribution Method. Draw BMD and SFD. **[8]**

b) Analyse the frame shown in Fig. 3 (b) by MDM. Draw BMD. **[8]**

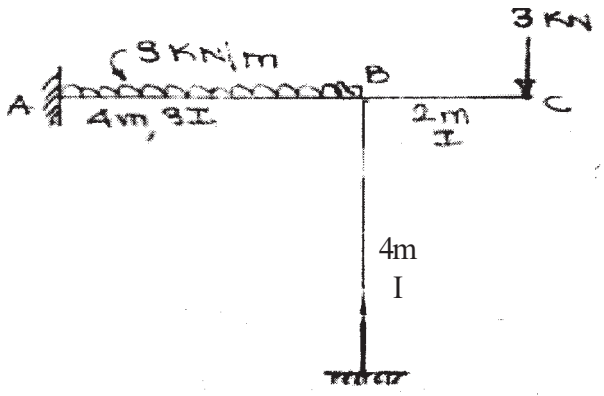


Fig. 3(b)

OR

Q4) a) Draw BMD for the beam shown in fig. 4 (a) by using Moment Distribution Method. **[8]**

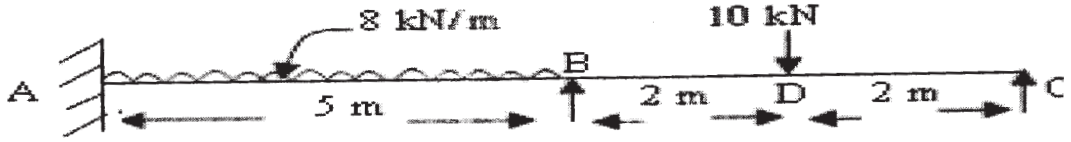


Fig. 4(a)

b) Analyze the frame shown in Fig. 4 (b) by MDM. Draw BMD. **[8]**

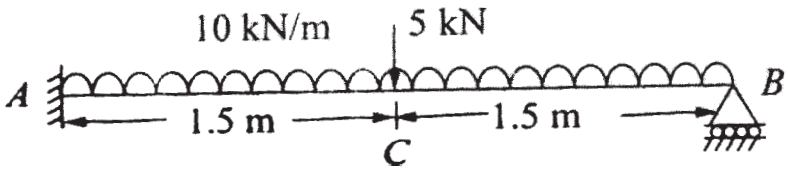


Fig. 4 (b)

Q5) a) A three hinge circular arch hinged at springing and crown point has a span of 30m and a central rise of 8m. It carries uniformly distributed load of 20KN/m over the left half of the span with a concentrated load of 150 KN at right quarter span point. Find the reactions at supports, normal thrust and shear at a section 5m from the left support. **[8]**

b) A two hinged parabolic arch of span 'L' and rise 'h' carries a concentrated Load 'W' at the crown. Determine the expression for horizontal thrust Developed at springing. **[8]**

OR

Q6) a) Plot BMD for three hinged parabolic arch, hinged at crown and at the Springing level. Arch has horizontal span, 30m, central rise, 5m and carries udl, 50 kN/m over the left half span. **[8]**

b) A two hinged parabolic arch of span 20 m, rise 4m and carries the udl of 50 kN/m over the length of 5m from left support A. Determine the horizontal thrust. **[8]**

SECTION - II

Q7) a) Using Flexibility Matrix Method, determine the reactions for the continuous beam ABC subjected to downward point load, 50kN at the center of span AB and clockwise moment, 100kN-m at the center of span BC. Span AB=half of Span BC = 6m. Assume constant EI for ABC. **[12]**

b) Explain concept of Flexibility matrix. **[4]**

OR

Q8) a) Analyze the beam as shown in fig. 8 (a) by Flexibility Matrix Method. Draw B.M.D. Take EI = constant. **[8]**

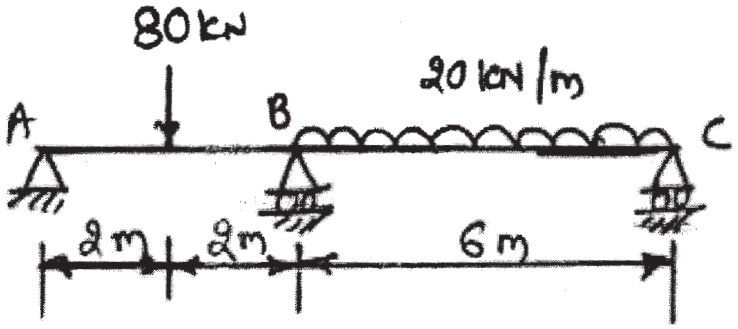


Fig. 8(a)

b) A Propped cantilever beam of span 6m is subjected to udl 100 kN/m over full Span using Flexibility Matrix Method, Analysis the beam and plot SFD & BMD. **[8]**

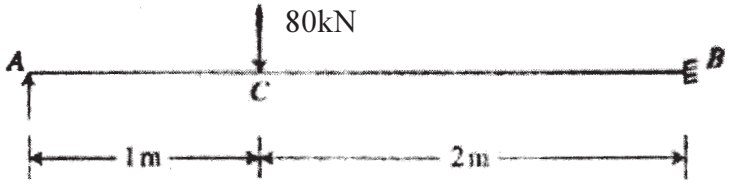
Q9) a) List out the property of stiffness matrix method. **[4]**

b) A continuous beam ABCD, fix at A and D and continuous over support B and C. Span AB = BC = CD = 4 meter each span is subjected to UDL of 15 KN/m, 20KN/m 4 KN/m respectively. Analyze the beam by Stiffness Matrix method and draw SFD and BMD. **[12]**

OR

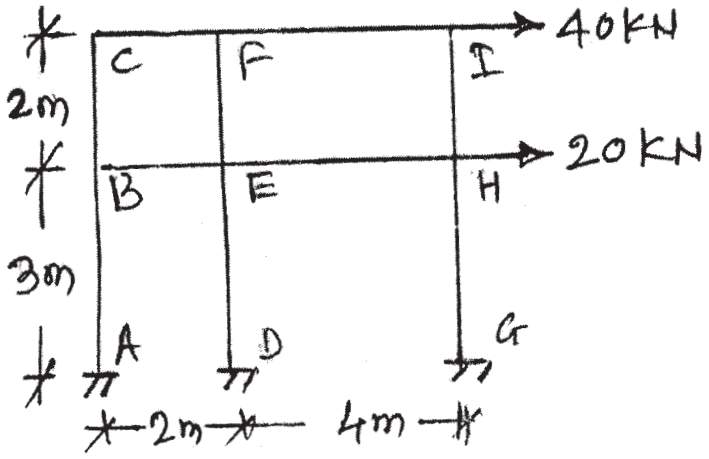
Q10)a) Analyze the beam as shown in fig. 8(a) by Stiffness method. Draw B.M.D. Take EI = constant. **[8]**

b) Using stiffness matrix method find the end moments at A and B for the given beam. **[8]**



Q11)a) A beam supported at both ends having span 8m. The beam carries Uniformly distributed load of 10KN/m over its entire span. Determine the central deflection in terms of its EI. Use finite difference method. Use Five nodes. **[6]**

b) A rigid jointed 2 bay - 2 story frames is shown in the fig 11 (b). Using Cantilever method, determine support reactions and moments. Area of Column. ABC = A and Area of column DEF & GHI = 2A. **[12]**



OR

Q12)a) The beam is supported and loaded an shown in fig. Q.12 (a). Determine the Deflection in terms of its EI under the load. Use finite difference method. Use five nodes. **[6]**

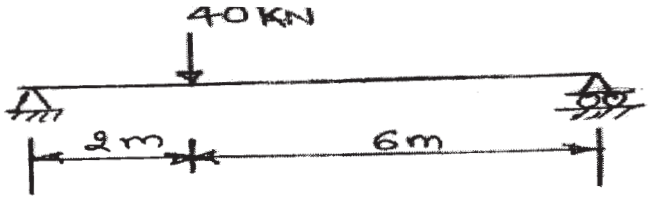


Fig 12(a)

b) Determine the approximate values of moment, shear, and axial force in each Member of frame loaded and supported as shown in fig. Q. 12 (b). Draw B.M.D. Use portal method. **[12]**

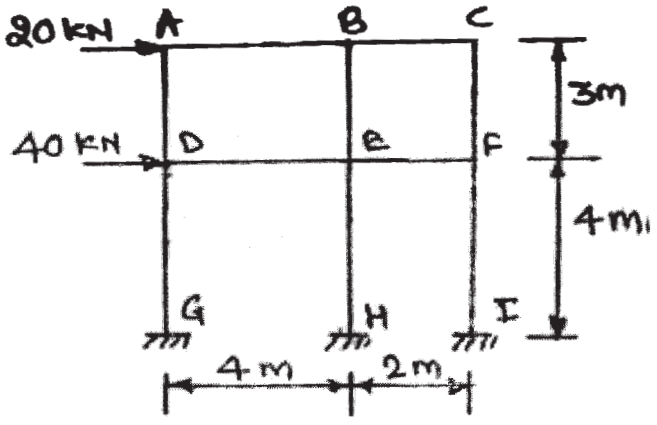


Fig 12(b)

Total No. of Questions : 12]

SEAT No. :

P2379

[Total No. of Pages : 4

[5153]-2
T.E. (Civil)
INFRASTRUCTURE ENGINEERING AND CONSTRUCTION TECHNIQUES
(2008 Course) (Semester - I)

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

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, and Q.5 or Q.6 from Section - I Q.7 or Q.8, Q.9 or Q.10 and Q.11 or Q.12 from Section - II.***
2) ***Answer to the two Sections should be written in separate books.***
3) ***Figures to the right indicate full marks.***
4) ***Use of logarithmic tables, slide rule, Mollies charts, electronics pocket calculator and steam table is allowed.***
5) ***Assume suitable data if necessary.***
6) ***Neat diagrams must be drawn wherever necessary.***

SECTION - I

Q1) a) What are the political, social and economical advantages of railways. **[6]**

b) Define rail. State the various functions of rails. **[4]**

c) Draw a typical cross section of a permanent way. Discuss in brief the basic functions of various components. **[6]**

OR

Q2) a) Define sleeper density. Using sleeper density of M+5, find out the number of sleepers required for constructing a B.G. railway track of 640 meter length. **[6]**

b) Define ballast. Why ballast is provided under railway track. **[4]**

c) What are main functions of Formation? Suggest remedial measures for failure of foundation. **[6]**

P.T.O.

Q3) a) What do you understand by Grade compensation on Curves? What would be the actual gradient for BG line on a curve of 3° with ruling gradient of 1 in 250. **[6]**

b) Define gradient. How it is expressed? State and explain various types of gradients. **[6]**

c) Write a short note on Modernisation of Indian railways. **[4]**

OR

Q4) a) What would be the equilibrium cant on a MG curved track of 7° for an average speed of trains 50 Kmph? Also calculate the maximum permissibel speed after allowing the maximum cant deficiency. (Cant deficiency for MG = 5.0 cm) **[6]**

b) Draw a neat line diagram of right hand turnout and show its various components. **[6]**

c) Write a short note on Metro Rail and Monorail. **[4]**

Q5) a) Define Port. Mention the factors which play a great role in site selection for Port. Name any two prominent ports in India. **[6]**

b) Discuss in brief the following methods of tunnelling in Hard Rock: **[6]**

i) Heading and Bench Method and

ii) Drift Method

c) Write a short note on Tunnel Ventilation and Tunnel Drainage. **[6]**

OR

Q6) a) Explain in brief California crossing method and Cherry Picker method. **[6]**

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

i) Wharves

ii) Dry dock

iii) Wet Dock

iv) Buoys

c) State and explain advantages of Tunnels over Open Cut. **[6]**

SECTION - II

Q7) a) Explain in brief the role of construction sector in the economic development of a country. **[4]**

b) Explain in brief the following: **[8]**

i) Heavy Engineering construction

ii) Industrial Construction

c) Draw a neat labelled sketch of a static tower crane. **[4]**

OR

Q8) a) What do you mean by hoisting operation? State various types of hoist. Explain any one in brief. **[6]**

b) State the classification of cranes. Explain with a neat sketch derrick crane. **[6]**

c) What factors are considered while selecting any crane? **[4]**

Q9) a) Distinguish between Rope operated Shovel and Hydraulically operated shovel. **[6]**

b) What points you will considered while selecting any equipment for civil engineering project. **[4]**

c) How will you differentiate the working operation of Power shovel & Backhoe. Also mention the use of power shovel and back hoe. **[6]**

OR

Q10)a) State the advantages and disadvantages of Crawler Tractor. **[8]**

b) Enumerate the various components of the Owning cost and Operating cost. **[8]**

Q11)a) Meniton the various methods of underwater concreting. Explain any one method in brief.Also draw a neat sketch. **[8]**

b) Explain with the sketch the layout for production of crushed sand? **[6]**

c) Write a short note on types of Barges. **[4]**

OR

Q12)a) Highlight the importance of dewatering while construction of foundation. Explain any one method in brief. **[8]**

b) Write a short note on Concrete pumps. **[6]**

c) Draw schematic layout of Aggregate processing Plant. **[4]**

Total No. of Questions : 8]

SEAT No. :

P2380

[Total No. of Pages :3

[5153]-3
T.E. (Civil)
STRUCTURAL DESIGN - I
(2008 Course) (Semester - I)

Time : 4 Hours] *[Max. Marks :100*

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

SECTION - I

Q1) a) State and explain type of steel structures with neat sketches. **[5]**

b) State and explain classification of cross section with bending stress diagram and classify **[10]**

i) ISHB 200 @ 37.3 kg/m

ii) ISMC 300 @ 35.8 kg/m.

c) Determine design tensile strength of 2-ISA 90×90×12 mm connected back to back to the gusset plate of thickness 12 mm by 5 number of M20 black bolts of 4.6 grade. **[10]**

OR

Q2) a) Differentiate between bolted and welded connection. **[5]**

b) State and explain the advantages of high strength bolts. **[5]**

c) Design a double angle section to carry a tension of 310 kN. The end connection is to be made by using M20 bolts of class 4.6. Assuming the angles is provided on both side of gusset plate. Draw the design details. **[15]**

P.T.O.

Q3) a) A strut 3.8 m long consist of 2-ISA 100×100×8 mm connected to each side of 12 mm thick gusset plate by fillet weld. Calculate design strength of the member. **[10]**

b) Design a built up column 8 m long to carry a factored axial load of 1800 kN. The column is restrained in position but not in direction at both the ends. Design a column by using two channels face to face and single lacing with bolted connections. **[15]**

OR

Q4) Design a gusseted base for a built up column ISHB 350 @ 67.8 kg/m with two plates 450×22 mm carrying an axial factored load of 3000 kN. The column is supported on concrete pedestal of M20 grade. Draw the design sketches. **[25]**

SECTION - II

Q5) a) Design a laterally supported beam of effective span 6 m for the following data: **[10]**

Maximum BM, M = 150 kNm and Maximum SF, V = 210 kN.

b) A column having an effective length of 3.5 m is subjected to factored axial load of 450 kN and factored bending moment of 50 kNm. Design the Column section and check for section strength only. **[15]**

OR

Q6) a) Calculate the magnitude of uniformly distributed load on a laterally unsupported beam ISLB 400 @ 558.2 kg/m for an effective length of 4 m. **[10]**

b) Explain with neat sketches Laterally supported beam, Laterally unsupported beam, web buckling and web crippling failure. **[15]**

Q7) A truss shown in Fig. 7 is used for an industrial building covered with AC sheet located at Pune. Calculate the panel point dead, live and wind load. Also design the members L_0L_1, U_1L_1 and L_0U_1, assuming spacing of trusses 3m, $k_1 = 1$, $k_2 = 0.98$, $k_3 = 1$, d (Cpe – Cpi) = $\pm$ 0.8. Draw the design sketches. **[25]**

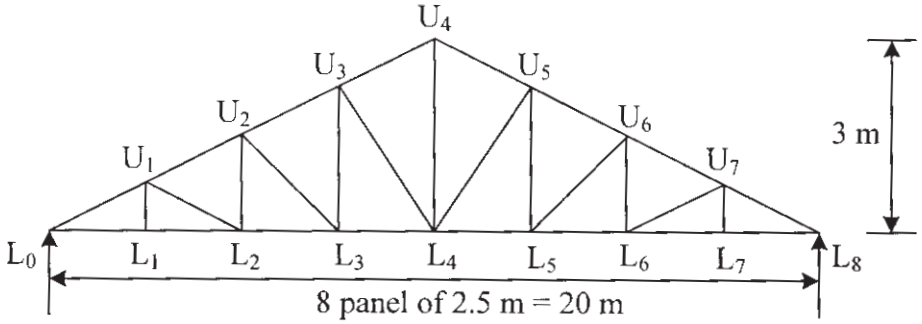


Fig. 7

OR

Q8) A simply supported welded plate girder of an effective span of 24 m subjected to uniformly distributed load 35 kN/m throughout the span excluding the self weight of plate girder. Assume compression flange laterally supported throughout the span. Design cross section of plate girder, stiffeners and connections. Draw sectional plan and elevation. **[25]**

Total No. of Questions : 12]

SEAT No. :

P2381

[Total No. of Pages :4

[5153]-4
T.E.(Civil)
FLUID MECHANICS-II
(2008 Pattern) (301004) (Semester-I)

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

Instructions to the candidates:

1) ***Answer Section-I: Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6.***
2) ***Answer Section-II: Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.***
3) ***Answers to the two sections should be written in separate answer books.***
4) ***Neat diagrams must be drawn wherever necessary.***
5) ***Figures to the right indicate full marks.***
6) ***Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
7) ***Assume suitable data, if necessary.***

SECTION-I

Q1) a) Explain with neat sketches: **[8]**
   i) Total Drag
   ii) Profile Drag
   iii) Skin Friction Drag
   iv) Form Drag.

b) In a pressure penstock 4550 m long water is flowing at 4 m/s. If the velocity of the pressure wave travelling in the pipe due to sudden complete closure of a valve at the downstream end is given as 1505 m/s, Find:
   i) The maximum pressure rise
   ii) The period of Oscillation. **[6]**

c) Explain the water hammer phenomenon with respect to the gradual closure of valve in elastic pipes. **[4]**

OR

Q2) a) On a flat plate of 2.1 m length and 1.05 m width, experiments were conducted in a wind tunnel with a wind speed of 48.5 km/h. The plate is kept at such an angle that co-efficient of drag and lift is 0.18 and 0.9 respectively. Determine Lift, Drag resultant force and power exerted by air on the plate. **[8]**

b) Describe in brief: **[8]**
   i) Types of Unsteady Flow
   ii) Fluid Compressibility.

c) Explain the term " Karman Vortex Trail". **[2]**

P.T.O.

Q3) a) Derive the expression for the work done per second by the jet on the inclined plate moving in the direction of the jet. **[8]**

b) A centrifugal pump is to discharge 0.116 m^3/s at a speed of 1455 r.p.m. against head of 26 m. The impeller diameter is 240mm, its width at outlet is 60 mm and manometric efficiency is 75%. Determine the vane angle at the outer periphery of the impeller. **[8]**

OR

Q4) a) A jet of water of diameter 80mm moving with velocity of 32 m/s, strikes a curved fixed plate tangentially at one end at an angle of 30^o to the horizontal. The jet leaves the plate at an angle of 20^o to the horizontal. Find the force exerted by the jet on the plate in the horizontal and vertical direction. **[8]**

b) Draw the neat sketch of centrifugal pump showing its component parts and explain its working also. **[8]**

Q5) a) A Pelton wheel is to be designed for the following specifications:

i) Power (brake or shaft) = 9570kW

ii) Head = 355 meters

iii) Speed = 740 r.p.m.

iv) Overall efficiency = 80%

v) Jet diameter = not to exceed 1/6th of the wheel diameter.

Determine the following:

1) The wheel diameter

2) Diameter of the jet, and

3) The number of jets required. **[8]**

b) A turbine is to operate under head of 27m at 210 r.p.m. The discharge is 9.5 m^3/s. If the efficiency is 90 percent determine the performance of turbine under a head of 21m. **[8]**

OR

Q6) a) Discuss the advantages and disadvantages of a Francis turbine over a Pelton wheel turbine. **[8]**

b) Derive the following expression for specific speed of a turbine with usual notations $N_S = \frac{N\sqrt{P}}{H^{5/4}}$ **[8]**

SECTION-II

Q7) a) Explain:

i) Classification of Channels

ii) Types of Channel Flows. **[8]**

b) A trapezoidal channel has side slopes of 3 horizontal to 4 vertical and slope of its bed is 1 in 1900. Determine the optimum dimensions of the channel, if it is to carry water at 0.55 m^3/s. Take Chezy's constant as 80. **[8]**

OR

Q8) a) A flow of water of 105 liters per second flows down in a rectangular flume of width 610mm and having adjustable bottom slope. If Chezy's constant C is 56, find the bottom slope necessary for uniform flow with a depth of flow of 295 mm. Also find the conveyance K of the flume. **[8]**

b) Derive the conditions for most efficient trapezoidal channel section. **[8]**

Q9) a) Explain:

i) Specific Force Diagram

ii) Specific Energy Curve. **[8]**

b) Derive the following expression for loss of energy due to hydraulic jump.

$$E_L = \frac{(y_2 - y_1)^3}{4y_1y_2}$$ **[8]**

OR

Q10)a) A 8.5 m wide rectangular channel conveys 15.50 m^3/s of water at a depth of 1.25m. Calculate:

i) Specific energy of the flowing water

ii) Critical depth, critical velocity and minimum specific energy

iii) Froude number and state whether the flow is subcritical or supercritical. **[8]**

b) Explain:

i) Classification of hydraulic jump

ii) Practical uses of hydraulic jump. **[8]**

Q11)a) Derive the following equation of the Gradually Varied Flow (G.V.F.). Also, State assumptions made for it. **[10]**

$$\frac{dy}{dx} = \frac{(s_o - s_f)}{\left[1 - (F_r)^2\right]}$$

b) Enlist the various methods of G.V.F. Computations. Explain any one method in detail. **[8]**

OR

Q12)a) Discuss in detail with neat sketches: **[12]**

i) Classification of channel bed slopes

ii) Various G.V.F. profiles

iii) Rapidly varied flow.

b) Find the slope of the free water surface in a rectangular channel of width 20.5 m, having depth of flow 5.1m. The discharge through the channel is 51 m^3/s. The bed of the channel is having a slope of 1 in 4100. Take the value of Chezy's constant C=65. **[6]**

Total No. of Questions : 12]

SEAT No. :

P2382

[Total No. of Pages : 4

[5153]-5
T.E. (Civil)
ADVANCED SURVEYING
(2008 Pattern) (Semester - I)

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

Instructions to the candidates:

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

SECTION-I

Q1) a) What are the different types of errors in GPS observations and explain anyone of them. **[5]**

b) Explain with neat sketches working of GPS in association with space, control and user segment. **[8]**

c) Define Geodetic Surveying. What factors are to be considered while selecting a triangulation station? **[5]**

OR

Q2) a) What is GPS? State and explain various components of GPS. **[5]**

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

c) Elevations of two triangulation stations A and B, 110 Km apart are 113 m and 432 m respectively. A peak C, 85 km from station A, has an elevation of 220.50m. A is a ground station. Ascertain if it is visible from B or not. Also find the minimum height of scaffolding at B, so that the line of sight has a minimum 2.5 m clearance anywhere. **[8]**

P.T.O.

Q3) a) The angles from triangle ABC were recorded as follows. Calculate the corrected values of angles. Use method of Correlates **[8]**

A=77°14'22" Weight-2

B=49°36'21" Weight-3

C=53°09'53" Weight-4

b) Explain step by step the procedure of adjustment of the observed spherical angle of the triangle. **[8]**

OR

Q4) a) Find the most probable values of the angles A and B from the following observations:

A=70°40'45"with weight 1;

B=62°51'27"with weight 2;

A+B=133°32'34"with weight 3;

Use method of correction. **[8]**

b) Define the term any four **[8]**

i) MPV
ii) True Value
iii) Residual error
iv) Wight of an observation
v) Independent quantity.

Q5) a) Explain with neat sketch how the alignment of tunnel is transferred from surface to the underground. **[5]**

b) Write short note on Curvature correction. **[5]**

c) The following reciprocal observations were made from points A and B **[6]**

Horizontal distance between A and B=6000 m

Angle of Elevation of B at A=1°07'02"

Angle of depression of A at B=1°00'05"

Height of instrument at A=1.40 m

Height of instrument at B=1.55 m

Height of signal at A=7.00 m

Height of signal at B=6.50 m

Find the difference of level between A and B. Take R sin 1"=30.88m.

OR

Q6) a) Derive the equation for determination of difference in elevation between two points for angle of elevation. **[5]**

b) The following observations were taken in a trigonometric levelling survey. Angle of depression to P at Q=1°42'22" Height of instrument at Q=1.18m Height of signal at P=4.22m Horizontal distance between P & Q=6945m coefficient of refraction=0.07 If the R.L. of Q is 345.32 m, calculate R.L. of P. **[6]**

c) Write short note on Axis signal correction. **[5]**

SECTION-II

Q7) a) Explain the principal of stereoscopy in details with sketch and give conditions for aerial Photography for stereoscopy. **[9]**

b) Define parallax of a point and describe the procedure of measuring parallax difference using a parallax bar. **[9]**

OR

Q8) a) A section line AB appears to be 15.10 cm on a photograph for which the focal length is 15 cm. the corresponding line measures 2.44 cm on a map which is to a scale 1:50000. The terrain has an avg. elevation of 320 m above Mean Sea Level. Calculate flying height of aircraft, above Mean Sea Level,when the photograph was taken. **[9]**

b) What are the various methods of determining scale of Vertical photograph? **[9]**

Q9) a) Write a note on **[8]**

i) Atmospheric windows.

ii) Active and Passive remote sensing.

b) Explain in detail applications and limitations of GIS. **[8]**

OR

Q10)a) Explain use of remote sensing in Civil Engg. Also Compare Arial photograph with satellite images. **[8]**

b) What is GIS? Explain in detail the component parts of GIS. **[8]**

Q11)a) Describe briefly how the soundings are located by Two Angles from the shore. **[5]**

b) What are the methods of locating Sounding? Explain anyone of them. **[5]**

c) What is mean by Sounding? Enumerate different instruments required for sounding and Explain Echo Sounding. **[6]**

OR

Q12)a) Define Hydrographic surveying and enlist various objectives of hydrographic surveying. **[5]**

b) When it is required to reduce the planimetric position of a sounding station by solving a three point problem. Enlist the method to solve a three point problem. Explain any one mechanical method. **[6]**

c) Define Tide and Enlist the different types of Tidal Gauges. **[5]**

❄ ❄ ❄

Total No. of Questions : 12]

SEAT No. :

P2383

[Total No. of Pages : 3

[5153]- 6
T.E. (Civil)
Hydrology and Water Resource Engineering
(2008 Pattern) (Semester - II) (301006)

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

Instructions to the candidates:

1) ***Answer 3 questions from each section.***
2) ***Numbers written on the right indicate full marks.***

SECTION - I

Q1) a) State various practical applications of hydrology **[6]**

b) State the factors governing site selection for rain guage station. **[6]**

c) Explain the different methods of determining the mean rainfall over a catchment. **[6]**

OR

Q2) a) Explain with a neat sketch weighing bucket type rainguage. **[6]**

b) What are the WMO recommendations for density of rainguage network. Based on this what are the recommendation by I.S.8389 –1983? **[6]**

c) Determine ϕ index from following data of storm of 8cm precipitation that resulted in direct runoff of 4.4 cm. **[6]**

Time (Hr)	1	2	3	4	5	6
Incremental rainfall per hours in cm	0.57	0.58	1.25	3.00	1.4	1.2

Q3) a) Explain factors affecting runoff **[8]**

b) Explain the dilution technique of stream guaging. **[8]**

OR

P.T.O.

Q4) Explain **[8]**

a) ISI standard pan Evaporimeter.

b) Field capacity and permanent wilting point. **[8]**

Q5) a) What is synthetic unit hydrograph? Why it is necessary. **[8]**

b) Explain any two methods of estimating peak flood discharge. **[8]**

OR

Q6) Develope the unit hydrograph for following data. **[16]**

Catchment area = 250 Km^2

Base flow = 10m^3/s

Time	0	6	12	18	24	30	36	42	48	54	60	66	72
ordinate of 6 Hr.cm^3/sec	10	110	260	210	160	110	80	60	45	35	25	15	10

SECTION - II

Q7) a) What are advantages and disadvantages of irrigation. **[6]**

b) What is Duty? How can it be improved. **[6]**

c) The following table shows the details of various crops grown in culturable area of 2000 hectares served by a field channel. Work out discharge? **[6]**

Sr	Crop	Intensity of Irrigation	Baseperiod (Days)	Kor depth(cm)
1	Wheat	40%	16	15
2	Jowar(Rabi)	50%	10	12

OR

Q8) a) Explain factors to be considered in determination of crop water requirement. **[6]**

b) Explain National water policy **[6]**

c) How crops are classified? State the principal Indian water crops and their seasons. **[6]**

Q9) a) State Dupits assumption. Derive expression for discharge from well through confined aquifer. **[8]**

b) What is water logging? Explain causes and effects of water logging? **[8]**

OR

Q10)a) Explain with a neat sketches Artesian well, free flowing well, confined and unconfined aquifer, & perched aquifer. **[8]**

b) Explain in detail 'Reservoir' sedimentation. **[8]**

Q11)a) Derive the expression for spacing of file drain. **[8]**

b) Write steps to estimate design discharge at head for design canal. **[8]**

OR

Q12)a) Explain lift irrigation scheme with various components. **[8]**

b) Explain in brief methods of application of water. **[8]**

Total No. of Questions :12]

SEAT No. :

P2384

[Total No. of Pages :4

[5153] - 7

T.E. (Civil)

PROJECT MANAGEMENT & ENGINEERING ECONOMICS

(2008 Pattern) (Semester - II)

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

Instructions to the candidates:

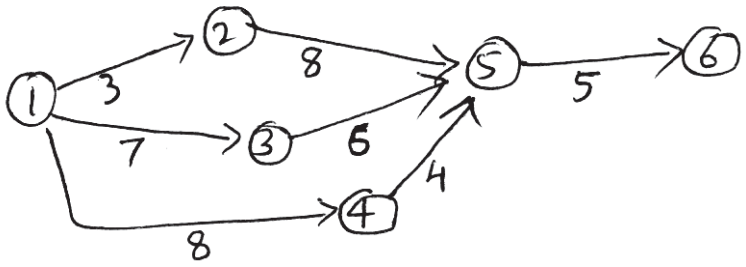
1) ***Answers to two sections should be written in separate answer books.***
2) ***Answer any three questions from each section.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right side indicate full marks.***
5) ***Assume suitable data, if necessary.***

SECTION-I

Q1) a) What are the functions of management? Explain any one. **[5]**

b) Define Dummy activity with the help of suitable example. **[5]**

c) Find out EST, LST, EFT, LFT and total project duration also highlight critical path of the network diag. given below. **[8]**



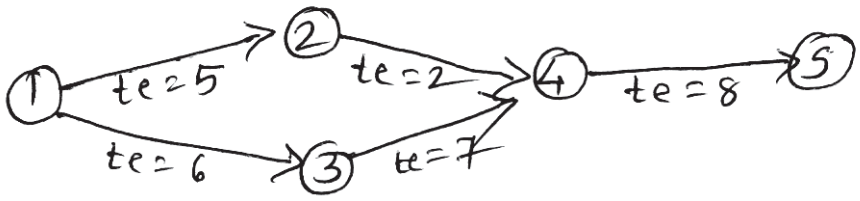
OR

Q2) a) Differentiate between AOA and AON networking methods. **[5]**

b) Define Gantt bar chart. Enlist its advantages and disadvantages. **[5]**

P.T.O.

c) Define optimistic, most probable and pessimistic time and find out total expected duration for the given network. **[8]**



Q3) a) What is the time cost relationship of an activity? Explain with sketch. **[4]**

b) Enlist step by step procedure of network crashing and findout cost slope of given activities. **[12]**

Activity	Normal time (Weeks)	Normal cost (Rs.)	Crash time (Weeks)	Crash cost (Rs.)
1-2	4	1,000	3	2,000
1-3	6	600	4	800
1-4	7	1,500	5	3,000
2-4	8	800	4	1,200
3-4	2	600	1	700
4-5	3	700	2	900

OR

Q4) a) What do you understand by crashing of network diag. **[4]**

b) Explain the methods of man power planning. **[4]**

c) Explain the importance of resource management for any project. **[4]**

d) Define cost slope with the help of suitable example. **[4]**

Q5) a) What are the functions of store keeper? **[4]**

b) Define Economic order quantity and derive expression for it. **[4]**

c) Define inventory and explain the costs associated with inventory problem. **[8]**

OR

Q6) a) Explain importance of break even analysis with help of sketch. **[4]**

b) List out step by step procedure to conduct ABC analysis. **[4]**

c) Seggregate the items as per their annal usage & draw ABC curve for the following data: **[8]**

Sr. No.	Item	Annual Usage (Rs.)
1	Steel	10,00,000
2	Cement	8,00,000
3	Sand	4,00,000
4	Oil	1,00,000
5	Water	50,000
6	Grease	30,000

SECTION-II

Q7) a) Write down safety precautions taken while working at high levels. **[4]**

b) Draw site layout of construction of multistoried building site. **[6]**

c) Explain importance of site layout in construction work. **[6]**

OR

Q8) a) Write a different PPE used on Tunnel construction site. **[4]**

b) Define IFR, ISR and injuri index with help of example. **[6]**

c) Draw site layout for construction of bridge over river. **[6]**

Q9) a) Explain demand and supply curve with suitable sketch. **[6]**

b) What do you understand by law of marginal diminishing utility? **[6]**

c) Explain importance of economics in construction. **[6]**

OR

Q10)a) What are the factors affecting on demand and supply? **[6]**

b) Define economics and discuss its applications in civil engineering. **[6]**

c) Explain law of substitution with suitable example. **[6]**

Q11)Write a short note on (any four): **[16]**

a) Capital & its type.

b) Annuity & its type.

c) IRR method.

d) NPV method.

e) Project appraisals.

OR

Q12)Write a short note on (any four): **[16]**

a) Present worth annuity.

b) Pay back period.

c) Cost benefit ratio.

d) ARR method.

e) Time value of money.

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Total No. of Questions : 8]

SEAT No. :

P2385

[Total No. of Pages : 6

[5153]-8
T.E.(Civil)
STRUCTURAL DESIGN - II
(2008 Course) (Semester -II)

Time : 4 Hours] *[Max. Marks : 100*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, and Q.3 or Q.4, in Seaction-I.***
2) ***Attempt Q.5 or Q.6 and Q.7 or Q.8 in Section-II.***
3) ***Answer to the two sections should be written in separate books.***
4) ***Figures to the right indicate full marks.***
5) ***Neat diagrams must be drawn wherever necessary.***
6) ***Use of Is 456-2000 and non programmable calculator is allowed.***
7) ***Mere reproduction from IS code as answer, will not be given full credit.***
8) ***Assume suitable data, if necessary.***

SECTION-I

Q1) a) i) Draw strain and stress distribution diagrams with all parameters for the design of RCC section of flexural member using LSM. **[4]**

ii) Explain the stress strain relationship for concrete according to the assumptions in limit state of collapse in flexure. **[4]**

b) A rectangular, singly reinforced beam, 300mm wide and 467mm effective depth is used as a simply supported beam over an effective span of 5. The reinforcement consists of 4 bars of 16mm diameter at tension face. Find the safe uniformly distributed load to its self weight. Use WSM with M25 concrete and Fe 415 steel. **[9]**

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

i) Width of rib = 230mm

ii) Effective flange width = 1400mm

iii) Thickness of flange = 140mm

iv) Effective depth = 467mm

v) Tension steel = 4 Nos. – #16 through plus + 2 Nos. –#16 curtail at midspan.

vi) Use M25 grade of concrete and Fe 500 grade of steel.

OR

P.T.O.

Q2) a) A rectangular beam section, 230mm wide and 500mm deep is reinforced with 4 bars of 20mm diameter in the tensile zone and 2 bars of 16mm in the compression zone. The clear cover is 25mm for both the reinforcement.
Determine moment of resistance of the section using WSM. Use M20 grade of concrete and Fe 415 grade of steel. **[8]**

b) A simply supported reinforced concrete beam has the following data:
i) Clear Span of beam = 5.2 m
ii) Width of supporting columns=230mm
iii) Beam section = 230×510mm
iv) Ultimate UDL on beam = 50kN/m, lnclusive of self weight
v) Reinforcement at top – 2 Nos of 10mm diameter bars
vi) Reinforcement at bottom – 2 Nos of 16mm diameter bars through + 2nos of 16mm diameter bars curtail. **[17]**

Design the shear reinforcement using vertical stirrups. Draw neat diagram showing zoning.
Material-Concrete of grade M25, All reinforcement-Fe500

Q3) Design the floor slab of a seminar hall of inside dimensions 8.77m × 15.77m. The thickness of the wall is 230mm. The centre to centre distance between the beams is 4m. Consider live load=4kN/m^2, Floor finish = 1.5kN/m^2.
Use M25 grade of concrete and Fe 500 grade of steel. Draw neat sketches showing details of main reinforcement. **[25]**

OR

Q4) Design the I and II flights dog legged staircase from plinth level to the first floor level for the following data: **[25]**
i) No of risers in I flight = 8
ii) No of risers in II flight = 10
iii) Floor to floor height = 3150mm
iv) Rise = 175mm; Tread = 250mm
v) Width of stair = 1200mm
vi) Live load = 4kN/m^2,
vii) Floor finish = 1.0 k/m^2

At plinth level, plinth beam is provided below first step, whereas at midlanding level and first floor level beam is provided at the outer face of landing.
Materials: M25 Grade of concrete, Fe 500 grade of reinforcement.
Show detailed load calculations. Draw the reinforcement details in sectional elevation for both flights.

SECTION-II

Q5) Continuous RC beam ABCD of rectangular section is simply supported at A and C and continuous over support B. Span AB = 4.0m, BC = 6.0m and CD = 5.0m. The beam carries dead load of 20 kN/m (including its self weight) and live load of 16 kN/m. The beam supports 120mm slab on both sides. Calculate design moments at support B and near mid span of BC after 20% redistribution of moments. Design the beam at these two locations only for flexure and draw the reinforcement details.

Material-Concrete of Grade M30, Fe 500 reinforcement.

[25]

OR

Q6) Design a continuous beam ABCD of span 9*m* for flexure and shear using IS Code method. AB=BC=CD=3.5m. The beam carries dead load of 16 kN/m (including its self-weight) and live load of 10 kN/m. Take material M30 and Fe 500. Show the reinforcement detail in longitudinal section and cross-section at continuous support and at mid span. **[25]**

Q7) a) Design an axially loaded rectangular short column to carry a working load of 900 kN. The unsupported length of column is 3.6 m. The column is held in position and not restrained against the rotation at both ends. Also design the footing for this column. Take SBC =200 kN/m^2.

Material M 25 and Fe 415 used. Show detailed load and design calculations and reinforcement details in plan and sectional elevation.**[20]**

b) State the functions of longitudinal and transverse reinforcement in columns. **[5]**

OR

Q8) Design a bi-axial short column by limit state method with material M25 and Fe 415 to carry a working load of 900 kN, working moment of 80 kN-m about major axis, bisecting the depth of column and 40 kN-m about minor axis, bisecting the width of column. The unsupported length of column is 3.6m. The column is fixed at one end and hinged at the other. Also design the footing for this column considering axial load and moment about major axis only. Take SBC = 250 kN/m^2. Show detailed design calculations and reinforcement details in plan and sectional elevation. **[25]**

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

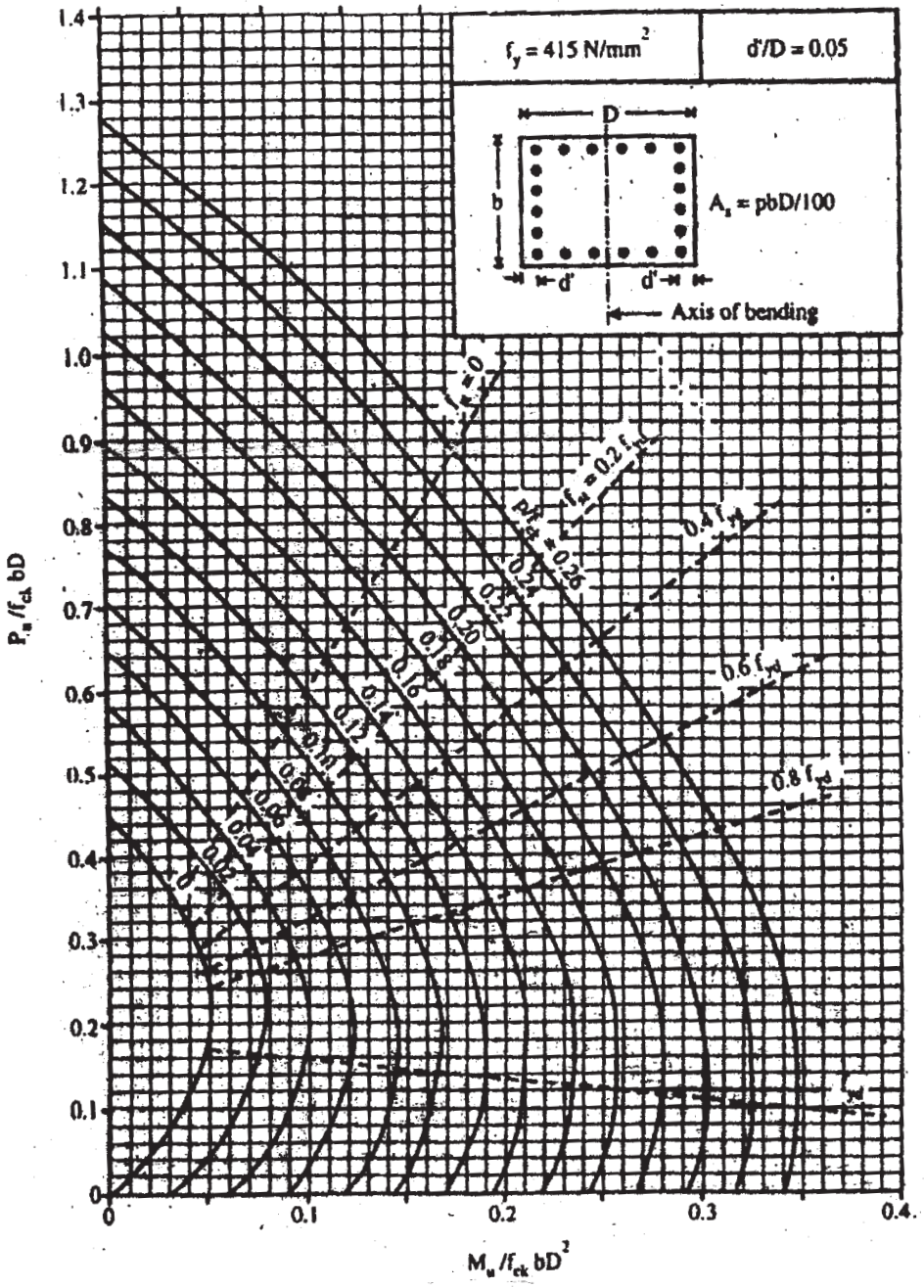


Chart 5

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

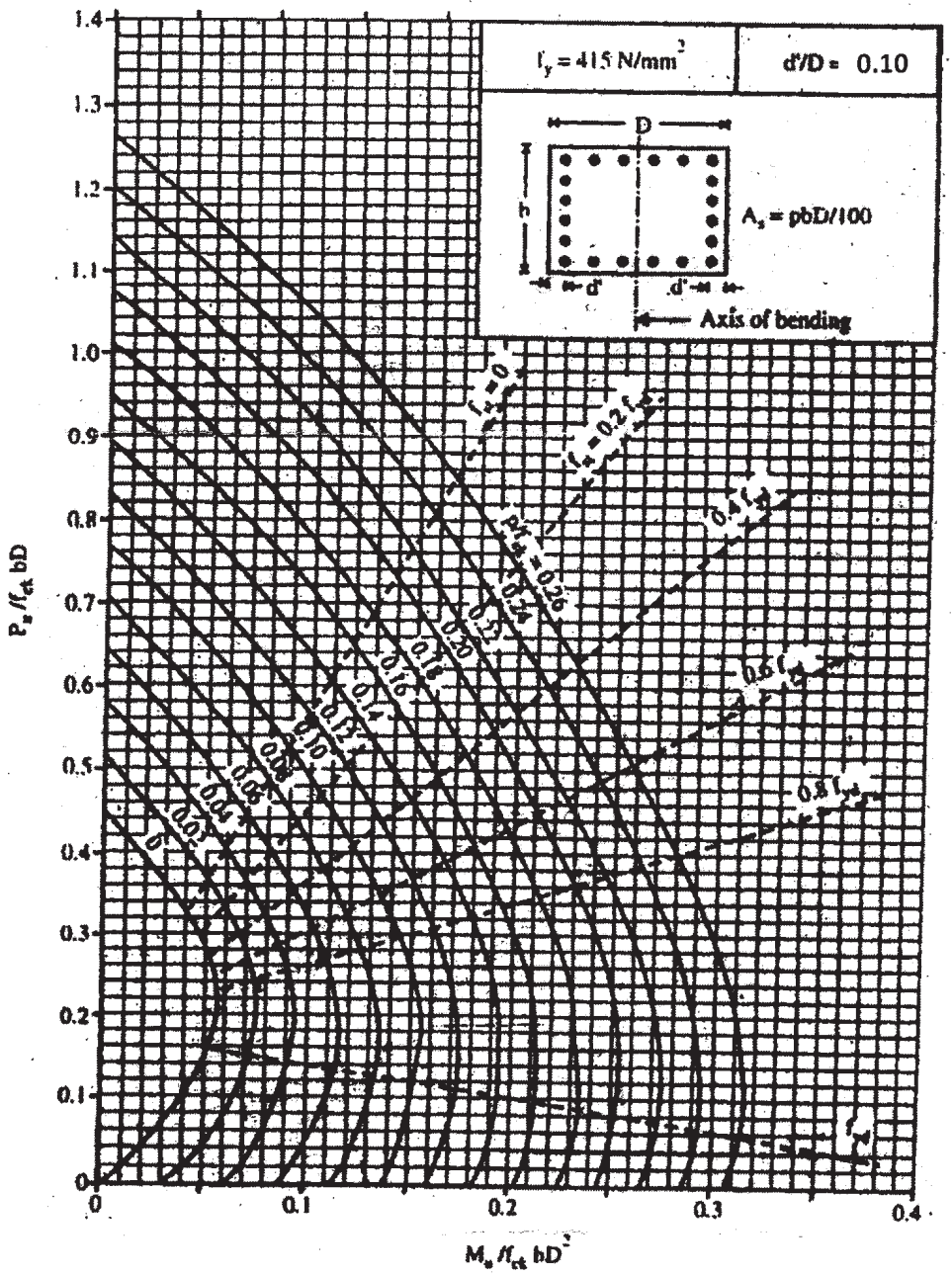
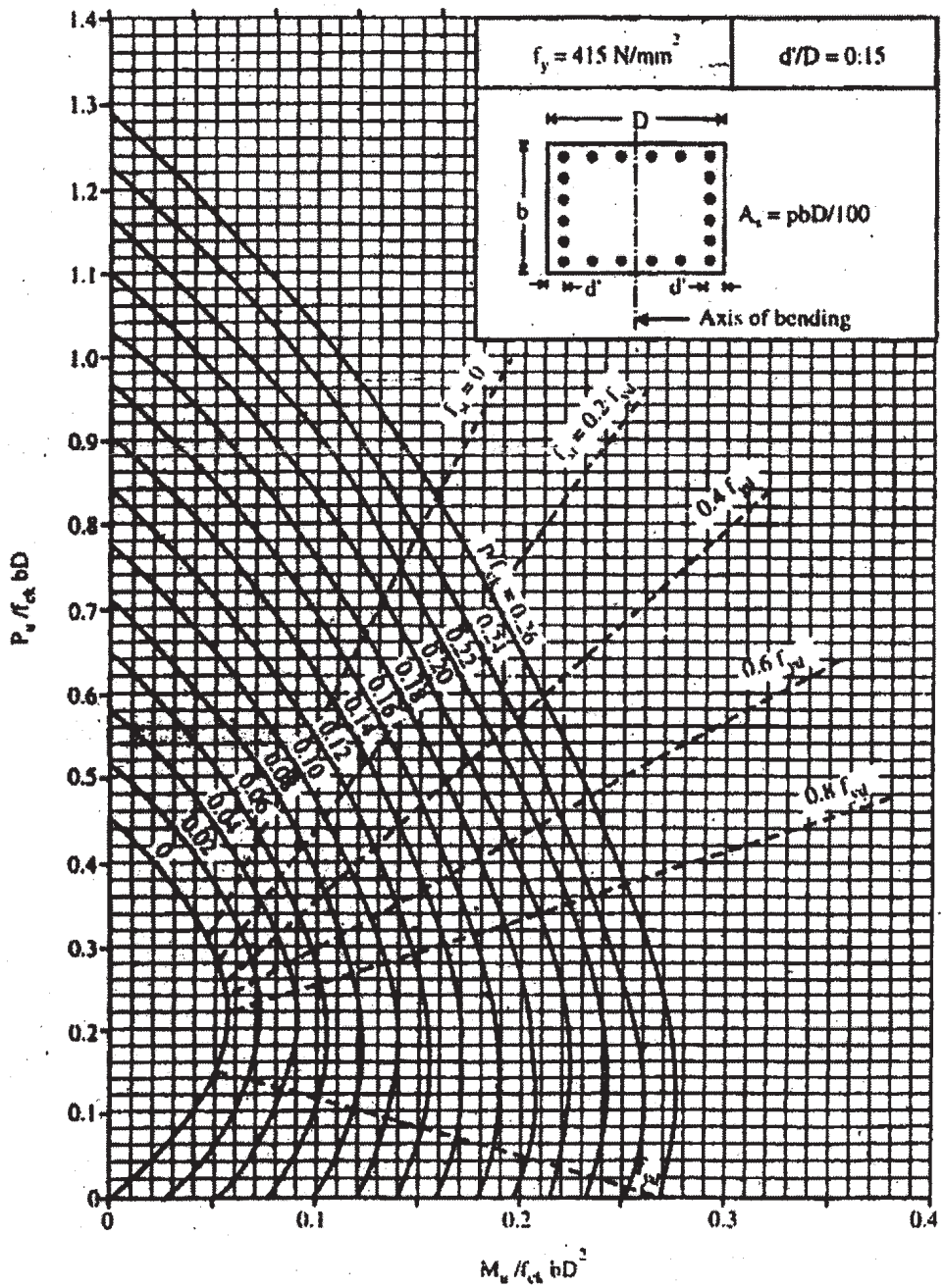


Chart 6

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



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Total No. of Questions : 12]

SEAT No. :

P2386

[Total No. of Pages : 3

[5153]- 9
T.E. (Civil)
ENVIRONMENTAL ENGINEERING - I
(2008 Pattern) (Semester - II)

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

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 from SECTION I and Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12 from SECTION II***
2) ***Answers to the two sections should be written in separate books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
6) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Enlist different methods of population forecasting and explain in detail one of them. **[6]**

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

c) What is design period? State its importance in water supply system design. **[6]**

OR

Q2) a) Define the term "per capita demand". Write the factors affecting "per capita demand". **[6]**

b) List the physical characteristics of water. State the IS standards recommendation for any four. **[6]**

c) Write an importance of pHin treatment of water. **[6]**

Q3) a) Design a mechanical flocculator to treat water for a population of one lakh, water being supplied at the rate of 150 litres per capita per day. Temperature of water is 30ºC, detention time is 30 minutes and paddle speed is 3 r.p.m. kinematic viscosity at 30º C = 0.8039×10^{-6} m^2/sec. **[8]**

b) What is coagulation? What are the factors on which the dosages of coagulants depend? **[8]**

OR

P.T.O.

Q4) a) Draw a neat sketch of circular sedimentation tank. Explain the sedimentation process used in water treatment plant. **[8]**

b) Draw a neat sketch of any one type of aerator for treatment of water. State the objectives of aeration process in water treatment. **[8]**

Q5) a) Draw a neat sketch of a slow sand gravity filter and explain filtration process. **[8]**

b) State and explain the factors affecting on disinfection. **[8]**

OR

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

i) Effect of pH on chlorination

ii) Plain chlorination,

iii) Post chlorination and

iv) Super chlorination

b) With a neat sketch explain back washing of rapid sand gravity filter. **[8]**

SECTION - II

Q7) a) Why softening of water is necessary? Explain the process of water softening. **[9]**

b) Discuss colour and odour removal by adsorption. **[9]**

OR

Q8) a) Explain demineralization of water by Reverse Osmosis method with a neat sketch. **[9]**

b) Explain ion exchange method of water softening with a neat sketch. **[9]**

Q9) a) What is packaged water treatment plant? What are the advantages of packaged water treatment plant? **[8]**

b) Explain the following layout systems with a neat sketch for water distribution: **[8]**

i) Tree or Dead end System

ii) Ring or Circular System

OR

Q10)a) Define rain water harvesting. Write different types of rain water harvesting system and explain any one in detail. **[8]**

b) Explain detection and prevention of wastage of water. **[8]**

Q11)a) Discuss the sources and effects of noise pollution and explain the noise control techniques. **[8]**

b) Explain primary and secondary air pollutants and state their importance. **[8]**

OR

Q12)a) Calculate the storage capacity of the distribution reservoir from the following data. **[8]**

i) Daily demand = 2,25,000 litres

ii) Pumping hours = 9 hours per day between 8 am to 5 pm.

iii) Pattern of draw off is as follows

Supply hours	Percentage of day's supply
7 am to 8 am	30%
8 am to 5 pm	35%
5 pm to 6.30 pm	30%
6.30 pm to 7 am	5%

b) Explain the principle and working of settling chamber. for removing particulate matter. **[8]**

Total No. of Questions : 12]

SEAT No. :

P2387

[Total No. of Pages : 3

[5153]- 10
T.E. (Civil)
FOUNDATION ENGINEERING
(2008 Pattern) (Semester - II) (301010)

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

Instructions to the candidates:

1) ***Answer three questions from Section I and three questions from Section II.***
2) ***Answer to the two Sections should be written in separate answer-books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Use of logarithmic tables, slide rule, electronic Calculator is allowed.***
5) ***Assume suitable data if necessary.***

SECTION - I

Q1) a) What is Sub surface exploration? What is the purpose of soil exploration? **[6]**

b) Define Borings. Explain in details about wash borings. **[6]**

c) Distinguish between disturbed and undisturbed samples. **[6]**

OR

Q2) a) Explain in detail standard penetration test. **[6]**

b) Differentiate between SPT and DCPT. **[6]**

c) Describe various types of soil samples. What is Area ratio? **[6]**

Q3) a) Explain with neat sketches different types of failure in soil. **[6]**

b) Explain in detail Terzaghi's bearing capacity theory. **[6]**

c) What is the effect of eccentricity on bearing capacity of the soil. **[4]**

OR

Q4) a) Explain in detail effect of water content on bearing capacity of soils. **[6]**

b) What are the limitations of plate load test? **[6]**

c) What is the concept of floating foundation? **[4]**

P.T.O.

Q5) a) What are the different causes of settlement. **[6]**

b) What are the different methods of finding coefficient of consolidation? Explain any one. **[6]**

c) What is the use of Plate load test in settlement analysis. **[4]**

OR

Q6) a) What is elastic settlement and list out the methods of determining elastic settlement. **[6]**

b) What is the concept of normally consolidation and over consolidation? Explain with examples. **[6]**

c) What is spring analogy method explain in detail. **[4]**

SECTION - II

Q7) a) What are the classifications of pile foundation. **[6]**

b) What are different dynamic pile formulae to determine pile load capacity. **[5]**

c) Write a short note on negative skin friction. **[6]**

OR

Q8) a) What are the advantages and disadvantages of piers in comparison of pile foundation. **[6]**

b) What is caisson? Explain different types of caisson with sketches. **[6]**

c) Write a short note on group capacity pile. **[5]**

Q9) a) What is sheet pile? Draw pressure distribution diagram for cantilever sheet pile and anchored sheet pile wall. **[6]**

b) With neat sketches Explain different types of coffer dams. **[6]**

c) Derive an expression for depth of embedment of cantilever sheet pile by making simplified assumption. **[5]**

OR

Q10)a) What is under reamed pile and limitation of under reamed pile. **[6]**

b) What is stone column technique? Discuss the stages of construction of stone column. **[6]**

c) What are the engineering problems of black cotton soil. **[5]**

Q11)a) Write a short note on Geosynthtics application in civil engineering. **[6]**

b) What are geosynthetics and state their function. **[5]**

c) Explain use of geotextile in the construction of Railway Track and Earthen Dams. **[5]**

OR

Q12)a) Enlist and explain different types of seismic waves. **[5]**

b) Explain phenomenon of liquefaction for sandy soil. **[5]**

c) What are the different types of earthquake explain in detail. **[6]**

Total No. of Questions :12]

SEAT No. :

P2388

[Total No. of Pages :5

[5153] - 11

T.E. (Mechanical Engineering)

MACHINE DESIGN - I

(2008 Course) (Semester - I)

Time : 4 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) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
6) ***Assume suitable data, if necessary.***

SECTION-I

Q1) a) What are various failures in Keys? Write corresponding strength expressions. **[4]**

b) The layout of an intermediate shaft of a gear box supporting two spur gears B and C is shown in Figure1. The shaft is mounted on two bearings A and D. The pitch circle diameters of gears B and C are 900 and 600 mm respectively. The material of the shaft is steel FeE 580 (S_{ut} = 770 N/mm^2 and S_{yt} = 580 N/mm^2). The factors k_b and k_t of ASME code are 1.5 and 2.0 respectively. Determine the diameter of shaft using the ASME code. Assume that the gears are connected to the shaft by means of keys. **[12]**

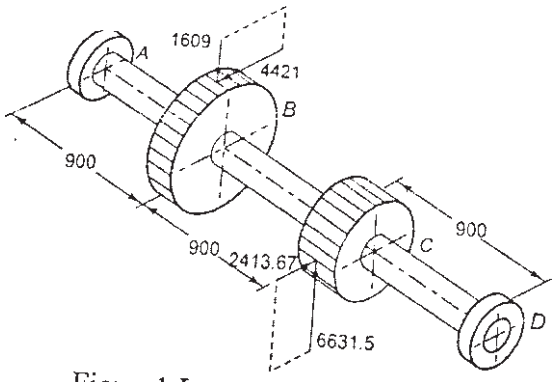

Figure1.Layout of shaft

OR

P.T.O.

Q2) a) When flexible coupling is preferred over rigid coupling? **[4]**

b) A coupling is used to transmit 50kW power at 300 rpm. There are six bolts. The outer diameter of the flanges is 200mm, while the recess diameter is 150mm. the coefficient of friction between the flanges is 0.15. The bolts are made of steel 45C8 (S_{yt} = 380N/mm^2) and the factor of safety is 3. Determine the diameter of the bolts. Assume that the bolts are fitted in large clearance holes. **[12]**

Q3) a) Derive an expression for maximum efficiency of squre screw. **[6]**

b) A machine vice as shown in Figure 2 has single start, square threads with 22 mm nominal diameter and 5mm pitch. The outer and inner diameters of the friction collar are 55 and 45 mm respectively. The coefficient of friction for thread and collar are 0.15 and 0.17 respectively. The machinist can comfortably exert a force of 125 N on the handle at a mean radius of 150 mm. Assuming uniform wear for the collar, calculate: **[10]**

i) The clamping force developed between the jaws; and

ii) The overall efficiency of the clamp.

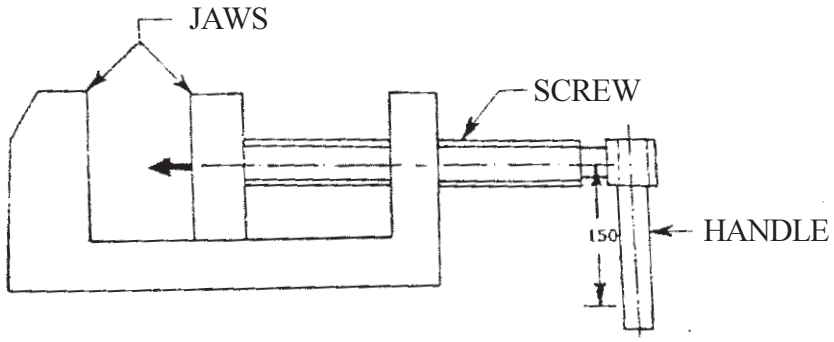

Figure 2 Machine vice

OR

Q4) A C-clamp as shown in Figure 3 has trapezoidal threads of 12 mm outside diameter and 2 mm pitch. The coefficient of friction for screw thread is 0.12 and for collar is 0.25. the mean radius of collar is 6mm. If the force exerted by the operator at end of handle is 80N.

Find;

a) Length of handle,

b) Maximum shear stress in the body of screw and where does this exist

c) Bearing pressure on threads. **[16]**

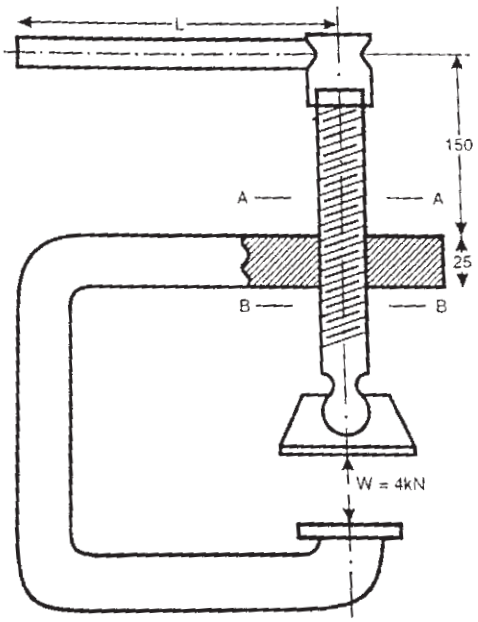

Figure 3. C -clamp

Q5) a) Derive expression for torqued to tighten the bolts. **[8]**

b) A wall bracket is attached to the wall by means of four identifcal bolts, two at A and two at B, as shown in Figure 4. Assuming that the bracket is held against the wall and prevented from tipping about the point C by all four bolts and using an allowable tensile stress in the bolts as 35 N/mm^2, determine the size of bolts on the basis of maximum principal stress theory. **[10]**

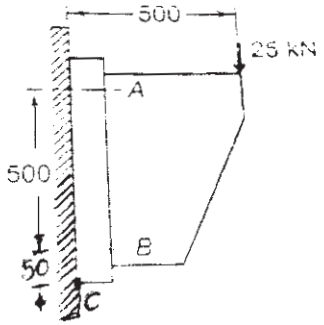

Figure 4. Wall bracket arrangement

OR

Q6) a) Explain design procedure of welded joint subjected to eccentric load in the plane of welds. **[8]**

b) A plate 75 mm wide & 10 mm thick is joined with another steel plate by means of single transverse and double parallel fillet welds as shown in Figure 5. The joint is subjected to a maximum tensile force of 55 kN. The permissible tensile & shear stresses in the weld material are 70 & 50 N/mm^2. Determine the required length of each parallel fillet weld. **[10]**

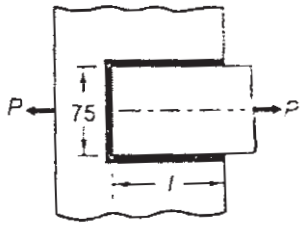

Figure 5. Welded joint

SECTION-II

Q7) a) What are the advantages of a split type flywheel over solid one piece flywheel? **[4]**

b) The torque developed by an engine is given by the following equation:

$T = 14250 + 2200 \sin 2\theta - 1800 \cos 2\theta$

where T is the torque in N-m and θ is the crank angle from inner dead centre position. The resisting torque of machine is constant throughout the work cycle. The coefficient of speed fluctuation is 0.01. The engine speed is 150 rpm A solid circular steel disk, 50 mm thick is used as flywheel. The mass density of steel is 7800 kg/m^3. Calculate the radius of the flywheel disk. **[12]**

OR

Q8) a) Derive expression for stresses in rimmed flywheel. **[4]**

b) The following data is given for a rimmed flywheel made of grey cast iron FG 200:

Mean radius of rim = 1.5 m; thickness of rim = 200 mm; width of rim = 300 mm; Number of spokes = 6; cross sectional area of each spoke = 10,000 mm^2; speed of rotation = 720 rpm;

Calculate

i) tensile stress in rim at $\phi = 30°$ and $\phi = 0°$ and

ii) the axil stress in each spoke. The mass density of cast iron FG 200 is 7100 kg/m^3. **[12]**

Q9) a) Derive an equations for load-deflection and load stress for helical spring. **[6]**

b) It is required to design a helical compression spring subjected to a maximum force of 1250 N. The deflection of the spring corresponding to the maximum force should be approximately 30 mm. The spring index can be taken as 6. The spring is made of patented and cold drawn steel wire The ultimate tensile strength and modulus of rigidity of the spring material are 1090 and 81370 N/mm^2 respectively. The permissible shear stress for the spring wire should be taken as 50% of the ultimate tensile strength. Design the spring and calculate; **[12]**

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 coil

OR

Q10)a) Derive an equation for stiffness of helical torsion spring. **[6]**

b) Explain nested spring with suitable sketch. **[6]**

c) Write note on multi-leaf spring with sketch. **[6]**

Q11)a) Derive an expression for maximum power transmitting capacity of belt. **[6]**

b) The following data is given for open flat belt drive;

Power transmitting capacity = 15 kW; The centre distance between pulleys is twice the diameter of the bigger pulley. Operating velocity = 20 m/s; Permissible stresses in belt = 2.25 N/mm^2; Lather density = 0.95 g/cc; Coefficient of friction = 0.35. Thickness of belt = 5mm.

Calculate:

i) Diameter of pulley;

ii) Length and width of the belt and;

iii) Belt tensions. **[10]**

OR

Q12)a) Explain with sketch various belt tensioning methods. **[8]**

b) Write selection procedure of V belt from manufacturers catalogue. **[8]**

Total No. of Questions : 12]

SEAT No. :

P2389

[Total No. of Pages :5

[5153]- 12
T.E. (Mech.)
HEAT TRANSFER
(2008 Pattern) (Semester - II)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) How does the thermal conductivity of insulating material vary with temperature? Explain with the help of suitable sketch. **[4]**

b) Define thermal conductivity and thermal diffusivity. State their units. **[4]**

c) A refrigerator stands in a room. Where air temperature is 21°C. The surface temperature on the outside of the refrigerator is 16°C. The sides are 30 mm Thick and has an equivalent thermal conductivity of 0.10 W/m. K. The heat transfer coefficient on the outside is 10W/m ^{2}.K. Assume one dimensional conduction through the sides, calculate the net heat flow rate and the inside surface temperature of the refrigerator. **[8]**

OR

Q2) a) State Fourier law of heat conduction and by using it derive an expression for steady state heat conduction through a long hollow cylinder of radii r_1 and r_2 maintains its two surfaces at temperatures, T_1 and T_2, respectively. **[6]**

b) Derive three dimensional generalize differential heat conduction equation in Cartesian coordinates and deduce it to one dimensional steady state heat conduction without heat generation. **[10]**

P.T.O.

Q3) a) Explain the concept of critical thickness of insulation on cylinder with the help of suitable illustration and sketches (s). **[6]**

b) A steam pipe of 5 cm inside diameter and 6.5 cm outside diameter is covered with a 2.75 cm radial thickness of high temperature insulation (k = 1.1 W/m. K). The surface heat transfer coefficient for inside and outside surfaces are 4650 W/m^2. K and 11.5 W/m^2. K, respectively. The thermal conductivity of the pipe material is 45 W/m.K. If the steam temperature is 200°C and ambient air temperature is 25°C, determine Heat loss per metre length of pipe. **[10]**

OR

Q4) a) Derive an expression for temperature distribution in a plane wall under steady state heat conduction with uniform heat generation. The wall is insulated on left surface and maintained at temperature T_S on right surface. **[8]**

b) A hollow sphere of inside radius 30 mm and outside radius 50 mm is electrically heated at its inner surface at a constant rate of 105 W/m^2. The outer surface is exposed to a fluid at 30°C, with heat transfer coefficient of 170 W/m^2.K. The thermal conductivity of the material is 20 W/m.K. Calculate inner and outer surface temperatures. **[8]**

Q5) a) Derive an expression for temperature distribution for unsteady state heat conduction using lumped heat capacity method. State assumptions in method. **[8]**

b) An aluminium sphere weighing 6 kg and initially at temperature of 350°C is suddenly immersed in a fluid at 30°C with convection coefficient of 60 W/m^2.K. Estimate the time required to cool the sphere to 100°C. Take thermophysical properties as

C = 900 J/kg. K, ρ = 2700 kg/m^3, k = 205 W/m.K. **[10]**

OR

Q6) a) What is the difference between fin effectiveness and fin efficiency? **[4]**

b) Explain the criteria of selection of fins. **[4]**

c) An aluminium alloy fin (k = 200 W/m.K), 3.5 mm thick and 2.5 cm long protrudes from a wall. The base is at 420°C and ambient air temperature is 30°C. The heat transfer coefficient may be taken as 11 W/m^2.K. Find the heat loss and fin efficiency, if the heat loss from fin tip is negligible.**[10]**

SECTION - II

Q7) a) State: **[8]**

i) Kirchoff's law of radiation,

ii) Wien's displacement law,

iii) Stefan Boltzman law,

iv) Define diffuse body

b) A hot water radiator of overall dimensions $2 \times 1 \times 0.2$ m is used to heat the room at 18°C. The surface temperature of radiator is 60°C and its surface is black. The actual surface of the radiator is 2.5 times the area of its envelop for convection for which the convection coefficient is given by $h_c = 1.3 (\Delta T)^{1/3}$ W/m^2.K. Calculate the rate of heat loss from the radiator by convection and radiation. **[8]**

OR

Q8) a) Define **[4]**

i) White body, and

ii) Opaque body.

b) Write a short note on gray body approximation. **[4]**

c) A black metal plate (k = 25 W/m. K) at 300°C is exposed to surrounding air at 30°C. It convects and radiates heat to surroundings. If the convection coefficient is 25 W/m^2.K. What is the temperature gradient in the plate? **[8]**

Q9) a) Explain the physical mechanism of convection heat transfer. **[4]**

b) Calculate the approximate Reynolds numbers and state if the flow is laminar or turbulent for a 10 m long yatch sailing at 13 km/h in sea water, $\rho = 1000$ kg/m^3 and $\mu = 1.3 \times 10^3$ kg/m.s. **[4]**

c) Explain the Reynolds Colburn analogy for turbulent flow over a flat plate. **[8]**

OR

Q10)a) Discuss the dimensional analysis for forced convection heat transfer. **[8]**

b) Air at 27° C is flowing across a tube with a velocity of 25 m/s. The tube could be either a square of 5 cm side or a circular cylinder of 5 cm dia. Compare the rate of heat transfer in each case, if the tube surface is at 127°C. **[8]**

Use the corrclation:

$Nu\ C\ Re^{n}\ Pr^{1/3}$

where, C = 0.027, n = 0.805 for cylinder

C = 0.102, n = 0.675 for square tube.

Take the properties of air at 77°C = 350 K

$\rho = 0.955\ kg/m^3$, $K_j = 0.03$ W/m.K.

$v = 20.92 \times 10^{-6}\ m^2/s$, Pr = 0.7, and $C_p = 1.009$ kJ/kg. K.

Q11)a) What do you mean by fouling factor? State the causes of fouling? **[4]**

b) Define effectiveness of heat exchanger. How is maximum heat transfer rate is obtained? **[4]**

c) Steam enters a counter flow heat exchanger, dry saturated at 10 bar and 180°C. It leaves at 350°C. The mass flow rate of the steam is 720 kg/min. The hot gas enters the exchanger at 650°C with mass flow rate of 1320kg/min. If the tubes are 30 mm in diameter and 3 m long, determine the surface are of tubes required. Neglect the resistance offered by metallic tubes. Use following. **[10]**

data:

For steam $C_{p.s.} = 2.71$ kJ/kg. K, and $h_i = 600\ W/m^2.K$. For gas $C_{p.g}$ 1 kJ/kg.K and $h_o = 250\ W/m^2.K$.

OR

Q12)a) Compare film wise and dropwise condensation. **[4]**

b) A heat exchanger is required to cool 55,000 kg/h of alcohol from 66°C to 40°C in a parallel flow heat exchanger using 40,000 kg/h of water entering at 5°C. Calculate. **[10]**

i) Exit temperature of water,

ii) Heat transfer rate,

iii) Surface area required

Take overall heat transfer coefficient.

$U = 580\ W/m^2.K$

C_p (alcohol) = 3760 J/kg.K.

C_p (water) = 4180 J/kg. K.

c) State the limitations of LMTD methods. **[4]**

Total No. of Questions : 12]

SEAT No. :

P2390

[Total No. of Pages : 5

[5153]-13
T.E. (Mech./Auto)
THEORY OF MACHINES - II
(2008 Course) (Semester - 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) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of logarithmic tables, electronic pocket calculator and steam tables is allowed.***
5) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Derive an expression for the friction torque in a multi collar pivot bearing with uniform pressure conditions. **[4]**

b) A single plate clutch is required to transmit 8 kW at 1000 rpm. The axial pressure is limited to 70 kN/m^2. The mean radius of the plate is 4.5 times the radial width of friction surface. if both the sides of the plate are effective and coefficient of friction is 0.25, find the **[12]**

i) Inner and outer diameter of the plate and the mean radius.

ii) Width of the friction lining.

OR

Q2) a) Obtain the expression for the torque transmitted by a centrifugal clutch. **[6]**

b) Define friction circle and friction axes. Explain the importance of friction circle and friction axis in case of slider crank mechanism. **[6]**

c) Derive an expression for the effort required to overcome thread friction while the load is being lifted. **[4]**

P.T.O.

Q3) a) Design a cam profile to operate an inline roller follower using following data **[16]**

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

The cam rotaes at uniform speed in clockwise direction. Determine the maixmum velocity and acceleration during outstroke and return stroke.

b) Explain what is Undercutting of cams? **[2]**

OR

Q4) 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

Q5) a) What is gyroscopic effect? Explain with example of aeroplane. **[4]**

b) Each arm of a porter governor is 200mm long and is hinged at a distance of 40 mm from the axis of the rotation. The mass of each ball is 1.5 kg and the sleeve is 25 kg. When the links are at 30º to the vertical, the sleeve begins to rise at 260 rpm. Assuming that the friction force is constant, find the maximum and minimum speeds of rotation when the inclination of arms to the vertical is 45º. **[12]**

OR

Q6) a) The turbine rotor of a ship has a mass of 1000 kg and rotates at 2200 rpm clockwise when viewed from the aft. The radius of gyration of the rotor is 220 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 controlling force in centrifugal governors? **[4]**

SECTION - II

Q7) a) 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 20º pressure angle involute with a module of 12 mm. Determine: **[12]**

- The addendum for the pinion and gear.
- Angle of contact on gear and pinion.
- The contact ratio.

b) What is interference? Explain the methods to avoid interference. **[6]**

OR

Q8) a) Describe significance of the following terms for a spur gear. **[6]**

i) Pressure angle

ii) Contact ratio

iii) Path of contact

b) The involute gears in mesh have a module of 8 mm and pressure angle of 20º. The larger gear has 57 while the pinion has 23 teeth. If the addenda on pinion and gear is one module, determine, **[12]**

i) Contact ratio

ii) Angle of action of pinion and wheel

iii) Ratio of sliding to rolling velocity at start of engagement, pitch point and at end of engagement

Q9) a) What is the significance of helix angle in the worm gears? Derive an expression for efficiency of worm gears. **[8]**

b) Explain the force analysis of bevel gears. **[4]**

c) Obtain an expression for formative number of teeth. **[4]**

OR

Q10)a) A drive is made up of two spiral gears of same hand, same diameter and of normal pitch 14 mm. The centre distance between the axes of the shafts is approximately 130 mm. The velocity ratio is 1.6 and the angle between the shafts is 75º. Assuming a friction angle of 6º, determine**[12]**

i) Spiral angle of each wheel

ii) Number of teeth on each wheel

iii) Efficiency of the drive

iv) Maximum efficiency

b) Determine the condition for maximum efficiency of spiral gears. **[4]**

Q11)a) Figure 1 shows a gear train in which gears D-E and F-G are compound gears. D gears with A and B; E gears with F; G gears with C. The numbers of teeth on each gear are A = 60, B = 120, C = 135, D = 30, E = 75, F = 30, G = 60. If the wheel A is fixed and arm makes 20 revolutions clockwise, find the revolutions of B and C. If arm is applied a turning moment of 1 kN-m, determine the turning moment on the shaft supporting the wheel C. **[12]**

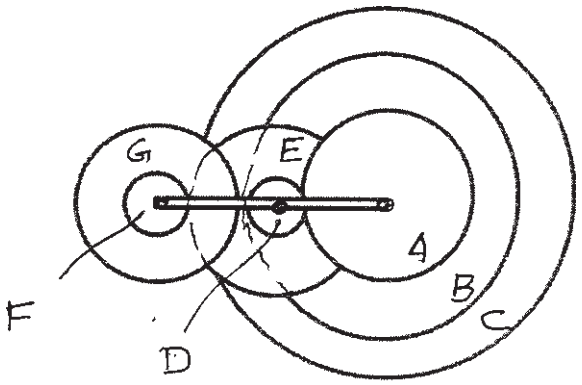

Figure 1: Q. 11

b) Compare simple and epicyclic gear train. Give examples of each. **[4]**

OR

Q12)a) An epicyclic gear train consists of two gears A and B having 30 and 40 teeth respectively. The arm rotates about the centre of the gear A at a speed of 80 rpm counterclockwise. Determine the speed of the gear B if **[12]**

i) The gear A is fixed

ii) Gear A rotates at 240 rpm clockwise instead of being fixed

b) What is the equivalent moment of inertia of a geared system? **[4]**

Total No. of Questions : 12]

SEAT No. :

P2391

[Total No. of Pages : 3

[5153]-14

T.E. (Mechanical Engineering)

INDUSTRIAL ENGINEERING AND TECHNOLOGY MANAGEMENT

(2008 Pattern) (Semeseter - I)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) Illustrate different functions of management. **[8]**

b) Discuss the Contingency Theory of Organizations with example. **[8]**

OR

Q2) a) Discuss different leadership Approach/Styles with examples. **[8]**

b) Explain the concept of managerial grid with example. **[8]**

Q3) a) Discuss different factors affecting the plant location planning. **[8]**

b) Enlist the types of Plant Layout and explain Product Layout in detail. **[10]**

OR

Q4) a) Explain in brief, Single Facility Location Problem. **[10]**

Consider the following data on locating a new facility which has to serve 5 different existing facilities. The co-ordinates of the existing facilities are (30, 20), (40, 50), (30, 30), (15, 30) and (20, 40). The number of tons of material transported per year from the new facility to each of the existing facilities is given in the table below. Find the x and y co-ordinates of the new facility.

Existing Facility	1	2	3	4	5
Weights	1000	980	1500	2000	1750

b) Write a short note on: Principles of Good Plant Layout and it application. **[8]**

P.T.O.

Q5) a) Explain the term Productivity with example and Discuss diifferent factors affecting Productivity. **[8]**

b) Discuss Time Study Procedure in detail. **[8]**

OR

Q6) a) Define the terms: **[8]**

i) Capacity Planning

ii) Aggregate Planning

And write a short note on: Procedure for Aggregate Production Planning.

b) Explain in brief, ABC Analysis for selective inventory Control. **[8]**

The production department for a company requires 3600 kg of raw material for manufacturing a particular item/year. It has been estimated that cost of placing an order is Rs. 36 and cost of carrying an inventory is 25% of investment in inventories. The price is Rs. 10 kg. The purchase manager wishes to determine an ordering policy for raw material.

SECTION - II

Q7) a) Explain Meaning of Technology Management and discuss role and significance of technology and management. **[8]**

b) Discuss impact of Technology on Society and Business. **[10]**

OR

Q8) a) Write a short note on: Evolution and Growth of Technology. **[8]**

b) Explain in detail Process Technology and Product Technology with appropriate examples. **[10]**

Q9) a) Explain exploratory technological forecasting techniques. **[8]**

b) Explain four phases of "S" curve with proper example. **[8]**

OR

Q10)a) Explain what you mean by morphological analysis by stating its applications. **[8]**

b) Explain technology monitoring process. **[8]**

Q11)a) Discuss key principles for developing technology strategy. **[8]**

b) Explain in detail the framework for formulating technology strategy. **[8]**

OR

Q12)a) Explain technology diffusion process. **[8]**

b) Explain in detail Steps used to adopt an appropriate technology for a particualr application. **[8]**

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Total No. of Questions : 12]

SEAT No. :

P2392

[Total No. of Pages : 4

[5153]-15
T.E. (Mechanical /Automobile)
Computer Oriented Numerical Methods
(2008 Pattern) (Semester-I) (302045)

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

Instructions to the candidates:

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

SECTION-I

Q1) a) Draw Flow chart for 'Modified Newton Raphson' Method. **[8]**

b) Use Simpson's 3/8 rule to evaluate **[8]**

$$I = \int_1^2 \frac{1}{x} dx$$

OR

Q2) a) Draw Flow chart for 'Gauss Quadrature 3 Point Formula'. **[8]**

b) Apply Newton Raphson Method to determine the root of equation **[8]**

$f(x)=x^3-4x+1=0$ to an accuracy of 0.001, take x1=0

Q3) a) Draw flowchart for 'Newton's Backward Difference' Interpolation. **[8]**

b) Determine y' and y'' at $x=0$ for following data **[8]**

x	0	1	2	3	4
y	2	5	10	22	34

OR

P.T.O.

Q4) a) Explain: **[6]**

Interpolation

Inverse Interpolation

Extrapolation

b) Find f(4.2) using Newton's Forward Difference **[10]**

X	4	6	8	10	12
F(x)	93	259	569	1071	1813

Q5) a) Draw Flow Chart for finding values of unknown variables by Back Substitution in Gauss-Elimination method. **[6]**

b) Solve following set of equations using Gauss Elimination Method. **[12]**

$$x+y+z=9$$

$$2x-3y+4z=13$$

$$3x+4y+5z=40$$

OR

Q6) a) Explain partial pivoting with example. **[6]**

b) Using Gauss Siedel method, solve the following set of simultaneous equations up to two decimal place accuracy. **[12]**

$$27x+6y-z=85$$

$$6x+15y+2z=72$$

$$x+y+54z=110$$

SECTION-II

Q7) a) Explain the following with suitable example **[8]**

i) significant Digit

ii) Inherent Error

iii) Rounding error

iv) Truncation error

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

x	1	2	3	4
y	0.17	0.18	0.23	0.32

OR

Q8) a) Draw flow chart to fit an equation $y=ax^b$ using Least Square Method. **[8]**

b) Fit an equation $y=ab^x$ through following set of points **[8]**

x	1	2	3	4
y	4	11	35	100

Q9) a) Draw flow chart to solve Ordinary differential equations using Euler's method. **[8]**

b) Given $\frac{dy}{dx}=\frac{1}{x+y}$. with initial conditions as y(0)=1, find y(0.1) with step size of 0.05. Use Runge Kutta 4th order method. **[8]**

OR

Q10)a) Draw flow chart to solve simultaneous first order differential equations using RK4 method. **[8]**

b) Solve the equation $\frac{dy}{dx}=1+xy$. Given the initial condition y(0)=2, find y(0.3) taking step size of 0.1 and accuracy of 0.001 using Modified Euler's formula. **[8]**

Q11)a) Draw flow chart to solve Parabolic Equation by Explicit Method. **[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 flow chart to solve Laplace Equation for given no of iterations.**[8]**

b) Evaluate the pivotal values of the following equation taking h=1 and upto one half of the period of vibration, **[10]**

$$16\frac{\partial^2 u}{\partial x^2} = \frac{\partial^2 u}{\partial t^2}$$

Given that $u(0,t) = u(5,t) = 0; u(x,0) = x^2(5-x)$ and $\frac{\partial u}{\partial t}(x,0) = 0$

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Total No. of Questions : 12]

SEAT No. :

P2393

[Total No. of Pages : 7

[5153]-16
T.E. (Mechanical Engineering)
MACHINE DESIGN - II
(2008 Course) (Semester - II) (302047)

Time : 4 Hours] *[Max. Marks : 100*

Instructions to the candidates:

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

SECTION - I

Q1) An intermediate shaft of a two stage co-axial gear box, shown in Fig.1, receives 10KW power at 288 rpm through right hand helical gear and transmits it to the output shaft through the spur pinion. The pitch circle diameters of helical gear and spur pinion are 450 mm and 108 mm respectively. The helix angle and normal pressure angle for helical gear are 23° and 20° respectively. The pressure angle for the spur pinion is 20°. The diameters of shaft at bearings A and B are 50 mm and 60 mm respectively. The load factor is 1.8 and the expected rating life of the bearings is 25000 hours. Select the deep groove ball bearings at A and B. The bearings are mounted such that bearing at A takes the thrust load. **[16]**

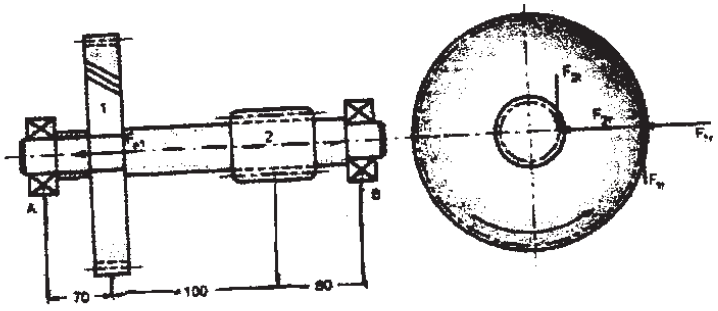

Fig.1

P.T.O.

Basic Capacities of Single Row Deep Groove Ball Bearings

Bearing Number	Basic Capacity	
	Static C_0 KN	Dynamic C KN
6010	16.00	21.60
6210	23.20	35.10
6312	52.00	81.90

Radial & Thrust Factors for Single Row Deep Groove Ball Bearings

F_a/C_0	$(F_a/V\ F_r) \leq e$		$(F_a/V\ F_r) > e$		e
	X	Y	X	Y	
0.025	1	0	0.56	2.0	0.22
0.04	1	0	0.56	1.8	0.24
0.07	1	0	0.56	1.6	0.27
0.13	1	0	0.56	1.4	0.31

OR

Q2) A single-row deep groove ball bearing is subjected to following work cycle **[16]**

Fraction of cycle	Radial Load 'Fr' kN	Thrust Load 'Fa' kN	Radial factor 'X'	Thrust Factor 'Y'	Race Rotating	Service Factor	Speed RPM
1/10	1.5	0.25	1.0	0	inner	1.2	400
1/5	1.0	0.75	0.56	2.0	outer	1.8	500
3/5	5.0	1.1	0.56	2.0	inner	1.5	600
Remaining	1.0	-	1.0	0	outer	2.0	800

If desired rating life of bearing is 15,000 Hrs. Select bearing from following data.

Bearing No.	6011	6211	6311	6411
Dynamic capacity 'C' kN	28.1	43.6	71.5	99.5

Q3) Design a full hydrodynamic journal bearing with the following specification for machine tool application: **[18]**

Journal diameter = 75 mm

Radial load = 10 KN

Journal Speed = 1440 rpm

Minimum oil film thickness = 25.5 microns

Permissible unit bearing pressure = 2 N/mm^2

Inlet temperature = 40°C

Radial clearance = 0.001 (r) mm

Mass density of lubricant = 860 Kg/m^3

Specific heat capacity = 1.76 KJ/kg°k

Bearing material = Babbit

Determine the length of the bearing and select suitable oil for this application

l/d	h_0/c	ε	S	(r/c) f	Q/rcn_sl	Q_s/Q	P_{max}/p
1	0.4	0.6	0.121	3.22	4.33	0.680	2.409
1	0.6	0.4	0.264	5.79	3.99	0.497	2.066

OR

Q4) The following data is given for 360° hydrodynamic bearing: **[18]**

- Journal diameter = 100 mm
- Bearing length = 50 mm
- Journal Speed = 1500 r.p.m
- Minimum oil-film thickness = 15 microns
- Viscosity of lubricants = 30 CP
- Specific gravity of lubricant = 0.86
- Specific heat of lubricant = 2.09 KJ/kg°C
- Fit between the journal and bearing is normal running fit H_7e_7.

Calculate:

a) The load carrying capacity of bearing;

b) The coefficient of friction;

c) The power lost in friction;

d) The total flow rate of the lubricant;

e) The side leakage; and

f) The temperature rise.

Diameter, mm	Tolerances, mm	
	H_7	e_7
100	+0.035 +0.00	–0.072 –0.107

Dimensionless Parameters for full journal bearings.

$\frac{l}{d}$	$\frac{h_0}{c}$	ε	S	$\left(\frac{r}{c}\right)f$	$\frac{Q}{r\,c n_s l}$	$\frac{Q_s}{Q}$	$\frac{P_{max}}{p}$
1/2	0.2	0.8	0.0923	3.26	5.41	0.874	3.745
1/2	0.4	0.6	0.319	8.10	4.85	0.730	2.739

Q5) A machine component is subjected to a completely reversed bending stresses cycle consisting of following parts" **[16]**

$\pm$300 MPa for 30% of time

$\pm$275 MPa for 25% of time

$\pm$400 MPa for 10% of time

$\pm$325 MPa for 25% of time

No load for remaining cycle

The material properties are the follows: UTS = 1200 MPa, YTS = 400 MPa, Corrected endurance strength = 128.0916 MPa. Take factor of safety as 1. Determine the life of the component and derive the expression you use.

OR

Q6) A stepped shaft is subjected to a uniform torque of 200 Nm, and a completely reversed bending moment of 550 Nm at the step. The shaft is made of cold drawn steel with ultimate tensile strength of 650 N/mm^2 and yield strength of 380 N/mm^2. The theoretical stress concentration factor for bending and torsion are 2 and 1.6 respectively. The other factors are

as follows:

Notch sensitivity = 0.96, Size factor = 0.85, Reliability factor = 0.868, Surface finish factor = 0.9. If the factor of safety is 1.5, determine the diameter of the shaft corresponding to the expected life of 15000 cycles and also for infinite life. **[16]**

SECTION - II

Q7) A single plate clutch with a single pair of contacting surfaces has an inner and outer radii of friction surface as 50 mm and 100 mm respectively. The coefficient of friction between the surfaces is 0.3. The normal intensity of pressure at any radius r is given by, $p = C_1 + C_2/r$, where C_1 and C_2 are constants. The normal intensity of pressure at inner radius is 1/3 times more than that at the outer radius. If the axial force is 4500 N, determine the torque transmitting capacity of the clutch. Derive an expression, you use. **[16]**

OR

Q8) A four wheeler has a total mass of 900 Kg. The mass moment of inertia of each wheel about an transverse axis through its centre of gravity is 0.5 Kg-m^2. The rolling radius of wheel is 0.35 m. The rotating and reciprocating parts of the engine and the transmission system are equivalent to a mass moment of inertia of 2.2 Kg-m^2 rotating at 5 times the speed of the wheel. The car is travelling at a speed of 80 Km/hr on a plane road. When the brakes are applied on all four wheels, the car decelerates at 0.4 g. Determine: **[16]**

a) the energy absorbed by each brake

b) the torque capacity of the brake

Q9) A spur gear pair is to be used to transmit 20 KW power from an electric motor running at 1440 rpm to the machine tool expected to run exactly at 600 rpm. The pinion and gear are to be made of alloy steel (S_{ult} = 800 N/mm^2) and plain carbon steel (S_{ult} = 700 N/mm^2) respectively. The service factor and factor of safety are 1.5 and 1.35 respectively. The face width is 12 times module for which load distribution factor is 1.4. The tooth system is 20° full depth involute. The gears are to be machined to meet the specifications of grade 7. The pinion and gear are to be case hardened to 400 BHN and 350 BHN respectively. Design the gear pair by using the velocity factor and Buckingham's equation for dynamic load. Use the **[18]**

following data:

Velocity factor $Kv = 6/6 + V$

Load stress factor $K = 0.16 (BHN/ 100)^2$ N/mm^2

Lewis form factor $Y = 0.484 - 2.87/Z$

For Grade 7 , e = 11.0 + 0.9 (m + 0.25$\sqrt{d}$)

Deformation factor C = 0.111e(Ep.Eg/Ep + Eg) N/mm

Modulus of elasticity for pinion Ep =207 × 10^3 N/mm^2

Modulus of elasticity for gear Eg =207 × 10^3 N/mm^2

Buckingham's equation F_d = 21V(bC + Ftmax) / 21V + $\sqrt{bC + Ft\,max}$ N

Ftmax = Ka.Km.Ft

Standard module in mm - 1,1.25,1.5,2.0,2.5,3.0,4.0,5.0,6.0,8.0,10.0,12,16

OR

Q10)a) A pair of helical gears consists of 20 teeth pinion meshing with 100 teeth gear. The pinion rotates at 720 rpm. The normal pressure angle is 20°, while the helix angle is 25°. The face width is 40 mm and normal module is 4 mm. The pinion is made of plain carbon steel 55C8 (S_{ut} = 720 N/mm^2) while the gear is made of plain carbon steel 40C8 (S_{ut} = 580 N/mm^2). The pinion and gear are heat treated to a surface hardness of 350 BHN and 300 BHN respectively. The service factor and factor of safety are 1.5 and 2.0 respectively. Assuming the velocity factor accounts for dynamic load, calculate the power transmitting capacity of helical gear pair. Use following data:

Velocity factor, Kv = 5.6 /5.6 +$\sqrt{V}$. **[12]**

b) Derive the relation for virtual number of teeth for a helical gear. **[6]**

Q11)A straight bevel gear pair is to be used to transmit 25 K W power from an electric motor rotating at 1500 rpm to a machine required to rotate exactly at 600 rpm. The axes of the pinion and gear intersect at right angles. The pinion and gear are to be made of plain carbon steel 55C8 (S_{ut} = 720 N/mm^2). The service factor and factor of safety are 1.25 and 1.75 respectively. The tooth system is 20° full depth involute. The gears are to be manufactured to meet the specifications of grade 6. The pinion and gear are to be case hardened to 420 BHN and 400 BHN respectively. Design the gear pair by using the velocity factor, Kv = (6/6+V) and the Buckingham's equation for dynamic load. Take

Y_p' = 0.3166. Machining grade 6 : e = 8.0 + 0.63 $\left(m + 0.25\sqrt{2rm}\right)$

Buckingham's equation F_d = 21V (bC + Ftmax)/21V + $\sqrt{bC + Ft\,max}$ N **[16]**

OR

Q12) 1/54/10/5 worm gear pair consists of worm made of case hardened carbon steel 10C4 and worm gear made of centrifugally cast phosphor bronze having permissible bending stress of 80 N/mm^2. The wear load factor for worm gear is 0.55 N/mm^2. The tooth system is 200 full depth involute, while the face width of the worm gear is 0.75 times the pitch circle diameter of worm. The coefficient of friction between worm and worm gear teeth is 0.04. The application factor and factor of safety are 1.25 and 1.5 respectively. The external surface area of the housing is 0.6 m^2. The overall heat transfer coefficient is 18 W/m^2 °C. The permissible temperature rise for the lubricant oil is 50°C. If the worm rotates at 1000 rpm, **[16]**

determine:

a) The beam strength of worm gear

b) The wear strength of worm gear

c) The maximum static load the worm gear can take, and

d) The maximum input power the worm can take. Use the following data:

Lewis form factor, Y:

z	20	30	40	50	60
Y	0.3204	0.3581	0.3890	0.4084	0.4210

Velocity factor, K_v = 6/6 + V

Total No. of Questions : 12]

SEAT No. :

P2394

[Total No. of Pages :3

[5153]-17
T. E. (Mechanical)
METEROLOGY & QUALITY CONTROL
(2008 Pattern) (Semester-II)

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

Instructions to the candidates:

1) ***Answers to the two sections should be written in separate answer books.***
2) ***Use of logarithmic tables, slide rules and electronic pocket calculator is allowed.***
3) ***Neat diagram must be drawn wherever necessary.***
4) ***Figures to the right indicates full marks.***
5) ***Assume suitable data, if necessary.***

SECTION-I

Q1) a) Describe the following term : **[8]**
i) Errors occurs in measurement
ii)Accuracy and precision

b) Define striaghtness and flatness. Explain with neat sketch method of checking straightness of straight edge by wedge method. **[8]**

OR

Q2) a) Explain the following terms **[8]**
i) Sine bar and Give one example how to use sine bar
ii) Autocollimator

b) Explain any one Mechanical comparator with neat sketch. **[8]**

Q3) a) What is interferometer. Explain NPL Interferometer applied to flatness testing. **[8]**

b) What is Taylor's principle? Determine the dimensions and tolerances of shaft and hole having size of 25H8h7 fit. **[10]**
(IT7=16i, IT8=25i, D is in a step 18-30mm)

OR

Q4) a) Design a workshop gauge for GO and NOGO gauge suitable for 35H8. (IT8=25i, D is in a step 18-30mm) **[10]**

b) Write short notes on **[8]**
i) Tomlinson's surface meter
ii) Tool maker's microscope

P.T.O.

Q5) a) Derive the relation for width W and depth H by constant chord method. Calculate chord length and its distance below tooth tip for a gear of module 5 mm and pressure angle 20 degree. **[8]**

b) Derive an expression for best wire size for measuring effective diameter. Calculate diameter of best size of wire for M20X2.5 screw **[8]**

OR

Q6) a) Write short notes on **[16]**

i) Recent trends in meterology

ii) CMM

iii)Pitch errors in screw threads

iv)Universal measuring machine

SECTION-II

Q7) a) Difference between: **[8]**

i) Quality Cost and Quality value

ii) Quality of conformance and Quality of performance

b) Explain DR. Edward Deming's PDCA and PDSA cycle for quality control. **[8]**

OR

Q8) a) Explain the Pareto Analysis and Cause and Effect diagram **[8]**

b) Explain the concept of Juran's Trilogy approach. **[8]**

Q9) a) Explain the Quality circle and its structure and concept. **[8]**

b) Write short notes **[8]**

i) KANBAN

ii)Five 'S'

OR

Q10) Write short notes on **[16]**

a) KAIZEN

b) FMECA

c) SIX SIGMA

d) ZERO DEFFECT

Q11)a) Comparison between variable chart and attribute chart. **[8]**

b) Draw and explain OC curve. **[4]**

c) Calculate sample size and AOQ for single sampling plan using following data **[6]**

i) Probability of acceptance of 0.4% defective in a lot is 0.528

ii) Lot size = 10,000 units

iii)Acceptance number = 1

iv)nP' = 1.6

v) Defectives found in the sample are not to be replaced.

OR

Q12)a) Differentiate between single, double, multiple sampling plan. **[8]**

b) A component with specification limits 40±0.1 was inspected the components were taken sub group of 5 items 10 such sub groups were checked the X & R values were noted as follows

Subgroup	1	2	3	4	5	6	7	8	9	10
X(mean)	34	33.8	31.3	33.4	34.1	33.8	33.3	35	30.8	33.2
R	10	7	8	5	4	12	2	7	4	9

Establish the central limits for limits for X (mean) and R charts. Draw the chart & check whether the product will meet the specifications or not, (Take A_2 =0.577, D_3 =0, D_4 = 2.115) **[10]**

♦ ♦ ♦

Total No. of Questions : 12]

SEAT No. :

P2395

[Total No. of Pages : 5

[5153]- 18
T.E. (Mechanical)
TURBO MACHINES
(2008 Pattern) (Semester - II) (302049)

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

Instructions to candidates:

1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10, Q11 or Q12.*
2) *Answer to the two sections should be written in separate books.*
3) *Neat diagram must be drawn wherever necessary.*
4) *Figures to the right side indicate full marks.*
5) *Use of electronic pocket calculator is allowed.*
6) *Assume suitable data if necessary.*

SECTION - I

UNIT - I

Q1) a) Show that the ratio of flow rate, $\frac{Q1}{Q2}=\frac{1+\cos\theta}{1-\cos\theta}$ for the impact of jet on stationary flat plate inclines at to the direction of horizontal jet. Where Q_1 = Upward directed flow rate and Q_2 = Downward directed flow rate. **[8]**

b) Show that, the maximum efficiency of the Pelton Wheel turbine is given by $(1+k\cos\beta)/2$. Where, k is bucket friction factor and β is bucket outlet angle. **[8]**

OR

Q2) a) A jet of oil having sp.gravity 0.8 of 40 mm diameter strikes a stationary plate inclined at an angle 30° with the axis of jet at a velocity of 30 m/s. Find the force exerted by the jet on the plate in the direction: **[8]**

i) Normal to plate

ii) Along the X-axis and Y-axis

Also, find the ratio of discharge which is divided into two streams.

b) A jet of water having velocity of 30 m/s enters on a series of moving vanes having velocity of 15 m/s. The jet makes 30° to the direction of motion of the vanes at inlet and leaves the vanes at 10° and 5 m/s. Draw

P.T.O.

the velocity triangles and find: **[8]**

i) Vane tip angles at inlet and outlet for a shock less flow.

ii) Work done per kg of water.

iii) Efficiency

UNIT - II

Q3) a) A Kaplan turbine working under a head of 20m develops 11772kW shaft power. The outer diameter of the runner is 3.5 m and hub diameter 1.75m. The guide blade angle at the extreme edge of the runner is 35°. The hydraulic and overall efficiencies of the turbine are 88% and 84% respectively. If the velocity of whirl is zero at outlet, determine: **[10]**

i) Runner vane angles at inlet and outlet at the extreme edge of the runner, and

ii) Speed of the turbine.

b) What is draft tube? Why it is used in a reaction turbine? Describe with neat sketch two different types of draft tubes. **[6]**

OR

Q4) a) A francis turbine with an overall efficiency of 75% is required to produce 148.25 kW power. It is working under a head of 7.62m. The peripheral velocity is $0.26\sqrt{2gH}$ and the radial velocity of flow at inlet is 0.96 $\sqrt{2gH}$. The wheel runs at 150 rpm and the hydraulic losses in the turbine are 22% of the available energy. Assuming radial discharge, determine:**[10]**

i) The guide blade angle,

ii) The wheel vane angle at inlet,

iii) Diameter of the wheel at inlet,

Width of the wheel at inlet.

b) A turbine is to operate under a head of 25m at 200 rpm. The discharge is 9 m^3/s. If the efficiency is 90%, determine: **[6]**

i) Power generated,

ii) Specific speed of the machine

iii) Type of turbine.

Unit -III

Q5) a) the mean diameter of the blades of an impulse turbine with a single row turbine is 1.05m and the speed is 3000 rpm. The nozzle angle is 18º, the ratio of blade velocity to steam velocity is 0.42 and ratio of relative velocity at outlet from the blades to that at inlet is 0.84. The outlet angle of the blade is to be made 3º less than the inlet blade angle. The steam flow is 8 kg/s. Draw velocity diagram and find the resultant thrust on blades, tangential thrust, axial thrust, power developed and blade efficiency. **[10]**

b) Derive an expression for maximum blade efficiency of a single stage impulse turbine in terms of nozzle angle. **[8]**

OR

Q6) a) A 50% reaction turbine runs at 3000 rpm. The angles at exit of fixed blading's and inlet of moving blading's are 20º and 30º respectively. The mean ring diameter is 0.7 m and steam condition is 1.5 bar and 0.96 dry. Calculate: **[10]**

i) Required height of blades to pass 50 kg/s of steam and

ii) Power developed by the stage.

b) Show that in a 50% reaction turbine, the maximum stage efficiency is $\frac{2\cos^2\alpha}{1+\cos^2\alpha}$ where, α is the nozzle angle. **[8]**

SECTION - II

UNIT - IV

Q7) a) In an oil gas turbine, air is compressed from a pressure of 1 bar and temperature of 300K up to a pressure of 5 bar. The oil used has a calorific value of 42500 kJ/kg and the combustor efficiency is 95%. The hot gases leave the combustor at 1000K. The isentropic efficiency of the turbine and compressor are 90% and 85% respectively. Assuming a mass flow rate of air at 1 kg/s, find: **[10]**

i) Air-Fuel Ratio

ii) Power output of the plant

iii) Thermal efficiency of power plant.

Assume $C_{pa} = 1.005 \frac{kJ}{kgK}$, $C_{pg} = 1.1 \frac{kJ}{kgK}$ and $\gamma = 1.4$ for air and gases.

Neglect pressure losses in combustor. Assume that the gases expand in the gas turbine from 5 bar pressure to 1 bar pressure.

b) For an actual Brayton cycle without any pressure drops, derive the condition for maximum plant output in terms of isentropic temperature ratio and compressor and turbine efficiencies. **[6]**

OR

Q8) a) A gas turbine plant of 800 kW capacities takes the air at 1.01 bar and 15ºC. The pressure ratio of the cycle is 6 and maximum temperature is limited to 700ºC. A regenerator of 75% effectiveness is added in the plant to increase the overall efficiency of the plant. The pressure drop in the combustion chamber is 0.15 bars as well as in the regenerator is also 0.15 bars. Assuming the isentropic efficiency of the compressor 80% and of the turbine 85%, determine the plant thermal efficiency. Neglect the mass of the fuel. **[10]**

b) Show that the optimum pressure ratio for maximum work output between fixed temperature limits of the Joule cycle is given as: **[6]**

$$r_{opt} = \sqrt{\left\{\frac{T_{max}}{T_{min}}\right\}^{\frac{\gamma}{(\gamma-1)}}}$$

UNIT - V

Q9) a) A centrifugal pump impeller whose external diameter and width at the outlet are 0.8 and 0.1 m respectively is running at 550 rpm. The angle of impeller vanes at outlet is 40º. The pump delivers 0.98 m^3 of water per second under an effective head of 35m. If the pump is driven by a 500kW motor. Determine: **[10]**

i) The Manometric efficiency

ii) The overall efficiency

iii) The Mechanical efficiency

b) Draw and explain characteristic curves for multistage centrifugal pumps in series and parallel **[6]**

OR

Q10)a) A centrifugal pump is to deliver water from a tank against a static head of 40m. The suction pipe is 50m long and 25cm diameter. The delivery pipe is 20cm diameter and 1600m long. The pump characteristic cane be defined as H = 100-6000 Q^2 where, H is the head in meters and Q is discharge in m^3/s. Calculate the net head and discharge of the pump. The coefficient of friction f=0.02 for both the pipes. Calculate power required to drive the pump if overall efficiency of the pump is 85%. **[10]**

b) Discuss the typical layout of centrifugal pump with the help of a neat sketch. Name the main parts and accessories. Discuss its working. **[6]**

UNIT -VI

Q11)a) An axial flow compressor having eight stages and 50% reaction design compresses air in the pressure ratio of 4:1. The air enters the compressor at 20ºC and flows through it with a constant speed of 90 m/s. The rotating blades of the compressor rotates with a mean speed of 180 m/s. Isentropic efficiency of the compressor may be taken as 82%. **[12]**

Calculate: i) Work done by the machine ii) Blade angles.

Assume, $\gamma=1.4, C_p=1.005\frac{kJ}{kgK}$

b) Define polytropic efficiency of axial flow compressor with help of T-s diagram and obtain an expression for polytropic efficiency. **[6]**

OR

Q12)a) A single sided centrifugal compressor for a gas turbine is required to deliver 10kg/s of air while operating with a total pressure ratio of 4.5 while turning18000 rev/min. Initial conditions of air are 1.013 bar pressure and 300K temperature. The air enters the inlet eye axially with a velocity of 140 m/s with no pre-whirl. Assuming isentropic efficiency for the compressor as 80% and slip factor as 0.92, make calculations for: **[12]**

i) Rise in total temperature

ii) Tip speed of the impeller and tip diameter

iii) Annulus area of inlet eye, and

iv) Power required to drive the compressor.

b) Define degree of reaction as applied to axial flow compressors and show that the blades are symmetrical for 50% reaction. **[6]**

Total No. of Questions : 12]

SEAT No. :

P2396

[Total No. of Pages : 4

[5153]-19
T.E. (Mechanical)
MECHATRONICS
(2008 Course) (Semester - II)

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

Instructions to the candidates:

1) ***Answer any three questions from each section.***
2) ***Answers to the two sections should be written in separate answer books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Use of logarithmic tables slide rule, Mollier charts, and electronic pocket calculator and steam tables are allowed.***
6) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Explain in brief Sensitivity, Accuracy and Precision with suitable example for each. **[8]**

b) Explain different dynamic characteristics of measurement system such as **[4]**

i) Response time

ii) Rise time

iii) Settling time

c) Sensitivity of a thermocouple is 0.01 V/°C. Find the output voltage if the temperature is 200°C. Also find temperature for 3.5V output. **[4]**

OR

Q2) a) An electrical resistance strain gauge of resistance 120Ω & gauge factor 2.0 is bonded to a specimen of steel. What will be the resistance change of the gauge due to stress of 60 MN/mm^2 tensile in the specimen (modulus of elasticity E = 180 GN/mm^2) **[6]**

b) What is meant by Temperature Compensation in Strain Gauges and how it is done? **[6]**

c) Explain capacitive type level measuring transducer. **[4]**

P.T.O.

Q3) a) Write Construction, working, applications, advantages and disadvantages of LVDT. **[8]**

b) A potentiometer with a total range of 350° is supplied with a voltage of 8 Vdc. The voltage at the wiper is 3.7 Vdc. What is the present angle of the pot? **[4]**

c) Describe proximity sensor with application. **[4]**

OR

Q4) a) What is meant by variable reluctance sensor? And write down its applications. **[6]**

b) Explain basic operation of rotary encoder? And its applications in CNC machine. **[5]**

c) Explain capacitive and inductive principles used in position sensing. **[5]**

Q5) a) Write a short note on SCADA system and its applications in industrial environment. **[10]**

b) Use block diagram reduction to simplify the block diagram shown in figure Q.5 (b) below into a single block relating C(s) to R(s). **[8]**

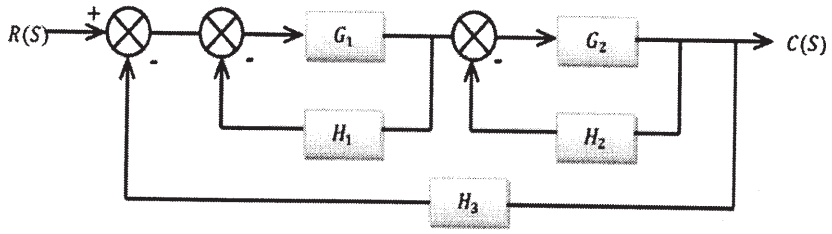

Figure Q 5 (b)

OR

Q6) a) Explain any one analog to digital converter. **[6]**

b) Explain Sample and hold circuit. **[6]**

c) Describe in brief mathematical model of Translational Mechanical system. **[6]**

SECTION - II

Q7) a) Explain Open Loop Contorl System with a suitable example. **[6]**

b) An open-loop system consists of three elements in series, the elements having transfer functions of 5, 1/s and 1/(s + 1) with feedback element transfer funciton 5. What is the overall transfer function of the system? **[6]**

c) Explain following terms: **[4]**

i) Process lag

ii) Control lag

OR

Q8) a) Explain control systems used for following (as open or closed loop control): **[6]**

i) Controlling the water height in a toilet tank.

ii) Stopping a clothes dryer when the clothes are dry.

iii) Actuation of street lights at 6 p.m.

b) Explain Closed Loop Control System with a suitable example. **[6]**

c) Explain following terms: **[4]**

i) Controlled variable

ii) Process Load

Q9) a) Define proportional controller with mathematical equation. State its advantages and disadvantages. **[6]**

b) Explain why derivative control mode cannot be used alone. **[6]**

c) Explain why PID control system is the most widely used control system.**[4]**

OR

Q10)a) Figure 10a shows an error time graph. Sketch the PD Controller output with respect to time, given, Kp = 5%/%, Kd = 0.5%/s and p(0) = 30%**[10]**

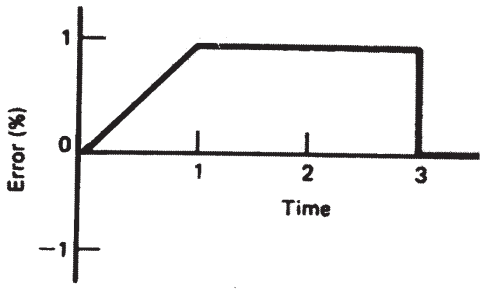

Figure 10a

b) Define P+I controller with mathematical equation. State its advantages.**[6]**

Q11)a) Construct a PLC ladder program for AND and OR gates. Use 2 NO push-button switches as inputs and green lamp as output. Develop a truth table for both logics. Also write Boolean equations for each rung. **[12]**

b) Draw, label and explain a typical PLC Architecture. **[6]**

OR

Q12)a) Develop a ladder diagram for the following:

A small house has three windows and two doors. Each window and door has a switch attached such that the contacts close when a door or window opens. Draw a PLC ladder logic diagram that will turn ON a light if one or more windows are open OR if both doors are open. **[12]**

b) What are the main components of a SCADA system? Explain with a block diagram. **[6]**

x x x

Total No. of Questions :12]

SEAT No. :

P2397

[Total No. of Pages :4

[5153] - 20

T.E. (Mechanical)

REFRIGERATION AND AIR-CONDITIONING

(2008 Course) (Semester - II) (302051)

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

Instructions to the candidates:

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

SECTION-I

Q1) a) Sketch the vapour compression cycle on T-s diagram and derive an expression for its COP. **[4]**

b) Prove that $(COP)_{HP} = (COP)_{R} + 1$ **[4]**

c) A simple R-12 plant is to develop 4 tonnes of refrigeration. The condenser and evaporator temperatures are 35°C and -15°C, respectively. Draw p-h diagram and determine: **[8]**

i) The mass flow rate of refrigerant in kg/s.

ii) The volume flow rate of refrigerant.

iii) Heat rejected to condenser in kW.

iv) Power required to drive the compressor.

v) COP of system.

vi) Compare this COP with COP of Carnot refrigerator operating between temperatures 35°C and - 15°C.

OR

P.T.O.

Q2) a) Define refrigerating effect. What is one ton of refrigeration? Derive formulation for calculating the tonnage of refrigeration? **[6]**

b) The pressure in the evaporator of an ammonia refrigerator is 1.902 bar and the pressure in the condenser is 12.37 bar. Calculate the refrigeration effect per unit mass of the refrigerant and $(COP)_R$ for following cycles: **[10]**

i) The dry saturated vapour delivered to the comprssor, where it is compressed isentropically to the condenser pressure.

ii) The dry saturated vapour delivered to the compressor and liquid after condensation is under-cooled by 10^oC.

Q3) a) Discuss the effect on performance of ideal VCC. **[8]**

i) lowering evaporator pressure, and

ii) Vapor super heat at compressor entry.

b) The refrigerant R - 12 enters the compressor of a refrigerator as a superheated vapour at 0.14 MPa and - 20^oC at a rate of 0.05 kg/s and leaves at 0.8 MPa and 50^oC. The refrigerant is cooled in the condenser to 26^oC and 0.72 MPa and is throttled to 0.15 MPa. Neglect any heat transfer and pressure drop in the connecting line between the components, determine **[8]**

i) Rate of heat removal from the refrigerated space.

ii) Power input to the compressor.

iii) The isentropic efficiency of the compressor, and

iv) Coefficient of performance of the refrigerator.

OR

Q4) a) Comparison of Vapour Absorption refrigeration system with Vapour Compression refrigeration System. **[6]**

b) Explain working of simple ammonia water vapour absorption refrigeration system with schematic. **[10]**

Q5) a) State desirable properties of refrigerants. **[4]**

b) How refrigerants are designated. Give the refrigerant number of with two refrigerants using designation formula. **[4]**

c) Draw schematic of cascade refrigeration system and explain its working. **[10]**

OR

Q6) a) Give the classification of refrigerants. **[4]**

b) Explain the selection criterion of refrigerants. **[4]**

c) Draw the schematic and p-h diagram of a vapour compression refrigeration system equipped with two evaporators at different temperature with single compressor using multi expansion valve and a back pressure valve. Explain its working mathematical formulation for calculation of performance of the system. **[10]**

SECTION-II

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

i) Specific Humidity

ii) Degree of saturation

iii) Relative Humidity

iv) Dew point temperature

b) The humidity ratio of atmospheric air at 28°C DBT and 760 mm of Hg is 0.016 kg/kg of dry air. Determine: **[8]**

i) Partial pressure of water vapour

ii) Relative humidity

iii) Dew point temperature

iv) Specific enthalpy

OR

Q8) a) Draw Skelton of psychrometric diagram and show various properties on it. **[4]**

b) Explain heating and humidification process with the help of psychrometric chart. **[4]**

c) Air is cooled from 39°C DBT and 29% RH to 24°C at the rate of 5 m^3/s. Calculate the capacity of cooling coil if the surface of cooling coil is 20°C. Also calculate the bi pass factor. Show the process on psychrometric diagram. **[8]**

Q9) a) Explain the working principle and classification of evaporators. **[4]**

b) Explain working principle of evaporative condensers with a suitable schematic. **[4]**

c) Explain the working of summer air conditioning system. **[8]**

OR

Q10)a) What are advantages of multistage compression in a refrigeration system? **[4]**

b) Why fluid expansion is used in refrigeration system? Classify different expansion systems. **[4]**

c) Write advantage of split air-conditioner and explain its working. **[8]**

Q11)a) Draw a typical air flow diagram for an air-conditioning unit and classify ducts and duct material. **[6]**

b) Explain velocity reduction method of duct design. **[4]**

c) Prove that equivalent diameter of a rectangular duct for same discharge rate is given by $D_{eq} = 1.265 \times \left[\frac{a^3 b^3}{a+b}\right]^{1/5}$. **[8]**

OR

Q12)a) Discuss the dynamic losses in duct. **[4]**

b) State various air distribution systems used in air conditioning. Explain any two of them. **[10]**

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

EEE

Total No. of Questions : 8]

SEAT No. :

P2398

[Total No. of Pages : 2

[5153]-21

T.E. (Mechanical) (Sandwich)

PRODUCTION MANAGEMENT

(2008 Pattern) (Semester-I) (Elective-I)(302061-A) (Self Study)

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

Instructions to the candidates:

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

SECTION-I

Q1) a) What are the functions of Management? How is Management interdisciplinary? **[8]**

b) Explain different types of organizations. Explain their advantages & disadvantages also. **[8]**

Q2) a) Explain the different functions of Production Planning & control. **[8]**

b) Explain the three types of Production systems with their advantages & disadvantages. **[8]**

Q3) a) What are the functions & applications of Industrial engineering? **[8]**

b) Explain in brief Principles of Material handling. **[8]**

Q4) Write SHORT NOTES on any THREE: [18]

a) PMTS

b) Multiple activity chart

c) Contributions of F.W. Taylor

d) Group dynamics

P.T.O.

SECTION-II

Q5) a) What is the importance of control chart? Explain operating characteristic curve. **[8]**

b) Describe the advantages & disadvantages of Sampling & 100% inspection quality system. **[8]**

Q6) a) Explain quality function deployment. **[8]**

b) Explain quality of design, quality of conformance & quality of performance. **[8]**

Q7) a) Discuss Six Sigma concept. Explain the steps in the implementation of it. **[8]**

b) What is ISO, QS and CMM standards? State its application areas. **[8]**

Q8) Write SHORT NOTES on any THRE: **[18]**

a) Taguchi method

b) PMEA

c) Concurrent engineering

d) Reliability testing

Total No. of Questions : 8]

SEAT No. :

P2399

[Total No. of Pages : 2

[5153]-22
T.E.(Mech.)S/W.
BEHAVIOURAL SCIENCE (Self Study)
(2008 Pattern) (Semester-I) (Elective-I)

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

Instructions to the candidates:

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

SECTION-I

Q1) a) What is the purpose of industrial Enterprize discuss external factors influencing and governing enterprise. **[8]**

b) Explain Environment in the urban and Rural Law. **[8]**

Q2) a) Explain Learning theories. **[8]**

b) Explain in detail incentive scheme. **[8]**

Q3) a) What are the fundamental of individual behaviour? What are the causes of human behaviour. **[8]**

b) Define organisation structure? Suggest two organisation structure for IT sector and Automobile sector. **[8]**

Q4) Write a short note on : **[18]**

a) Activity based costing

b) Starategic planning

c) Affiliation and Mass law.

P.T.O.

SECTION-II

Q5) a) What is formal and informal group? Explain any one in detail. **[8]**

b) Define conflict. What are the nature and causes of conflicts. **[8]**

Q6) a) What theory X and theory Y? Where it is used? **[8]**

b) "Communication makes an organisation alive" Discuss emphasising the importance of communication in an organisation. **[8]**

Q7) a) How will you set pattern of interview for the post of production supervisor? State the important consideration. **[8]**

b) What is management of change? When and where it is applied. **[8]**

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

a) Role of self Assessment

b) Indirect interview techniques

c) Management grid.

Total No. of Questions : 12]

SEAT No. :

P2400

[Total No. of Pages : 2

[5153]-23

T.E.(Mechanical Sandwich)

WELDING TECHNOLOGY

(2008 Pattern) (Semester-I) (302061C) (Elective-I) (Self Study)

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

Instructions to the candidates:

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

SECTION-I

Q1) a) What are the types of welding flames. **[6]**

b) Write short note on Oxy Acetylene Welding? **[6]**

c) Explain advantages & disadvantages of gas welding? **[6]**

OR

Q2) a) Explain disadvantages of gas welding? **[6]**

b) What are types of gas welding? **[6]**

c) Explain welding nozzles? **[6]**

Q3) a) What are Arc Welding and explain its process? **[8]**

b) Explain Submerged Arc welding and TIG? **[8]**

OR

Q4) a) Explin types of electrodes? **[8]**

b) Explain Plasma Arc Welding and Arc Spot Welding? **[8]**

Q5) a) Explain the projection welding with diagram and advantage? **[8]**

b) Advantages and Limitations of Resistance Welding? **[8]**

OR

Q6) a) Explain Spot Welding with diagram and advantages? **[8]**

b) Explain percussion welding with neat sketch? **[8]**

P.T.O.

SECTION-II

Q7)	a)	Explain the advantages of solid state welding.	**[6]**
	b)	What is flash butt welding?	**[6]**
	c)	What is cold welding process?	**[6]**
		OR	
Q8)	a)	Explain atomic hydrogen welding?	**[6]**
	b)	Write short note on Thermit welding?	**[6]**
	c)	Explain forge Welding.	**[6]**
Q9)	a)	What is Principle operation of Brazing and soldering?	**[8]**
	b)	Advantages, Limitation and application of brazing welding?	**[8]**
		OR	
Q10)	a)	Comparison of soldering, brazing and regular welding?	**[8]**
	b)	Explain Adhesive Welding and its application?	**[8]**
Q11)	a)	Explain defects in welding with neat sketch?	**[8]**
	b)	Discontinues in welding and quality check of welding?	**[8]**
Q12)	a)	List different factors involved in welding costing?	**[8]**
	b)	What is discontinuities in welds.	**[8]**

Total No. of Questions : 12]

SEAT No. :

P2401

[Total No. of Pages : 5

[5153]- 26

T.E. (Mechanical Sandwich)

THEORY OF MACHINE AND MACHINE DESIGN II

(2008 Pattern) (Semester - II)

Time :4 Hours] *[Max. Marks :100*

Instructions to the candidates:

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

SECTION - I

Q1) a) Explain in short **[6]**

i) Type synthesis

ii) Number synthesis

iii) Dimensional synthesis

b) A cam is to be designed for a Knife edge follower with the following data: **[10]**

i) Cam lift = 40 mm during 90°of cam rotation with SHM.

ii) Dwell for the next 30°

iii) During the next 60° of cam rotation, the follower returns to its original position with SHM

iv) Dwell during the remaining 180°.

Draw the profile of the cam when the line of stroke of the follower passes through the axis of the cam shaft and cam rotates in clockwise direction.

OR

P.T.O.

Q2) a) Explain with neat sketches different types of cams and followers. **[6]**

b) Explain the term body guidance. **[4]**

c) Derive the Freudersteins equation of a four bar mechanism. **[6]**

Q3) a) State and prove the law of gearing. **[6]**

b) In an epicyclic gear train ,an arm carries two gears A and B having 36 and 45 teeth respectively. If the arm rotates at 150 rpm in the anticlockwise direction about the centre of the gear A which is fixed, determine the speed of gear B. If the gear A instead of being fixed, makes 300 rpm in the clockwise direction, what will be the speed of gear B? **[10]**

OR

Q4) a) Explain with neat sketches different types of gear trains. **[8]**

b) A pinion having 30 teeth drives a gear having 80 teeth. The profile of the gears is involute with 20º pressure angle, 12 mm module and 10 mm addendum. Find the length of path of contact, are of contact and the contact ratio. **[8]**

Q5) a) Explain the effect of gyroscopic couple on an aeroplane. **[6]**

b) A band and block brake, having 14 blocks each of which subtends an angle of 15º at the centre, is applied to a drum of 1 meter effective diameter. The drum and flywheel mounted on the same shaft has a mass of 2000 kg and a combined radius of gyration of 500 mm. The two ends of the band are attached to pins on opposite sides of the brake lever at distances of 30 mm and 120 mm from the fulcrum. If a force of 200 N is applied at a distance of 750 mm from the fulcrum, determine. **[12]**

i) maximum braking torque

ii) angular retardation of the drum.

iii) time taken by the system to come to rest from the rated speed of 360 rpm.

The coefficient of friction between blocks and drum is 0.25.

OR

Q6) a) Write a note on 'Epicyclic train dynamometer'. **[6]**

b) The turbine rotor of a ship has a mass of 2000 kg and rotates at a speed of 3000 rpm clockwise when looking from a stern. The radius of gyration of the rotor is 0.5 m.

Determine the gyroscopic couple and its effect upon the ship when the ship is steering to the right in a curve of 100 meter radius at a speed of 16.1 knots (1knot = 1855 m/hr).

Calculate also the torque and its effects when the ship is pitching in simple harmonic motion, the bow falling with its maximum velocity. The period of pitching is 50 seconds and the total angular displacement between the two extreme positions of pitching is 12°. Find the maximum acceleration during pitching motion. **[12]**

SECTION - II

Q7) a) A pair of Spur gears is to be used for driving a compressor at 300 rpm by a 7.5 kw, 1200 rpm electric motor. The center distance is 250 mm. The gears are to be made of plain carbon steel 50c4 having ultimate tensile strength of 700 MPa. The service factor is 1.5 while factor of safety is 2.

i) Initially using velocity factor, design the gear pair and specify their dimensions.

ii) Assume Grade 6 of manufacture, find exact dynamic load using Buckinghams equation.

iii) Find the available factor of safety for the designed gear pair in bending.

iv) Using the obtained factor of safety, Specify the required surface hardness.

Use the following data:

- Pressure angle, $\phi = 20^{\circ}$
- Lewis form factor, $Y = 0.484 - \frac{2.87}{Z}$.
- For Grade 6, $e = 8 + 0.63\ [m + 0.25\ \sqrt{2r}\ ]$

- Velocity factor, $Kv = \frac{6}{6+v}$

- Dynamic load, $F_d = \frac{21V(bce + F_{t\max}}{21V + \sqrt{ebc + F_{t\max}}}$

- Deformation factor, c = 11400 N/mm^2.

- Standard module : 1,1.25, 2.0, 2.5, 3.0, 4.0, 5.0, 6.0, 8.0, 10. **[16]**

OR

Q8) a) State and explain the different types of gear tooth failures, their causes and remedies. **[8]**

b) What is formative number of teeth in helical gears? Derive an expression for formative number of teeth in helical gears. **[8]**

Q9) a) Derive the stribecks equation for basic static capacity of bearing. State the assumptions made. **[8]**

b) A multiple disc clutch, steel on bronze, is to transmit 4.5 kw at 750 rpm. The inner radius of the contact is 40 mm and outer radius of the contact is 70 mm. The clutch operates in oil with an expected coefficient of 0.1. The average allowable pressure is 0.35 N/mm^2. Find **[8]**

i) the total number of steel and bronze discs

ii) the actual axial force required.

iii) the actual average pressure.

iv) the actual maximum pressure.

OR

Q10)a) Write the procedure to select the ball bearing from manufactures catalogue. **[8]**

b) A cone clutch is used to connect on electric motor running at 1440 rpm with a machine that is stationary. The machine is equivalent to a rotor of mass 150 kg and radius of gyration as 250 mm. The machine has to be brought to the full speed of 1440 rpm from a stationary condition in 40

seconds. The semi cone angle is 12.5°. The mean radius of the clutch is twice the face width. The coefficient of friction is 0.2 and the normal intensity of pressure between contacting surfaces should not exceed 0.1 N/mm^2. Assuming uniform wear condition, calculate. **[8]**

i) the inner and outer diameters.

ii) the face width of friction lining.

iii) the force required to engage the clutch.

iv) the amount of heat generated during each engagement of clutch.

Q11)a) Write note on 'Stress concentration and methods of reducing it'. **[8]**

b) A transmission shaft having an ultimate tensile strength of 600 MPa and yield strength of 380 MPa is subjected to a fluctuating torque of 200 N.m anticlockwise and 800 N.m clockwise. The factor of safety is 2 and expected reliability is 50%. The surface factor is 0.8 and the size factor is 0.85. Assuming that there is no stress concentration, determine the diameter of the shaft for infinite life. Assume the distortion energy theory of failure. **[10]**

OR

Q12)a) Explain modified Goodman's diagram for axial and bending fluctuating stresses. **[8]**

b) The machine element is subjected to a workcycle of complete reversed bending stresses as follows: **[10]**

i) 300 MPa for 30% of time.

ii) 275 MPa for 25% of time.

iii) 400 MPa for 10% of time.

iv) 325 MPa for 25% of time.

v) No load for remaining time.

The material has an ultimate tensile strength of 1200 MPa. Take surface finish factor as 0.8,size factor as 0.85 and reliability factor as 0.897. The operating temperature is 400°C for which the temperature factor is 0.5. Assuming the fatigue stress factor at the most stressed section as 0.7, determine the life of the component.

Total No. of Questions : 12]

SEAT No. :

P2402

[Total No. of Pages : 4

[5153]-27

T.E. (Mechanical Engineering S/W)

MECHATRONICS

(2008 Course) (Semester - II) (302065)

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

Instructions to the candidates:

1) ***Answers to the two sections should be written in separate answer books.***
2) ***Answer Q.No. 1 or Q.No.2, Q.No. 3 or Q.No. 4, and Q.No. 5 or Q.No. 6 from section-I and Q.No. 7 or Q.No.8, Q.No. 9 or Q.No. 10, Q.No. 11 or Q.No. 12from section-Il.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Use of Electronic pocket Calculator is allowed.***
6) ***Assume Suitable data, ifnecessary and mention it clearly.***

SECTION - I

Q1) a) Discuss in detail the selection criterion for a Resistive Temperature Detector. **[6]**

b) A Potentiometer has a total winding resistance of 8 kΩ and a maximum displacement range of 5 cm. The power dissipation at maximum displacement is not to exceed 50 m W. Determine the output voltage of the potentiometer when the input displacement is 2 cm. **[6]**

c) With respect to principle, schematic arrangement and applications explain strain gauge type force sensor. **[6]**

OR

Q2) a) Draw a suitable schematic and explain the operation of angular velocity sensors. Also, list two advantages as well as disadvantages of this sensor.**[9]**

b) With respect to principle, construction advantages, limitations and applications, explain Thermocouple. **[9]**

Q3) a) Strain Gauge is bonded to a steel beam of 150 mm long and having a cross section area of 5 cm^2. The Gauge has an unstrained resistance of 220Ω and GF of 2. When load is applied to the beam, the resistance of the Gauge changes by 0.015Ω. If the Young's Modulus of the beam is 200 GPa, determine the change in length of the beam as well as the force applied to the beam. **[8]**

(b) Describe the basic elements of the generic Mechatronics system with a block diagram. **[8]**

OR

P.T.O.

Q4) a) Classify, in detail, Displacement sensors. **[4]**

b) Draw a suitable schematic and explain the operation of an Optical Encoder. **[6]**

c) Write six distinct points of comparison between Potentiometer and Inductive Sensor. **[6]**

Q5) a) Derive the transfer function between output x and input u(t) of the Mass Spring Damper system in Figure Q5 (a). **[10]**

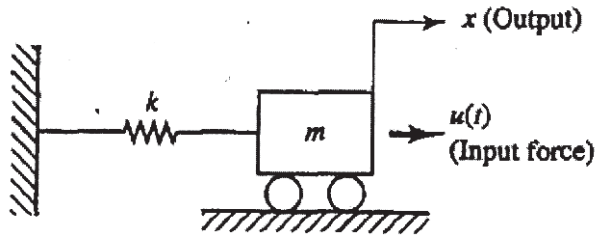

Figure Q5 (a).

b) Draw a suitable flowchart and explain the working of an Analog to Digital Converter. **[6]**

OR

Q6) a) A 8-bit DAC has a V_{ref} of 0-10 V. The binary input is 11100101. Find the equivalent analog output voltage. **[8]**

b) Draw a suitable block diagram and explain the working of an SCADA system. **[8]**

SECTION - II

Q7) a) Write four distinct points of comparison between Closed Loop and Open Loop Control System. **[8]**

b) Figure Q7(b) shows a block diagram. Simplify and find the Relation between Y(s)/X(s). **[8]**

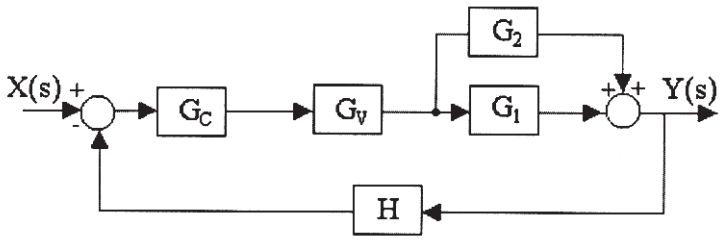

Figure Q7 (b)

OR

Q8) a) Simplify the block diagram given in Figure Q8 (a) and obtain the expression for Y(s)/X(s). **[8]**

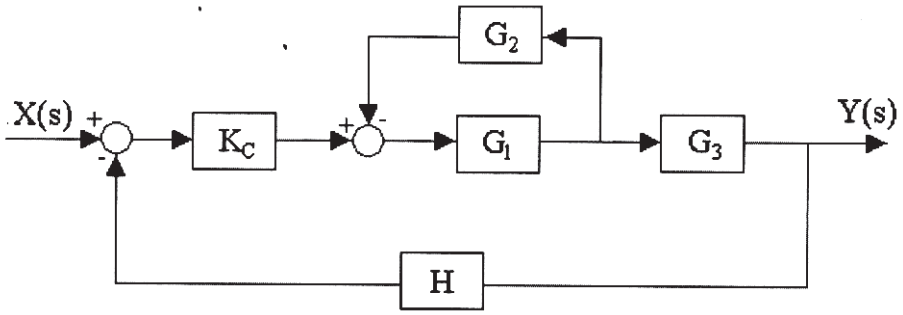

Figure Q8 (a)

b) Draw a block diagram and discuss the application of closed loop control system in any household appliance. **[8]**

Q9) a) Given the error of Figure Q9 (a), plot a graph of a P controller output as a function of time. $K_p = 10$ and $P_0(0) = 15\%$. **[10]**

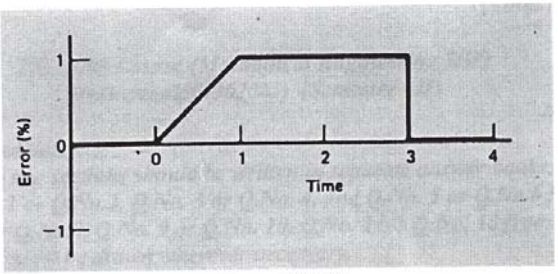

Figure Q9 (a)

b) Derive the equation for the control signal, u, for the Proportional plus Derivative (PD) controller. Discuss, in detail, the advantages and disadvantages of adding Derivative term to the Proportional term. **[6]**

OR

Q10)a) Derive the equation for the control signal, u, for the Proportional Integral Derivative (PID) controller. Discuss, in detail, the advantages and disadvantages of adding Integral term to the Proportional term. **[8]**

b) A proportional controller is used for speed control with a setpoint of 12 rpm within a range of l 0 to 15 rpm. The controller output at zero error is 20%. The proportional constant Kp ,= 10%/%. If the speed jumps to 13.5 rpm, calculate the error in % and controller output for next 2 seconds assuming the speed remains at 13.5 rpm. **[8]**

Q11)a) Given four normally open switches (P1, P2, Sl and S2), with DC motor (M) write a PLC program to satisfy following objectives: **[12]**

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 S1 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) Discuss the importance of Timers in a PLC. **[6]**

OR

Q12)a) Discuss Examine ON and Examine OFF conditions used in ladder program with an example of latching the output. **[6]**

b) Using a suitable schematic list the components in a PLC as well as explain the significance of each of the components. **[12]**

Total No. of Questions : 12]

SEAT No. :

P2403

[Total No. of Pages :3

[5153]-28
T. E. (Mechanical S/W)
TRIBOLOGY
(2008 Course) (Semester-II) (302066)

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

Instructions to the candidates:

1) ***Answer any three questions from each section.***
2) ***Answers to the two sections should be written in separate books.***
3) ***Neat diagram must be drawn wherever necessary.***
4) ***Figures to the right indicates full marks.***
5) ***Use of logarithmic tables, slide rules, Mollier charts and electronic pocket calculator is allowed.***
6) ***Assume suitable data, if necessary.***

SECTION-I

Q1) a) Explain in detail use of Tribology in industry? **[8]**

b) Discuss the various types of additives? **[8]**

OR

Q2) a) What is Lubrication? Write in detail about properties? **[8]**

b) Explain in detail types of rolling contract bearing? **[8]**

Q3) a) What are the various laws of friction and explain them in detail? **[8]**

b) Explain in detail friction measurement? **[8]**

OR

Q4) a) Define wear? Explain types of wear in detail? **[8]**

b) Derive the equation for volume of abrasive wear with usual notation? **[8]**

Q5) a) Write concept of temperature rise? **[8]**

b) Explain Raimondi & Boyd method used for the design & analysis of hydrodynamic journal bearing? **[10]**

OR

Q6) a) Following data refers to a 360º(full) hydrodynamic bearing; Journal diameter d= 75mm, bearing length 1 = 75mm, radial clearance C=0.05mm, minimum film thickness h_0= 0.02 mm, Journal speed N=420 rpm, radial load W= 3500 N, Cp for oil = 1.75 kJ/KgºC, ρ of oil = 0.9 gm/cc. Calculate (i) Required viscosity of oil, Z (ii) The coefficient of friction μ, (iii) The heat generated , Hg (iv) The amount of oil pumped through the bearing. **[10]**

P.T.O.

b) State advantages & disadvantages of hydrodynmamic and hydrostatic bearing over each other? **[8]**

SECTION-II

Q7) a) Define Hydrostatic lubroication? Write its application in industry? **[8]**

b) Explain in detail viscous flow through rectangular slot? **[8]**

OR

Q8) a) Write in detail load carrying capacity of hydrostatic step bearing? **[8]**

b) The following data is given for hydrostatic step bearing of vertical turbo generator **[8]**
Thrust load = 500KN, shaft diameter = 300mm, recess diameter = 260mm, shaft speed =750rpm, viscosity of lubricant = 10cp. Draw neat sketch showing effect of film thickness. Calculate i) optimum film thickness for minimum power loss.

Q9) a) What is role of lubrication in metal forming operations. **[8]**

b) Write notes on **[8]**

i) Ring oil Lubrication

ii) Oil circulation system

OR

Q10)a) What is gas lubrication? Write its merits, demerits? **[8]**

b) A plate of 60 mm length and infinite width is separated from the plane by an oil film 50 microns thickness and having viscosity of 0.07 N-s/m^2. If the normal load per unit width of 80 KN/m is applied on the plate, determine: **[8]**

i) The time required to reduce the film thickness to 3.5 microns and

ii) The maximum pressure.

Q11)a) Write short notes on **[10]**

i) Thrust bearing

ii) Clearance Seals

b) Write in detail about automatic packing? **[8]**

OR

Q12)a) The Rayleigh step bearing has following details; **[10]**

- Length of the bearing = 800mm
- Width of the bearing = 200mm
- Load on the bearing = 350KN
- Sum of surface roughness on contacting surfaces = 8 microns
- Minimum oil film thickness = 20 x Sum of surfaces roughness value
- Sliding velocity = 7.5 m/s

Calculate:

i) Dimensions of the step;

ii) The maximum oil film thickness;

iii)The viscosity of the lubricating oil; and

iv)Maximum pressure at the step

b) Define Gasket? Write its application? **[8]**

♦ ♦ ♦

Total No. of Questions :12]

SEAT No. :

P2404

[Total No. of Pages :4

[5153] - 31

T.E. (Automobile Engineering)

MACHINE DESIGN

(2008 Pattern) (Semester - I) (316481)

Time : 4 Hours] *[Max. Marks :100*

Instructions to the candidates:

1) ***Answer any 3 questions from each section.***
2) ***Answer to the two sections should be written in separate book.***
3) ***A figure to the right indicates full marks.***
4) ***Use of electronic pocket calculator is allowed.***
5) ***Assume suitable data, if necessary.***

SECTION-I

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

b) Design a protected type rigid flange coupling to transmit 40 KW at rated speed of 1000 RPM. Take shear stress for steel as 81 Mpa, shear stress for cast iron as 36.52 Mpa, crushing stress as 324 Mpa and standard diameters in mm are 25, 27, 28, 32, 34. Assume square key. **[14]**

OR

Q2) a) Prove that a square key is strong in shear and crushing. **[4]**

b) A steel shaft 2 m long between bearings carries a 1000 N pulley at its mid point. The pulley is keyed to the shaft receives 30 KW at 150 RPM which is transmitted to a coupling. The belt drive is horizontal and ratio of tensions is 3 and diameter of pulley is 955 mm. Calculate the diameter of shaft. Take maximum shear stress as 41 Mpa. **[14]**

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

P.T.O.

b) A machine slide weighing 3 KN is elevated by a double start acme threaded screw at the rate of 0.84 m/min. If the coefficient of friction is 0.12, calculate the power to drive the slide. The end of the screw carries a thrust collar of 32 mm inside diameter and 58 mm out side diameter Pitch of the screw thread is 7mm and outside diameter is 44 mm. Take coefficient of friction for collar as 0.09 and allowable shear stress as 44.125 Mpa. Is it strong enough to sustain the load? **[8]**

OR

Q4) a) Explain the different forms of threads with sketches. **[10]**

b) Two plates are fastened by means of two bolts. The bolts are made of plain carbon steel with yield strength 400 Mpa and factor of safety 5. Determine the size of the bolts if the Load is 5 KN. **[6]**

Q5) a) Write a short note on S-N diagram. **[6]**

b) A steel connecting rod is subjected to a reversed axial loading 180 KN. Determine the required diameter of rod using factor of safety 2. Take ultimate stress = 363 Mpa, yield shear stress = 216 Mpa, yield stress = 470 Mpa, fatigue stress concentration factor = 1, correction factor = 0.7, surface finish factor = 1, size factor = 0.89. **[10]**

OR

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

b) The brasses of an automobile engine connecting rod have worn so as to allow play which gives shock loading equivalent to a weight 6000 N falling through a height 0.2 mm. The connecting rod is 250 mm long and has a cross-sectional area 300 mm^2. Determine the maximum stress induced in connecting rod, resilience in tension or compression, Take $E = 2\times10^5$ Mpa. **[6]**

SECTION-II

Q7) a) Write a short note on Nipping in leaf springs. **[6]**

b) Calculate the thickness of semi-elliptical spring having 1 m span carrying a load of 5400N. The permissible stress for the spring is 490 Mpa. Also calculate the width if leaves are unstressed initially and leaves are stressed initially. Take deflection = 75 mm, full length leaves = 2, graduated leaves = 6, $E = 2\times10^5$ Mpa. ($C_1 = 3$, $C_2 = 2$). **[10]**

OR

Q8) a) Derive an expression for shear stress in helical springs. **[6]**

b) Design a helical spring to carry a load of 500 N with deflection 25 mm. The spring index is 8. Permissible shear stress is 350 Mpa, modulus of rigidity is 84×10^3 Mpa and a = 6.68 mm. **[10]**

Q9) a) Explain the hydrodynamic theory of lubrication. **[6]**

b) The following data is given for a full hydrodynamic bearing used for electric motor. Radial load = 1200N, Journal speed = 1440rpm, journal diameter = 50 mm, static load on bearing = 350N. The values of surface roughness of the journal and the bearing are 2 and 1 micron respectively. The minimum oil film thickness should be 5 times the sum of surface roughness of the journal and the bearings. Determine length of the bearing. radial clearance, minimum oil film thickness, viscosity of lubricant and flow of lubricant. Take operating temperature as 65°C. Bearing pressure may be assumed to be 2 N/mm^2 and $1N/mm^2$ respectively for static and running condition. **[10]**

I/d	S	r/c	(h_0/c)	Q/rcnl
0.5	0.779	1000	0.6	4.29
1	0.121	1200	0.4	4.33
1.5	0.134	1400	0.2	4.89

OR

Q10)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]**

Q11)a) Derive Lewis equation for beam strength. **[6]**

b) A spur gear set to transmit 20 KW at 900 rpm of pinion. The transmission ratio is 7/3:1. Take 20° FDI, Z_1 = 18 σ_d = 140 Mpa for pinion and σ_d = 55Mpa for gear. The diameter of the pinion is 105 mm. Design number of teeth, module, face width for strength only.

$Y = \pi (0.154-0.912/Z)$, $C_v = 3.05/3.05+V$ **[12]**

OR

Q12)a) Explain about herringbone gears with sketch. **[6]**

b) Design a pair of helical gears are to transmit 15KW at 10,000 rpm of the pinion with PCD 80mm. The transmission ratio is 3:1. Assume $\alpha = 20°$ FDI, $\beta = 45°$, σ_d = 193.2 Mpa, BHN = 250 for pinion and gear. Check only tangential tooth load. **[12]**

$Y = \pi (0.154-0.912/Z_e)$, $C_v = 5.55/5.55+V^{0.5}$

Total No. of Questions : 12]

SEAT No. :

P2405

[Total No. of Pages : 5

[5153]- 32
T.E. (Automobile)
AUTOMOTIVE ENGINE DESIGN
(2008 Pattern) (Semester - II) (316483)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) Derive an expression for efficiency of dual cycle. **[6]**

b) An engine working on Otto cycle has a volume of 0.45 m^3, pressure 1 bar and temperature 30ºC at the beginning of compression stroke. At the end of compression stroke, the pressure is 11 bar. 210kj of heat is added at the constant volume. Determine: **[10]**

i) p, T and V at salient points in the cycle.

ii) % clearance

iii) Efficiency

iv) Net work per cycle

v) Power development, if rpm = 210

OR

Q2) a) Derive an expression for thermal efficiency of Diesel cycle. **[6]**

b) In an air standard diesel cycle, the compression ratio is 16. At the beginning of isentropic compression the temperature is 15ºC and pressure is 0.1 MPa. Heat is added until the temperature at the end of constant pressure process is 1480ºC. Calculate: **[10]**

i) the cut-off ratio

ii) the heat added per kg of air

iii) the cycle efficiency

iv) mean effective pressure.

P.T.O.

Q3) a) Explain the design consideration of combustion chamber for SI engine. **[6]**

b) In a single cylinder four stroke petrol engine has the following specification: Brakepower=7.35 kW **[10]**

Speed = 5000 r.p.m

Brake mean effective pressure = 0.21MPa

Bore to stroke ratio = 0.909

Compression ratio = 6

Determine the bore and length of cylinder.

OR

Q4) a) Explain selection of firing order. **[6]**

b) A four stroke S.I engine produces 35kW power with a mechanical efficiency of 80%. The fuel-air ratio is 1:14 and the fuel consumption of the engine is 0.4 kg/k Whr. The heating value of fuel is 43000 kJ/kg. Find: **[10]**

i) indicated power

ii) the friction power

iii) the brake thermal efficiency

iv) the indicated thermal efficiency

v) the fuel consumption per hour

vi) the air consumption per hour

Q5) a) Explain dry sump lubrication system with neat sketch. **[8]**

b) A two stroke diesel engine was subjected to motoring test. The wattmeter reading was 1.6 kW. The engine was then tested for one hour and following observation were noted. Observations: **[10]**

i) net brake torque = 125 Nm

ii) engine r.p.m = 610

iii) fuel consumption = 2.7 kg

iv) calorific value of the fuel = 41000kJ/kg

v) cooling water used = 825 kg

vi) temperature rise of cooling water = 8ºC

vii) temperature rise of exhaust gases = 350ºC

viii) room temperature = 30ºC

ix) air fuel ratio = 32:1

x) specific heat of exhaust gas = 1.05kJ/kg-k

calculate:

1) brake power

2) indicated power

3) mechanical efficiency

4) indicated thermal efficiency

5) heat balance on minute and percentage basis

OR

Q6) a) Describe the types of radiator and explain their advantages and applications. **[6]**

b) A two stroke engine was motored when the meter reading was 1.5k.W. then the test on the engine was carried out for one hour and the following observations were recorded: **[12]**

Brake torque = 125 Nm

Speed = 600 rpm

Fuel used = 2.5 kg

Calorific value of fuel = 40.3 MJ/kg

Cooling water used = 818kg

Rise in temperature of cooling water = 10ºC

Exhaust gas temperature = 345ºC

Room temperature = 25ºC

A/F = 32:1

Determine:

i) B.P

ii) I.P

iii) Mechanical efficiency

iv) Indicated thermal efficiency

v) Draw heat balance sheet on minute basis and also in percentage.

SECTION - II

Q7) a) A piston made up of grey cast iron FG200, is to be used for a four stroke petrol engine with the following specification: **[10]**

Cylinder bore = 100mm

Stroke = 120 mm

Maximum gas pressure = 5 N/mm^2

Break mean effective pressure = 0.65 N/mm^2

Fuel consumption = 0.227 kg/kW-h

Higher calorific value of fuel = 42000 kJ/Kg

Speed = 2200 r.p.m

Thermal conductivity of cast iron = 46W/m°C

Allowable temperature difference for piston = 222°C

It is assumed that 5% of the total heat developed in the cylinder is absorbed by the piston. If the required factor of safety is 5, determine:

i) The thickness of piston head;

ii) The thickness of piston barrel;

iii) The numbers and size of reinforcing ribs, if required.

b) The cylinder of a four-stroke petrol engine, made of grey cast iron FG200, has a bore diameter 250mm and is subjected to maximum gas pressure of 3.0 N/mm^2. Poisson's ratio for the cylinder material is 0.25. The reboring factor for the cylinder wall is 7.5mm. if the required factor of safety for the cylinder wall is 5, determine: **[8]**

i) the thickness of cylinder wall

ii) the stresses induced in cylinder wall

OR

Q8) a) Design a connecting rod, made of alloy steel 40Ni3 for four stroke petrol engine with the following data: **[18]**

Piston diameter = 100mm

Stroke = 140 mm

Length of connecting rod, center to center = 315mm

Weight of reciprocating parts = 18.2N

Speed = 1500 r.p.m with possible over speed of 2500 r.p.m

Compression ratio =4:1

Maximum explosion pressure = 2.45 N/mm^2

Number of bolts used for big end =2

Material for bolts = 40 Ni3

Yield strength of alloy steel, 40 Ni3 = 600N/mm^2

Factor of safety = 5

Permissible bearing pressure between piston pin and small end connecting rod bearing = 25N/mm^2

Permissible bearing pressure between crank pin and big end connecting rod bearing = 10 N/mm^2.

Q9) a) Explain the cylinder leakage test procedure. **[8]**

b) Explain the cylinder ignition timing. **[8]**

OR

Q10) Write short note on: **[16]**

a) Exhaust gas analyzer.

b) Mechanical fuel pumps testing.

c) Vacuum gauge test

d) Distributors dwell angle.

Q11) a) Explain variable timing engine. **[8]**

b) Write the advantages of Wankle engine over duel fuel engine. **[8]**

OR

Q12) a) Write a short note on Duel fuel engine and DTS-i. **[8]**

b) Explain the homogeneous compression charge ignition (HCCI) engine. **[8]**

Total No. of Questions :12]

SEAT No. :

P2406

[Total No. of Pages :4

[5153] - 33

T.E. (Automobile Engineering)

AUTOMOTIVE TRANSMISSION

(2008 Course) (Semester - II)

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

Instructions to the candidates:

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

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

b) With neat sketch explain single plate clutch. **[6]**

c) Differentiate in-between FEFWD and RERWD. **[5]**

OR

Q2) a) What are the Clutch lining materials? List down the desirable properties of the lining materials. **[4]**

b) Explain Synchromesh gearbox with neat sketch. **[6]**

c) List down the different clutch lining materials? What are its general requirements? **[6]**

Q3) a) Explain the Hotchkiss drive layout with neat sketch. **[6]**

b) Explain constant velocity joint with neat sketch. **[4]**

c) Explain the construction and working of Constant Mesh gearbox with neat sketch. **[8]**

OR

P.T.O.

Q4) a) Explain all wheel drive with net sketch. **[6]**

b) Explain centrifugal clutch with neat sketch. **[4]**

c) Discuss the following: **[8]**

i) Driving thrust

ii) Torque Reaction

iii) Lubrication of gearbox

Q5) a) What is the purpose of the final drive? Explain the type of final drive with neat sketch. **[8]**

b) With neat sketch explain the conventional type of differential? **[8]**

OR

Q6) a) What is the function of the rear axle? Explain the loads acting on the rear axle. **[8]**

b) Discuss the following: **[8]**

i) Semi Floating Rear Axle

ii) Full Floating Rear Axle

iii) Three quarter Floating Rear Axle

Q7) a) With neat sketch explain the Fluid Flywheel. **[8]**

b) An epicyclic gear train as shown in fig. has a Sun wheel S of 30 teeth and two planet wheels P of 50 teeth each. The Planet wheels mesh with internal teeth of a fixed annulus A. The driving shaft is connected to the arm, which carries the planet wheels. The driving shaft carrying the sun wheel transmits 4 KW at 300 RPM. Determine the speed of the driven shaft and the tore transmitted if the overall efficiencey is 95%. **[10]**

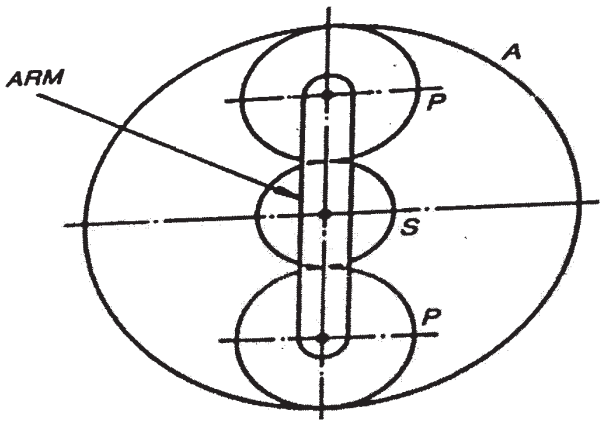

Fig. 1

OR

Q8) a) Explain with neat sketch Torque converter. **[8]**

b) An epicyclic gear train consist of a sun wheel S, a stationary internal gear E and the identical planet wheels P carried on a star shaped planet carrier C. The size of different toothed wheels is such that the planet carrier C rotates at 1/5th of the speed of sun wheel S. The minimum number of teeth on any wheel is 16. The driving torque on the sun wheel is 98.1 Nm. Determine the **[10]**

i) Number of the teeth on different wheels of the train, And

ii) Torque necessary to keep the internal gear stationary.

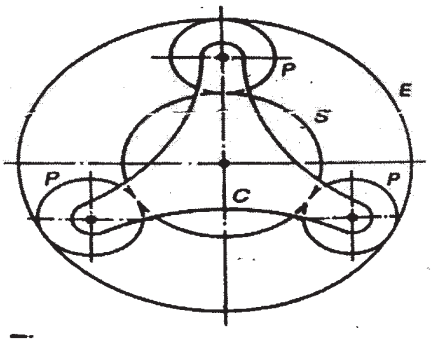

Fig 2

Q9) a) What is mean by Hydromatic transmission? Explain it in the breif. **[8]**

b) With neat sketch explain the continuous Variable Transmission (CVT). **[8]**

OR

Q10)a) List down the advantages and disadvantages of the Continuous Variable Transmission. (CVT). **[8]**

b) Differentiate in-between Manual and Automatic Transmission. **[8]**

Q11)a) With neat sketch explain the Torque Tube drive in detail. **[8]**

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

i) Propeller Shaft.

ii) Constant Velocity Joint.

OR

Q12)a) With neat sketch explain in detail Electromagnetic Clutch. **[8]**

b) Explain the clutch used in any light motor vehicle (motorcycle) with neat sketch. **[8]**

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Total No. of Questions : 12]

SEAT No. :

P2407

[Total No. of Pages : 3

[5153]-34
T.E. (Automobile)
AUTOTRONICS
(2008 Pattern) (Semester-II) (316485)

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

Instructions to the candidates:

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

SECTION-I

Q1) a) Explain working principle of resistive transducer with two examples. **[6]**

b) Define and explain concept of precision and accuracy. **[4]**

c) Explain priciple of working of Anti Lock Brake system. **[6]**

OR

Q2) a) Explain working principle of thermoelectric transducer with two examples. **[6]**

b) Define and explain concept of linearity and hysterisis. **[4]**

c) Explain principle of working of Air Bag system. **[6]**

Q3) a) Explain construction, working and application of electromagnetic sensors. **[8]**

b) Explain classification of Manifold Absolute Pressure (MAP) sensors; Explain construction & working of any one of them. **[8]**

OR

P.T.O.

Q4) a) Explain construction and classification of combustion knock sensor. **[6]**

b) Explain working principle of temperature sensor. **[4]**

c) Explain principle of working and classification of exhaust gas sensor. **[6]**

Q5) a) Explain construction, working and applications of programmable logic controllers. **[8]**

b) Explain working of internal relays and timers in PLC. **[6]**

c) Explain working of power windows. **[4]**

OR

Q6) Write short note on follwoing: **[3×6=18]**

a) Sequential and combinational logic.

b) Counters in PLC

c) Analog to digital converter.

SECTION-II

Q7) a) Explain the sequential fuel injection technique with the detail line diagram. **[9]**

b) Discuss the ignition module functions for current limit, dwell and coil life. **[9]**

OR

Q8) a) Discuss in deatil electronic ignition system. **[6]**

b) Spark timing control method, devices and trouble shooting. **[6]**

c) Explain injection management and list fuel system components. **[6]**

Q9) a) Draw layout of ABS system and explain working. **[8]**

b) List various vehicle management systems, their components, and subcomponents. Explain any one. **[8]**

OR

Q10)a) Draw layout of electric power steering and explain working. **[8]**

b) Explain sensors used in vehicle management systems for crash and for security system. **[8]**

Q11)a) Explain operation of electronic stability system. **[8]**

b) Explain operation of rollover mitigation system. **[8]**

OR

Q12)a) Discuss latest vehicle safety features in modern car. **[8]**

b) Explain stability, rollover and other essential vehicle running safety features for automobiles. **[8]**

Total No. of Questions :12]

SEAT No. :

P2408

[Total No. of Pages :3

[5153] - 35

T.E. (Automobile)

VEHICLE BODY ENGINEERING

(2008 Pattern) (Semester - II) (316486)

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

Instructions to the candidates:

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

SECTION-I

Q1) a) Explain with a neat sketch wind tunnel testing having open circuit? And what do you mean by scale model testing? Explain briefly? **[10]**

b) What is Aerodynamic drag & lift? Explain the drag coefficients for different vehicles? **[8]**

OR

Q2) a) How side force is developed by the air flow? How does it affect on the vehicle performance? **[10]**

b) Explain the various optimization techniques for minimum drag? **[8]**

Q3) a) Sketch and explain typical car body nomenclature terms. **[10]**

b) Explain the terms visibility and blind area. **[6]**

OR

P.T.O.

Q4) a) Sketch five types of cars classified as per styling forms. Write two constructional features of each with application. **[10]**

b) Explain various safety features you would incorporate in car body. **[6]**

Q5) a) Write six differences between double deck bus and single deck bus. **[6]**

b) Explain the difference between frame and shell construction. **[5]**

c) List four factors considered for design emergency door. **[5]**

OR

Q6) a) Prepare a suitable layout for seating layout for luxury bus with their Features. **[6]**

b) What are motor rules regarding driver seats. **[5]**

c) What factor you will consider for designing a passenger vehicle carrying passenger within city area. **[5]**

SECTION-II

Q7) a) Sketch the different types vehicle body also write their features and application. **[8]**

b) List six major requirement of driver cabinet. What factor to be considered to design driver cab for truck. **[8]**

OR

Q8) a) What factors you will consider for designing a commercial vehicle carrying? **[8]**

i) LPG gas from Pune to Kolhapur.

ii) Milk from Nashik to Mumbai.

iii) Heavy unshaped component form Delhi to Bangalore.

b) What is the different design consideration for commercial vehicle Body work. **[8]**

Q9) a) Explain the symmetric & Asymmetric loading with neat sketch? **[10]**

b) Explain shear panel method of structure analysis. **[6]**

OR

Q10)a) What is open integral structure? Explain how structure takes bending and torsion with neat diagram. **[10]**

b) Define and explain with sketches working and non-working joints. **[6]**

Q11)a) Explain why and how energy absorbing system is used in automobile. **[6]**

b) What is ergonomics? How it can be applied in designing drivers seat in luxury bus. **[6]**

c) Explain the any two safety system used in Automobile. **[6]**

OR

Q12)a) Write and explain safety devices which are in incorporated in the vehicle. **[6]**

b) Sketch the different seat used in automobile. **[6]**

c) Explain Anthropometry with neat sketch. **[6]**

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Total No. of Questions :12]

SEAT No. :

P2409

[Total No. of Pages :4

[5153] - 41

T.E. (Electronics)

FEEDBACK CONTROL SYSTEM

(2008 Course) (Semester - I) (304201)

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

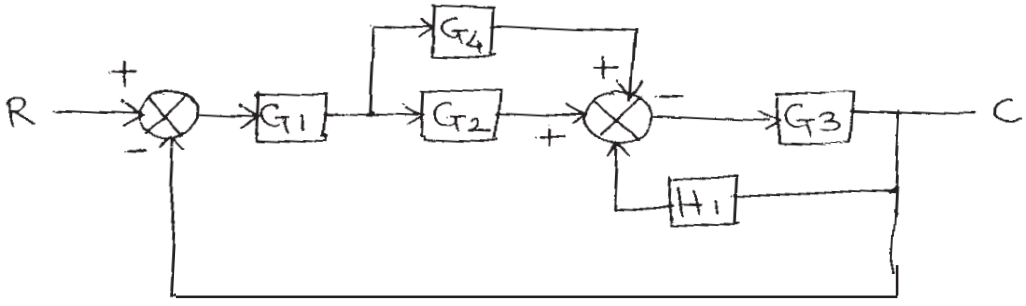
Instructions to the candidates:

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

SECTION-I

Q1) a) Distinguish between Open Loop & Closed Loop. **[8]**

b) Reduce the block diagram into a single equivalent block using block diagram reduction technique and obtain $\frac{C(s)}{R(s)}$. **[8]**



OR

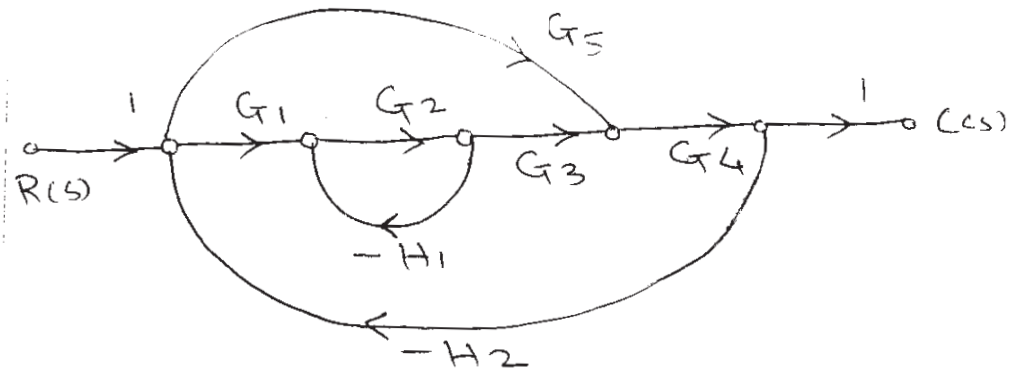
Q2) a) Write Short Notes on: **[8]**

i) Feed back & Feed Forward Control System.

ii) Steeper Motor.

P.T.O.

b) Find $\frac{C(s)}{R(s)}$ by using Mason's gain formula. **[8]**



Q3) a) State the Routh's criteria. A Unity Feedback Control system has. **[8]**

$G(s)=\frac{K}{S(S+1)(S+2)(S+5)}$. Find the range of K for the Stability of the System using Routh's Criteria.

b) What are static error coefficients? Derive the formulae for each. **[8]**

OR

Q4) a) For the system with Transfer function. **[8]**

$G(s)=\frac{1}{(S+3+7j)(S+3-7j)}$ Draw the pole zero plot and find the damping ratio, natural frequency, peak time and maximum overshoot.

b) Using the Routh Hurwitzs criteria determine the. **[8]**

i) No. of roots in left half of S-Plane.

ii) No. of roots in right half of S-Plane.

iii) The stability of the System whose Characteristic equation is

$S^4 + 8S^3 + 18S^2 + 16S + 5 = 0$.

Q5) a) Explain the following terms and their importance. **[6]**

i) Phase Margin.

ii) Gain Margin.

b) A Unity feedback control system has a open loop transfer function as **[12]**

$$G(s) = \frac{10}{s(1+0.5s)(1+0.1s)}$$

Sketch the Bode Plot and determine from it.

i) Gain Cross Over Frequency.

ii) Phase Crossover Frequency

iii) Gain Margin.

iv) Phase Margin.

OR

Q6) a) State the Nyquist Stability Criteria. How to determine gain Margin and phase Margin. **[6]**

b) Sketch the generalized Nyquist path and explain its sections. **[6]**

c) State the advantages of Nyquist plot? **[6]**

SECTION-II

Q7) a) Define the below terms: **[8]**

i) State

ii) State Variables.

iii) State Vectors.

iv) State Space.

b) Obtain the state transition matrix for the system: **[8]**

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

OR

Q8) a) Obtain the State Space model using with transfer function. **[8]**

$Y(s) = 1$

$U(s) = (S^2 + 5s + 6)$

b) Define the terms for Second Order System: **[8]**

i) State Variables.

ii) State Space.

iii) State Vector.

iv) State Trajectory.

Q9) a) Explain the Piezoelectric Pressure Transducer. **[8]**

b) State the PID Control Mode and State Characteristics. **[8]**

OR

Q10)a) Explain the PLC Operating modes. **[8]**

b) Draw the ladder diagram for number of Tank Filling Machine. **[8]**

Q11)a) Explain how fuzzy logic control scheme can be applied for temperature control of process. **[9]**

b) Explain the Fuzzification and Defuzzification methods. **[9]**

OR

Q12)a) Write a Short note on Artificial Neuron. **[9]**

b) Explain the various types of neural networks used in the Control System. **[9]**

Total No. of Questions : 12]

SEAT No. :

P3606

[Total No. of Pages : 4

[5153]-42

T. E. (Electronics)

DATA COMMUNICATION

(2008 - Pattern)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) What are the noise reduction techniques? Explain the matched filter method. **[8]**

b) Explain following processes with neat diagram : **[8]**

i) Stationary Random Process

ii) Non-Stationary Random Process

iii) Wide Sense Stationary Process

iv) Ergodic Process.

OR

Q2) a) Show that if a wide sense stationary process X(t) is passed through a LTI filter with impulse response h(t) then its output has constant mean square value. **[8]**

b) Explain various probability distribution functions. **[8]**

P.T.O.

Q3) a) Explain need of synchronizer in digital multiplexing. What is bit synchronization? Explain working of early-late bit synchronizer with neat diagram. **[8]**

b) What are multilevel coding schemes? Explain MLT-3 **[8]**

OR

Q4) a) What is Inter Symbol Interference and Eye Pattern? Explain interpretation of an eye pattern with neat diagram. **[8]**

b) Plot frequency spectrum for RZ and NRZ, Unipolar and Polar format, Manchester format for basic line codes for 11001010. **[8]**

Q5) a) Determine the encoded message for the following 8-bit data codes using the following CRC generating polynomial $P(x) = x_4 + x_3 + x_0$: **[10]**

i) 11001100

ii) 01011111

b) Explain ARQ system in detail. **[8]**

OR

Q6) a) For a (6, 3) systematic LBC. three parity bits given as,

$C_4 = d_i + d_2$, $C_5 = d_2 + d_3$, $C_6 = d_i + d_3$, **[10]**

i) Determine generator matrix

ii) Construct code generated by this matrix

iii) Determine error capacity of the code

iv) Prepare syndrome decoding table

v) If received vector is 101101 and 100011, determine message words.

b) Explain in detail Viterbi decoding algorithm with an example. **[8]**

SECTION - II

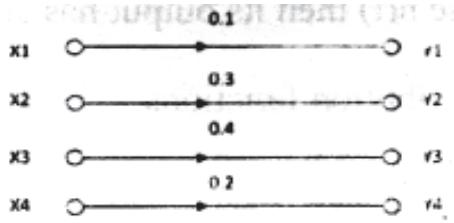
Q7) a) Explain entropy with its mathematical analysis. **[8]**

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 $p_1=p_4=1/8$ and $p_2=p_3=3/8$. Find out information rate of source. **[8]**

OR

Q8) a) Derive expression for the channel capacity of an ideal AWGN channel with infinite bandwidth. **[8]**

b) Determine different entropies, mutual information and channel capacity for following channel. **[8]**



Q9) a) Explain the working of DPSK transmitter and receiver. **[8]**

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. **[8]**

i) PN sequence length

ii) Chip duration of PN

iii) PN sequence period.

OR

Q10)a) Binary data transmitted at a rate of 25 Mbps over a channel whose bandwidth is 10 MHz. Find energy per bit at the receiver input for a coherent BPSK and DPSK to achieve error probability $P_c \leq 10^{-4}$. Assume $N_0/2 = 10^{-10}$ W/Hz. **[8]**

b) Explain with the help of neat block diagram QPSK transmitter and receiver. Also give the mathematical analysis. **[8]**

Q11)a) Compare TDMA, FDMA and CDMA. **[10]**

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

OR

Q12)a) Explain working principle of slotted ALOHA, ALOHA, CSMA and CSMA/CD. **[8]**

b) A FHSS system has following parameters. **[10]**

i) No. of bits/symbol = 4

ii) No. of symbols/hop= 4.

Calculate processing gain of the system.

If the above system is changed to SHSS with following parameters

i) No. of bits/symbol = 4

ii) No. of symbols/hop = 7

Calculate processing gain of the SHSS.

Total No. of Questions : 12]

SEAT No. :

P2410

[Total No. of Pages :5

[5153]- 43

T.E. (Electronics Engineering)

NETWORK SYNTHESIS AND FILTER DESIGN

(2008 Pattern) (Semester - I)

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

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 from section I and attempt Q.No. 7 or Q.No. 8, Q.No.9 or Q.No. 10, Q.No.11 or Q.No. 12 from Section - II.***
2) ***Answer to the two sections should be written in separate answer books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Determine the range of K so that polynomial $P(s) = s^3 + 14s^2 + 56s + K$ is Hurwitz. **[6]**

b) Explain the concept and physical significance of poles and zeros. **[6]**

c) Test whether $F(s) = \frac{s(s+3)(s+5)}{(s+1)(s+4)}$ is positive real function. **[6]**

OR

Q2) a) What is Hurwitz's polynomial? State and explain properties of the same in details. **[6]**

b) Explain the following basic removal operations. **[6]**

i) Removal of pole at infinite from impedance function.

ii) Removal of pole at origin from impedance function.

c) Synthesize the following by removal of poles at infinity

$$Z(s) = \frac{(s^2+1)(s^2+9)}{s(s^2+4)}$$ **[6]**

P.T.O.

Q3) a) Give the properties of driving point LC impedance function. **[4]**

b) Realize the following function using foster - I and cauer - I form,

$$Z(s)=\frac{(s+1)(s+4)}{s(s+2)}$$ **[8]**

c) Identify and Realize the following function using cauer - I form

$$Z(s)=\frac{s^2+2s+2}{s^2+s+1}$$ **[4]**

OR

Q4) a) Give the properties of driving point RL impedance function. **[4]**

b) Synthesize the following function using foster - II and cauer - II method. **[8]**

$$Z(s)=\frac{(s+1)(s+3)}{(s+2)(s+4)}$$

c) Synthesize the following function using cauer - II form, **[4]**

$$Z(s)=\frac{s(s^2+4)}{(s^2+1)(s^2+9)}$$

Q5) a) What is zeros of Transmission? Explain the concept in details. **[6]**

b) Synthesize the following transfer function with 1Ω termination

$$\frac{V_2}{V_1}=\frac{s^2-s+1}{s^2+s+1}$$ **[4]**

c) Synthesize open circuit voltage ratio transfer function, $\frac{V_2}{V_1}=\frac{1}{(s+2)(s+5)}$ using RC ladder network. **[6]**

OR

Q6) a) Realize the following transfer function. **[8]**

$$Z_{12}(s) = \frac{2}{s^3 + 3s^2 + 4s + 2}$$

b) Realize the following voltage transfer function. **[8]**

$$\frac{V_2}{V_1} = \frac{(s+2)(s+4)}{(s+3)(3s+4)}$$

SECTION - II

Q7) a) Explain frequency scaling and Impedance scaling with suitable example. **[6]**

b) Find the order and transfer function of Low pass butterworth approximation filter whose requirements are characterize by, A_{max} = 1 dB, A_{min} = 30 dB, ω_p = 80 rad/ sec, ω_s = 350 rad/sec. **[6]**

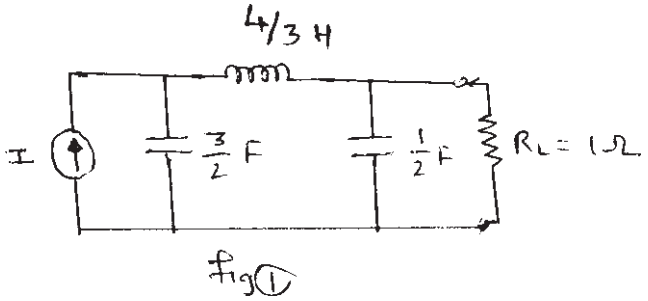
c) Compare butterworth and chebyshev filter. **[6]**

OR

Q8) a) Write a short note on frequency transformation. **[6]**

b) Determine the normalize transfer function that realize the second order chebyshev response with 0.2 dB ripple in the pass band. **[6]**

c) Normalized third order low pass filter is shown in fig (1), Design the corresponding High pass filter with its cut-off frequency $\omega_c = 10^6$ rad/ sec and the impedance level of 500Ω **[6]**



fig①

Q9) a) Differentiate between passive and active filter. **[4]**

b) What is cascade approach in active filter synthesis? Explain in brief and list the advantage of the approach. **[6]**

c) Synthesize the following high pass filter using RC-CR transformation, where 'K' is arbitrary constant. **[6]**

$$T_{HP}(s) = \frac{Ks^2}{s^2 + s + 25}$$

OR

Q10)a) Design second order Low pass butterworth active RC filter with cut-off frequency f_c = 1.5kHz (use positive feedback topology) **[4]**

b) Synthesze the second order LPF to have a pole frequency of 10kHz and a pole Q of 5 using saraga design of sallen and key circuit. **[6]**

c) Explain the different biquad feedback topologies used in active filter designing and list the important observations. **[6]**

Q11)a) For the series RLC circuit shown in fig (2) below. **[6]**

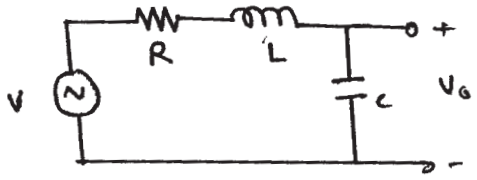


fig (2)

Calculate the sensitivity of the resonant frequency (ω_p), the quality factor (Q_p) and the gain constant (K) with respect to R, L and C.

b) Explain the effect of the following op-amp characteristics on the active filter. **[6]**

i) CMRR

ii) Slew rate

iii) Dynamic range

c) What is sensitivity? Write the properties of sensitivity function. **[4]**

OR

Q12)a) Prove the following sensitivity relationships. **[8]**

i) $S_x^{p^n} = n\, S_x^p$

ii) $S_{\sqrt{x}}^p = 2\, S_x^p$

iii) $S_x^{\sqrt{p}} = \frac{1}{2} S_x^p$

iv) $S_{x^n}^p = \frac{1}{n} S_x^p$

b) Explain the concept of gain sensitivity? Also explain the various factors affecting the gain sensitivity. **[8]**

Total No. of Questions : 12]

SEAT No. :

P2411

[Total No. of Pages : 2

[5153]-44
T.E.(Electronics)
304204: MICROCONTROLLERS
(2008 Pattern) (Semester-I)

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

Instructions to the candidates:

1) ***Attempt Q.1or Q.2, Q.3 or Q.4, Q.5 or Q.6 From Section-I .***
2) ***Attempt Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12 from Section-II.***
3) ***Answers to the two sections should be written in separate answer-books.***
4) ***Neat diagram must be drawn wherever necessary.***
5) ***Assume suitable data if necessary.***

SECTION-I

Q1) a) With a neat diagram explain architecture feature of 8 bit microprocessor. **[8]**

b) Explain the various criteria to choose the microcontroller. **[4]**

c) Compare Harvard and Van-Neumann architecture. **[6]**

OR

Q2) a) Explain the 8051 microcontroller architecture with suitable block diagram. **[8]**

b) Explain the limitation of 8 bit Microcontroller. **[4]**

c) Compare 8051, 8052 and 8031 microcontroller. **[6]**

Q3) a) What is mean by addressing modes? What are the types of addressing modes? Explain with suitable examples any three addressing modes of 8051. **[8]**

b) Explain the port 1 of 8051 Microcontroller with suitable diagram. **[8]**

OR

Q4) a) Explain different timer/counter modes of 8051. **[8]**

b) Ten hex numbers are stored in RAM Location 50H onwards. Write a program to find the largest number in the set. The largest number should be finally saved in 60 H location. **[8]**

Q5) a) Draw and explain with the help of flow chart 4*4 key board interfacing with 8051 microcontroller **[8]**

b) Draw and explain pin configuration of ADC 0808. **[8]**

OR

P.T.O.

Q6) a) Write a program to interface 16*2 LCD with 8051 Microcontroller to display the "SPPU" on first position in second row of LCD. **[8]**

b) Assuming that XTAL Frequency =22 MHz, write a program to generate a pulse train of 2 seconds period on pin p2.4. Use timer 1 in mode 1.**[8]**

SECTION-II

Q7) a) Explain the 8051 connection to RS232 with suitable diagram. **[8]**

b) Explain I2C Protocol with timing diagram. **[8]**

OR

Q8) a) Explain the following buses in details **[8]**

i) RS-232

ii) RS-485.

b) Explain SPI Protocol with diagram. **[8]**

Q9) a) Explain PIC 18 Architecture With suitable block diagram. **[10]**

b) Explaim the working register (WREG) in PIC Microcontroller. **[6]**

OR

Q10)a) Write a C18 Program to toggle only the PORTB.4 bit continuously every 50ms. Use timer 0, 16 bit mode, the 1:4 prescaler to create the delay. Assume that XTAL=10MHZ. **[8]**

b) Explain the File Register of the PIC 18FXXX. **[8]**

Q11)a) Explain in brief various steps involved in the designing of data acquisition system. **[14]**

b) Explain why PIC is popular as compare with 8051 microcontroller**.** **[4]**

OR

Q12)a) Explain the characteristics of following temperature sensor **[9]**

i) RTD

ii) Thermister

iii) Thermocouple

iv) IC Temperature sensor

b) Explain how the speed of the DC motor controlled by PWM. **[4]**

c) Explain the working Principle of DC motor. **[5]**

Total No. of Questions : 12]

SEAT No. :

P2412

[Total No. of Pages : 3

[5153]- 46
T.E. (Electronics)
DRIVES AND CONTROLS
(2008 Pattern) (Semester - II) (304207)

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

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10, Q11 or Q12.***
2) ***Answers to the two sections should be written in separate book.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right side indicate full marks.***
5) ***Assume Suitable data if necessary.***
6) ***Nonprogrammable electronic pocket calculator is allowed.***

SECTION - I

Q1) a) Draw and explain the working of single phase semi-converter feeding a separately excited d.c. motor. Explain with typical waveforms, the operation in continuous and discontinuous armature current modes. **[8]**

b) Explain the following power factor improvement techniques for single phase converters; i) Symmetrical angle Control ii) Extinction angle Control. **[10]**

OR

Q2) a) Explain the basic characteristics of a separately excited DC motor. What is base speed? Explain how to control the speed of a separately excited DC motor above and below the rated speed. **[6]**

b) The speed of a separately excited dc motor is controlled by a single phase semiconverter. The field current is also controlled by a semi converter and is set to maximum possible value. The ac supply voltage to the armature and field converter is single phase 230 V, 50 Hz. The armature resistance and field resistance are 0.4Ω & 150Ω respectively, and the motor voltage constant is $K_v = 0.7$ V/A rad/s. The load torque is 50 N.m at 1200 rpm. The armature and field currents are continues and ripple free.

Determine: i) the field current ii) the firing angle of armature converter. **[6]**

c) What is the need of reversible drives? Explain with circuit diagram the operation of four quadrant chopper drive. **[6]**

P.T.O.

Q3) a) With the help a neat block diagram. Explain the operation of Microcontroller based DC drive. State its advantages. **[8]**

b) Explain open loop and closed loop control of DC drives with Transfer function. **[8]**

OR

Q4) a) What is PLL? Explain PLL based speed control of DC motor using block diagram. **[8]**

b) What is braking? Explain different types of braking techniques for a dc machine. **[8]**

Q5) a) What are the different speed control techniques of a three phase Induction motor? Explain the significance of V/f control for 3 phase Induction motor. Explain the requirements of a 3 phase induction motor drive. **[8]**

b) What is the need of vector control in Induction Motors? Briefly explain vector control of 3 phase induction motors. **[8]**

OR

Q6) a) Draw and explain torque-slip curve of induction motor and mark the stable operating point. Explain various operating regions like motoring, regeneration and plugging. **[8]**

b) With the help of block diagram explain closed loop speed control of 3 phase induction motor. **[8]**

SECTION - II

Q7) Write Short notes on **[18]**

a) Cylindrical rotor motor Drive

b) Synchronous Reluctance motor drive

c) Salient pole motor Drive

OR

Q8) a) With the help of block schematic explain Scalar control of a 3 phase induction motor. **[10]**

b) With the help of block schematic explain Separate and self control of Synchronous motor. **[8]**

Q9) a) With the help of a neat circuit diagram and waveforms explain the operation of 3 phase brushless dc motor drive. State the applications of 3 phase brushless dc motor drive. **[8]**

b) Mention various types of stepper motors. Explain the operation of any one type of stepper motor. Enlist the applications of stepper motors. **[8]**

OR

Q10)a) With the help of block schematic explain the typical Switched Reluctance motor drive. State advantages and disadvantages of Switched Reluctance motor drive. **[8]**

b) Compare brushless dc motor with conventional dc motor. **[4]**

c) Explain a simple driver circuit for stepper motor. **[4]**

Q11)a) Write short note on: Traction motor drive. **[8]**

b) Enlist different applications of neural network in drives and control. Explain the operations of Fuzzy logic based Induction motor drive. **[8]**

OR

Q12)a) What is Neuro fuzzy system? Explain Adaptive network based Fuzzy Interface System. **[8]**

b) Explain the operation of neural network based PWM controller. **[8]**

Total No. of Questions : 12]

SEAT No. :

P2413

[Total No. of Pages : 2

[5153]- 47
T.E. (Electronics)
SENSORS AND INTERFACES
(2008 Pattern) (Semester - II)

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

Instructions to candidates:

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

SECTION - I

Q1) a) List and explain performance parameters of Sensors/transducers. **[8]**

b) Explain pH Measurement. **[8]**

OR

Q2) a) Explain capacitance probe type level sensing technique for conducting and non-conducting liquid. **[8]**

b) Explain with neat diagram pitot tube flow meter. **[8]**

Q3) a) Compare thermocouple, RTD and semiconductor temperature sensors. **[8]**

b) Explain with neat diagram I/P and P/I converters. **[8]**

OR

Q4) a) Write a short note on SMART transmitter. **[8]**

b) Explain various analog signal conditioning techniques. **[8]**

Q5) a) Explain selection criteria for ADCs related to sensor interfacing. **[8]**

b) Enlist the features of PIC micro controller. Draw and explain interfacing of 4 × 4 matrix keyboard with PIC 16F84. **[10]**

OR

P.T.O.

Q6) a) Draw and explain the interfacing of LCD to 8051 microcontroller. **[10]**

b) Explain any two types of DAC. **[8]**

SECTION - II

Q7) a) Write short note on IEEE488 bus standard. **[8]**

b) Write short note on 12C protocol. **[8]**

OR

Q8) a) Explain two communication modes of HART protocol. **[8]**

b) Explain Foundation Field-bus technology with respect to process control networks. **[8]**

Q9) a) Explain with neat diagram directional control valves. **[8]**

b) Explain with neat diagram working of: **[8]**

i) Solenoid valve ii) Poppet valve

OR

Q10)a) Explain with neat diagram working of a single acting and double acting hydraulic cylinder actuators. **[8]**

b) Draw control valve characteristics and explain the terms linear, equal percentage and quick opening. **[8]**

Q11)a) Draw relay ladder symbols for various input and output devices which can be interfaced to PLC. Explain various selection Criteria for a PLC? **[10]**

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

i) Analog Input / Output of PLC

ii) Interfacing Input and Output devices with PLC

OR

Q12)a) Define scan cycle of a PLC. Explain with neat diagram architecture of PLC. Explain advantages of PLC. **[10]**

b) Give important specifications and selection criterion of a PLC. **[8]**

Total No. of Questions : 12]

SEAT No. :

P2414

[Total No. of Pages :3

[5153]-48

T.E.(Electronics Engineering)

MICROCOMPUTER BASED SYSTEM

(2008 Pattern) (Semester-II) (304209)

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

Instructions to the candidates:

1) ***Answers the Q.1 OR Q.2 and Q.3 OR Q.4 and Q.5 OR Q.6, Q.7 OR Q.8, Q.9 OR Q.10, Q.11 OR Q.12.***
2) ***Answer any three questions from each section.***
3) ***Neat diagram must be drawn wherever necessary.***
4) ***Figures to the right side indicate full marks.***
5) ***Use of Calculator is allowed.***
6) ***Assume suitable data, if necessary.***

SECTION-I

Q1) a) Explain pipelining in 8086 also write the advantage of pipelining. **[8]**

b) Explain the following addressing modes of 8086 processor with suitable examples. **[8]**

i) Register Indirect

ii) Immediate

iii) Register

iv) Relative based indexed

OR

Q2) a) Draw and explain 8086 processors architecture in detail. **[8]**

b) Explain the concept of segmentation and address translation process in 8086. **[8]**

P.T.O.

Q3) a) Explain following instructions with example. **[8]**

i) SAL AL, 1

ii) AAA

iii) TEST AL, 10b

iv) LOOPZ state 3

b) Write an assembly language program in 8086 for sorting of ODD and EVEN numbers contained in an array of 100 bytes is stored at location 9000H;. Store the ODD numbers at 8000H and EVEN at 4200H. **[8]**

OR

Q4) a) Explain Interrupt structure of 8086 microprocessor in detail. **[8]**

b) Write a program in assembly language of 8086 to convert a 3 digit hexadecimal number stored in register into its ASCII equivalent. **[8]**

Q5) a) Draw and explain programmers model of 80386 **microprocessor** in protected mode. **[10]**

b) Explain the process of changing privilege levels in 80386 microprocessor. **[8]**

OR

Q6) a) What do you mean by descriptor tables? Explain how physical address is calculated using descriptors in GDT and selectors? **[8]**

b) What is paging in 80386? How paging is controlled through control registers? **[10]**

SECTION-II

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

i) BIOS

ii) PS2 port

iii) Serial and parallel printer interface

b) Draw and explain block diagram of IBM PC Pentium based mother board. **[10]**

OR

Q8) a) Explain the different pins associated with USB interface. What are the different types of data transfers associated with USB? **[8]**

b) List the name of buses found on the Pentium motherboard. Identify the high and low speed buses and explain their features them in brief. **[10]**

Q9) a) Explain with suitable example the following instructions of ARM processor. **[8]**

i) MUL R1, R2, R3

ii) LDR R2, [R3]!

iii) ADD R0, R1, R2

iv) LDMIA R0!, {R1–R3}

b) Explain the features of ARM processor. List applications of ARM processor. **[4]**

c) What is significance of special purpose registers r13, r14, r15? **[4]**

OR

Q10)a) Draw and explain data flow model of ARM 7core? **[8]**

b) Explain CPSR and SPSR register in ARM core. **[8]**

Q11)Design 8086 processor based stepper motor control. The stepper connected to the processor through 8255 and suitable driver circuit. The motor is having a step angle of 1.8 degrees. Draw appropriate interfacing circuitry, driver circuitry, flow chart and write a program to drive the motor through 200 steps with a delay of 800 mS. **[16]**

OR

Q12)Design 8086 based system to monitor temperature of the water pipe used in process control industry. The system will take input from the temperature sensorPT100. The output of the system is connected to the heater through relay switch. The system turns the heater ON if temperature falls below 50 degrees Celsius and turns OFF if temperature rises above 50 degree Celsius. Design suitable signal conditioning circuitry, draw complete interface diagram using 8255 of equivalent as I/O port and suitable 8bit ADC. Draw the flowchart and write the program in assembly language which initialization of the peripherals. **[16]**

Total No. of Questions : 12]

SEAT No. :

P2415

[Total No. of Pages :2

[5153]-49
T. E. (Electronics)
INDUSTRIAL MANAGEMENT
(2008 Course) (Semester-II) (End Sem.) (304210) (Theory)

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

Instructions to the candidates:

1) ***Answer to two sections to be written in separate answer books.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

SECTION-I

Q1) a) Explain in detail FW Taylor priniples of management. **[9]**

b) Explain in detail forms of ownerships of organisation. **[9]**

OR

Q2) a) What is system? Describe various activities to functional subsystems. **[9]**

b) What is the role of Decision Making? Discuss about system approach to problem solving. **[9]**

Q3) a) Define strategy. Explain Mintzberg's 5 P's of strategy. **[8]**

b) Explain in detail ETOP. **[8]**

OR

Q4) a) Discuss Ansoff model tracing analysis of strategic management. **[8]**

b) Select any one type of industry; carry out its SWOT analysis in detail? Explain the importance of SWOT analysis? **[8]**

Q5) a) Define quality? List different quality management assistant tools. Explain any one in detail. **[8]**

b) Define Kaizen. State benefits and principles of Kaizen. **[8]**

OR

Q6) a) Explain concept of ISO 9000 quality system. **[8]**

b) What is Pareto analysis? Discuss Pareto chart . When it is used? **[8]**

P.T.O.

SECTION-II

Q7) a) Explain CPM in detail. **[10]**

b) What is Cost Benefit Analysis? Discuss limitations and applications of Cost Benefit Analysis. **[8]**

OR

Q8) a) Write note on break even analysis. Discuss assumptions & limitations and applications of break even analysis. **[10]**

b) Explain SEBI. What are important functions and responsibilities of SEBI? **[8]**

Q9) a) What are the benefits of training? Explain with suitable examples. **[8]**

b) Explain the objectives of HRM. **[8]**

OR

Q10)a) Explain Human Resource Information System. **[8]**

b) Explain career planning in brief. **[8]**

Q11)a) State goals of E-commerce. Give advantages and disadvantages of E-commerce. State scope of E-commerce. **[8]**

b) Explain different phases of ERP implementation. Explain different components of ERP implementation. **[8]**

OR

Q12)a) Describe C2B model. State advantages of C2B model. **[8]**

b) Explain in detail business process re-engineering. **[8]**

♦ ♦ ♦

Total No. of Questions :12]

SEAT No. :

P2416

[Total No. of Pages :4

[5153] - 50
T.E. (Electronics)
DISCRETE TIME SIGNAL PROCESSING
(2008 Course) (Semester - II) (304211)

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

Instructions to candidates:

1) ***Answer any three questions from each section.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Your answers will be valued as a whole.***
5) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
6) ***Assume suitable data if necessary.***

SECTION-I

Q1) a) An analog signal is described by **[6]**

$$x(t) = 3\cos 2000\pi t + 5\sin 6000\pi t + 10\cos 12000\pi t$$

i) Determine the minimum sampling rate to avoid aliasing.

ii) Write the equation of discrete time signal obtained after sampling?

b) Draw and explain the block diagram of digital signal processing system.**[6]**

c) Obtain the direct form I and direct form II realizations for the system:**[6]**

$$y(n) = 0.3y(n-1) + 0.1y(n-2) + 2x(n) + 0.4x(n-2)$$

OR

Q2) a) Determine the impulse response of the system described by the difference equation: **[6]**

$$y(n) = 0.6y(n-1) - 0.08y(n-2) + x(n)$$

b) Explain direct form II structures for realization of LTI discrete time sytems. **[6]**

c) Determine the response of the system h(n) = {1/2 1/4 1/2} to the input x(n) = {3 2 4 3}. **[6]**

P.T.O.

Q3) a) Compute 4 point DFT of the following sequence: **[6]**

$x(n) = \{1\ 1\ 1\ 1\}$

b) Compute the circular convolution of the following sequence: **[6]**

$x_1(n) = \{4\ 3\ 2\ 1\}$ $x_2(n) = \{1\ 2\ 1\ 2\}$

c) Explain the following properties of DFT **[4]**

i) Time Shifting

ii) Circular Convolution

OR

Q4) a) Compute the 8 point DFT of the following sequence using DIT_FFT algorithm **[10]**

$x(n) = \{1\ 2\ 3\ 4\ 4\ 3\ 2\ 1\}$

b) The DFT of a sequence is given by **[6]**

$X(k) = \{10\ -2+2j\ -2\ -2\ -2j\}$

Determine the time domain sequence.

Q5) a) Compute the Z transform of **[9]**

i) $x(n) = (1/2)^n\ u(n) + 3^n\ u(-n-1)$

ii) $x(n) = na^n\ u(n)$

iii) $x(n) = 2^n\ u(n-2)$

b) The system is characterized by **[7]**

$$H(z) = \frac{1 - z^{-1}}{1 - 0.2z^{-1} + 0.15z^{-2}}$$

Determine h(n) for

i) Causal system

ii) Anticausal system

iii) Non-causal system

OR

Q6) a) Compute the inverse Z transform of **[6]**

$$X(z) = \frac{1}{1 - 1.5z^{-1} + 0.5z^{-2}}$$

i) ROC: $|z| > 1$

ii) ROC $|z| < 0.5$

b) Find the Z transform of **[6]**

i) $x(n) = \frac{-n}{e^{40}}$ Draw pole zero diagram.

ii) $x(n) = -\frac{1^n}{5}\, u(n) + 5\frac{1^{-n}}{2}\, u(-n-1)$.

c) Find the system function H(z) and difference equation, if impulse response of the system is $h(n) = 2(0.5)^n u(n)$. **[4]**

SECTION-II

Q7) a) Explain the impulse invariant technique. What is its drawback? How Bilinear transformation overcomes it? **[8]**

b) Design digital Butterworth filter using bilinear transformation for the following specifications. Assume T = 1 sec. **[10]**

$$\sqrt{0.5} \leq |H(\omega)| \leq 1 \quad 0 \leq \omega \leq \pi/2$$

$$|H(\omega)| \leq 0.2 \quad 3\pi/4 \leq \omega \leq \pi$$

OR

Q8) a) Explain and compare different window functions w.r.t. transition band, main lobe, and peak side lobe. **[6]**

b) Design a lowpass filter using frequency sampling method: **[12]**

Passband: 0-5 kHz

Sampling rate: 18 kHz

Length of filter: 9

Q9) a) Explain the process of decimation. **[8]**

b) Explain the polyphase filter structure used for interpolation. **[8]**

OR

Q10)a) Explain the sampling rate conversion by a non-integer factor. **[8]**

b) Explain the application of multirate signal processing in Compact HI-Fi systems. **[8]**

Q11)a) Explain the factors that influence the selection of a digital signal processor. **[8]**

b) Explain the following units of a digital signal processor. **[8]**

i) MAC unit

ii) Pipelining

OR

Q12)a) Explain five important salient features of TMS320C28XX digital signal processor and draw its functional block diagram. **[8]**

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

i) Harvard Architecture

ii) Barrel Shifter

EEE

Total No. of Questions :12]

SEAT No. :

P2417

[Total No. of Pages :4

[5153] - 51

TE (Electronics and Telecommunication)

CONTROL SYSTEMS

(2008 Course) (Semester - I)

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

Instructions to the candidates:

1) ***Answer 03 questions from Section I and 03 questions from Section II.***
2) ***Answers to the two sections should be writeen in separate books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
6) ***Assume suitable data, if necessary.***

SECTION-I

Q1) a) State the block diagram reduction rules. **[8]**

b) Determine the transfer function Y(s)/ R(s) using Mason's gain formula for the system shown in Figure No.1. **[8]**

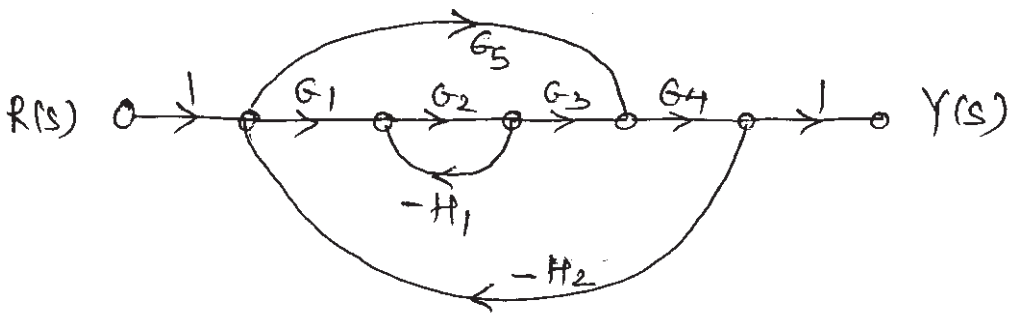


figure No.1

OR

P.T.O.

Q2) a) Obtain the transfer function Y(s)/R(s) using block diagram reduction rules for the system shown in Figure No.2. **[8]**

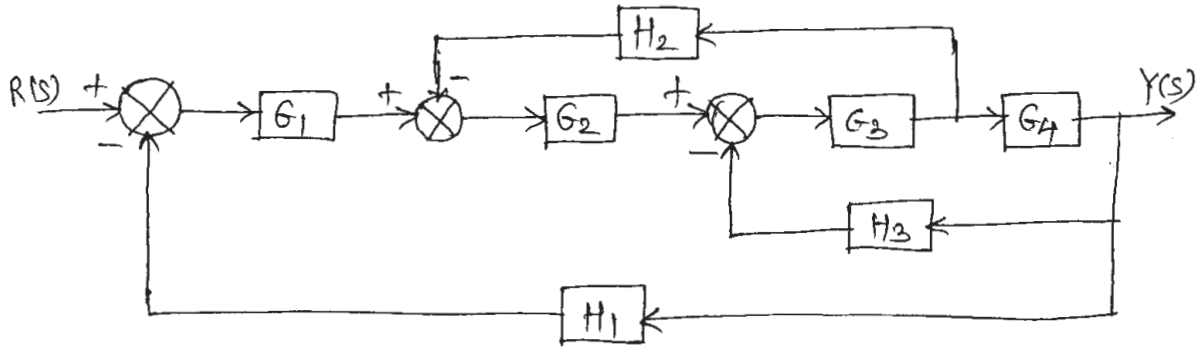


Figure No. 2

b) Determine the transfer function $V_0(s)/V_{in}(s)$ for the system shown in Figure No.3. **[8]**

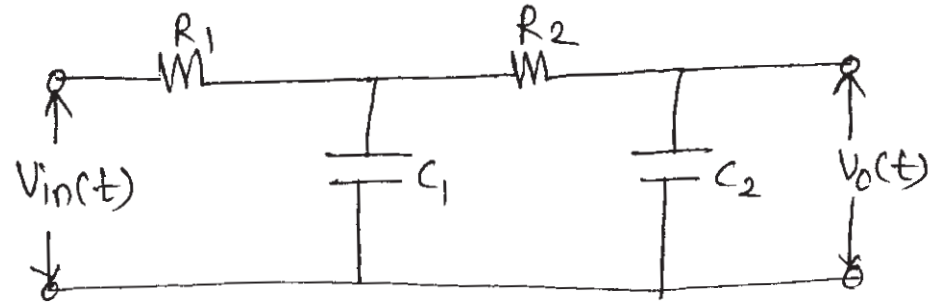


Figure No. 3

Q3) a) Sketch the root locus of unity feedback system with open loop transfer function $G(s) = \dfrac{K}{s\,(s+3)\,(s+4)}$ **[10]**

b) Investigate the stability of a system with characteristic equation $Q(s) = s^6 + 9s^5 + 20s^4 + 12s^3 + 8s^2 + 16s + 16 = 0$ **[6]**

using Routh stability criterion.

OR

Q4) a) Explain the steps involved in sketching Root locus. **[8]**

b) For the unity feedback system with open loop transfer function $G(s) = \dfrac{100}{s\,(s+10)}$. Determine ξ, w_n, w_d, t_r, t_p, t_s *and* m_p. **[8]**

Q5) a) Draw the Bode plot for the system with open loop transfer function $G(s) = \frac{50}{s(s+2)(s+10)}$. Determine gain and phase margins, gain and phase crossover frequencies. Comment on stability. **[12]**

b) For the system with closed loop transfer function $G(s) = \frac{100}{s^2 + 12s + 100}$ determine ξ, w_n, m_r, w_r. **[6]**

OR

Q6) Explain Nyquist stability criterion and sketch Nyquist plot of unity feedback system with open loop transfer function. $G(s) = \frac{10}{s(s+1)(s+5)}$. Comment on stability. **[18]**

SECTION-II

Q7) a) Determine the controllable canonical and observable canonical state model of the system with transfer function.

$$G(s) = \frac{2s^2 + 6s + 1}{s^3 + 6s^2 + 7s + 9}.$$ **[8]**

b) Derive the expression for obtaining transfer function from state model and obtain the transfer function of the system with state model matrices. **[8]**

$$A = \begin{bmatrix} 0 & 1 \\ -2 & 3 \end{bmatrix}, B = \begin{bmatrix} 0 \\ 1 \end{bmatrix}, C = \begin{bmatrix} 2 & 5 \end{bmatrix}, D = \begin{bmatrix} 0 \end{bmatrix}$$

OR

Q8) a) Investigate the state controllability and observability of a system with state model matrices. **[8]**

$$A = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -2 & -3 & -4 \end{bmatrix}, B = \begin{bmatrix} 0 \\ 0 \\ 2 \end{bmatrix}, C = \begin{bmatrix} 1 & 0 & 2 \end{bmatrix}$$

b) Determine the state transition matrix for **[8]**

$$A = \begin{bmatrix} 0 & 1 \\ -5 & -6 \end{bmatrix}$$

Q9) a) Draw the block diagram of PID controller. Write its equation. Obtain its transfer function and list the features. **[8]**

b) List different control actions in PID controller. Write their equations and features. **[8]**

OR

Q10)a) Explain position and velocity algorithms of PID controller. **[8]**

b) Explain the process of elevator system and draw its ladder diagram. **[8]**

Q11)a) Explain level control system and temperature control system with the help of neat instrumentation diagrams. **[12]**

b) Draw the block diagram of digital control system and list its advantages over analog control system. **[6]**

OR

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

a) Model reference adaptive control.

b) Self tuning regulator.

Total No. of Questions : 12]

SEAT No. :

P2418

[Total No. of Pages :3

[5153]-52

T.E. (E & TC)

DIGITAL COMMUNICATION

(2008 Course) (Semester-I)

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

Instructions to the candidates:

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

SECTION-I

Q1) a) Draw and explain block diagram of digital Communication system. Discuss various formatting techniques involved in it. **[10]**

b) If a TV signal of 4.5 MHz bandwidth is transmitted using 8 bit binary PCM,

Determine:

i) The minimum signal to quantization noise ratio.

ii) The minimum bit rate.

iii) The minimum transmission bandwidth needed. **[8]**

OR

Q2) a) What is linear predictive coding technique, explain with the help of block diagram. **[8]**

b) A multifrequency signal to be converted to digital form using PCM. The frequencies contained in the signal are 2KHz, 5KHz, 8KHz, and 10KHz. Find the minimum sampling rate. Also find the Bandwidth for PCM transmission if the number of bits are 8/ sample. **[10]**

Q3) a) For the given data stream draw various line codes such as NRz, RZ, Manchester and AMI. Bits stream: 10101110. **[8]**

b) Explain scrambling operation with the help of suitable example. **[8]**

OR

Q4) a) With the help of block diagram explain PCM-TDM System. **[8]**

b) The T1 carrier system which multiplexes 24 voice channels based on 8 bit PCM. The signal is sampled at 8 KHz. A single bit is added at the end of each frame for synchronization. Calculate.

i) Duration of each bit.

ii) Transmission rate of PCM-TDM system. **[8]**

P.T.O.

Q5) a) Explain classification of Random process with mathematical expressions. **[8]**

b) If $X(t) = A \cos(w_c t + \phi)$ is a random process with ϕ as a random variable uniformly distributed over $(0, 2\pi)$. Determine mean and Autocorrelation function for the same. **[8]**

OR

Q6) a) Suppose that a WSS random process X(t) with power spectrum Sxx(w) is the in put to the filter shown in figure. Find the power spectrum of the output process y(t) **[8]**

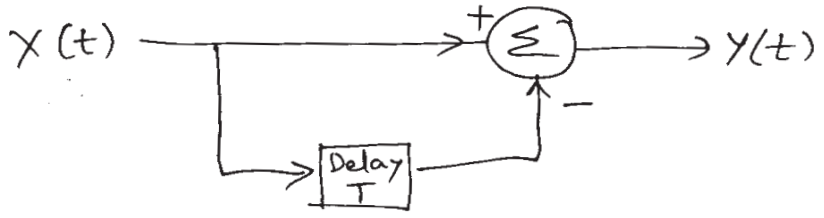


Figure .

b) What is Bandpass Random process? Derive and sketch PSDs of quadrature components of a Bandpass random process. **[8]**

SECTION-II

Q7) a) Draw and explain the block diagram of QPSK modulation system. Draw necessary waveforms. **[10]**

b) For an FSK system, the following data are observed,

Transmitted binary data rate= 2.5×10^6 bits/sec.

Power spectral density of noise = 10^{-20} W/Hz.

Amplitude of received signal = 1μ V.

Determine the average probability of symbol error assuming coherent detection. **[8]**

OR

Q8) a) Draw and explain block diagram of DPSK modulation scheme. **[10]**

b) Considering the data stream as 10110 draw waveforms for MSK system. **[8]**

Q9) a) With the help of suitable diagram explain the concept of matched filter. **[8]**

b) For an equiprobable binary baseband data the optimal receiver receives –5mV for O and + 5mV for 1, corrupted with white noise of PSD 10^{-9} W/Hz. With optimum decision thereshold what is the probability of error in reception if data rate is 9600 bits/sec? **[8]**

OR

Q10)a) Derive an expression for impulse response of matched filter. **[8]**

b) Draw neat schematic of correlation receiver and explain in detail. **[8]**

Q11)a) In a DSSS-CDMA system, the data rate f_b=6Kbps. And the chip rate f_c=12mb/s. What is the Jamming margin if an output SNR of 10d B is required for a Pe = 10^{-5}? Assume a system loss of 1.5dB. **[8]**

b) Draw and explain with the help of waveforms FHSS system. **[8]**

OR

Q12)a) Define following terms. **[8]**

i) Cell.

ii) Cell splitting.

iii) Frequency Reuse.

iv) Duplexing.

b) Design a hypothetical experiment to measure path loss L_s, at frequencies f_1= 30MHz and f_2=60MHz. when the distance between the transmitter and receiver is 100 km. Find the effective area of the receiving antenna, and calculate the path loss in decibels for each case. **[8]**

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Total No. of Questions :12]

SEAT No. :

P2419

[Total No. of Pages :4

[5153] - 53

T.E. (E & TC)

NETWORK SYNTHESIS AND FILTER DESIGN

(2008 Course) (Semester - I)

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

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4 and Q.5 or Q.6 from section I.***
2) ***Solve Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12 from section II.***
3) ***Assume suitable data if necessary.***

SECTION-I

Q1) a) What is positive real function? Give necessary and sufficient conditions for a function to be positive real function. **[6]**

b) Test whether the following polynomial is Hurwitz

$$F(s)=s^4+s^3+5s^2+3s+4.$$ **[6]**

c) Synthesis the following positive real function: **[6]**

$$Z(s)=\frac{s^2+2s+6}{s\,(s+3)}.$$

OR

Q2) a) Explain the concept and physical significance of poles and zeros. **[6]**

b) When is the network said to be **[8]**

i) Stable

ii) Causal

State and explain the conditions for stability and causality of a network function.

c) State the properties of all types of filters. **[4]**

P.T.O.

Q3) a) State the properties of RLC driving point functions and explain its synthesis procedure. **[6]**

b) Synthesize the following function by cauer first and second form

$$Z(s) = \frac{(s + 2)(s + 5)}{(s + 1)(s + 3)}.$$ **[10]**

OR

Q4) a) Find the Foster - I and Foster - II forms of the following transfer function:

$$Z(s) = \frac{(s + 1)(s + 3)}{s(s + 2)}.$$ **[8]**

b) State the properties of RC dp impedance and RL dp impedances. **[6]**

c) Gvie the essential properties of RLC admittance function. **[2]**

Q5) a) Explain the concept and significance of zeros of transmission in network synthesis. **[6]**

b) Synthesize $Z_{21}(s) = \frac{2}{s^3 + 3s^2 + 4s + 2}$ in to LC ladder network with 1 ohm termination. **[6]**

c) What do you mean by a constant resistance network? Derive the open circuit parameters of a bridge circuit. **[4]**

OR

Q6) a) Synthesize $\frac{V_2}{V_1} = \frac{s^2 + 1}{s^2 + 2s + 1}$. **[6]**

b) Realize $H(s) = \frac{KS}{(s + 4)(s + 2)}$ using RC ladder n/w. **[6]**

c) State the properties of transfer function. Obtain the transfer function of a two port terminated network in terms of Z parameters. **[4]**

SECTION-II

Q7) a) Explain the frequency scaling and impedance scaling. **[6]**

b) Give basic properties of Chebyshev filter. Obtain the transfer function of second order normalised low pass Chebyshev filter. **[6]**

c) Design third order Butterworth approximation high pass filter with cut off frequency $w_0 = 10^6$ rad/s, and $R_0 = 500\Omega$. Using frequency transformation. **[6]**

OR

Q8) a) Explain the concept and necessity of approximation technique in filter designing. **[6]**

b) Derive the expression of transfer function of normalised LPF of second order butterworth filter. **[6]**

c) The specifications fo a Chebyshev filter are: **[6]**

Passband ripple = 0.5 dB

Passband = 0 to 2.5 MHz

Stopband attenuation = 40 dB

Stopband frequency = 5 MHz.

i) Determine the order 'n' of the filter.

ii) Draw its pole location in s-plane.

Q9) a) Write short note on RC-CR transformation. **[6]**

b) Draw a neat diagram of positive feedback topology and derive the transfer function of the positive feedback topology assuming an ideal Op-Amp. **[10]**

OR

Q10)a) Synthesis the given real pole transfer function using an active RC circuit with only two Op-Amps. **[8]**

$$T(s) = \frac{-(s+8)}{(s+3)(s+4)}.$$

b) Explain the different biquad feedback topologies used in active filter designing and list the important observations. **[8]**

Q11)Write short notes on: **[16]**

a) FDNR

b) Effect of CMRR on filter response.

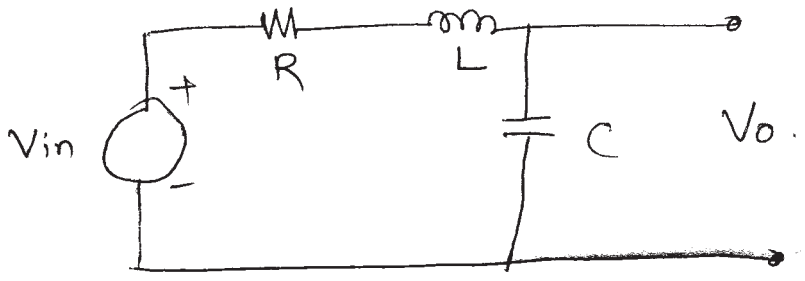
c) Op-Amp frequency compensation.

d) Multielement derivation.

OR

Q12)a) What are the factors affecting gain sensitivity? Explain them. **[8]**

b) Find the transfer function (Vo/Vin) for a RLC circuit. Compute the sensitivities for K, Wp and Qp to the elements. **[8]**



EEE

Total No. of Questions : 12]

SEAT No. :

P2420

[Total No. of Pages : 3

[5153]-54
T.E. (E & TC)
MICROCONTROLLERS AND APPLICATIONS
(2008 Pattern) (Semeseter - I)

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

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.***
2) ***Answers to the two Sections should be written in separate answer books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume Suitable data if requires.***

SECTION - I

Q1) a) Explain the difference between Microprocessor & Microcontroller. **[8]**

b) Explain the need of power saving modes in Microcontrollers. Explain power down and idle mode in detail. **[8]**

OR

Q2) a) Explain Harvard and Von-Neumann Architecture. **[8]**

b) Draw & explain the architecture of Microcontroller in detail. **[8]**

Q3) a) Explain format of TMOD register in 8051 Microcontroller in detail. **[8]**

b) Explain structure of internal memory for 8051. Also explain why stack pointer is initialized to 07H after a reset. **[8]**

OR

Q4) a) Explain port structure of 8051 in detail and configure ports as input and output. **[8]**

b) What is the signficance of PSW register. Explain with example. **[8]**

P.T.O.

Q5) a) Explain following: **[10]**

i) Editor

ii) Simulator

iii) Assembler

iv) Cross-Compiler

v) Embedded 'C'

b) Write assembly language program for interfacing LED. Also draw and explain interfacing. **[8]**

OR

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

i) JNZ

ii) POP

iii) MOVX

iv) ACALL

v) LCALL

b) State and explain various addressing modes in 8051 with an example each. **[8]**

SECTION - II

Q7) a) Interface 8 bit DAC to 8051 microcontroller. Write ALP for getting following waveforms at output. **[8]**

i) Triangular

ii) Square wave

b) Explain the operation of I2C bus with START, STOP conditions. **[8]**

OR

Q8) a) Explain the operation of SPI bus. **[8]**

b) Interface 8K of RAM and 4K of EPROM to 8051. Assume suitable starting addresses. **[8]**

Q9) a) Explain Embedded C program to blink LED, connected to any port of PLC after every 250 μS. **[8]**

b) Explain the role TRIS register for PLC Microcontroller with suitable example. **[8]**

OR

Q10)a) Explain the oscillator circuit for PLC family and explain role of BOR. **[8]**

b) Write a C program to get a byte of data from Port A, if the value of the byte sent is less than 1000, then transmit it to PORT B, otherwise transmit it to PORT D. Assume suitable delay. **[8]**

Q11)a) Design a Microcontroller based path follower robot. **[8]**

b) Design 8051/PLC based system to measure temperature. Display the temperature on LCD. Draw the interfacing diagram. Write algorithm and program for the same. **[10]**

OR

Q12) With algorithm and Flowchart, design a general Data Acquisition system using 8051 or PLC 18 for parameters like temperature, pressure, humidity. Design appropriate signal conditioning circuits. Display the output parameters on appropriate output devices. Draw a complete block diagram. **[18]**

Total No. of Questions : 12]

SEAT No. :

P2421

[Total No. of Pages : 4

[5153]-55

T.E. (Electronics & Telecommunications)

DIGITAL SIGNAL PROCESSING

(2008 Course) (Semester - I)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) State any four advantages of Digital Signal Processing over Analog Signal Processing. **[4]**

b) Obtain the direct form I, direct form II realization of the following system. **[8]**

$$y(n)=0.75\,y(n-1)-0.125\,y(n-2)+6x(n)+7x(n-1)+x(n-2).$$

c) Determine the impulse response $h(n)$ for the system described by the difference equation. **[6]**

$$y(n)-3y(n-1)-4y(n-2)=x(n)+2x(n-1)$$

OR

Q2) a) State and prove the following properties of Z transform **[8]**

i) Convolution of two sequences.

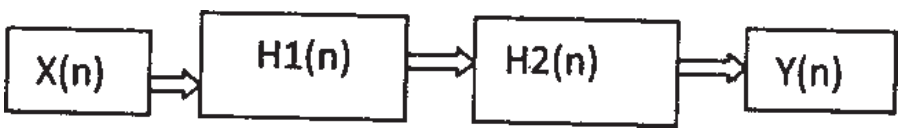
ii) Differentiation in Z domain.

b) Find the response of the cascade system shown if **[10]**

$H_1(n) = [1/2, 1/4, 1/2]$ $H_2(n) = \delta(n-2)$

And $x(n) = \delta(n+2) - 3\,\delta(n-1) - 4\,\delta(n-3)$

Are given to the input $x(n)$ =



P.T.O.

Q3) a) Explain DIF algorithm for FFT calculation in detail. **[6]**

b) Explain the difference between FT, DTFT and DFT with formula and find the DFT for following sequence **[10]**

i) $x(n) = \{1, 1, 0, 0\}$

ii) $x(n) = (-1)n$ for $0 < n < 3$.

OR

Q4) a) A linear time -invariant system is characterized by the system function

$$H(z)=\frac{3-4z^{-1}}{1-3.5z^{-1}+1.5z^{-2}}$$

Specify the ROC OF H(z) and determine h(n) for the following conditions: **[8]**

i) The system is stable

ii) The system is causal

iii) The system is anticausal

b) Draw the signal flow graph complete in all respect for 8 point DIT FFT. **[8]**

Q5) a) Compute the inverse Z transform .ROC |Z|> 1 **[8]**

$$Z = \frac{1}{(1+Z^{-1})(1-Z^{-1})^2}$$

b) Perform the circular convolution of the following sequences **[4]**

$x1(n) = \{1, 2, 3, 4\}$ $x2(n) = \{2, 1, 2, 1\}$

c) Explain scaling and shifting properties of ROC of Z-transforms. **[4]**

OR

Q6) a) Find H(z) and determine its poles and zeros **[8]**

$y(n) = 3/4\ y(n-1) - 1/8y\ (n-2) + x(n)$ state, if system is stable?

b) Compute the Z transform and ROC for both sided sequence **[8]**

$x(n) = a^n u(n) + b^n u(n-1)$

comment on ROC when $a > b$ and $a < b$.

SECTION - II

Q7) a) Design a second order Discrete Time Butterworth LPF whose cutoff frequency is 1 KHz at a sampling frequency of 10,000 Hz using BLT method. **[10]**

b) What are the advantages of digital filter over analog filter? Why the ideal filters are not realizable? Draw a typical practical response of filter and show the different specifications required to design a filter. **[8]**

OR

Q8) a) Convert the following analog filter to a digital filter using impulse invariant technique assume T = 1s. **[8]**

$$H(s) = \frac{1}{(s+1)(s+2)}.$$

b) Show that the bilinear transformation maps $j\Omega$ -axis in the s-plane onto unit circle in z-plane, and maps the left half s-plane inside the unit circle in z-plane. **[4]**

c) Explain window functions in detail: **[6]**

i) hamming

ii) hanning

iii) kaiser

Q9) a) What is the principle of down sampling? What is the importance of antialiasing filter? Derive the expression for decimated output signal ($y(m)$). **[6]**

b) What is the need of polyphase interpolation? Explain in detail polyphase interpolator. **[4]**

c) Name the two general methods used for sampling rate conversions with their advantages and disadvantages. Also explain the application of DAC in compact Hi-Fi systems. **[6]**

OR

Q10)a) Explain sampling rate conversion by a non-integer factor. **[8]**

b) With the help of suitable diagram mathematical equation show that decimation is a not a time invariant process. **[8]**

Q11)a) Explain five important salient features of TMS 320C67xx digital singal processor and draw its functional block diagram. **[8]**

b) Explain the necessity of: **[8]**

i) Pipelining in DSP Processor.

ii) VLIW architecture in DSP Processor.

OR

Q12)a) Explain the desired features of DSP processor and compare it with microprocessor. **[8]**

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

i) barrel shifter

ii) MAC Unit

Total No. of Questions : 12]

SEAT No. :

P2422

[Total No. of Pages : 4

[5153]-56

T.E. (Electronics & Telecommunication)
SIGNAL CODING & ESTIMATION THEORY
(2008 Course) (304187) (Semester - II)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) Consider a DMS 'X' with two symbols x_1 and x_2 with probabilities $p(x_1) = 0.9$ and $p(x_2) = 0.1$. Find the efficiency and redundancy of this code and its second order extension (Use Huffman code) **[8]**

b) Show that mutual information is always positive. Also calculate H(X), H(X,Y), H(X/Y), H(Y/X) and I(X,Y) for a channel with three inputs x_1, x_2 and x_3 and three output y_1, y_2, y_3. **[10]**

$$P(Y/X) = \begin{bmatrix} 0.8 & 0.2 & 0 \\ 0.1 & 0.3 & 0.6 \\ 0 & 0.3 & 0.7 \end{bmatrix}$$

$p(x_1) = 1/3$, $p(x_2) = 1/3$, $p(x_3) = 1/3$.

OR

Q2) a) Determine the Lempel ziv code for the following bit stream. **[8]**

0100011111001101011011110000

Recover the original sequence from the encoded stream.

b) Calculate variation in codevector of Huffman code and Shannon fano code of following DMS. **[10]**

$$p(x_1) = 0.4, p(x_2) = 0.2, p(x_3) = 0.2, p(x_4) = 0.1, p(x_5) = 0.1$$

P.T.O.

Q3) a) Explain JPEG compression standards and its application. **[8]**

b) For a systematic linear block code, the three parity check bits C4, C5, C6 are given by **[8]**

$C4 = d1 \oplus d2 \oplus d3$

$C5 = d1 \oplus d2$

$C6 = d1 \oplus d3$

i) Calculate dmin.

ii) Justify this code is perfect or not.

iii) Calculate transmitted codevector for message bit 101.

iv) Calculate syndrome for received codevector 000110.

OR

Q4) a) Show that the Shannon's limit for an AWGN channel is equal to - 1.6Db, in the information capacity theorem. **[8]**

b) Write short notes on any two of the following: **[8]**

i) Fire code

ii) Wavelet error control coding.

iii) Sphere packing problem.

Q5) a) Determine the code tree and trellis diagram for the convolutional encoder as shown in figure given below (Fig.1) **[8]**

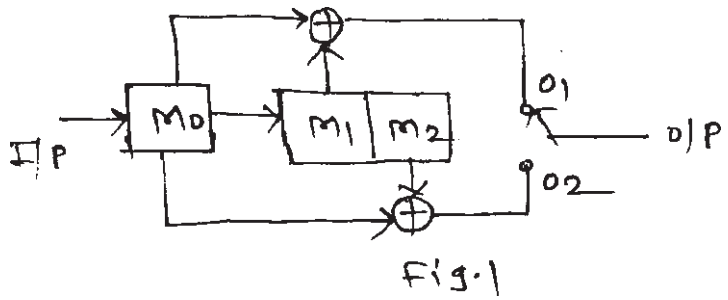


Fig.1

b) Explain Turbo code in detail. **[8]**

OR

Q6) a) A rate 1/3 convolution encoder has generating vectors as $g_1 = (001)$, $g_2 = (011)$, $g_3 = (110)$ **[12]**

i) Sketch encoder

ii) Draw state diagram

iii) If input message sequence is 101101 determine the output sequence of the encoder

b) Explain Asymptotic coding gain. **[4]**

SECTION - II

Q7) a) For the (255,225) Reed-Soloman code **[8]**

i) How many bits are there in a symbol of the code?

ii) What is block length in bits.

iii) What is minimum distance of the code?

iv) How many symbols in error can the code correct

b) Consider the BCH (15,5) triple error correcting code with the generator polynomial $g(x) = x^{10} + x^8 + x^5 + x^4 + x^2 + x + 1$. Find the error using Gorenstein Zierler algorithm in received Polynomial $x^6 + x^4$. **[10]**

OR

Q8) a) Find Minimal polynomial of GF (16) whose transfield is GF (2) with primitive polynomial $x^4 + x + 1$. **[10]**

b) Explain RSA algorithm and substitution ciphers. **[8]**

Q9) a) What is Bayesian Estimation? Find the Bayesian estimation with squared error as cost function. **[8]**

b) Consider the problem where the observed samples are $Y_k = M + N_k$ $k = 1,2,3....k$, M and N_k are statistical independent Gaussian random variables with zero mean and variance $\sigma 2$. Find $\hat{m}_{ms,} \hat{m}_{map}$ and $\hat{m}_{mave}$. **[8]**

OR

Q10)a) Explain Kalman filter in context of estimation theory. **[8]**

b) State and explain cramer-Rao inequality for a random parameter. **[8]**

Q11)a) Give MAP criteria and explain multiple hypothesis for three regions H0, H1, H2. Hence give the criterion to select the hypothesis. **[8]**

b) In on-off keying system, the source transmits signal of amplitude 1 volt or 0 volt. Noise n(t) is added which has zero mean and variance = 1 and it is Gaussian set up the LRT (Likelihood Ratio Test) for this problem. **[8]**

OR

Q12)a) Explain Generalized likelihood ratio tests (GLRTs) and its one application in detail. **[8]**

b) Derive the expression for minimax cost. **[8]**

x x x

Total No. of Questions : 12]

SEAT No. :

P2423

[Total No. of Pages : 2

[5153]- 57
T.E. (E & TC)
SYSTEM PROGRAMMING & OPERATING SYSTEM
(2008 Pattern) (Semester - II)

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

Instructions to candidates:

1) ***Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10, Q11 or Q12.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume suitable data, if necessary***
4) ***Answers to the two sections should be written in separate answer-books.***

SECTION - I

Q1) a) Explain algorithm of Pass I of two pass assembler. **[8]**

b) Explain elements of formal language with example. **[6]**

c) List the Assembler directives and explain any one with example. **[4]**

OR

Q2) a) Explain program generation and program execution in language processing. **[8]**

b) Explain linear and nonlinear data structure used in language processing. **[6]**

c) Explain YACC tool in brief. **[4]**

Q3) a) Explain macro lexical expansion with example. **[8]**

b) List and explain code optimization techniques. **[8]**

OR

Q4) a) Explain positional and keyword parameters of Macro with examples. **[8]**

b) Explain phases of compiler with example. **[8]**

Q5) a) Explain dynamic loading and dynamic linking. **[8]**

b) List and explain the steps in software development. **[8]**

OR

P.T.O.

Q6) a) Explain absolute and relocatable loaders. **[8]**

b) Explain in details structure of the editor. **[8]**

SECTION - II

Q7) a) Explain the Bankers algorithm for deadlock avoidance with example. **[10]**

b) Explain reader writer and dining philosopher IPC classical problems with solutions. **[8]**

OR

Q8) a) Explain first come first serve, shortest job first and round robin process scheduling algorithms with examples. **[10]**

b) Draw and explain the process state diagram. **[8]**

Q9) a) Consider the following page reference string. **[8]**

1, 2, 3, 4, 1, 5, 6, 3, 2, 3, 1, 4, 5, 6, 4.

The number of page frames = 4. Calculate page faults and the hit ratio for First out page replacement algorithm.

b) Explain best fit, first fit worst fit algorithms used in swapping. **[8]**

OR

Q10)a) Explain virtual memory with paging. **[8]**

b) Explain the page design issues. Explain effect of size of page on system. **[8]**

Q11)a) Explain different operations on file and folders. Explain the types of file access. **[8]**

b) Explain IO software layers. **[8]**

OR

Q12)a) Explain in brief magnetic and optical storage devices. **[8]**

b) Write short notes on **[8]**

i) Disc Space management

ii) Graphical user interface

Total No. of Questions : 12]

SEAT No. :

P2424

[Total No. of Pages : 3

[5153]-58
T.E.(E & TC)
COMPUTER ORGANISATION AND ARCHITECTURE
(2008 Pattern) (Semester-II)

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

Instructions to the candidates:

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

SECTION-I

Q1) a) Explain following addressing modes with suitable example. **[6]**

i) Direct addressing mode

ii) Indirect addressing mode

iii) Immediate addressing mode

b) Perform(10)×(-3) using Booth's multiplication algorithm. **[12]**

OR

Q2) a) With the help of flow chart explain floating point addition operation. **[8]**

b) Describe different IEEE standards for representing floating point numbers. Represent the following in single precision format: **[10]**

i) (100.625)

ii) (-64)

iii) (20)

P.T.O.

Q3) a) Draw and explain organization of single bus CPU with control signals. **[8]**

b) Write control sequence for conditional branch instruction. **[8]**

OR

Q4) a) Explain with respect to micro programmed control unit: **[8]**

i) Micro-instruction sequencing

ii) Micro-instruction encoding

b) Using input output gating for the registers in single bus organization explain operation of **[8]**

i) Fetching a data byte from memory

ii) Storing a data byte in memory

Q5) a) Explain with neat block diagram and timing diagram the synchronous DRAM. **[8]**

b) Draw and explain USB signals for USB communication. Explain bus protocol and four types of data transfer for USB. **[8]**

OR

Q6) a) What is cache memory? Explain set associated cache organization. **[8]**

b) Explain the concept of virtual memory. How virtual address is translated to physical address? **[8]**

SECTION-II

Q7) a) State difference between software & hardware interrupt and give example of each. **[6]**

b) Explain segmentation concept. List its advantages and disadvantages. **[6]**

c) Obtain the effective and physical address for the following addressing modes with the Contents of register as give:

offset= 2000H, DS= 4000H, Displacement= 0200H, BX= 3000H, DI= 5000H. **[6]**

i) Register relative addressing mode

ii) Based indexed addressing mode

iii) Direct addressing mode.

OR

Q8) a) Draw flag register format of 8086 and explain function of each bit. **[6]**

b) Explain the minimum and maximum modes of operation in 8086 and pins associated with it. **[6]**

c) Explain the following instructions related to 8086: **[6]**

i) MOV [1203], AL

ii) PUSH AX

iii) INC [BX]

Q9) a) Explain the real mode of 80386. **[6]**

b) State the function of different registers used in 80386. **[10]**

OR

Q10)a) What is paging? Explain with suitable diagram addressing translation for paging giving details of page frame, page table and page directory. **[10]**

b) Explain following related to multitasking in 80386. **[6]**

i) Task Descriptor

ii) TSS

iii) TR

Q11)a) Differentiate RISC and CISC. **[6]**

b) Explain role of Barrel shifter in ARM core data flow model. **[6]**

c) Explain different operating modes of ARM7. **[4]**

OR

Q12)a) Write short note on (any two): **[8]**

i) Instruction pipelining

ii) Superscalar processor

iii) Tightly couples and loosely coupled Multiprocessor

b) Give classification of various computer architecture for Flynn's classification. **[8]**

Total No. of Questions : 12]

SEAT No. :

P2425

[Total No. of Pages :2

[5153]-59
T. E. (E & TC)
INDUSTRIAL MANAGEMENT
(2008 Course) (Semester-II)

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

Instructions to the candidates:

1) ***Answers to the two sections should be written in separate books.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicates full marks.***
4) ***Use of logarthmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
5) ***Assume Suitable data, if necessary.***

SECTION-I

Q1) a) Define an " Organization ". What are its characteristics? Compare a "Traditional Organization" and "Modern Organization". **[8]**

b) What are the different managerial levels? Elaborate on the different skills required at each level. **[8]**

OR

Q2) a) Compare Private and Public limited companies. Discuss advantages of Joint Stock organization. **[8]**

b) Explain how today's managers use Genaral Administration Theory. **[8]**

Q3) a) Prepare the Environmental Threat and Opportunity Profile of a Software Industry. **[8]**

b) Explain Porter's Five Forces Model of competition in an Industry. **[8]**

OR

Q4) a) Sketch the GE Nine Cell Matrix and explain the three different zones. **[8]**

b) Prepare the SWOT Analysis Matrix for a hypothetical organization. **[8]**

Q5) a) Explain the basic philosophy of Total Quality Management(TQM). What are the advantages of this technique over other quality management techniques? **[10]**

b) Explain the 5s Quality Management Technique. **[8]**

OR

P.T.O.

Q6) a) Explain the importance of ISO 14001 : 2004 Standards in detail with suitable examples on application of this standard. **[10]**

b) Explain the basic philosophy of 'Pokka Yoke'. State its advantages and limitations. **[8]**

SECTION-II

Q7) a) What do you understand by a Project Network? Explain the following w.r.t. the same **[8]**

i) Dummy activity

ii) Concurrent activities

b) Explain 'Break Even Analysis'. What are its limitations? **[8]**

OR

Q8) a) Explain PERT in project management. Where it is used? **[8]**

b) Distinguish between Fixed Capital and Working Capital. Discuss various sources of this capital. **[8]**

Q9) a) What is meant by Supply Chain Management(SCM)? What is the role of SCM at Strategic, Tactical, Operational and Execution levels. **[8]**

b) Discuss various types of Inventories. **[8]**

OR

Q10)a) Explain the EOQ model with discounts. **[8]**

b) Explain the ABC Analysis in detail. **[8]**

Q11)a) With suitable example, distinguish between data and information. Elaborate characteristics and types of information. **[10]**

b) Define ERP and ERP Systems. What are its benefits? What are the difficulties in implementing ERP? **[8]**

OR

Q12)a) Explain the various manufacturing activities supported by Information Systems. **[10]**

b) List different types of e-Commerce. Explain C2B in detail. **[8]**

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Total No. of Questions :12]

SEAT No. :

P2426

[Total No. of Pages :4

[5153] - 60

T.E. (Electronics and Telecommunication)

WAVE THEORY AND ANTENNA

(2008 Course) (Semester - II)

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

Instructions to the candidates:

1) ***Answers to the two sections should be written in separate answer books.***
2) ***Answer three questions from section I with Q1 or Q2, Q3 or Q4 and Q5 or Q6 and Q7 or Q8, Q9 or Q10, Q11 or Q12 from section II.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right side indicate full marks.***
5) ***Use of calculator is allowed.***
6) ***Assume suitable data if necessary.***

SECTION-I

Q1) a) A normally incident E filed has amplitude 1V/m in the free space just outside of sea water. For a frequency of 30MHz at what depth will be amplitude of E be 1mV/m? (assume $\in_r = 80, \mu_r = 1$ and $\sigma = 2.5$ s/m for sea water). **[8]**

b) State Maxwell's field equation with their significance and derive the wave equation for lossless dielectric medium. **[8]**

OR

Q2) a) What is polarization of wave? Explain the polarization of three types of wave with the help of relevant diagram? **[8]**

b) Explain and derive the relationship between depth of penetration and conductivity. **[8]**

P.T.O.

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

i) Gyro frequency

ii) Virtual height

b) For a flat earth assume that at 400 km reflection takes place. The maximum density of the ionosphere corresponds to a refractive index of 0.9 at 10MHz. Calculate range for which f_{MUF} = 10MHz. **[8]**

OR

Q4) a) Calculate the maximum single hop distance for D, E, F1 and F2 layers if their heights are assumed to be 70, 130, 230 and 350 km respectively above the earth and the angle of incidence is 10^o in all cases. **[6]**

b) Derive the fundamental equation for free space propagation and explain its parameter. **[5]**

c) Explain the ground wave propagation in detail. **[5]**

Q5) a) The power radiated by a lossless antenna is 10 watts. The radiation intensity of this antenna is $U = B_o \cos^3 \theta$ (W/Sr) $0 \leq \theta \leq \pi/2$ $0 \leq \Phi \leq 2\pi$. **[9]**

Find

i) The maximum power density in (W/m^2) at a distance of 1000 meter (Assume for field distance) specify the angle where this occurs.

ii) Directivity

iii) Gain of the antenna

b) Explain relationship between radian and steradian. **[4]**

c) Explain Antenna Radial Integrals. **[5]**

OR

Q6) a) Explain the following parameters of antenna with relevant diagram and mathematical expressions. **[9]**

i) Radiation pattern

ii) Antenna Efficiency

iii) Power Gain

iv) Radiation Power Density

b) Write a short notes on: **[9]**

i) Effective length of transmitting antenna.

ii) Different types of Antenna apertures.

SECTION-II

Q7) a) Derive the expression for radiation resistance of infinitesimal dipole. **[8]**

b) The diameter of a circular loop antenna is 0.04λ. How many turns of the antenna will give a radiation resistance of 36Ω. **[8]**

OR

Q8) a) A uniform linear array consists of 16 isotropic point sources with a spacing of $\lambda/4$. If the phase difference is 90^{o}, calculate **[8]**

i) HPBW

ii) Directivity in dB

iii) Beam solid angle

iv) Effective aperture.

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

i) Pattern Multiplication

ii) Binomial array

Q9) a) Explain what is meant by top loading? What are different types of capacitor loading? Draw approximate current distribution. **[8]**

b) What is meant by Rhombic Antenna? How it is constructed and operating principle of it. **[8]**

OR

Q10) Write a short notes on following antennas with respect to structural details, radiation pattern, features and applications **[16]**

a) Whip Antenna

b) Ferrite Rod Antenna

c) V Antenna

d) Hertz Antenna

Q11) a) Explain the horn antenna, its different types and applications in detail. **[9]**

b) A parabolid reflector has radiation characteristics whose HPBW is 5^{o}. Find out its null beam width and power gain. **[9]**

OR

Q12) Write a short notes on the following antennas: **[18]**

a) Microstrip Patch Antenna.

b) Yagi-Uda antenna.

c) Turnstile Antenna.

d) Lens Antenna.

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Total No. of Questions :12]

SEAT No. :

P2427

[Total No. of Pages :3

[5153] - 61

T.E. (Electrical)

MICRO CONTROLLER APPLICATION

(2008 Course) (Semester - I)

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

Instructions to the candidates:

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

SECTION-I

Q1) a) Draw and explain 8051 microcontroller pin diagram and functional diagram. **[9]**

b) What is role of PSW register in 8051microcontroller also explain all flags. **[9]**

OR

Q2) a) Explain differences between 8051 microcontroller and 8085 microprocessor. **[9]**

b) Draw and explain RAM organization of 8051 and specify bit and byte address. **[9]**

Q3) a) Write ALP to transfer data from locations 2500H & 2501H to internal memory locations 30H and 31H using 8051 microcontroller. **[8]**

b) Write ALP to multiply numbers at location 28H & 29H using 8051. **[8]**

OR

P.T.O.

Q4) a) Memory addresses 1000H & 1001H has data. Write ALP to subtract them. **[8]**

b) Write an ALP to arrange 10 numbers in ascending order from location 30H. **[8]**

Q5) a) Assuming that XTAL = 11.0592 MHz. Write a program to generate a square wave of 1 KHz frequency on port 1 pin 2. **[8]**

b) Explain Timer related SFR available in 8051 microcontroller. **[8]**

OR

Q6) a) Write an ALP to generate 0.5 second delay using Timer 0. **[8]**

b) Explain TCON register and TMOD registers used in 8051 microcontroller. **[8]**

SECTION-II

Q7) a) Show memory mapping for 32 K External memory interface also draw a diagram. **[10]**

b) What is the roll of assembler and cross assembler? **[8]**

OR

Q8) a) Explain serial communication of 8051 and associated SFR in serial communication. **[10]**

b) Explain external 8255 interface in detail. **[8]**

Q9) a) Explain use of ADC in measurement of temperature with microcontroller 8051. **[8]**

b) Explain use of ADC for rms voltage measurement. **[8]**

OR

Q10)a) Draw interfacing diagram of stepper motor also write ALP to rotate stepper motor. **[8]**

b) Draw a flow chart for measurement of level measurement using 8051.**[8]**

Q11)a) What is 4×4 matrix keyboard? Draw interfacing with 8051. **[8]**

b) Explain LCD interfacing diagram in detail. **[8]**

OR

Q12)a) Is there any roll of ADC/DAC in DC motor interfacing? Justify your answer. **[8]**

b) A 16×2 LCD is interfaced with 8051. Write an ALP to write any 2 sentences. **[8]**

Total No. of Questions : 12]

SEAT No. :

P2428

[Total No. of Pages : 3

[5153]-62
T.E.(Electrical)
ELECTRICAL MACHINES – II
(2008 Pattern)/(Semester-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 side indicate full marks.***
5) ***Use of electronic pocket calculator is allowed***
6) ***Assume Suitable data, if necessary.***

SECTION-I

Q1) a) What is armature reaction? Explain its effect on synchronous machine at zero p.f lag, zero p.f. lead and unity p.f. **[8]**

b) A 10 kvA 400 volt 50Hz 3 phase star connected alternater has OCC observations as below

If(Amp)	1.8	3.2	5.2	8.4	11.5	16
Voc(volts)	155	308	450	570	620	635

with full load zero p.f. the field current of 14.5A produces a terminal voltage of 510 V. On short circuit 4.5 Amp excitation is sufficient to circulate full local current calculate the voltage regulation of this alternator at full local 0.8 p.f lagging. **[10]**

OR

Q2) a) Compare salient pole & non salient pole rotor constructions in case of synchronous machines. **[6]**

b) With usual notations derive the emt equation of 3 phase synchronous generator. **[4]**

c) A 1500 KVA, 6.6 KV, 3 phase star connected alternetor has effective armature resistance of 0.5 Ω/ph & synchronous reactance of 5 Ω/phase. Calculate the voltage regulation at full load.

i) Unity p.f.

ii) 0.8 lagging p.f. **[8]**

P.T.O.

Q3) a) Explain necessity of synchronization of 3 phase alternators. With neat diagram, explain dark lamp method. **[8]**

b) Define 'V' curve & 'Λ'curve (Inverted 'V' curve).Explain operation of synchronous moter at constant load and variable excitation. **[8]**

OR

Q4) a) A three phase alternator has direct axis synchronous reactance of 0.85 pu & quaderature axis synchronous reactance of 0.55 pu. Determine load angle, the no load p.u. voltage & voltage regulation of this alternator when operations at full load 0.8 pf lagging. **[8]**

Assume Vpn = 1pu, Ia = 1pu. Ra = 0

b) State different methods of starting 3 phase synchronous moter. Explain any two methods. **[8]**

Q5) a) Write a short note on 3 phase Induction generator **[8]**

b) With neat diagram explain working of synchronous induction moter. State its applications. **[8]**

OR

Q6) a) State different methods of speed control of 3 phase induction moter. Hence explain V/F method. **[8]**

b) With neat diagram explain the working of three phase induction Voltage regulator. **[8]**

SECTION-II

Q7) a) Explain the procedure to plot circle diagram of a.c. series moter. **[8]**

b) What are the problems in D.C. series moter with A.C. supply? What are corrective actions to be taken? **[8]**

OR

Q8) a) What are the types of comperated a.c. series moter? Describe each with neat diagram **[8]**

b) Explain the constructional feature, principle of operation of Universal moter. State its applications. **[8]**

Q9) a) With neat diagram explain construction & working of Linear Induction moter. State its applications. **[8]**

b) What are the causes of harmonics production is 3 phase induction moter? explain crawling phenomenon in induction moter. **[8]**

OR

Q10)a) With neat diagram explain construction & working of parmanent magnet type stepper moter. **[8]**

b) Write short note on 'Brushless d.c. moter' **[8]**

Q11)a) Explain double revolving field theory. Hence draw torque-speed characteristics of single phase induction moter. **[8]**

b) With neat diagram explain construction & working of shaded pole Induction moter. Draw its torque-speed characteristics. State its application. **[10]**

OR

Q12)a) A 220 V, single phase induction moter gave the following tests:

Blocked roter test: 120V, 9.6A, 460W

No load test: 220V, 4.6A, 125W

The stater resistance is 1.5Ω & during blocked roter test, the starting winding is open. Determine the equivalent circuit parameters. also find the core, frictional & windage losses. **[8]**

b) With neat diagram explain constrction & working of capacits start induction moter. Draw its torque-speed characteristics. State its applications. **[10]**

Total No. of Questions :12]

SEAT No. :

P2429

[Total No. of Pages :3

[5153] - 63
T.E. (Electrical)
POWER ELECTRONICS
(2008 Course) (Semester - I)

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

Instructions to the candidates:

1) ***Answers to the two sections should be written in separate answer books.***
2) ***Answer three questions from section I with Q1 or Q2, Q3 or Q4 and Q5 or Q6 and Q7 or Q8, Q9 or Q10, Q11 or Q12 from section II.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right side indicate full marks.***
5) ***Use of calculator is allowed.***
6) ***Assume suitable data if necessary.***

SECTION-I

Q1) a) Explain latching of SCR using two transistor analogy. How duration of gate pulse is decided? **[6]**

b) Explain importance of following ratings of SCR. **[10]**

i) Holding current and Latching current.

ii) PIV rating.

iii) dv/dt, di/dt Rating.

iv) Maximum Temperature.

OR

Q2) a) Draw gate characteristics of SCR. Explain how value of gate voltage and gate current can be selected. **[8]**

b) What are the different turn on methods of SCR? Explain. **[8]**

Q3) a) Describe working of single phase two pulse SCR controlled mid point converter with RL load through the waveforms of Source voltage, load voltage, load current and voltage across SCR. Derive output voltage expression. **[10]**

b) Explain the operation of single phase fully controlled bridge converter with inductive load with associated waveforms. **[6]**

OR

P.T.O.

Q4) a) Describe concept of overlap angle. Write expression for voltage drop due to overlap angle in three phase full bridge converter. **[8]**

b) Explain working of three phase full converter feeding highly inductive load with a firing angle of 60^{o} & obtain expression for phase voltage & Line voltage. **[8]**

Q5) a) Explain single phase ac regulator feeding resistive load. Derive expression for rms load voltage. Draw output voltage waveform. **[9]**

b) Describe the operation of tap changer sequence control of a.c. voltage regulator with suitable diagram and waveforms. **[9]**

OR

Q6) a) Draw neat diagram and explain how TRIAC can be used in all 4 quadrants. **[9]**

b) What is Snubber? What are the types? Explain step by step procedure of design of snubber circuit. **[9]**

SECTION-II

Q7) a) Draw and explain the operation and characteristics of IGBT in comparison with SCR. What are Frequency and Power ratings of IGBT? **[8]**

b) With the help of neat structural diagram and suitable waveforms, explain the operation of MOSFET. **[8]**

OR

Q8) a) Discuss the switching characteristics of the IGBT with the help of neat circuit diagrams and waveforms. **[8]**

b) Compare MOSFET and IGBT based on characteristics and applications. **[8]**

Q9) a) Draw the schematics of step-down chopper and derive an expression for output voltage in terms of duty - cycle for a step-down chopper. **[8]**

b) What are the control parameters of chopper? Explain the TRC and CLC control strategies used for chopper. **[8]**

OR

Q10)a) Draw the circuit of a Class E chopper and explain its working using waveforms. **[8]**

b) A d.c chopper circuit connected to a 100 V d.c source supplies an inductive load having 40mH in series with a resistance of 5 Ω. A freewheeling diode is placed across the load. When operated with 60% duty cycle and 500 Hz switching frequency, calculate the Output Voltage, Load current mini and maxi value and % Ripple current. **[8]**

Q11)a) With the help of neat circuit diagram and associated waveforms, explain the operation of single phase full bridge voltage source inverter with inductive load. What is the advantage of 120^{o} conduction interval? **[9]**

b) With the help of neat circuit diagram and waveforms, explain briefly the operation of three phase bridge inverter with star connected resistive load in 180^{o} conduction mode. **[9]**

OR

Q12)a) With the help of neat circuit diagram and associated waveforms, explain the operation of single phase Sinusoidal PWM voltage source inverter with resistive load. **[9]**

b) State the various methods of voltage control in inverter circuits and explain each of them briefly. **[9]**

EEE

Total No. of Questions : 12]

SEAT No. :

P2430

[Total No. of Pages : 3

[5153]-64

T.E. (Electrical Engineering)

ELECTRICAL INSTALLATION MAINTENANCE & TESTING

(2008 Pattern) (Semester-I) (303144)

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

Instructions to the candidates:

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

SECTION-I

Q1) a) Explain the terms feeder and distributor. State different types of feeders and distributors. State their relative advantages and disadvantages. **[10]**

b) State Kelvin's law. State its limitations. **[6]**

OR

Q2) a) Compare overhead and underground supply system. State their advantages and disadvantages. **[10]**

b) Compare 1 phase 2 wires overhead systems with 3 phases 3 wire overhead system for volume of conductor material required. **[6]**

Q3) a) Explain in detail function of the equipments used in the substation. **[10]**

b) Classify and explain various types of substations. **[6]**

OR

Q4) a) State the objectives of substation grounding. State and explain the factors which affect the soil resistivity. **[10]**

b) Explain the terms: **[6]**

i) Touch potential
ii) Step potential
iii) Transfer potential.

P.T.O.

Q5) a) State the different maintenance strategies? Explain condition based maintenance in detail. **[10]**

b) Explain planned and preventive maintenance of transformer. **[8]**

OR

Q6) a) Explain in detail various insulation stressing factors. **[10]**

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

i) Signature Analysis.

ii) Tan Delta measurement.

SECTION-II

Q7) a) Write short notes on- **[10]**

i) Dissolved gas analysis.

ii) Degree of polymerization.

b) Discuss in detail different failure modes of transformer. **[8]**

OR

Q8) a) How transformer oil gets contaminated? With suitable block diagram explain the reconditioning process of transformer oil. **[10]**

b) Explain the process of condition monitoring of on load tap changer. **[8]**

Q9) a) Explain various methods used for location of fault in power cables. **[8]**

b) Enlist different faults occurring in the induction motor and their causes. **[8]**

OR

Q10)a) Write a short note on: **[8]**

i) Signature analysis.

ii) Thermography.

b) Explain in detail tan delta measurement. **[8]**

Q11) Explain working, troubleshooting and maintenance of following household appliances. **[16]**

a) Water pump

b) Refrigerator.

OR

Q12) Explain working, troubleshooting and maintenance of following household appliances **[16]**

a) Mixer

b) Fan

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Total No. of Questions :12]

SEAT No. :

P2431

[Total No. of Pages :3

[5153] - 65
T.E. (Electrical Engineering)
ENGINEERING ECONOMICS AND MANAGEMENT
(2008 Pattern) (Theory) (Semester - I) (311121)

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

Instructions to the candidates:

1) ***Answer any one questions from each unit.***
2) ***Answers to the two sections should be written in separate books.***
3) ***Figures to the right indicate full marks.***

SECTION-I

UNIT - I

Q1) a) Define Organisation. Explain the difference between proprietary and partnership organisation. **[8]**

b) Difference between public sector and joint stock organisation. **[8]**

OR

Q2) a) What is sales forecasting? Explain various methods of sales forecasting in brief. **[8]**

b) Explain the concept of 'Law of demand' & 'Law of supply'. **[8]**

UNIT - II

Q3) State the various 'principles' of organisation? Explain the different organisational structures with diagram. **[16]**

OR

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

a) Lean manfacturing

b) Kanban

c) ABC Analysis

d) Plant layout

P.T.O.

UNIT- III

Q5) a) What is Marketing? Describe various functions of marketing management? **[9]**

b) What is Marketing Research? Explain the meaning and importance of marketing research in developing marketing programme. **[9]**

OR

Q6) a) Explain the concept of 'Depreciation and Budget'. **[9]**

b) Describe various methods of costing? **[9]**

SECTION-II

UNIT - IV

Q7) a) Define motivation. Differentiate between monetary and non monetary factors. **[8]**

b) Explain the concept of 'Group Dynamics'. **[8]**

OR

Q8) a) Define leader. Explain the different types of leadership. **[8]**

b) What are the qualities required to become successful 'Entrepreneur'. **[8]**

UNIT- V

Q9) a) Explain the process of recruitment in brief. **[8]**

b) What is Training? Explain the importance & types of training. **[8]**

OR

Q10)a) What is 'stress'? How to manage stress? **[8]**

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

i) Job satisfaction

ii) Business Ethics

UNIT - VI

Q11)What is disaster management. Discuss importance scope and types of disaster. **[18]**

OR

Q12)Prepare a detailed disaster management plan for floods of River. **[18]**

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Total No. of Questions :12]

SEAT No. :

P2432

[Total No. of Pages :4

[5153] - 66
T.E. (Electrical)
POWER SYSTEMS - II
(2008 Course) (Semester - II)

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

Instructions to the candidates:

1) ***Answer any three questions from each section.***
2) ***Answers to the two sections should be written in separate answer books.***
3) ***Neat diagram must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Use of logarithmic tables, slide rule, electronic pocket calculator is allowed.***

SECTION-I

Q1) a) Derive power flow equations using generalized constants of transmission line. **[8]**

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: $A=D=0.98\angle 3^0$, $B=110\angle 75^o\Omega$/ph, Determine: **[8]**

i) Sending end voltage and power angle.

ii) Sending end active and reactive power.

OR

Q2) a) What is line compensation? Why it is necessary? Compare static capacitors and synchronous compensators. **[8]**

b) Explain surge impedance loading, Efficiency and regulation of transmission line. **[8]**

Q3) a) A three phase 220kV, 50Hz transmission line consists of 1 cm radius of conductor spaced 3 m at the corner of an equilateral triangle. Calculate disruptive critical voltage between the lines. Irregularity factor = 0.96, Temperature = 20^oC, barometric pressure = 72.2cm of Hg. Dielectric strength of air = 21.1 kV(rms)/cm. Hence calculate corona. **[8]**

b) Explain power handling capacity and power loss at various voltage levels. **[8]**

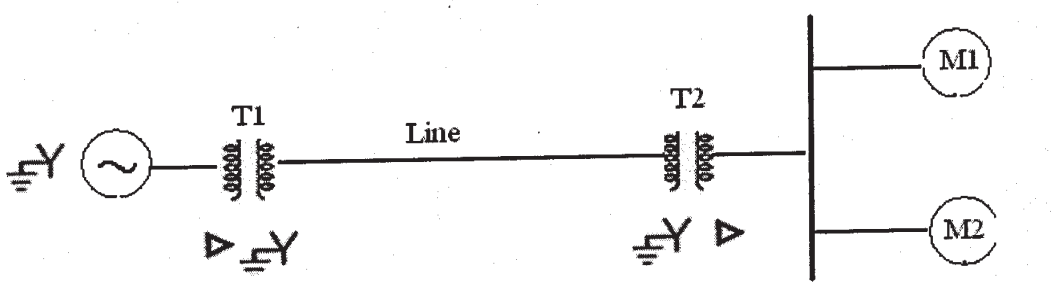
OR

P.T.O.

Q4) a) Write a short note on radio and television interference and reduction of interference. **[8]**

b) Explain advantages & disadvantages of EHVAC transmission. **[8]**

Q5) a) A 50MVA 15kV three phase generator has a sub transient reactance of 0.20pu. The generator supplies two motors over transmission line having transformers at both ends, as shown in the fig. The motors have rated inputs of 30MVA and 20 MVA, both 30kV with 0.15pu sub transient reactance. The rating of the sending end transformer T_1 is 50 MVA 11Δ-132Y with leakage reactance of 0.10pu. transformer T_2 at the receiving end has three single phase transformers connected as three phase unit. The rating of each individual transformer is 20MVA, 33/76kV with leakage reactance of 0.12 pu. Series impedance of the line is (25+j75 ohms. Draw the impedance diagram with all impedances marked in pu. Select the generator rating as the base in the generator circuit. **[9]**



b) What do you mean by p.u. system? Prove that the single phase and three phase values are same in p.u. **[9]**

OR

Q6) a) Explain the concept of sub transient, transient and steady state current and impedances in detail with proper diagrams. **[9]**

b) Explain the functions of current limiting reactors in power systems. Discuss the different locations of reactors with reference to its performance. **[9]**

SECTION-II

Q7) a) Draw the equivalent circuit for zero sequence reactance of three phase transformer, for different combinations of connections. **[9]**

b) In a three phase four wire system the currents in line a,b and c under normal conditions of loading were as follows: **[9]**

$I_a = 100\angle 30^o$ A, $I_b = 50\angle 300^o$ A, $I_c = 30\angle 180^o$A.

Calculate the zero, positive and negative phase sequence currents in line a and return current in the neutral conductor.

OR

Q8) a) A 50 MVA, 11 kV, 3 phase synchronous generator was subjected to different types of faults. The fault currents are as follows, **[9]**

LG fault – 4130 amp

LL fault – 2590 amp

LLL fault – 1870 amp

The generator neutral is solidly grounded. Find per unit values of 3 sequence reactance's of generator.

b) 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 $Z_0 = Z_S + 2Z_M$. **[9]**

Q9) a) Explain the singular transformation method of formation of Y_{bus} matrix. **[8]**

b) Explain Newton Raphson method of load flow analysis along with flowchart. **[8]**

OR

Q10)a) Determine the Y bus for the three bus system. Neglect the shunt capacitances of the lines. The line series impedances are as follows. **[8]**

Bus code	Impedance (pu)
1-2	0.08+j0.24
1-3	0.02+j0.06
2-3	0.06+j0.18

b) Derive static load flow equation for 'n' bus system. **[8]**

Q11)a) With the help of suitable diagram, explain different component of HVDC transmission system along with their function. **[8]**

b) Give advantages and Disadvantage of HVDC transmission system. **[8]**

OR

Q12)a) Explain constant Extinction angle control method of HVDC system.**[8]**

b) Give the detail classification of HVDC transmission system. **[8]**

EEE

Total No. of Questions : 11]

SEAT No. :

P2433

[Total No. of Pages : 2

[5153]-67
T.E. (Electrical)
ENERGY AUDIT AND MANAGEMENT
(2008 Course) (Semester - II)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) Give high ligerts of energy conservation bill 2001. **[8]**

b) Discuss energy reforms taking place in Indian energy sector. **[8]**

OR

Q2) a) What are adverse effect of uncontrolled use of fossil fuel for electricity generation? **[8]**

b) What is green building? Explain provisions made in India regarding this. **[8]**

Q3) a) What is energy policy? What is the importance of energy policy? With suitable example explain standard format of energy policy. **[9]**

b) What is supply side management? Explain various alternatives for improvements in supply conditions. **[9]**

OR

Q4) a) Define Demand side management. Explain different waveshaping tools used in DSM. **[9]**

b) Explain necessity of energy management. Also explain principles used in energy management? **[9]**

Q5) a) What is executive summary? State its importance Give format of energy audit report. **[8]**

b) Compare preliminary audit with detailed energy audit. **[8]**

OR

P.T.O.

Q6) a) Discuss importance of data analysis in energy audit. State different areas and relevant data required. **[8]**

b) Explain phases in detailed energy audit. **[8]**

SECTION - II

Q7) a) Explain in detailed financial appraisal criteria. **[9]**

b) Furan investment of Rs. 10 lacs in energy saving project, the annual savings of Rs. 2 lacs for consecutive seven years from initial year. With discounting rate of 15% calculate NPV. Also state feasibility. **[9]**

OR

Q8) a) What is energy service company? What is role of these companies in energy management? **[9]**

b) What are desirable properties of tariff? Explain tariffs benefited energy conservation. **[9]**

Q9) a) Discuss energy conservation options in fans and blowers. **[8]**

b) Explain energy conservation measures in boilers and Furances. **[8]**

OR

Q10)a) State energy saving options in lighting systems. **[8]**

b) Enlist energy unservation techniques in refrigeration and air conditioning systems. **[8]**

Q11)Solve any two of following: **[16]**

a) Discuss energy audit case study of paper and pulp industry.

b) Energy conservation options in T & D sector.

c) Energy audit case study of sugar Industry.

d) Present outcome of energy audit case study of thermal power plant.

Total No. of Questions :12]

SEAT No. :

P2434

[Total No. of Pages :3

[5153] - 68
T.E. (Electrical)
UTILIZATION OF ELECTRICAL ENERGY
(2008 Course) (Semester - II) (303147)

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

Instructions to the candidates:

1) ***Answers to the two sections should be written in separate answer books.***
2) ***Answer three questions from section I Q1 or Q2, Q3 or Q4, Q5 or Q6 and Q7 or Q8, Q9 or Q10, Q11 or Q12 from section II.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right side indicate full marks.***
5) ***Use of calculator is allowed.***
6) ***Assume suitable data if necessary.***

SECTION-I

Q1) a) State classification of electric heating and state advantages of electric heating. **[9]**

b) With suitable diagrams explain direct and indirect arc heating. State the materials used for arc furnace electrodes. **[9]**

OR

Q2) a) With suitable diagram explain Laser welding. State four applications of Laser welding. **[9]**

b) A 30kW, 3 phase, 400 volt resistance oven uses Nichrome strip of 0.254 mm thickness for star connected elements. The heating element temperature is to be 1100°C and that of charge is to be 700°C. Calculate width of heating element. Take emissivity = 0.9, radiating efficiency as 0.5. The specific resistance of Nichrome is 101.6×10^{-8} ohm meter. **[9]**

Q3) a) With suitable diagram explain electroplating process. **[8]**

b) Explain electrical circuit used in refrigerator. **[8]**

OR

P.T.O.

Q4) a) Explain construction and working of - thermostat, pressure switch. **[8]**

b) State the principle of anodizing and state its applications. **[8]**

Q5) a) Define - solid angle, luminous efficiency, depreciation factor, space to height ratio. **[8]**

b) Compare - incandescent lamp with discharge lamp. **[8]**

OR

Q6) a) State and explain laws of illumination. **[8]**

b) State and explain the factors considered for designing indoor lighting scheme. **[8]**

SECTION-II

Q7) a) Explain two systems of traction power supply. **[9]**

b) Compare - steam engine drive with electric drive. **[9]**

OR

Q8) a) With suitable diagram explain overhead catenary system. **[9]**

b) Explain construction and working of pantograph current collector. **[9]**

Q9) a) Draw trapezoidal velocity curve. State the terms involved in it. **[8]**

b) A train has schedule speed of 60 kmph between stops which are 6 km apart. Find the maximum speed if **[8]**

i) Duration of stops = 60 second

ii) Acceleration = 2 kmphps

iii) Retardation 3 kmphps

iv) Speed time curve shape - trapezoidal.

OR

Q10)a) State the terms involved in the expression for total tractive effort. Explain each term in brief. **[8]**

b) State the expression for coefficient of adhesion. Explain factors affecting coefficient of adhesion. **[8]**

Q11)a) What is route-relay inter lock? Explain it with suitable diagram. **[8]**

b) Discuss suitability of DC series motor for traction purpose. **[8]**

OR

Q12)a) Derive the expression for power loss and efficiency for series parallel control of two DC series motor. Draw respective voltage - time diagram. **[8]**

b) Explain any one method used for regenerative braking of DC series motor. **[8]**

EEE

Total No. of Questions : 12]

SEAT No. :

P2435

[Total No. of Pages : 3

[5153]- 69
T.E. (Electrical)
DESIGN OF ELECTRICAL MACHINES
(2008 Pattern) (Semester - II) (303148)

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

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 questions from Section I and Q.7 or Q.8, Q.9 or Q.10, Q11 or Q12 questions from Section II.***
2) ***Answers to the two sections should be written in separate books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
6) ***Assume suitable data, if necessary.***

SECTION - I

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

i) Leakage coefficient

ii) Window space factor

iii) Stacking Factor.

b) Explain the differences between electric circuit and magnetic circuit. What is the magnetic leakage in magnetic circuit? Define magnetic leakage coefficient. How the performance of ac machines depend on leakage Flux of magnetic circuit. **[10]**

OR

Q2) a) Explain principle components of leakage flux for polyphase machines. **[8]**

b) Explain the concept of "Real and Apparent Flux Densities" over the one slot pitch of ac machine. Consider the slots are parallel sided. **[8]**

Q3) a) Derive output equation of three phase transformer. **[8]**

b) Draw heating curve and cooling curve. Define the heating time constant, cooling time constant and discuss the concept of final steady temperature rise. **[8]**

OR

P.T.O.

Q4) a) Explain the hydrogen cooling system used for turbo-generators. Write the advantages of hydrogen cooling system. **[6]**

b) Determine the main dimensions of the core and the number of turns on H.V. and L.V. windings of a 25 kVA, three phase 50Hz, 6600/440volts, delta/star, core type transformer. Cruciform core for which area factor is 0.56, window space factor is 0.25, volts per turn of 21 v, current density of 2.36 A/mm^2 and flux density of 1.1 Wb/m^2. Take height of window as twice the width of window. **[10]**

Q5) a) Explain specifications of transformer as per IS 2026. **[8]**

b) Explain the construction of magnetic core of modern core type power transformers. Explain the significance of mitred joints in construction of core. **[10]**

OR

Q6) a) Explain the process of design of cooling tubes of a transformer. **[8]**

b) Explain the procedure to estimate active and reactive components of no load current of single phase core type transformer. **[10]**

SECTION - II

Q7) a) Discuss factor which govern the choice of electrical loading and specific magnetic loading. **[10]**

b) With reference to ac windings compare: **[8]**

i) Single layer and double layer winding

ii) Fractional slot and integral slot winding.

OR

Q8) a) Explain the fractional slot winding used for stator of three phase induction motor. What are the advantages of fractional slot winding? **[8]**

b) Determine main dimensions of 15kw, three phase,415v, 50Hz, 1480 rpm, 4 pole squirrel cage induction motor having efficiency of 85%, and full load power factor of 0.85 lag.Assuming specific electrical and magnetic loadings of 34000 AMP cond./m and 0.45T respectively. Assume good overall design. **[10]**

Q9) a) Discuss harmonic induction torques and harmonic synchronous torques produced by harmonic fields in three phase induction motor. **[8]**

b) Discuss the importance of suitable combinations of stator and rotor slots in case of three phase induction motor. **[8]**

OR

Q10)a) Give step by step procedure to design squirrel cage rotor of star connected three phase induction motor. **[8]**

b) Derive the equation for end ring current for the rotor of squirrel cage induction motor. **[8]**

Q11)a) Explain effect of saturation of performance of three phase induction motor. **[4]**

b) Explain the method of calculation of magnetizing current of three phase induction motor considering- **[12]**

i) MMF for air gap

ii) MMF for stator teeth

iii) MMF for rotor teeth

iv) MMF for stator core.

OR

Q12)a) Draw a neat sketch of a magnetic circuit of three phase four pole induction motor. Clearly indicate: **[8]**

i) Rotor core

ii) Rotor teeth

iii) Air gap

iv) Stator core and teeth.

b) Explain methods for improving starting torque of Induction motor. **[8]**

Total No. of Questions : 12]

SEAT No. :

P2436

[Total No. of Pages : 4

[5153]-70

T.E. (Electrical)

CONTROL SYSTEM-I

(2008 Pattern) (Semester-II)

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

Instructions to the candidates:

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

SECTION-I

Q1) a) Explain a feedback control system Giving an example,. List the advantages of feedback. **[8]**

b) Give comparison of closed loop and open loop control system. **[4]**

c) Explain order and type of control system. Give example. **[4]**

OR

Q2) a) Determine transfer function the system signal flow graph as show in fig.2a. **[8]**

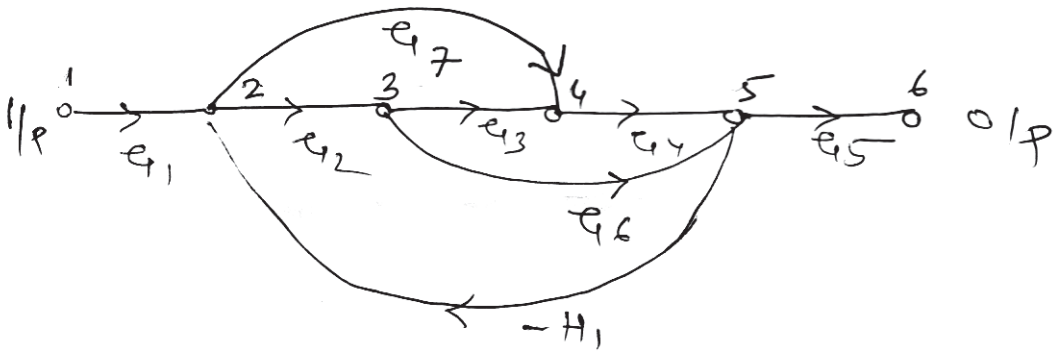


Fig 2a

P.T.O.

b) Determine transfer function using block diagram reduction technique for the system shown in fig.2b. **[8]**

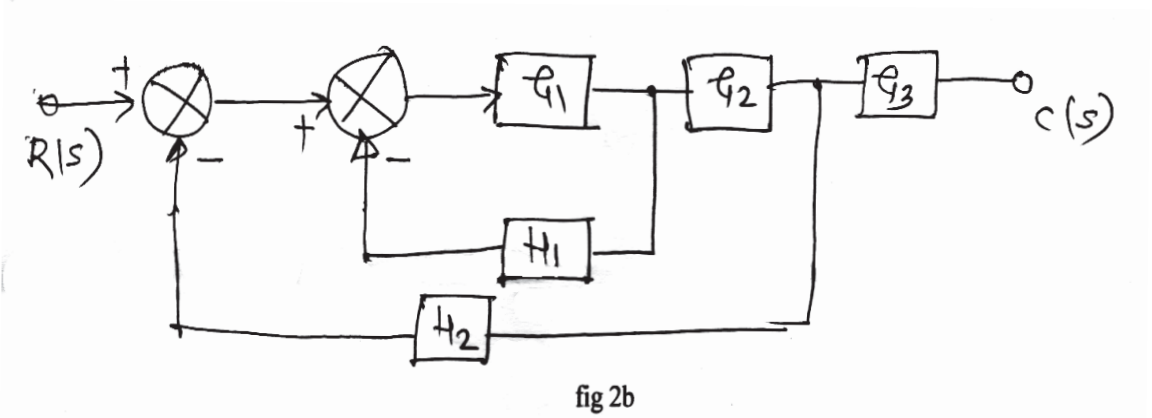


fig 2b

Q3) a) Find steady state error for unit step unit ramp and unit acceleration inputs for the following systems: **[8]**

$$G(s) = \frac{5}{s(s+2)\ (s+10)}$$

b) Discuss the response and steady state errors for a second order system if inputs are: **[8]**

i) Step unit signal.

ii) Unit ramp signal. and iii) Unit parabolic signal.

OR

Q4) a) Sketch time response and define various time domain specifications for a second order under damped control system with Unit step input. **[8]**

b) Find rise time, peak time and peak-overshoot for the system given by.

$$G(s) = \frac{100}{(S^2 + 7S + 100)}$$ **[8]**

r^2

Q5) a) Discuss Routh's Hurwitz criterion. What are its limitations? **[8]**

b) For a unity feedback system. output is marginally stable and oscillates with frequency 3.5 rad/sec. Find K marginal with open loop transfer function. **[10]**

$$G(s)\,H(s) = \frac{4}{(S^2+2S+2K)}$$

OR

Q6) a) Sketch the root locus for a system with loop transfer function $G(s)=\frac{K}{s(s+1)(s+3)}$ Also discuss on stability of the system. **[10]**

b) Explain magnitude condition and Angle condition for system to be stable. How they are applicable in Root locus sketch. **[8]**

SECTION-II

Q7) a) State and explain all frequency domain specifications. **[8]**

b) The OLTF of unity feedback system is:

$$G(S)=\frac{10(S+10)}{(S+3)(S+4)(S+2)}$$ **[8]**

Construct Bode plot and determine GM and PM.

OR

Q8) a) Explain polar plot stability analysis. Make a rough sketches of polar plots for type '0', '1' and '2' systems. **[8]**

b) State and explain Nyquist stability criterion. **[8]**

Q9) a) Explain the terms related to state space representation of control systems. **[8]**

i) State.

ii) State Vector.

iii) State Space.

iv) Output equation.

b) Find the transfer function for the system represented as.

$$\begin{bmatrix}\dot{x}_1\\ \dot{x}_2\\ \dot{x}_3\end{bmatrix}=\begin{bmatrix}-5 & 1 & 0\\ 0 & -3 & 1\\ -3 & -6 & -5\end{bmatrix}\begin{bmatrix}x_1\\ x_2\\ x_3\end{bmatrix}+\begin{bmatrix}0\\ 0\\ 1\end{bmatrix}u$$

$$y=\begin{bmatrix}0 1 0\end{bmatrix}\begin{bmatrix}x_1\\ x_2\\ x_3\end{bmatrix}$$ **[8]**

OR

Q10)a) Explain how transfer functions is obtained from state model and vice versa. **[8]**

b) Find state model of the transfer function given as **[8]**

$$G(S) = \frac{10}{s(S+3)(S+4)}$$

Q11)a) With neat diagrams, explain the PD, PI, and PID controllers. **[10]**

b) Write note on potentiometer. **[8]**

OR

Q12)a) Write short notes on LAG and LEAD compensator networks. **[10]**

b) Derive transfer function of armaturecontrolled D.C.Servomotor. **[8]**

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Total No. of Questions :12]

SEAT No. :

P2437

[Total No. of Pages :3

[5153] - 71

TE (Instrumentation & Control)

INSTRUMENTATION FOR CHEMICAL ANALYSIS

(2008 Pattern) (Semester - I) (306261)

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

Instructions to the candidates:

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

SECTION-I

Q1) a) Explain the Principle & experimental setup for Coulometry. **[8]**

b) State the advantages of Instrumental methods of chemical analysis over classical methods of analysis. **[8]**

OR

Q2) a) Define Chemical Instrumental Analysis. Explain various units used in chemical analysis. **[8]**

b) Give detailed classification on Instrumental methods of analysis. **[8]**

Q3) a) Explain various laws of Photometry. **[8]**

b) Enlist various types of UV Visible Spectrophotometers. Explain Single Beam Spectrophotometer. **[8]**

OR

Q4) a) Explain the principle and working of AAS. **[10]**

b) Explain Background Correction in AAS. **[6]**

P.T.O.

Q5) a) State the working principle of Infrared Spectroscopy. Explain IR Sources and IR Detectors. **[10]**

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

OR

Q6) a) Write a short note on Flame Photometer. **[8]**

b) What is the working principle of Atomic Emission Spectroscopy. Explain various excitation sources in detail. **[10]**

SECTION-II

Q7) a) Explain the principle of Fluorescence and Phosphorescence. **[6]**

b) Explain the working of Raman Spectrometer in detail. **[10]**

OR

Q8) a) Explain the working of NMR Spectrometer. **[10]**

b) Explain the working of CO_2 Analyzer in detail. **[6]**

Q9) a) Write a short note on Time of Flight Mass Spectrometer. **[8]**

b) Explain various detectors used in Mass Spectrometer. **[8]**

OR

Q10)a) Explain the working of Gas Chromatography in detail. **[8]**

b) Explain the working principle and constructional details of HPLC. **[8]**

Q11)a) State Bragg's Law. Explain ESCA in detail. **[9]**

b) Explain Instrumentation for X ray Spectroscopy. **[9]**

OR

Q12) Explain the significance of Radiation detectors. Write short notes on: **[18]**

a) Lonisation Chamber.

b) Geiger-Muller counter.

c) Proportional counter.

d) Steering Control Techniques.

Total No. of Questions : 12]

SEAT No. :

P2438

[Total No. of Pages : 3

[5153]-72
T.E. (Instrumentation & Control)
EMBEDDED SYSTEM DESIGN
(2008 Pattern) (Semester-I)

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

Instructions to the candidates:

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

SECTION-I

Q1) a) Explain the function of pins $\overline{RD}$ and $\overline{WR}$ of 8051. Also explain how they are used for interfacing of external RAM with interfacing diagram. **[8]**

b) Draw and Explain the IE register of 8051 microcontroller. **[8]**

OR

Q2) a) Draw and Explain the TMOD register of 8051 microcontroller. **[8]**

b) Explain Difference between Microprocessor & Microcontroller. Also explain how will you select a microcontroller for a particular application? **[8]**

Q3) a) Write an assembly language program to add 10-bytes stored at external memory location starting from 3600H. Put the result (2-byte) on next two memory locations where 10-byte of data ends. **[8]**

b) Explain Different addressing mode of 8051 microcontroller with suitable example. **[10]**

OR

Q4) a) Explain in short the different modes of Serial communication for 8051.**[8]**

P.T.O.

b) Explain below mnemonics with suitable example **[10]**

i) MOVX @DPTR,A
ii) ORL A,R0
iii) MUL AB
iv) ADDC A,R0
v) DJNZ R3,AGN

Q5) a) Interface 16x2 LCD to 8051 and write an assembly language program to display "EMBEDDED" on first line of LCD. **[8]**

b) With a neat diagram, explain the interfacing of 4 x 4 matrix keyboard to 8051. Also draw a flowchart to explain the logic used for detection of key presses. **[8]**

OR

Q6) a) Draw the interfacing diagram of Stepper motor with 8051 microcontroller. Also explain the function of ULN in Short. **[8]**

b) Draw and explain Interfacing diagram of DAC0808 with 8051. Also write a program to generate a Triangular wave. **[8]**

SECTION-II

Q7) a) The following is the UART control register of AVR microcontroller. Explain the bits of this register **[8]**

RXCIE	TXCIE	UDRIE	RXEN	TXEN	CHR9	RXB8	TXB8

b) Explain the Watchdog Timer Control Register (WDTCR) in AT Mega 8535 AVR microcontroller. **[8]**

OR

Q8) a) Explain in detail the TCCR1A of AT mega8535 microcontroller. **[8]**

COM1A1	COM1A0	COM1B1	COM1B0			PWM11	PWM10

b) Draw & explain the Status Register SREG of AT Mega8535. **[8]**

Q9) a) Explain the different clock sources which can be used with AVR microcontroller. **[8]**

b) Explain the function of port D of AT Tiny2313 AVR microcontroller with the help of PORTD, DDRD & PIND registers. **[10]**

OR

Q10)a) Explain the Addressing mode of AVR microcontroller. **[8]**

b) Explain the following instructions of AVR microcontroller. **[10]**

i) MOV r2,r18

ii) LD r1,Z

iii) OR r1,r2

iv) NEG r30

v) SWAP r10

Q11)Discuss the design of Data Acquisition system with AVR microcontroller based on the following points.

a) Block diagram. **[4]**

b) Description. **[4]**

c) Selection of ICs for the system. **[4]**

d) A general algorithm. **[4]**

OR

Q12)a) With a neat diagram, explain the interfacing of 16x2 LCD display with 8 data lines to the AVR microcontroller. **[8]**

b) With a neat diagram explain the interfacing of Serial ADC to the AVR microcontroller. **[8]**

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Total No. of Questions : 12]

SEAT No. :

P2439

[Total No. of Pages :3

[5153]-73
T.E. (Instrumentation & Control)
CONTROL SYSTEM COMPONENTS
(2008 Course) (Semester - I)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) Compare contactor and a relay. **[6]**

b) Explain the construction, working & application of following types of switches. **[12]**

i) Pressure switch.

ii) Thumbwheel switch.

OR

Q2) a) Explain with neat sketch the working of reed relay. **[8]**

b) Give the application of following types of switches. Draw standard symbols. **[10]**

i) SPST

ii) Selector switch.

iii) Limit switch

iv) Level switch

v) Push button.

Q3) a) Draw electrical wiring diagrams for jogging operation of motor. **[8]**

b) What do you mean by Braking of motors? Explain the concept of any one method of braking. **[8]**

OR

P.T.O.

Q4) a) Explain the advantages and layout of Motor Control Center. **[8]**

b) Using standard symbols, draw electrical wiring diagram for DOL starter. **[8]**

Q5) a) Explain with a neat diagram the working of FRL. **[8]**

b) Draw pneumatic circuit for implementing Y = AB + C where Y is the output i.e. single acting pneumatic cylinder and A, B and C are inputs. **[8]**

OR

Q6) a) Draw pneumatic symbols for the following and give the applications. **[8]**

i) Flow control valve.

ii) Sequence valve.

iii) 4/2 Direction control valve.

iv) Compressor

b) Draw pneumatic circuit for speed control of double acting pneumatic cylinder in forward direction. **[8]**

SECTION - II

Q7) a) Explain Hydraulic supply with the help of neat diagram. **[8]**

b) Explain with a neat sketch the working of gear pump. **[8]**

c) List the characteristics of the oil used in hydraulic systems. **[2]**

OR

Q8) a) Compare electrical systems with Hydraulic systems (minimum 4 important points). **[8]**

b) Using standard symbols, draw regenerative hydraulic circuit to have equal force while extending and retracting. **[10]**

Q9) a) Explain the construction, working, and application of synchro. **[8]**

b) Explain the use and working of a circuit breaker. **[8]**

OR

Q10)a) Explain the use of seals and snubber. **[8]**

b) Explain the front panel controls of an alarm annuciator. **[8]**

Q11)a) Explain purging method of protection. **[8]**

b) Explain different types of tube fittings. **[8]**

OR

Q12)a) Explain sanitary pipe fittings. **[8]**

b) Compare explosion proof and intrinsic safety protection methods. **[8]**

Total No. of Questions : 12]

SEAT No. :

P2440

[Total No. of Pages : 3

[5153]-74

T.E.(Instrumentation and Control)

ELECTRONIC INSTRUMENTATION

(2008 Pattern) (Semester-I) (306264)

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

Instructions to the candidates:

1) ***Answer to the two sections should be written in separate answer books.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume suitable data if necessary.***

SECTION-I

Q1) a) Explain any three types of measurements in DMM with neat diagram. **[9]**

b) How passive components can be measured in LCR meter? Also explain the "Q" concept in LCR meter. **[9]**

OR

Q2) a) Explain the circuit of practical RMS detector used in Digital multimeter. **[10]**

b) Write short note on Automatic Test Equipment (ATE)? **[8]**

Q3) a) Explain how pulse waveform can be generated using astable and monostable multivibrator circuits. **[8]**

b) Draw the neat block diagram of Arbitrary waveform generator and explain its working. **[8]**

OR

Q4) a) Using neat block diagram, explain the working of Sine wave Synthesizer. **[8]**

b) Explain pulse characteristics. **[8]**

P.T.O.

Q5) a) Explain the following features of Digital Storage Oscilloscope: **[8]**

i) Roll mode,

ii) Sampling rate,

iii) Refresh mode,

iv) Post trigger mode.

b) List out and explain the different sweep modes of oscilloscope. **[8]**

OR

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

i) Sampling oscilloscope,

ii) Delay line.

b) Explain the 10:1 probe. **[6]**

SECTION-II

Q7) a) Explain the working of V to F converter with neat diagram. Also list out its applications. **[10]**

b) Explain the working of sample and hold circuit with neat diagram. **[8]**

OR

Q8) a) Explain the working of binary weighted DAC. **[8]**

b) Explain the working of dual slope integrator type ADC with neat diagram and waveform. **[10]**

Q9) a) Describe the following modes of Universal counter:

i) Totalizing,

ii) Period,

iii) Time interval,

iv) Ratio mode. **[8]**

b) State the various measurement error in universal counter and explain any two in detail. **[8]**

OR

Q10)a) Write a short note on digital capacitance meter. **[8]**

b) Explain the working of frequency meter with neat block diagram. **[8]**

Q11)a) What is virtual Instrumentation? Explain its any one application. **[8]**

b) Harmonic Distortion Analyzer with neat block diagram. **[8]**

OR

Q12)a) Explain the working of Spectrum Analyzer with swept frequency technique with neat block diagram. **[8]**

b) Explain the working of Heterodyne wave analyzer with neat block diagram. **[8]**

Total No. of Questions : 12]

SEAT No. :

P2441

[Total No. of Pages : 2

[5153]-75

T.E. (Instrumentation & Control)

INDUSTRIAL MANAGEMENT

(2008 Course) (Semester - I) (306265)

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

Instructions to the candidates:

1) ***Any three questions from each section.***
2) ***Answer to the two section should be written in separate books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Assume Suitable data, if necessary.***

SECTION - I

Q1) a) What is business process re-engineering? Why it is important? Give different steps involved in it and also mention its advantages. **[10]**

b) Explain Porter's five forces with neat diagram. How are useful in the business? **[8]**

OR

Q2) a) Critically evaluates the importance of SWOT analysis, is it developing a sustainable business strategy. **[10]**

b) Explain briefly the Mind Mapping and Cause & Effect diagram. **[8]**

Q3) a) Briefly explains the salient features of ISO 9001 standard. **[10]**

b) Explain with importance Quality Circle. **[6]**

OR

Q4) Write short notes on: **[16]**

a) Industry Institute interaction

b) The effect of GAT/WTO agreement

P.T.O.

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

i) Outsourcing

ii) Purchasing

b) Explain the supply chain management concept along with its advantages? **[6]**

OR

Q6) a) What is ABC analysis? How it wallets the inventory to reduce cost? **[10]**

b) Explain Store keeping and Material handling. **[6]**

SECTION - II

Q7) a) What is motivation? Explain Maslow's theory. **[10]**

b) What is Leadership? What are functions and Qualities of Leadership? **[8]**

OR

Q8) a) Explain in detail Training. **[12]**

b) What is the role of Job description in manpower selection? **[6]**

Q9) a) Distinguish between CPM and PERT as project network analysis techniques. **[8]**

b) What is break even analysis? Give its assumptions and importance. **[8]**

OR

Q10)a) Write a note on Capital Structure. **[8]**

b) What is finance? Explain various sources of raising finance. **[8]**

Q11)Write short notes on: **[16]**

a) Disaster Management.

b) Global Warming.

OR

Q12)State and explain the concept of disaster management. Explain in detail its cause's effect & mitigation mechanism. **[16]**

Total No. of Questions : 12]

SEAT No. :

P2442

[Total No. of Pages : 4

[5153]- 76

T.E. (Instrumentation & Control Engineering)
DIGITAL SIGNAL PROCESSING FUNDAMENTALS
(2008 Pattern) (Semester - II) (306267)

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

Instructions to the candidates:

1) ***Answers Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 from Section I.***
2) ***Answers Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12 from Section II.***
3) ***Answers to the two sections should be written in separate answer sheets.***
4) ***Neat diagrams must be drawn wherever necessary.***
5) ***Figures to the right indicate full marks.***
6) ***Assume suitable data if necessary.***
7) ***Use of calculators/Log table is allowed.***

SECTION - I

Q1) a) State and explain the transformations on the independent variable in signal. **[8]**

b) Determine the output of linear time invariant (LTI) system having impulse response $h(n) = \{1,5,1,1\}$ and input signal $x(n) = \{1,3,2,1\}$ using graphical method. **[10]**

OR

Q2) a) Determine the cross-correlation between $x(n) = \{4,5,6,0\}$ and $y(n) = \{4,3,2,4\}$ using tabulation method. **[8]**

b) State and explain the following properties of discrete time system. **[10]**

i) Stability

ii) Causality

iii) Time-variant

iv) Recursive

v) Linearity

P.T.O.

Q3) a) Determine and sketch the magnitude and phase spectrum of the system with difference equation **[8]**

$$y(n)-1.8y(n-1)+2y(n-2)=3x(n) \text{ use } \omega=0, \pm\frac{\pi}{4}, \pm\frac{\pi}{2}, \pm\pi$$

b) Explain the basic structures of IIR systems. **[8]**

OR

Q4) a) Realize the direct form-I and direct form-II structure for the transfer function **[8]**

$$H(z)=\frac{(z+2)(z+5)}{(z+1.2)(z+1.6)(z+3)}$$

b) For the discrete time system described by **[8]**

$y(n)-\frac{3}{2}y(n-1)+\frac{1}{2}y(n-2)=x(n)$ obtain the system function $H(z)$, draw the pole-zero plot and comment on stability.

Q5) a) Compute the 8-point IDFT of sequence **[8]**

$$X(k)=\{6,-0.707-j1.707,1-j,0.707+j0.293,0,0.707-j0.293,1+j, -0.707+j1.707\}$$

b) Explain any four properties of DFT. **[8]**

OR

Q6) a) Explain the Twiddle Factor with its properties. **[8]**

b) Obtain the circular convolution between two sequences using graphical method **[8]**

$x_1(n)=\{2,5,0,4\}$ and $x_2(n)=\{4,1,3\}$

SECTION - II

Q7) a) Explain the radix-2 decimation-in-frequency (DIF) FFT algorithm for N = 8. **[8]**

b) Determine the 8-point DFT of x(n)={1,1,1,1,0,0,0,0} using radix-2 decimation-in-time (DIT) FFT algorithm, show all intermediate results.**[8]**

OR

Q8) a) Distinguish between radix-2 DIT-FFT and radix-2 DIF-FFT algorithm.**[8]**

b) Compute the IDFT of the sequence **[8]**

$X(k)=\{4,1-j2.414,0,1-j0.414,0,1+j0.414,\ 0,1+j2.414\}$

Using radix-2 decimation-in-frequency (DIF) IFFT algorithm,show all intermediate results.

Q9) a) Design linear-phase FIR low pass filter (LPF) with the following desired frequency reponse: **[8]**

$$H_d(e^{j\omega})=\begin{cases} e^{-3j\omega} & \text{for } 0 \le |\omega| \le \dfrac{\pi}{4} \\ 0 & \text{for } \dfrac{\pi}{4} < |\omega| \le \pi \end{cases}$$

Use Hanning window with $M = 7$, where M is the length of the filter.

b) Design linear-phase FIR high pass filter (HPF) with the following desired frequency response: **[8]**

$$H_d(e^{j\omega})=\begin{cases} e^{-2j\omega} & \text{for } \omega_c \le |\omega| \le \pi \\ 0 & \text{for } |\omega| < \omega_c \end{cases}$$

Use Bartlett window with $M = 5$, where M is the length of the filter and $\omega_c = 2$ rad/sample.

OR

Q10)a) What are the different methods of FIR filter design? Compare FIR filter and IIR filter. **[8]**

b) Design FIR low-pass filter (LPF) for with cut-off frequency = 200 *Hz*, sampling frequency = 1000 *Hz* using Rectangular window for $M = 7$, where M is the length of the filter. **[8]**

Q11)a) Explain the Bilinear Transformation and Impulse Invariance Methods in details. **[8]**

b) Determine the Order, Analog cut-off frequency and analog transfer function of the digital Butterworth low-pass filter with the following specification using Bilinear transformation: **[10]**

Passband: $0.9 \leq |H(e^{j\omega})| \leq 1 \quad \text{for } |\omega| \leq 0.3\pi$

Stopband: $|H(e^{j\omega})| \leq 0.2 \quad \text{for } 0.6\pi \leq |\omega| \leq \pi$

Assume T = 1 sec.

OR

Q12)a) Convert the analog filter **[8]**

$$H(s) = \frac{4}{(s+1)(s+2)}$$

into digital filter using bilinear transformation for $T = 1$ sec.

b) Design an IIR low-pass Butterworth filter using impulse-invariant method for the following specifications. **[10]**

Passband: $0.8 \leq |H(e^{j\omega})| \leq 1 \quad \text{for } |\omega| \leq 0.2\pi$

Stopband: $|H(e^{j\omega})| \leq 0.2 \quad \text{for } 0.6\pi \leq |\omega| \leq \pi$

Assume T = 1 sec.

Total No. of Questions : 12]

SEAT No. :

P2443

[Total No. of Pages : 2

[5153]- 77

T.E. (Instrumentation & Control)
POWER PLANT INSTRUMENTATION
(2008 Pattern) (Semester - II) (306268)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) What is difference between humidification and Dehumidification? **[8]**

b) Explain absorption unit operation with neat sketch? **[8]**

OR

Q2) a) What are the different types of compressor? Explain any one in detail. **[8]**

b) Explain the importance of fan and blower in process industry? **[8]**

Q3) a) Explain with neat sketch working of Condenser? **[8]**

b) Derive equation for LMTD for any heat exchange. **[8]**

OR

Q4) a) Explain in detail energy balance in boiler. **[8]**

b) Explain with neat sketch working of evaporator? **[8]**

Q5) a) What is the importance of power plant. Give detail classification. **[9]**

b) Sketch P & I diagram of boiler. **[9]**

OR

Q6) a) What are advantages and disadvantages of thermal power plant. **[9]**

b) Explain with neat sketch working of smoke detector. **[9]**

P.T.O.

SECTION - II

Q7) a) Explain the shutdown procedure for boiler. **[8]**

b) Explain with neat sketch CFBC boiler. **[8]**

OR

Q8) a) Explain Combustion control for boiler operation. **[8]**

b) Explain in detail about boiler inspection procedure. **[8]**

Q9) a) Enlist different types of sensors and their function used in turbine. **[8]**

b) Explain with neat sketch vibration control system used for turbine. **[8]**

OR

Q10)a) Explain dissolved oxygen analyzer in power plant with neat diagram. **[8]**

b) Explain the importance PH measurement in power plant. **[8]**

Q11)a) Explain with neat sketch working of pressurized boiling water reactor. **[9]**

b) Write note on conventional and non-conventional energy source. **[9]**

OR

Q12)a) Explain importance of instrumentation in diesel power plant. **[9]**

b) Explain working of solar power plant with neat sketch. **[9]**

Total No. of Questions :12]

SEAT No. :

P2444

[Total No. of Pages :4

[5153] - 78

T.E. (Instrumentation & Control)

PROCESS LOOP COMPONENTS

(2008 Pattern) (Semester - II)

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

Instructions to the candidates:

1) ***Answers 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 side indicate full marks.***
5) ***Your answers will be valued as a whole.***
6) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
7) ***Assume suitable data if necessary.***

SECTION-I

Q1) a) A sensor outputs a voltage ranging from 0 to 40 mV. For interface to an ADC the signal needs to be in the range of 0 to 3V. Develop the signal conditioning circuit. **[10]**

b) Draw P&ID symbols for the following: **[8]**

i) Pneumatic control valve

ii) Hydraulic line

iii) I/P converter

iv) High/Low alarm

OR

P.T.O.

Q2) a) Define the following using typical level control loop. **[10]**

i) Process

ii) Disturbance

iii) Manipulated variable

iv) Load variable

v) Controlled variable

b) State the advantages of SMART transmitter over conventional DPT. **[8]**

Q3) a) Explain the following process characteristics. **[8]**

i) Capacity

ii) Distance lag

b) Explain the following w.r.t controller. **[8]**

i) Direct and Reverse control

ii) Antireset windup

OR

Q4) a) Draw the responses of P, I, P+I and D controller to step input. **[8]**

b) Explain ON-OFF controller with neat diagrams. **[8]**

Q5) a) What is mean by tuning of controller? List various tuning methods. **[8]**

b) Explain ultimate cycle method with neat diagrams. **[8]**

OR

Q6) a) Explain stability criteria and quarter amplitude decay ratio criteria. **[8]**

b) Draw and explain I to P conversion techniques. **[8]**

SECTION-II

Q7) a) Develop physical ladder diagram for tank level control system. Assume suitable data. **[6]**

b) State the limitations of relay based systems. **[6]**

c) List out the specifications of PLCs. **[6]**

OR

Q8) a) Explain the following w.r.t PLC **[6]**

i) Ladder diagram

ii) Rung

iii) Scan time

b) Draw the architecture of PLC and explain each block. **[6]**

c) Develop PLC logic program for stirred tank system. Assume suitable data. **[6]**

Q9) a) Explain Inherent characteristics of control valve with neat diagrams. **[8]**

b) Explain w.r.t. control valve: **[8]**

i) valve coefficient

ii) rangeability

iii) turndown ratio

iv) viscosity index

OR

*Q10)*a) List out various types of control valves. Also describe actuator with AO and AC actions and neat diagrams. **[8]**

b) An equal percentage valve has a maximum flow of 55 cm^3/s and a minimum of 3 cm^3/s. If the full travel is 4 cm, find the flow at a 1.5 cm opening. **[8]**

Q11)a) Describe control valve noise generation and remedies on it. **[8]**

b) Describe the effects and remedies of cavitation and flashing. **[8]**

OR

Q12)a) Let us assume that we have a control valve regulating liquid flow from a tank. The water level is to be controlled in this tank at a level of 27 feet by regulating the outflow. The measured inflow varies from 0 to 125 gpm. Find the required C_v and sizing for the valve. **[8]**

b) Explain the control valve with positioner in details. **[8]**

EEE

Total No. of Questions : 12]

SEAT No. :

P2445

[Total No. of Pages : 2

[5153]- 79

T.E. (Instrumentation and Control)
INSTRUMENTATION SYSTEM DESIGN
(2008 Pattern) (Semester - II)

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

Instructions to the candidates:

1) ***Answer Q.1 or 2, Q.3 or 4, Q5 or 6, Q.7 or 8, Q.9 or 10, Q11 or Q12.***
2) ***Figures to the right indicate full marks.***

SECTION - I

Q1) a) Explain different types of the specifications? **[8]**

b) What are the different approaches adapted for product design? **[8]**

OR

Q2) a) Explain briefly NEEMA Standard. Explain type 1,2 and 3 of NEEMA standards. **[8]**

b) Explain different tests carried out on an enclosure. **[8]**

Q3) a) What is mean by Shielding. With the help of one example, explain the necessity of Shielding. **[8]**

b) Explain how electronic equipments can be protected from EMI? . **[8]**

OR

Q4) a) Explain electrostatic discharge with reference to Human Body Model. **[8]**

b) Describe the enclosure design guidelines to protect the equipment against ESD. **[8]**

Q5) a) Explain how ECG measurement is possible using AD620 instrumentation amplifier? **[9]**

b) What are the features of voltage to current converter XTR110? Explain any one application in detail. **[9]**

OR

P.T.O.

Q6) a) Design the temperature transmitter for following specifications. **[9]**

i) The output from RTD signal conditioning circuit is 0-5V for temperature range of 0-100°C.

ii) The output of transmitter is 4-20mA.

b) Explain how AD594/595 can be used as a stand-alone Celsius thermometer? **[9]**

SECTION - II

Q7) a) What is an isolation? Draw and explain with neat diagram one application of MCT2E. **[9]**

b) Explain any one application of CD4046B. **[9]**

OR

Q8) a) Design digital voltmeter using ICL7107 for input voltage range of 0-2V full scale. **[9]**

b) Design digital frequency counter for frequency range of 10 KHz using ICM 7217A. **[9]**

Q9) a) Explain analog circuit PCB design rules. **[8]**

b) Explain general considerations of layout check. **[8]**

OR

Q10)a) Enlist the different soldering techniques. Explain any one in detail. **[8]**

b) Write short notes on : (Any two) **[8]**

i) Double sided PCB.

ii) Multilayer PCB.

iii) Digital PCB design

Q11)a) Explain "Bath Tub Curve" with neat diagram. **[8]**

b) Explain the terms availability and maintainability. **[8]**

OR

Q12)a) Explain the term MTTF and MTBF. **[8]**

b) Write short note on virtual instrumentation. **[8]**

Total No. of Questions : 12]

SEAT No. :

P2446

[Total No. of Pages :4

[5153]-80
T. E. (Instrumentation)
CONTROL SYSTEM DESIGN
(2008 Course) (Semester-II)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Answers to the two sections should be written in separate answer books.***
3) ***Neat diagram must be drawn wherever necessary.***
4) ***Figures to the right indicates full marks.***
5) ***Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
6) ***Assume suitable data, if necessary.***

SECTION-I

Q1) Design a phase lead compensator if the open loop transfer function is given by $G(s)H(s) = \frac{k}{(s(s+2)(s+5))}$ if % over shoot required is 10%, steady state error <=0.2., peak time t_p = 1.71 sec. **[18]**

OR

Q2) a) Derive transfer function for lag network. **[6]**

b) The process transfer function is given by $G(s) = \frac{4}{(s(s+2)(s+3))}$. Design a lag compensator so that K_v>= 10 sec^{-1}, damping ratio is 0.5 and settling time is 2 sec, with tolerance 10%. **[12]**

Q3) Apply Bode plot method to design a lag compensator for unity feedback system having. $G(s) = \frac{k}{(s(s+1)(s+5))}$ such that P.M. $\approx 50^o$ G.M. atleast 30dB and ess = 0.15 rad for unit ramp input. **[16]**

OR

Q4) Open loop transfer function is given by $G(s) = \frac{5}{(s(s+3)(s+2))}$. Design a suitable compensator so that K_v = 25 sec^{-1}, phase margin 60° and gain margin should be at least 20dB. **[16]**

P.T.O.

Q5) Find tuning constant of P, Pi, and PID controller for following process **[16]**

$$G(s) = \frac{(10e^{-2s})}{(10s+1)}$$

OR

Q6) Find tuning constant P,Pi, and PID if process transfer function is given by **[16]**

$$G(s) = \frac{k}{(s+4)(s+5)(s+6)}$$

SECTION-II

Q7) a) Design a controller if the process open loop transfer function is given by

$G(s) = \frac{1}{(3s+1)}$ and desired close loop behaviour is given by

$G(s) = \frac{1}{(4s+1)}$. **[9]**

b) Design a PI controller if open loop transfer function is given by

$G(s) = \frac{5}{(s(s+2)(s+1))}$ so that P.M. is 50° at ω = 6 rad/sec. **[9]**

OR

Q8) a) Design a PD controller for a open loop transfer function **[9]**

$G(s) = \frac{4}{(s(s+2)(s+3))}$ so that K_v=30 sec^{-1} and PM= 40° at ω= 8 rad/ sec.

b) Design a controller if the process open loop transfer function is given by

$G(s) = \frac{1}{(5s+1)}$ and desired close loop behaviour is given by

$G(s) = \frac{1}{(10s+1)}$. **[9]**

Q9) a) Obtain the state transition matrix of following system matrix using Caley-Hamilton Theorem. **[12]**

$$A=\begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -40 & -38 & -11 \end{bmatrix}$$

b) Check whether following system is controllable or not. **[4]**

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \\ \dot{x}_3 \end{bmatrix}=\begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -10 & -5 & -1 \end{bmatrix}\begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix}+\begin{bmatrix} 0 \\ 1 \\ 1 \end{bmatrix}u$$

$$y=\begin{bmatrix} 1 & 2 & 1 \end{bmatrix}\begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix}+5u$$

OR

Q10) Find the state transition matrix if $A=\begin{bmatrix} -4 & 0 & 0 \\ 0 & -5 & 0 \\ 0 & 0 & -6 \end{bmatrix}$ using Caley-Hamilton theorem. Also find the response of system to step input if initial conditions are $x_0=\begin{bmatrix} 1 \\ 0 \\ 3 \end{bmatrix}$ and $B=\begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$ **[16]**

Q11) Determine feedback gain matrix so that poles of given system should placed to

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \\ \dot{x}_3 \end{bmatrix}=\begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -210 & -107 & -18 \end{bmatrix}\begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix}+\begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix}u$$

$$y=\begin{bmatrix} 1 & 3 & 2 \end{bmatrix}\begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix}+1u$$

so that desired poles can be placed at –1,–2,–5. **[16]**

OR

Q12) Design a full state observer for a system given so that desired poles are –2,–4,–5. **[16]**

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \\ \dot{x}_3 \end{bmatrix} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -40 & -36 & -11 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} u$$

$$y = \begin{bmatrix} 1 & 0 & 4 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix}$$

♦ ♦ ♦

Total No. of Questions :12]

SEAT No. :

P2447

[Total No. of Pages :3

[5153] - 81

T.E. (Computer)

DATABASE MANAGEMENT SYSTEMS

(2008 Pattern) (Semester - I) (310241)

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

Instructions to the candidates:

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

SECTION-I

Q1) a) Explain data abstraction. **[4]**

b) Draw and explain overall structure of Database management system. **[10]**

c) What are advantages of DBMS over normal file system? **[4]**

OR

Q2) a) Explain the concept of primary key, candidate key, super key and Foreign Key with suitable examples. **[6]**

b) What is ER diagram and Extended ER diagram? Explain with Example. **[6]**

c) Explain different data models Hierarchical, Network and Object Relational Model. **[6]**

Q3) a) Write note on Database Modification using SQL Insert, Update and Delete Queries. **[8]**

b) Explain Basic Operations in Relational Algebra with suitable example. **[8]**

OR

P.T.O.

Q4) a) Write short note DDL, DML and DCL. **[8]**

b) Explain concept of stored procedures, Cursors, triggers and assertions. **[8]**

Q5) a) What are various database anomalies that lead us to redesign the database? **[6]**

b) What is normalization? Explain Fist Normal Form (1NF) with example. **[4]**

c) Explain Partial dependency and Transitive Dependency with suitable example. **[6]**

OR

Q6) a) Write short note on canonical cover. **[4]**

b) What is Second Normal Form (2NF)?, Explain how to convert a relation in 1NF to 2NF. **[6]**

c) Explain 3NF and BCNF. **[6]**

SECTION-II

Q7) a) Explain concept of indices and explain any two types of Indices. **[8]**

b) Write the Transformation Rules for Relational Expressions. **[8]**

OR

Q8) a) Compare B Tree and B+ Tree. Write short note on B Tree as an indexing technique. **[8]**

b) Write a detailed note on various steps in Query processing. **[8]**

Q9) a) Explain ACID Properties of transaction in detail. **[4]**

b) What are checkpoints? Explain Deferred and Immediate Checkpoints. **[8]**

c) Explain time stamp based Concurrency Control. **[4]**

OR

Q10)a) Write short note on the two phase locking protocol and rigorous two phase locking protocol. **[8]**

b) Explain Shadow Paging with diagram. **[8]**

Q11)a) Write short note on Association Rule Mining. **[4]**

b) Explain need of distributed database system with advantages and disadvantages of distributed database system. Also explain distributed database system. **[8]**

c) Draw and explain components of Data warehouse. **[6]**

OR

Q12)a) Explain 2-Tier and 3-Tier Architecture of databases. **[6]**

b) Write short note on any three. **[12]**

i) Data Mining Process.

ii) Pointer Swizzling techniques.

iii) Centralized and client server database architecture.

iv) Persistent Programming Languages.

Total No. of Questions : 12]

SEAT No. :

P2448

[Total No. of Pages : 3

[5153]-82
T.E. (Computer Engg.)
DATA COMMUNICATIONS
(2008 Pattern) (Semester-I) (310242)

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

Instructions to the candidates:

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

SECTION-I

Q1) a) With help of block diagram, explain BFSK transmitter and receiver. **[6]**

b) Explain WDM and CDMA multiplexing techniques. **[6]**

c) Compare Analog and digital modulation. **[6]**

OR

Q2) a) Explain in detail digital communication system. **[8]**

b) Explain difference in Bit rate and baud rate. **[4]**

c) Write short note on modem. **[6]**

Q3) a) Explain sampling theorem. **[8]**

b) Explain with diagram operation of DPCM transmitter. **[8]**

OR

Q4) a) Explain line coding polar schemes. **[8]**

b) Explain pulse code modulation technique. **[8]**

P.T.O.

Q5) a) Explain following terms related to codes: **[10]**

i) Code word.

ii) Code rate.

iii) Hamming weight of code word.

iv) Code efficiency.

v) Hamming distance.

b) Explain why error detection and correction required. **[6]**

OR

Q6) a) Describe Shannon's theorem on channel capacity. Explain with suitable example. **[8]**

b) Explain the Huffman encoding algorithm. **[8]**

SECTION-II

Q7) a) Write short note on control signaling and signaling function with respect to circuit switching networks. **[8]**

b) Explain in detail seven layers ISO-OSI reference model. **[10]**

OR

Q8) a) Explain architecture of Bluetooth protocol. **[8]**

b) Comment on the TCP/IP protocol stack? How it is different than OSI seven layer model. **[10]**

Q9) a) Comparison of optical fiber with coaxial and twisted pair cable. **[8]**

b) Define bridges and explain with neat diagram different types of bridges. **[8]**

OR

Q10) a) Explain advantages and dis-advantages of packet switching. **[8]**

b) Explain classification of wireless media in detail. **[8]**

Q11)a) Describe the frame format of PPP with diagram. **[8]**

b) What is static and dynamic channel allocation? **[8]**

OR

Q12)a) Write short note on one bit siding window protocol. **[8]**

b) List and write the use of different network connection devise. **[8]**

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Total No. of Questions : 12]

SEAT No. :

P2449

[Total No. of Pages :3

[5153]-83

T.E. (Computer Engineering)

MICROPROCESSORS AND MICROCONTROLLERS

(2008 Course) (Semester - I) (310243)

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

Instructions to the candidates:

1) ***Answer Question No. 1 OR 2, 3 OR 4, and 5 OR 6 from Section I and Q. No. 7 OR 8, 9 OR 10 and 11 OR 12 from Section II.***
2) ***Answers to the two Sections must be written in separate answer books.***
3) ***Neat diagrams must be drawn whenever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Compare 80386, 80486, and the Pentium based on architecture. **[6]**

b) Explain Floating Point Unit of the Pentium? **[6]**

c) What is the function of each of the following pins? **[6]**

i) BRDY #

ii) ADS #

iii) BE0 # - BE 7 #

OR

Q2) a) Describe cache organization of the Pentium. **[6]**

b) Which features makes the Pentium, a superscalar processor? Explain in detail. **[6]**

c) What is Branch Prediction in the Pentium? Explain with diagram. **[6]**

Q3) a) Explain addressing modes of the Pentium. **[8]**

b) What is the purpose of control registers? Explain significance of CR0 in working of cache and paging unit. **[8]**

OR

P.T.O.

Q4) a) With the help of neat diagram, explain non-pipelined read bus cycle of the Pentium. **[6]**

b) List and explain protected mode registers of the Pentium. **[6]**

c) Describe any two instructions. **[4]**

i) XADD

ii) BTC

iii) SWAPB

Q5) a) How linear address is translated to physical address in the Pentium. Draw the required data structures. **[8]**

b) Describe call gate mechanism in details. Draw the related descriptor formats. **[8]**

OR

Q6) a) How logical address is translated to linear address in the Pentium. Draw the required data structures. **[8]**

b) How pages can be protected in the Pentium? Give details. **[8]**

SECTION - II

Q7) a) What is I/O permission bit map? When it is referred? **[6]**

b) Explain task switch operation through task gate. **[6]**

c) Write any six difference between 8086 and virtual 86 mode. **[6]**

OR

Q8) a) Explain IDT in Pentium in details. How interrupt handling in protected mode is dependent on contents of IDT? **[6]**

b) Explain steps in entering Virtual mode. **[6]**

c) Explain nested task in the Pentium. **[6]**

Q9) a) Draw and Explain internal RAM organization of 8051. **[12]**

b) Explain the function of following pins. **[4]**

i) TI

ii) T0

OR

Q10)a) Explain addressing modes of 8051 microcontroller. Explain with suitable example. **[8]**

b) Explain following 8051 instructions. **[8]**

i) MOVC

ii) MOVX

iii) SETB

iv) RETI

Q11)a) Write features of 8096 microcontroller. **[4]**

b) Explain IE & IP registers of 8051 microcontroller. **[8]**

c) Explain any two modes of timer operation in 8051. **[4]**

OR

Q12)a) How many interrupt sources are there in 8051? List them & explain interrupt handling mechanism in 8051. **[8]**

b) Describe serial port on 8051 with the help of SCON. **[8]**

Total No. of Questions : 12]

SEAT No. :

P2450

[Total No. of Pages : 2

[5153]-84
T.E.(Computer)
DIGITAL SIGNAL PROCESSING
(2008 Pattern) (Semester-I)

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

Instructions to the candidates:

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

SECTION-I

Q1) Explain different classification of signals with example. **[16]**

OR

Q2) a) Define energy and power signal. Find whether the following signal is an energy signal or power signal x(n) = n n > 0
= 0 n < 0 **[7]**

b) Test Linearity, Causality, and time invariance systems of y(n)=x(n) u(n). **[9]**

Q3) a) Obatin DTFT of different standard signals. **[12]**

b) Explain clearly: Circular convolution. **[6]**

OR

Q4) a) Compare DFT with DTFT. **[4]**

b) Why the result of circular and linear convolution is not same? **[4]**

c) Using DFT and IDFT obtain circular convolution of **[10]**
x(n) = {2, 0, 0, 1} and h(n) = {4, 3, 2, 1}.

Q5) Derive and explain Radix-2 Decimation in time (DIT) FFT algorithm for computing N-point DFT. **[16]**

OR

Q6) a) State time shifting property of Z-transform and calculate x(n) = ∂ (n+2). **[4]**

b) Explain different properties of twiddle factor. **[9]**

c) Define ROC and state significance of ROC. **[3]**

P.T.O.

SECTION-II

Q7) a) Explain the method of simple geometric interpretation to obtain the frequency response of DT system. **[10]**

b) Determine impulse response of a system:
$y(n)=x(n)-x(n-1)-3y(n-1)-2y(n-2)$ **[8]**

OR

Q8) a) Define system function H(z). How it is obtained from the general difference equation? **[6]**

b) what is pole zero plot? State condition for causality and stability in terms of ZT. **[6]**

c) Determine H(z) and draw a pole zero plot for a system **[6]**

$$x(n)+x(n-1)=y(n)+\frac{3}{4}y(n-1)+\frac{1}{8}y(n-2)$$

Q9) a) Explain Gibb's phenomenon associated with FIR filter design. What are the desirable features of window function to improve the frequency response? **[10]**

b) The transfer function of analog filter is: $H(s)=\frac{3}{(s+2)(s+3)}$ with T_S=0.1sec.Design the digital IIR filter using BLT method. **[6]**

OR

Q10)a) To design the digital IIR filter, analog IIR filter is designed first, why? What are the different methods to design IIR filters? Explain any one in brief. **[10]**

b) What are the advantages and disadvantages of FIR filter. **[6]**

Q11)a) Obtain linear phase FIR filter of $H(z)=\left(1+\frac{z^{-1}}{4}+\frac{z^{-2}}{4}+z^{-3}\right)$. **[6]**

b) Compare DSP processor and general purpose processors. **[6]**

c) What are the advantages of representing the digital filter in block diagram form? **[4]**

Q12)a) Draw Direct Form-I IIR filter structure for: $H(z)=3+\frac{4z}{(z-0.5)}-\frac{2}{(z-0.25)}$ **[8]**

b) Explain the application of DSP in speech processing. **[8]**

Total No. of Questions : 12]

SEAT No. :

P2451

[Total No. of Pages : 3

[5153]-85

T.E. (Computer Engieneering)

THEORY OF COMPUTATION

(2008 Pattern) (Semester - I)

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

Instructions to the candidates:

1) ***Attempt Q. 1 or 2, Q.3 or 4, Q.5 or 6, Q.7 or 8, Q.9 or 10, Q.11 or 12.***
2) ***Answer to the two section should be written in separate books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Assume Suitable data, if necessary.***

SECTION - I

Q1) a) Give the Mealy and Moore machine for the following processes. "For input from (0 + 1)*, if inputs ends in 101, output X; if input ends in 110, output Y, otherwise output Z". **[6]**

b) Let L be a language. It is clear from the definition that $L^+ \subseteq L^*$. Under what circumstances are they equal? **[6]**

c) Define the following terms with example: **[6]**

i) Symbol

ii) Alphabet

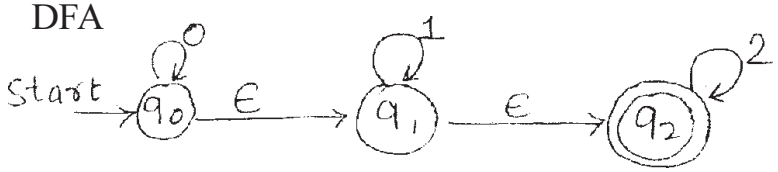
iii) DFA

OR

Q2) a) Consider the following NFA with ε - transitions. Convert this NFA to **[10]**

i) NFA without ε -moves

ii) DFA



b) Construct NFA and DFA for accepting all possible strings of zeroes and ones not containing 101 as a substring. **[6]**

c) Differentiate between NFA and DFA. **[2]**

P.T.O.

Q3) a) For the following regular expression, draw an FA recognizing the corresponding language. **[6]**

r = (1 + 10)*0

b) Let L be any subset of 0*. Prove that L* is regular. **[6]**

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

OR

Q4) a) For each of the following draw DFA, **[8]**

i) (11 + 00)*

ii) (111 + 100)*.0

b) Explain the use of regular expressions in unix with any one example. **[4]**

c) Write short note on pumping lemma for regular expression **[4]**

Q5) a) In each case, find a CFG generating the given language: **[9]**

i) The set of odd length strings in {a, b}* with middle symbol a

ii) The set of even length strings in {a, b}* with the two middle symbosl equal

iii) The set of odd length strings in {a, b}* whose first, middle and last symbols are all same

b) Define Normal Forms with the help of example. **[4]**

c) Write a short note on Application of CFG. **[3]**

OR

Q6) a) Describe the language generated by each of these grammars. Justify your answer with an example. **[12]**

i) $S \rightarrow a\ S\ a\ |b\ S\ b|\ \varepsilon$

ii) $S \rightarrow a\ S\ a\ |b\ S\ b|\ a\ |\ b$

iii) $S \rightarrow a\ S\ b\ |b\ S\ a|\ \varepsilon$

b) For right linear grammar given below obtain an equivalent left linear grammar. **[4]**

$S \rightarrow 10A\ |\ 01$

$A \rightarrow 00A|1$

SECTION - II

Q7) a) Specify following with respect to Push Down Automata: **[8]**

i) Definition.

ii) Transition Function.

iii) Example.

b) Construct PDA equivalent to CFG of following productions: **[10]**

$S \rightarrow 0BB, \quad B \rightarrow 0S, \quad B \rightarrow 1S, \quad B \rightarrow 0$

OR

Q8) a) Construct a PDA accepting $\{a^n.b^n \mid n >= 1\}$ **[10]**

b) Explain how DPDA is different from NPDA with Example. **[8]**

Q9) a) Construct PDA accepts Language generated by the CFG. **[8]**

$S \rightarrow S + S$

$S \rightarrow S * S$

$S \rightarrow 4$

b) Define post machine. Compare FA, PDA, TM. **[8]**

OR

Q10)a) What is Post Correspondence Problem? Explain with Example. **[8]**

b) Construct Turing Machine for finding 2's Complement of a binary number. **[8]**

Q11)a) Construct Turing Machine for reversing a string. **[8]**

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

i) Halting Problem of Turing Machine

ii) Write short note on Universal Turing Machine

OR

Q12)a) Define Following Terms: **[8]**

i) Recursive Language

ii) Recursive Enumerable Language

b) Prove the theorem - "if L1 and L2 are recursively enumerable languages over Σ then L1 $\cup$ L2 and L1 $\cap$ L2 are also recursively enumerable". **[8]**

Total No. of Questions : 12]

SEAT No. :

P2452

[Total No. of Pages : 3

[5153]- 86

T.E. (Computer Engg.)

PRINCIPLES OF PROGRAMMING LANGUAGES

(2008 Pattern) (Semester - II)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) What are different parameter passing methods? Explain each in detail with example. **[8]**

b) Explain programming language paradigms.State example of each paradigms. **[8]**

OR

Q2) a) Why does the use of dynamic scoping imply the need for runtime type checking? **[8]**

b) What do you mean by activation records? How this feature is used for implementing recursive function calls? **[8]**

Q3) a) What are the features of procedural programming? How procedures and modularity makes procedural programming as a better choice for programming. **[8]**

b) Compare C and PASCAL programming languages. **[8]**

OR

P.T.O.

Q4) a) Explain the following with reference to PASCAL Programming language:

i) Scope rules

ii) Local and global variable

iii) Parameter passing

iv) Pointers

v) Data Types **[10]**

b) With suitable diagram demonstrate and explain the execution steps for imperative programming. **[6]**

Q5) a) Comment on implementation differences among JAVA and C++ programming languages. Write a code for some requirements of JAVA & C++. **[10]**

b) What are the benefits of the object oriented model that have led to its increase in popularity? **[8]**

OR

Q6) a) Explain difference between dynamic and static method binding with respect to JAVA programming language. **[10]**

b) Explain JAVA applications and JAVA applets. Draw typical Applet life cycle. **[8]**

SECTION - II

Q7) a) Explain in brief following constructs with respect to .NET framework:**[10]**

i) Arrays

ii) Interfaces

iii) Event Handler

iv) Delegates

v) Classes and methods

b) What is the base class of .NET framework? What is importance of assemblies? **[8]**

OR

Q8) a) Explain value type and reference type with respect to C# **[8]**

b) Describe following public methods of C# **[8]**

i) bool equals ()

ii) int GetHashCode()

c) Describe in brief structure of C# program **[2]**

Q9) a) Explain following conditional predicate with Prolog. **[8]**

i) CUT ii) If then else

b) Explain how backtracking works in prolog. **[8]**

OR

Q10)a) State and explain key features of logical programming specifications. **[8]**

b) Explain resolution and unification in logic programming with suitable example. **[8]**

Q11)a) Explain numeric predicate functions supported by LISP. **[6]**

b) Whether LISP supports macros and object definition. Justify with example. **[10]**

OR

Q12)a) Describe following properties of functional programming language: **[8]**

i) Lazy function evaluation ii) Referential transparency

b) Compare functional and imperative language with respect to following issues: **[8]**

i) Systematic structure ii) Semantics
iii) Concurrent Execution iv) Data structures

Total No. of Questions : 12]

SEAT No. :

P2453

[Total No. of Pages : 2

[5153]- 87

T.E. (Computer Engineering)

COMPUTER NETWORKS

(2008 Pattern) (Semester - II)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) Discuss OSI model of computer Networks in detail. **[6]**

b) What are different service models? Discuss TCP model of computer Networks? **[6]**

c) Discuss any three application layer services. **[6]**

OR

Q2) a) Describe Domain Name System in detail. **[6]**

b) What is HTTP? Discuss the need for FTP. **[6]**

c) Write a short Note on TELNET. **[6]**

Q3) a) What are the different transport services? Discuss any two in detail. **[8]**

b) Discuss TCP/IP connection management in detail. **[8]**

OR

Q4) a) Discuss congestion control protocols in detail. **[8]**

b) Discuss the header formats of **[8]**

i) TCP

ii) UDP

Q5) a) What QoS? How to achieve QoS? **[8]**

b) Discuss any two scheduling Algorithms in detail. **[8]**

OR

P.T.O.

Q6) a) What are the different differentiated services? Discuss any two. **[6]**

b) Write a short note on integrated services? What is RSVP protocol discuss? **[10]**

SECTION - II

Q7) a) Discuss-

i) IPV4 ii) IPV6 in detail. **[8]**

b) Discuss Network layer Design issues? **[8]**

OR

Q8) a) What is ARP? What is RARP? Compare & contrast? **[8]**

b) Write a short note on ICM protocol (V4 & V6). **[8]**

Q9) a) Discuss distance vector routing in detail. **[6]**

b) What do you mean by IP routing ? Give the classification of IP routing protocols. **[6]**

c) Discuss IGRP in detail. **[6]**

OR

Q10) Write short Notes on-

i) RIP ii) OSPF iii) BGP **[18]**

Q11) a) What is HDLC discuss in detail. **[4]**

b) What are the different PPPprotocols? Discuss. **[8]**

c) What is hub? How it is different than switch? **[4]**

OR

Q12) a) What do you mean by link virtualization? How it is been done? **[8]**

b) What are routers? Describe? **[4]**

c) Discuss Pridges in detail? What are they used for? **[4]**

Total No. of Questions : 12]

SEAT No. :

P2454

[Total No. of Pages :2

[5153]-88

T. E. (Computer Engg.)

FINANCE & MANAGEMENT INFORMATION SYSTEM

(2008 Course) (Semester-II) (310251)

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

Instructions to the candidates:

1) ***Answers to the two sections should be written in separate answer books.***
2) ***Figures to the right indicate full marks.***
3) ***From Section I, answer (Q1 or Q2) and (Q3 or Q4) and (Q5 or Q6).***
4) ***From Section II, answer (Q7 or Q8) and (Q9 or Q10) and (Q11 or Q12).***
5) ***Neat diagrams must be drawn wherever necessary.***
6) ***Make suitable assumptions wherever appropriate and relevant.***

SECTION-I

Q1) a) List down the functions of management and explain each function in detail? **[9]**

b) Explain HR management and selection. What strategies are followed in appraisal? **[8]**

OR

Q2) a) Explain the concept of International Business Management. What are the benefits to host nation with international business? **[9]**

b) What is the need of information systems? What are various components of information system? **[8]**

Q3) a) Explain goal of financial management and fundamental principle of finance? **[9]**

b) With examples write short note on balance sheet? **[8]**

OR

Q4) a) What is Financial Management? Explain profit and loss account? **[9]**

b) Explain about Share, debentures & International Security. **[8]**

Q5) a) Give role of MIS in decision making? **[8]**

b) Explain business process reengineering and relevance of IT? **[8]**

OR

Q6) Explain any two of the followings: **[16]**

a) Decision Support System

b) Programmed and non-programmed Decision

c) Knowledge management and system

SECTION-II

Q7) a) Explain E-business enterprise: Organisation of business in digital form and e-business? **[9]**

b) Write a short note on e-commerce and e-communication? **[8]**

OR

Q8) a) Explain in detail security and businesses along with web enabled business management? **[9]**

b) Write short note on e-collaboration and real time enterprise? **[8]**

Q9) a) Explain Enterprise Resource Planning. **[9]**

b) Explain outsourcing and off-shoring in Global management? **[8]**

OR

Q10)a) Write short note on cultural, political and economical challenges in Global management? **[9]**

b) Explain global business IT strategies and applications? **[8]**

Q11)a) Explain in detail IPR law? **[8]**

b) Explain IT impact on society? **[8]**

OR

Q12)a) Explain in detail cyber law and IT act? **[8]**

b) Write a short note on right to information act? **[8]**

♦ ♦ ♦

Total No. of Questions :12]

SEAT No. :

P2456

[Total No. of Pages :3

[5153] - 90
T.E. (Computer Engineering)
SOFTWARE ENGINEERING
(2008 Course) (Semester - II) (310253)

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

Instructions to the candidates:

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

SECTION-I

Q1) a) Explain the software myths of a developer and manager. **[8]**

b) What are the advantages of an evolutionary process model? Explain with a process model. **[8]**

OR

Q2) a) Explain the incremental process model. **[8]**

b) What is an agile process model? Explain how Extreme programming supports agile process. **[8]**

Q3) a) Explain the requirement analysis with usecases and actors. **[8]**

b) How data flow modeling is used in requirements modeling? **[8]**

OR

Q4) a) Explain the requirement elicitation task in requirements engineering. **[8]**

b) Explain the class based modeling with an example. **[8]**

P.T.O.

Q5) a) Explain the following design concepts. **[10]**

i) Abstraction

ii) Modularity

iii) Software architecture

iv) Cohesion

b) Explain user interface design process. **[8]**

OR

Q6) a) Explain any three software architecture styles. **[10]**

b) What are the design issues in user interface design? **[8]**

SECTION-II

Q7) a) Give the strategies of testing. Explain the unit testing strategy. **[10]**

b) Explain the performance and acceptance testing methods. **[8]**

OR

Q8) a) Give the test case derivation loop testing and condition testing. **[8]**

b) What is black box testing? How it is done using boundary value analysis and equivalence partitioning. **[10]**

Q9) a) Differentiate measurement and metric. Explain GQM. **[8]**

b) Explain the process based estimation. **[8]**

OR

*Q10)*a) Explain the size and function oriented metrics and how they are used in software estimation. **[8]**

b) How effort estimation is carried out in COCOMO? **[8]**

Q11)a) Explain the importance of tracking the schedule. Describe the use of timeline chart for scheduling. **[8]**

b) Compare proactive and reactive risk and expalin risk identification in proactive risk management. **[8]**

OR

Q12)a) What is software configuration management? Explain the SCM process. **[8]**

b) Explain the FURPS quality factors. **[8]**

EEE

Total No. of Questions :12]

SEAT No. :

P2457

[Total No. of Pages :3

[5153] - 91

T.E .(I.T.)

DATABASE MANAGEMENT SYSTEMS

(2008 Course) (Semester - I)

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

Instructions to the candidates:

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

SECTION-I

Q1) a) How following problems are handled with DBMS. **[8]**

i) Data Isolation.

ii) Data Redundancy and Inconsistency.

iii) Data Integrity.

b) Explain various Data Models used in DBMS. **[10]**

OR

Q2) a) Explain the structure of DBMS. **[10]**

b) What do you mean by Key? State & explain Codd's rules. **[8]**

Q3) a) What do you mean by Cursor? Explain the types of cursor with example. **[8]**

b) Explain various set operation in SQL with example. **[8]**

OR

P.T.O.

Q4) a) Explain Natural join & division operation in relational algebra with example. **[8]**

b) Explain Stored Procedures & Triggers. **[8]**

Q5) a) What is Normalization? Explain 1NF & 2NF with example. **[8]**

b) What do you mean by decomposition? Explain lossless decomposition & dependency preserving decomposition with suitable example. **[8]**

OR

Q6) a) Specify Armstrong's axioms. Use Armstrong's axioms to prove the soundness of pseudo transitivity rule. **[8]**

b) Describe the concept of transitive dependency and explain how this concept is used to define 3NF. **[8]**

SECTION-II

Q7) a) Define Hashing. Explain the difference between Static & Dynamic Hasing. **[8]**

b) Explain detail use of B Tree as an indexing technique. Compare B Tree and B+ Tree. **[10]**

OR

Q8) a) Define Query processing. Explain Merge join algorithm in Query processing. **[10]**

b) Explain following: **[8]**

i) Dense index.

ii) Sparse index.

iii) Clustered index.

Q9) a) State and Explain Thomas Write rule. **[8]**

b) Explain Shadow Paging mechanism with diagram along with the benefits. **[8]**

OR

Q10)a) Explain the concept of 'transaction'. Describe ACID properties for transaction. **[8]**

b) Show that two phase locking protocol ensures conflict serializability. **[8]**

Q11)a) Write short note on: **[8]**

i) Data Warehouse Manager.

ii) Pointer Swizzling Techniques.

b) What do you mean by Distributed Database system? Explain its working with proper diagram with advantages. **[8]**

OR

Q12)a) Explain 2 Tier & 3 Tier architecture of Databases. **[8]**

b) Explain the need of Backup and Replication. **[8]**

Total No. of Questions : 12]

SEAT No. :

P2458

[Total No. of Pages : 3

[5153]-92
T.E. (Information Technology)
SOFTWARE ENGINEERING
(2008 Pattern) (Semester - I)

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

Instructions to the candidates:

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

SECTION-I

Q1) a) Explain the following models **[10]**

i) Waterfall Model

ii) Concurrent Model

b) What are process Models? Explain Personal Software Process and Team Software Process. **[8]**

OR

Q2) a) Software Engineering is considered as layered technology. Comment. **[9]**

b) Explain Agile Process Model. **[9]**

Q3) a) Draw E-R diagram for relationship between customer and banking system. **[6]**

b) Draw and explain the traceability table for requirement management. **[6]**

c) Describe two real time situation in which the customer and the end-user is same. Describe two situation in which they are different. **[4]**

OR

P.T.O.

Q4) a) What is meant by requirement specifications? What are the characteristics that requirement must meet? **[8]**

b) What is meant by normal and exciting requirements? How requirements are validates? **[8]**

Q5) a) Explain the goals of design process? **[8]**

b) Explain Data-centered architecture and Data-Flow architecture. **[8]**

OR

Q6) a) What are the elements in data design? What are the guidelines for the data design? **[8]**

b) What are the interface design principles and guidelines? **[8]**

SECTION-II

Q7) a) What is cyclomatic complexity? How is it determined for a flow graph? Illustrate with example. **[8]**

b) What are the testing strategies for web application? Explain the testing process for web application. **[8]**

OR

Q8) a) What is black box testing? What are the ways to perform black box testing? **[8]**

b) What is verification testing and validation testing? Explain in brief. **[8]**

Q9) a) What are the categories of stakeholders? What are the characteristics of effective project manager? **[8]**

b) Explain the COCOMOII estimation model. **[8]**

OR

Q10)a) What are the ways in which software estimation can be classified? Elaborate. **[6]**

b) What is FPA? Explain in brief. **[10]**

Q11)a) What are the software quality factors? Explain any four. **[12]**

b) What are the types of risks? Explain in brief. **[6]**

OR

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

a) Software quality assurance (SQA).

b) Change control process.

c) Earned value analysis.

❄ ❄ ❄

Total No. of Questions : 12]

SEAT No. :

P2459

[Total No. of Pages : 3

[5153]-93
T.E.(IT)
OPERATING SYSTEMS
(2008 Pattern) (Semester-I)

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

Instructions to the candidates:

1) ***Answer THREE questions from each section,***
2) ***Answer to the Two sections should be written in SEPARATE answer books.***
3) ***Figure to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

SECTION-I

Q1) a) Describe with the help of neat diagram the interaction of operating system with hardware. **[8]**

b) Draw and explain the architecture of windows 2000. **[8]**

OR

Q2) a) State in brief the four key features of each of the following types of OS. **[8]**

i) Batch
ii) Distributed
iii) Multithreading
iv) Time-sharing

b) Explain modern UNIX kernel with a neat diagram. **[8]**

Q3) a) Consider the following set of processes, with the length of processes given in milliseconds. Solve the problem using FCFS & Round Robin scheduling (Assume time quantum equal to 1). **[12]**

Process	Arrival time	Burst time
P1	0	6
P2	2	2
P3	4	3
P4	6	4
P5	8	5

i) Draw Gantt chart illustrating the execution of these processes.
ii) Calculate waiting time and turnaround time for each process.
iii) Calculate the average waiting time and turnaround time for all the processes.

b) Explain UNIX Multi-level feedback queue scheduling. **[6]**

OR

P.T.O.

Q4) a) What is the difference between Process and Thread? What are the contents of Thread Control Block (TCB). State the advantages and disadvantages of user level threads. **[12]**

b) What is System call? Explain fork () System call. **[6]**

Q5) a) Consider the following state of the system. Check Whether System is in Deadlock State or not. **[8]**

	Allocation matrix				Max matrix				Available vector			
	A	B	C	D	A	B	C	D	A	B	C	D
P0	0	0	1	2	0	0	1	2	2	1	0	0
P1	2	0	0	0	2	7	5	0				
P2	0	0	3	4	6	6	5	6				
P3	2	3	5	4	4	3	5	6				
P4	0	3	3	2	0	6	5	2				

b) Explain the conditions for the occurrence of Deadlock? **[8]**

OR

Q6) a) Implement the Producer Consumer problem using Semaphores and discuss how the critical section requirements are fulfilled. **[8]**

b) What is Inter Process Communication? Explain different methods of IPC. **[8]**

SECTION-II

Q7) a) Explain internal and external fragmentation. **[8]**

b) Free memory holes of sizes 100K, 500K, 200K, 300K, and 600K are available. The processes of size 200K,417K,112K and 426K are to be allocated. How processes are to be placed in **[8]**

i) First Fit

ii) Best Fit

iii) Worst Fit

iv) Next Fit.

c) What is thrashing? **[2]**

OR

Q8) a) A process contains following virtual pages on disk and is assigned a fixed allocation of three frames in main memory. Show successive pages residing in the three frames using FIFO, LRU, and Optimal.

Reference string:7,0,1,2,0,3,0,4,2,3,0,3,2,1,2,0,1,7,0,1. **[8]**

b) Explain segmentation in detail with suitable diagram. **[6]**

c) Describe the following term in brief: **[4]**

i) Principle of locality

ii) Belady's anomaly?

Q9) a) Assume the disk head is initially positioned over track 53. For the disk track request 98, 183, 37, 122, 14, 124, 65, 67 show head movement of cylinders using FCFS, SSTF, SCAN, C-SCAN. **[8]**

b) What are the different buffering ways in I/O buffering? **[8]**

OR

Q10)a) What is RAID? Explain the advantages and disadvantages of RAID. Also explain seven RAID levels in brief. **[10]**

b) Draw and explain UNIX I/O structure and explain in detail role and implementation of buffer cache in UNIX I/O subsystem. **[6]**

Q11)a) What is the difference between passive and active security threats? **[6]**

b) Describe two approaches to intrusion detection. What does audit record contain? **[6]**

c) Write note on Protection Domain. **[4]**

OR

Q12)a) Explain with the diagram the taxonomy of malicious programs. **[8]**

b) Explain protection policy and mechanism in details. **[8]**

Total No. of Questions : 12]

SEAT No. :

P2460

[Total No. of Pages : 4

[5153]-94

T.E. (Information Technology)

THEORY OF COMPUTATION

(2008 Pattern) (Semester - I)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) Design a FSM to check given decimal number is divisible by 4 or not. **[8]**

b) Prove that: **[8]**

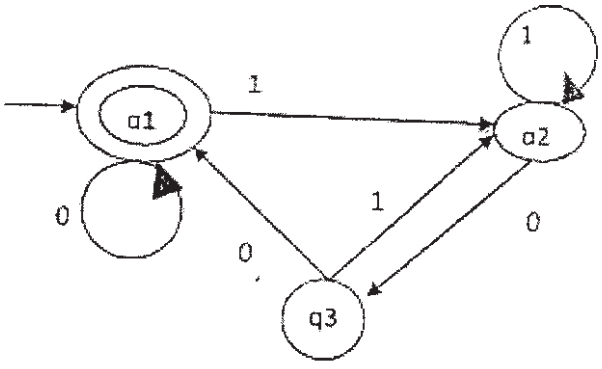
i) $(111^*)^* = (11 + 111)^*$

ii) $(0^*1^*)^* = (0 + 1)^*$

OR

Q2) a) Construct FSM for Binary Adder. **[6]**

b) Convert following DFA to RE. **[6]**



c) Define following terms with example: **[4]**

i) Kleen Closure.

ii) Regular expression.

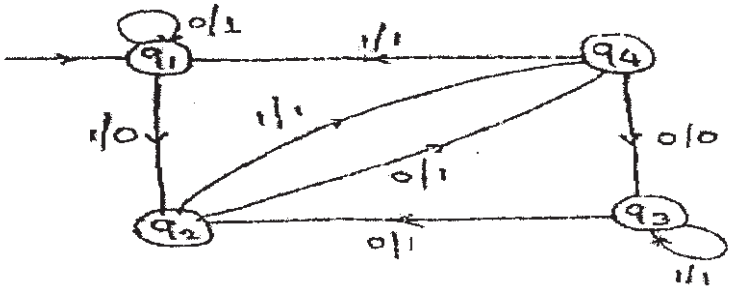
P.T.O.

Q3) a) Construct NFA for given RE (a + b)* (aa + bb) and find equivalent DFA. **[8]**

b) Construct Moore and convert it to Mealy Machine for 2's complement of any binary number. **[8]**

OR

Q4) a) Convert following Mealy Machine to its equivalent Moore Machine. **[8]**



b) Convert following NFA to its equivalent DFA. **[8]**

	0	1
→P	Q, S	Q
Q	R	Q, R
R	S	P
*S	---	P

Q5) a) Find CNF for the given CFG: **[8]**

$S \rightarrow PQP$

$P \rightarrow 0\ P | \in$

$Q \rightarrow 1\ Q | \in$

b) Prove that the following grammar is ambiguous and obtain unambiguous grammar. Consider W = ibtibtaea. **[10]**

$S \rightarrow iCtS$

$S \rightarrow iCtSeS$

$C \rightarrow b$

$S \rightarrow a$

OR

Q6) a) Construct CFG for **[8]**

i) All binary strings with eaul no. of a's and b's.

ii) All binary strings with no. of a's are even.

b) Simplify the following Grammar: **[10]**

$S \rightarrow Aa|bS$

$A \rightarrow aA|bB$

$B \rightarrow aA|bc$

$C \rightarrow aC|bc$

SECTION - II

Q7) a) State and explain Pumping Lemma for CFLs. **[6]**

b) Prove that if L_1 and L_2 are context-free languages over an alphabet then: **[10]**

L_1 Union L_2,

L_1 Concatenated with L_2

and L* are also CFLs.

OR

Q8) a) Convert the following right linear grammar to left linear grammar: **[8]**

$S \rightarrow 0A|1B$

$A \rightarrow 0C|1A|0$

$B \rightarrow 1B|1A|1$

$C \rightarrow 0|0A$

b) Construct FA for the following grammar: **[8]**

$S \rightarrow Ab|ab$

$A \rightarrow Ab|Bb$

$B \rightarrow aB|a$

Q9) a) Design a PDA to accepts the language: **[8]**

$L = \{a^n b^n \mid n >= 0\}$

b) Construct a PDA that accepts the language generated by the following grammar: **[8]**

$S \rightarrow aA$

$A \rightarrow aABc|bB|a$

$B \rightarrow b$

$C \rightarrow c$

OR

Q10)a) Construct the PM that accepts the language: **[8]**

$L = \{a^n b^n \mid n >= 1\}$

b) Construct the PDA that accepts the language: **[8]**

$L = \{a^n b^m c^n \mid m, n >= 1\}$

Q11)a) Construct TM to calculate a – b where b > 0 and a, b both are Unary Numbers. **[10]**

b) Construct TM to replace 110 by 001 in any input binary strings. **[8]**

OR

Q12)a) Write short notes on: **[10]**

i) Multi Tape TM

ii) Universal TM

b) Construct TM for Multiplication of two unary numbers. **[8]**

Total No. of Questions : 12]

SEAT No. :

P2461

[Total No. of Pages :2

[5153]-95
T.E. (Information Technology)
COMPUTER NETWORK TECHNOLOGY
(2008 Course) (Semester - I) (314443)

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

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 in section - I Q7 or Q8, Q9 or Q10, Q11 or Q12.***
2) ***Figures to the right indicate full marks.***

SECTION - I

Q1) a) What is routing? State different types of routing? Write properties of routing algorithm. **[8]**

b) Explain the parameters for quality of Service in Network Layer. **[8]**

OR

Q2) a) Compare virtual circuit subnet and datagram subnet. **[8]**

b) What do you mean by congestion? Discuss the open loop and closed loop congestion control mechanism. **[8]**

Q3) a) What is fragmentation? Explain types of fragmentation with example. **[8]**

b) List all special IP addresses. State the private IP addresses. **[8]**

OR

Q4) a) Is framentation supported by IPv4 and IPv6? Explain. **[8]**

b) What is ICMP? Explain the working of ICMP with suitable example. **[8]**

Q5) a) What is a Socket? Explain various socket primitives used in clinet-server interaction. **[8]**

b) How Nagle's algorithm helps in TCP transmission policy? Explain the clark's solution to overcome the silly window syndrome. **[10]**

OR

P.T.O.

Q6) a) Explain the three way handshake algorithm for TCP connection establishment. **[10]**

b) Give the functions of four different timers used in TCP. **[8]**

SECTION - II

Q7) a) List the similarities and difference between POP3 and IMAP. **[8]**

b) Explain the MIB along with its structure. **[8]**

OR

Q8) a) List and describe seven message types in SNMP. **[8]**

b) Explain the terms - Managing Entity. Managed Device, Management Agents, MIB w.r.t. network management context. **[8]**

Q9) a) Explain Round Robin and Weighted Fair Queuing algorithm for scheduling. **[8]**

b) Explain the architecture of wireless application protocol. **[8]**

OR

Q10)a) What do you mean by integrated services? Explain with suitable example. **[8]**

b) Explain features and specification methods of Session Initiation Protocol. **[8]**

Q11)a) Discuss various layers used in ATM architecture. **[9]**

b) Explain Bluetooth architecture with diagram. **[9]**

OR

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

a) Limitations of Bluetooth.

b) ATM Protocol Stack.

c) Hidden Station problem.

Total No. of Questions : 12]

SEAT No. :

P2462

[Total No. of Pages : 3

[5153]- 96

T.E. (Information Technology)

SYSTEM SOFTWARE PROGRAMMING

(2008 Pattern) (Semester - II)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) What do you mean by pass explain Analysis and Synthesis phase of a two Pass assembler. **[8]**

b) Explain batch-patching with respect to Single Pass Assembler with suitable example. **[6]**

c) Explain the term System Programming. **[2]**

OR

Q2) a) Describe algorithm of Pass I of two Pass assembler with example. **[8]**

b) Enlist different types of errors that are handled by Pass I and Pass II of two Pass assembler. **[8]**

Q3) a) Explain parameter passing techniques in Macro processor with suitable example. **[8]**

b) Enlist different data structures required during Pass I and Pass II of two pass Macro Processor. **[8]**

OR

P.T.O.

Q4) a) Explain pass-I of two pass macro processor with suitable example. **[8]**

b) Explain Nested Macro definition with example. **[8]**

Q5) a) Describe different phases of compiler with suitable examples. **[10]**

b) What are the advantages and disadvantages of top down parsing. **[8]**

OR

Q6) a) What is Lexical Analysis? Explain lexical analyzer with suitable example and show the contents of different tables. **[10]**

b) Describe shift reduce parser with example. **[8]**

SECTION - II

Q7) a) Explain following Machine Independent code optimization techniques. **[12]**

i) Common sub expression elimination

ii) Loop Invariants

iii) Constant Folding

b) Write a short note on activation record. **[4]**

OR

Q8) a) Explain the importance of intermediate code generation in compiler. **[4]**

b) Discuss code generation issues. **[6]**

c) Explain any two machine dependent code optimization technique with suitable example. **[6]**

Q9) a) Explain with flow chart design of absolute loader. **[6]**

b) What is loader? Enlist the basic functions of a loader. **[6]**

c) Explain Compile and Go Loader scheme. **[6]**

OR

Q10)a) Compare linking loader and linkage editor. **[4]**

b) Explain RLD and TXT cards. **[4]**

c) Explain Binary Symbolic Subroutines (BSS) loading scheme with example. Also discuss how allocation, relocation, linking & loading is done. **[10]**

Q11)a) Explain in detail typical editor structure. **[8]**

b) Explain Debug Monitor in detail. **[4]**

c) Explain YACC file structure. **[4]**

OR

Q12)a) State merits and demerits of line and screen editors. **[4]**

b) Write a short note on. **[12]**

i) Programming Environment

ii) User Environment

iii) LEX

Total No. of Questions : 12]

SEAT No. :

P2463

[Total No. of Pages :2

[5153]-97

T. E. (Information Technology)

MANAGEMENT INFORMATION SYSTEM

(2008 Course) (Semester-II) (314449)

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

Instructions to the candidates:

1) ***Answers to the two sections should be written in separate sheet.***
2) ***Use of logarithmic tables, slide rules and electronic pocket calculator is allowed.***
3) ***Neat diagram must be drawn wherever necessary.***
4) ***Figures to the right indicates full marks.***
5) ***Assume suitable data, if necessary.***

SECTION-I

Q1) a) What is corporate planning? Explain with example. **[8]**

b) Define operation support system with example. **[8]**

OR

Q2) a) What is strategic planning? Explain role of planning in business. **[8]**

b) Differentiate between operation support system and management support system? **[8]**

Q3) a) How the decision support system is useful to reduce the risk in the business. Explain. **[9]**

b) What are the different programming languages used in an expert system and Al. Explain with example. **[9]**

OR

Q4) a) What is Knowledge mining? How it is useful for decision making? **[9]**

b) What is an expert system? Explain the different expert system tools with example. **[9]**

Q5) a) Explain the electronics payment process with technical details. **[8]**

b) Explain how E-governance is useful to increase the efficiency of an organisation. **[8]**

OR

P.T.O.

Q6) a) What are the different challanges in SCM development? **[8]**

b) "The growth of business is depends on E-Commerce". True or False Justify. **[8]**

SECTION-II

Q7) a) Define application of MIS in Marketing Management. **[9]**

b) What is application integration? Explain advantages and disadvantages of it. **[9]**

OR

Q8) a) Define application of MIS in Hotel Management. **[9]**

b) What is multi cross functional system? Explain advantages and disadvantages of it. **[9]**

Q9) a) What is the future of IT enable services? Explain with example. **[8]**

b) Explain the challenges and limitations of IT enable services in India. **[8]**

OR

Q10)a) What are the different objectives of document processing? Explain. **[8]**

b) What is the current scenario of BPO in India? **[8]**

Q11)a) Define the terms **[8]**

1) Software piracy 2) Patent

b) What are the different mechanisms to avoid Software piracy? Explain. **[8]**

OR

Q12)a) Define system control and audit. **[8]**

b) Define Geo-Economical platform and data access issue. **[8]**

♦ ♦ ♦

Total No. of Questions : 12]

SEAT No. :

P2464

[Total No. of Pages : 2

[5153]- 98

T.E. (Information Technology)

PROGRAMMING PARADIGMS

(2008 Pattern) (Semester - II) (314450)

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

Instructions to candidates:

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

SECTION - I

Q1) a) Define data object and its life time of? Explain both programmer and system defined data object. **[8]**

b) Explain how cost of programming languages need to measured. **[8]**

OR

Q2) a) Explain procedural and logic based programming paradigms in detail. **[8]**

b) Explain with example the content of code segment and activation record at run time. **[8]**

Q3) a) What are the different problems occurred at the time of expression evaluation? Explain it with suitable example. **[8]**

b) Explain properties of following data types. **[8]**

i) Structured ii) Derived

OR

Q4) a) Explain in detail with example Static scope and Dynamic Scope. **[8]**

b) State and explain referencing environment with suitable example. **[8]**

Q5) a) Define the term multithreading? Explain the with respect to java and C++. **[10]**

b) Explain Applet life cycle. **[8]**

OR

P.T.O.

Q6) a) Differentiate C++ and Java. And write features supported by java but not be C++. **[10]**

b) Explain how the of sequence control is done in recursive subprograms. **[8]**

SECTION - II

Q7) a) What is garbage collection? How it is done in LISP. **[8]**

b) What is Unification and Resolution? Explain with respect to Logic programming? **[8]**

OR

Q8) a) Define the term cuts? How to use cuts in programming. **[8]**

b) Define different synchronization mechanisms. **[8]**

Q9) a) Explain concept of mapping with its examples. **[8]**

b) Define following terms with respect to functional programming. **[8]**

i) Ambiguity ii) Free and bound identifier

iii) Reduction

OR

Q10)a) Explain shared memory and message passing parallelism. **[8]**

b) Explain the design principles of parallel programming. **[8]**

Q11)a) Explain concept of data definition language and data manipulation language. **[8]**

b) Write short note on: **[10]**

i) Windows Programming using Visual Basic.

ii) Socket Programming using JAVA.

OR

Q12)a) Write short notes on: **[10]**

i) Internet Programming

ii) parallel Compilers

b) Explain design principles Data flow programming and explain different scemes used in data flow computation. **[8]**

Total No. of Questions : 11]

SEAT No. :

P2465

[Total No. of Pages : 2

[5153]- 99
T.E. (I.T.)
HUMAN COMPUTER INTERACTION AND USABILITY
(2008 Pattern) (Semester - II)

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

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10 and Q.11.***
2) ***Draw neat diagrams whenever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

SECTION - I

Q1) a) Differentiate between human short-term memory and long-term memory. **[8]**

b) What is interaction design? What are goals of interaction design? **[8]**

OR

Q2) a) What is ergonomics? Discuss importance of human factors in human-computer interaction design. **[8]**

b) What are models of interaction? Explain any one model in details. **[8]**

Q3) a) Describe briefly four different interactions styles used to accommodate the dialog between user and computer. Specify advantages and disadvantages of each interaction style. **[10]**

b) What is WIMP interface? Discuss its advantages and disadvantages. **[8]**

OR

Q4) a) What are different paradigms of interactions? Explain any one of the following in details **[10]**

i) Pervasive computing

ii) Invisible computing

iii) Wearable computing

b) Discuss the practical issues in interaction design process. **[8]**

P.T.O.

Q5) a) What is Usability Engineering? Explain principles that support usability. **[8]**

b) Why is context important in selecting and applying guidelines and principles for interface design? Illustrate your answer with examples. **[8]**

OR

Q6) a) With respect to Human Diversity how to accommodate users with disabilities and elderly users while designing user interfaces. **[8]**

b) Evaluate Microsoft Power Point interface on the basis of the "Eight golden rules of interface design". **[8]**

SECTION - II

Q7) a) What is web-usability? What are benefits of web usability? Discuss the guiding principles of web-usability. **[10]**

b) Explain any two evaluation paradigms for UI design. **[8]**

OR

Q8) a) What is DECIDE? List and explain unique phases of DECIDE framework. **[10]**

b) Compare: Formative Evaluation versus Summative Evaluation. **[8]**

Q9) a) Explain any one cognitive model of goal or task hierarchy. **[8]**

b) Give any two diagrammatic or textual notations used to design dialogs in effective user interface. Justify your notations with respective examples. **[8]**

OR

Q10)a) What is the purpose or aims of Task Analysis? Explain knowledge based task analysis **[8]**

b) Explain GOMS model by taking appropriate task. Also discuss the issue of closure in terms of your GOMS description. **[8]**

Q11)Write short notes on any THREE of the following: **[16]**

a) Information and data visualization

b) Ubiquitous computing

c) Groupware systems

d) Augmented Reality

Total No. of Questions :12]

SEAT No. :

P2466

[Total No. of Pages :4

[5153] - 100
T.E. (I.T.)
DESIGN AND ANALYSIS OF ALGORITHMS
(2008 Course) (Semester - II) (314455)

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

Instructions to the candidates:

1) ***Draw neat diagrams wherever necessary.***
2) ***Assume suitable data if necessary.***
3) ***Figures to the right indicate full marks.***

SECTION -I

Q1) a) Find out the time complexity for the recurrence equation as follows: **[8]**

i) $T(n) = T(n/2)+1$

ii) $T(n) = 2T(n/2) +n$

Also explain whether above equations belong to Searching or Sorting.

b) Prove by contradiction - "there are infinitely many prime numbers". **[8]**

OR

Q2) a) Suppose you have algorithms with running time listed below. How much faster will they get if input size is reduced by half. **[8]**

i) $100n^2$

ii) $n \log n$

iii) 2^n

iv) n^2

b) Write an algorithm to search an element in an array of size n. Calculate complexity of this algorithm. **[8]**

P.T.O.

Q3) a) What is divide and conquer strategy? Explain Master's theorem. **[8]**

b) Explain convex hull problem with a suitable example. **[8]**

OR

Q4) a) Which algorithm uses the principle of decrease-by-half? Why is it called so? **[8]**

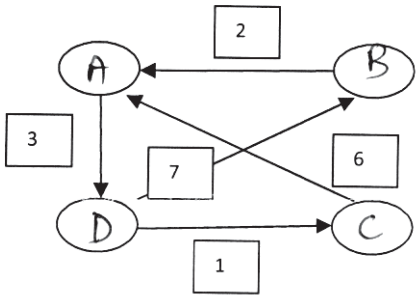
b) Write Kruskal's algorithm. Comment on its complexity. **[8]**

Q5) a) What is memory function? Explain why it is advantageous to use memory functions. **[9]**

b) Explain with suitable example Warshall's algorithm. **[9]**

OR

Q6) Find all-pairs shortest path using Floyd's algorithm for the following weighted graph. **[18]**



SECTION -II

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

Live nodes, expanding nodes, bounding funciton and solution space.

b) What are planar graphs? Explain graph coloring with suitable examples. **[8]**

OR

Q8) What is backtracking? What kind of problems does it solve? Solve the following knapsack problem using backtracking. **[16]**

i	p_i	w_i
1	24	15
2	15	10
3	25	18

For n=3 and m=20.

Q9) a) Explain the terms: **[9]**

Branch and Bound, LC, LIFO and Bounding function. How are LIFO and LC techniques different?

b) Differentiate between Backtracking and Branch and Bound. **[9]**

OR

Q10) Solve the following job scheduling problem using LCBB. **[18]**

Job	p_i	d_i	t_i
1	5	1	1
2	10	3	2
3	6	2	1
4	3	1	1

Where P_i : indicates penalty if i^{th} job is not completed by deadline d_i. pi has burst time t_i. We want to have minimum penalty.

Q11)a) What is a deterministic and non-deterministic algorithm? Write a non-deterministic algorithm for searching am element. **[8]**

b) Prove that: A clique problem is NP-complete. **[8]**

OR

Q12)a) Waht is satisfiability problem? Explain DNF and CNF. **[8]**

b) Explain NP-Complete and NP-Hard. Give examples. Are all NP-Complete problems NP-Head or vice versa? Justify. **[8]**

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Total No. of Questions : 12]

SEAT No. :

P2467

[Total No. of Pages : 3

[5153]-101

T.E. (Chemical Engineering)

CHEMICAL ENGINEERING MATHEMATICS

(2008 Pattern) (Semester - I)

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

Instructions to the candidates:

1) ***Answers to the two sections should be written in separate answer-books.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of logarithmic tables,slide rule, Molliercharts, electronic pocket calculator and stream tables is allowed.***
5) ***Assume Suitable data, if necessary.***

SECTION-I

Q1) a) Find real root of equation $x^3-1.8x^2-10x+17=0$ using bisection method. **[8]**

b) State and explain the graphical interpretation of Newton Raphson Method. **[8]**

OR

Q2) a) State and explain the graphical interpretation of false position method. **[8]**

b) Solve the equation $\cos x - xe^x = 0$ using secant method upto '3' places of decimal Point. **[8]**

Q3) a) Solve the following system of equations using Gauss elimination method.
$3x + y + 3z = 3$, $2x - 3y - z = -3$, $2x + y + z = 4$. **[8]**

b) Solve the following system of equations using Gauss-Seidal method:
$4x + y + z = 5$, $x + 6y + 2z = 19$, $-x - 2y - 5z = 10$. **[8]**

OR

Q4) a) Solve the following system of equations using LU decomposition method:
$2x + 3y + z = 9$, $x + 2y + 3z = 6$, $3x + y + 2z = 8$. **[8]**

b) Discuss in short the drawbacks of Elimination methods. **[8]**

P.T.O.

Q5) a) Use least square regression to fit a straight line to the following data: **[9]**

x	1	2	3	4	5	6	7
y	0.5	2.5	2.0	4.0	3.5	6.0	5.5

b) Explain linear regression and write down the criteria for a "best" fit. **[9]**

OR

Q6) a) The values of Nussult number (Nu) and Reynolds number (Re) found experimentally are given below. If the relation between Nu and Re is of the type $Nu=a.Re^b$, find the values of a and b for the given value of Nu and Re. **[10]**

Re	3000	4000	5000	6000	7000
Nu	14.3575	16.65517	16.7353	17.6762	18.5128

b) State various methods of least square criteria. **[8]**

SECTION - II

Q7) a) Using 4th order RungeKutta method solve $\frac{dy}{dx}=1+y^2$. Given y(0)=0, h=0.2 find y at x=0.4. **[8]**

b) Using Euler's method, find an approximate value of y for $\frac{dy}{dx}=x-y^2$, for given boundary conditions, x=0, y=1, find y at x = 4. Take step size h=1. **[8]**

OR

Q8) a) Discuss the stability region of Runge-Kutta method. **[8]**

b) Using Euler's method, find an approximate value of y for $\frac{dy}{dx}=x+2y$ for given boundary conditions, x=1, y=1, find y at x=1.4. Take step size h=0.1. **[8]**

Q9) State the PDE representing neat flow in one-dimensional problem(i.e. parabolic equation). Using finite difference approximation. Derive Crank-Nicholson formula for solving the PDE. **[16]**

OR

Q10) Discuss in detail the algorithm and flow chart to generate forward differences. **[16]**

Q11) a) How one dimensional search is applied in a multidimensional problem. **[12]**

b) What are the six steps of optimization. **[6]**

OR

Q12) a) Write the working procedure of the simplex method. **[9]**

b) Explain scanning and bracketing procedures for optimization of unconditional functions of one dimensional search. **[9]**

Total No. of Questions :12]

SEAT No. :

P2468

[Total No. of Pages :4

[5153] - 102
T.E. (Chemical)
MASS TRANSFER - I
(2008 Course) (Semester - I) (Theory)

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

Instructions to the candidates:

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

SECTION -I

Q1) a) State & explain Maxwell's law of diffusion. **[4]**

b) Explain the choice of separation methods. **[4]**

c) Ammonia is diffusing through an inert air film 2 mm thick at a temperature of 20°C and pressure 1 atm. The concentration of ammonia is 10% by volume on one side and zero on another side of film. Determine the mass flux. Estimate the effect on rate of diffusion if pressure is increased to 10 atm.

The diffusivity of ammonia in air at 20°C and 1 atm 0.185 cm^2/s. **[8]**

OR

Q2) a) A volatile organic compound benzene costing Rs.45 per kg is stored in a tank 10m diameter and open at top. A stagnant air film 10 mm thick is covering the surface of the compound beyond which the compound is absent. If the atmospheric temp. is 25°C. Vapour pressure of the compound is 150mm Hg and its molor diffusivity is 0.02 m^2/hr. Calculate the loss of benzene in Rs./day. **[12]**

b) Explain Fick's law of diffusion. **[4]**

P.T.O.

Q3) a) Explain film theory and surface renewable theory. **[8]**

b) An ethanol (A) -water (B) solution in the form of a stagnant film 2 mm thick at 293°K is in contact at one surface with an organic solvent in which ethanol is soluble and water is insoluble. Hence $N_B = 0$. At point one, the concentration of ethanol is 16.8 wt.% and the solution density is $\rho_1 = 972.8$ kg/m^3. At point two, the concentration of ethanol is 6.8 wt.% and $\rho_2 = 988.1$ kg/m^3. The diffusivity of ethanol is 0.740×10^{-9} m^2/s. Calculate steady state flux NA for 100 kg of solution. **[8]**

OR

Q4) a) Derive relation between overall and individual mass transfer resistance (8) **[8]**

b) In a mass transfer operation operating at 1 atm. The individual mass transfer coefficients have the following values, $k_x = 22$ kgmol/m^{2}h $k_y =$ 1.07 kgmol/m^{2}h. The equilibrium composition of gaseous and liquid phases are characterized by Henry's law $P^* = 0.08 \times 10^6 x$ mm Hg. **[8]**

i) Determine the overall mass transfer coefficients.

ii) Determine the resistance of liquid and gas phase.

Q5) a) What is minimum liquid to gas ratio for the absorber? How it is determined and explain it s significance during the design of absorption column. **[6]**

b) Gas containing 2% (by volume) solute A is fed to an absorption tower at a rate of 0.35 m^3/sec at 26°C and 106.658 KPa pressure and 95% of original solute is removed by absorbing it in solvent B. Solvent containing 0.005 mole fraction of solute enters the tower at top and exit liquid streams from absorption tower contains 0.12 mole of A per mole of B. Find the flow rate of liquid solvent entering the absorption tower on solute free basis. **[8]**

c) Define HTU and NTU. **[4]**

OR

Q6) a) Explain the selection criteria for solvent in absorption. **[6]**

b) Explain absorption and stripping factor. **[4]**

c) Derive an expresstion for height of packed bed absorption column in terms of NTU & HTU. **[8]**

SECTION -II

Q7) a) Derive an equation for height of packing required in forced draft counter current cooling tower in terms of Z = HTU × NTU **[8]**

$$\text{Where, NTU} = \int_{H_{G1}}^{H_{G2}} \frac{dH_g}{Hf - H_g}$$

b) An air, water sample has DBT 50°C and WBT 35°C, using humidity chart calculate, **[10]**

i) Absolute humidity,

ii) Dew point,

iii) Humid heat,

iv) Percentage relative humidity,

v) Enthalpy of saturated air,

vi) Humid volume.

The total pressure is 1 atm, average molecular weight of air is 28.84 and vapor pressure of air at 50°C is 0.1234×10^5 N/m^2.

OR

Q8) a) What are the different types of Humidification and dehumidification equipments? Explain any one in detail. **[10]**

b) Define: **[8]**

i) Absolute Humidity

ii) Percentage Humidity

iii) Relative Saturation

v) Humid Volume

Q9) a) Explain the different types packing used in separation towers? Give classification. **[4]**

b) Explain tray towers Versus packed towers. **[4]**

c) Explain with neat sketch-Mechanically agitated vessel. **[8]**

OR

Q10)a) Define: **[4]**

i) Ideal tray,

ii) Murphree tray efficiency

b) Explain Operating Characteristics of sieve Plate Column. **[4]**

c) Draw and explain Venturi scrubber and Wetted wall column for gas-liquid contact. **[8]**

Q11)a) A sheet material measuring $1m^2$ and 5 cm thick is to be dried from 45% to 5% moisture under constant drying conditions. The dry density of material is 450 kg/m^3 and equilibrium moisture is 2%. The available Drying surface is $1m^2$. Experiments showed that the rate of drying was Constant at 4.8 kg/m^2hr between 45% to 20% and thereafter the rate is decreased linearly. Calculate the total time required to dry the material from 45% to 5%. All moisture contents are on wer basis. **[4]**

b) Explain the phenomena of movement of moisture within the solid. **[4]**

c) Define: **[8]**

i) Bound moisture

ii) Unbound moisture

iii) Equilibrium Moisture

iv) Free moisture

OR

Q12)a) Derive the equation for calculating constant rate of drying period and falling rate of drying period. **[8]**

b) Draw and explain (Principle, working and construction.) **[8]**

i) Rotary Dryer

ii) Drum Dryer

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Total No. of Questions : 12]

SEAT No. :

P3594

[Total No. of Pages : 2

[5153] - 103
T.E. Chemical
CHEMICAL PROCESS TECHNOLOGY
(2008 Course)

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

Instructions to the candidates :

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

SECTION - I

Q1) a) Draw & explain the production of Soda Ash using modified solvay process. **[8]**

b) Explain any four types of unit operations and unit processes with schematic representation and applications. **[8]**

OR

Q2) a) Explain the production of Aluminium in electrolytic industry with neat diagram. **[8]**

b) Discuss the recovery of Magnesium salts from sea water. **[8]**

Q3) a) Draw and explain the production of ammonia with major engineering problems. **[8]**

b) Explain the production of sulphuric acid using DCDA process with neat diagram. **[8]**

OR

Q4) a) Explain any one process for the production of phosphoric acid with suitable diagram. **[8]**

b) Draw & explain the production of Ammonium Nitrate with neat diagram. **[8]**

P.T.O.

Q5) a) With a neat diagram explain the construction and working applications of coke oven furnace. **[10]**

b) Draw & explain the production of sugar with neat diagram. **[8]**

OR

Q6) a) Explain the production of dextrin in detail. **[10]**

b) Draw & explain the production of paper-pulp. **[8]**

SECTION - II

Q7) a) Draw & explain the production of penicillin with neat diagram. **[8]**

b) With a neat diagram, explain the production of detergents with applications. **[8]**

OR

Q8) a) Explain the production of coke from bituminous coal with suitable diagram. **[8]**

b) Explain the production of glycerin as a by product of soap industry. **[8]**

Q9) a) Draw a suitable diagram of fuel cell, define the types and explain in brief. **[8]**

b) Explain any refinery operation with neat diagram. **[8]**

OR

*Q10)*a) With a neat diagram, explain the production of natural gas. **[8]**

b) With a suitable reaction and diagram, explain the production of water gas. **[8]**

*Q11)*a) Describe the production of cumene. **[8]**

b) Draw and explain the production of halogenated methane hydrocarbons. **[10]**

OR

*Q12)*a) Draw and explain the production of ethylene dichloride. **[8]**

b) Describe the production of methanol with major engineering problems. **[10]**

▽▽▽▽

Total No. of Questions : 12]

SEAT No. :

P2469

[Total No. of Pages : 3

[5153]-104

T.E. (Chemical Engineering)

CHEMICAL ENGINEERING THERMODYNAMICS-II

(2008 Pattern) (Semester-I)(309344)

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

Instructions to the candidates:

1) ***Answers to the two sections should be written in separate answer books.***
2) ***Answer Q1 or 2, Q3 or 4, Q5 or 6 from section I and Q7 or 8, Q9 or10,Q11 or 12 from section II.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right side indicate full marks.***
5) ***Use of Calculator is allowed.***
6) ***Assume Suitable data if necessary.***

SECTION-I

Q1) a) Derive an expression for the fugacity coefficient of a gas obeying the equation of state P(V-b) = RT and estimate the fugacity of ammonia at 10 bar and 298 K, when b=3.7 × 10^{-5} m^3/kmol. **[6]**

b) The density of gaseous ammonia is 24.3 kg/m^3 at 473 K and 50 bar. Estimate its fugacity. **[5]**

c) What is fugacity and fugacity coefficient? **[5]**

OR

Q2) a) What is the effect of temperature and pressure on chemical potential? **[8]**

b) What is the significance of Lewis-Randall Rule? Show using a fugacity versus concentration diagram, how the Lewis-Randall rule is applicable to one end while Henry's Law is applicable to the other end **[8]**

Q3) a) A container is divided into two parts, one containing 3 moles of hydrogen at 298 K and 1bar and the other containing oxygen at 298 K and 3 bar. Calculate the free energy of mixing when the partition is removed. **[8]**

b) What is the Gibbs-Duhem equation? Derive its various forms. **[8]**

OR

P.T.O.

Q4) a) How are partial molar properties determined? **[8]**

b) Give the van Laar equations and explain all the terms involved. **[8]**

Q5) a) Explain with diagram the criterion of stability of a system. **[7]**

b) Explain the T-x,y diagram. **[7]**

c) Draw the T-x,y diagram for an azeotropic mixture. **[4]**

OR

Q6) a) Liquids A and B form an azeotropic mixture containing 46.1 mol% A at 101.3 kPa and 345 K. The vapour pressures of A and B are 84.8 kPa and 78.2 kPa respectively. Calculate the van Laar constants. **[9]**

b) Explain the T-x,y diagram in detail. **[9]**

SECTION-II

Q7) a) Water(1) and hydrazine(2) system forms an azeotrope containing 58.5 mol% hydrazine at 393 K and 101.3 kPa. Calculate the equilibrium vapor composition for a solution containing 20 mol% hydrazine. The relative volatility of water with reference to hydrazine is 1.6 and vapour pressure of hydrazine at 393 k is 124.76 kPa. **[10]**

b) Explain the conditions when a system is stable. **[8]**

OR

Q8) a) Describe the method of slopes for ln γ vs.mole fraction curves and the mid point method for finding thermodynamics consistency. **[10]**

b) Derive the equation for flash vaporization. **[8]**

Q9) a) Derive a relationship between mole fraction of the components taking part in a reaction and the extent of reaction. **[8]**

b) Give the criteria for chemical reaction equilibrium. **[8]**

OR

Q10)a) Derive an equation for equilibrium constant in terms of activities of reacting components. **[8]**

b) Consider a reaction $H_2O \rightarrow H_2+1/2O_2$ occurring in a closed vessel with n_0 moles of water vapor initially. Derive an expression for the mole fractions of all the components and the fractional decomposition of water in terms of the reaction coordinate. **[8]**

Q11)a) In a reaction n-butane is isomerized to i-butane. The reaction attains equilibrium at the following compositions: at 317 K (mole % Butane = 31.0) and at 391 K (mole % Butane = 43.0). assuming the activites are equal to mole fractions calculate the standard free energy of the reaction at 317 K and 391 K and average value of heat of reaction over this temperature range. **[8]**

b) How is equilibrium constant determined? **[8]**

OR

Q12)a) Derive an expression relating mole fractions of components to reaction coordinate for a multiple reaction system. **[8]**

b) The standard heat of formation of ammonia and the corresponding Gibbs free energy by the reaction at 298k: $N_2+3H_2 \rightarrow 2NH_3$ are -46,100 and -16,500 J/mol respectively. Calculate the equilibrium constant for the reaction at 500k. **[8]**

Total No. of Questions :6]

SEAT No. :

P2470

[Total No. of Pages :3

[5153] - 105

T.E. (Chemical Engg.)

INDUSTRIAL ORGANISATION & MANAGEMENT

(2008 Course) (Semester - I) (307351)

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

Instructions to the candidates:

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

SECTION-I

Q1) a) Define Management. Explain in details various functions of management. **[10]**

b) Planning is looking ahead and Control in looking back. Comment. **[6]**

OR

Explain the following: **[16]**

a) Administration

b) Authority and Responsibility

c) Unity of Command & Direction

d) Division of Labour

Q2) a) What is Performance Appraisal? Explain the importance and need of performance appraisal. **[8]**

b) Define job evaluation and explain any methods of job evaluation. **[8]**

OR

a) What is man power planning? What are objectives and techniques of manpower planning. **[8]**

b) Explain the functions of Trade Unions. **[8]**

P.T.O.

Q3) Write short notes on the following: **[18]**

a) Purchase Process.

b) EOQ

c) Vendor Development.

OR

a) Functions fo Store Keeper.

b) Inventory Control.

c) Inspection and Quality Control.

SECTION-II

Q4) What is Market Research? Explain various methods of market research. How it help an enterprise to position its business in a competitive business environment? Explain. **[16]**

OR

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

i) Distribution Channels.

ii) Distinguish between marketing and selling.

b) State and Explain objectives and importance of advertising. **[8]**

Q5) a) What is anti-dumping duty? Explain the impact of anti-dumping duty in international business. **[8]**

b) What is international Trade? How it helps in developing and supporting Indian Economy. Explain in brief. **[8]**

OR

a) Explain the concept of TQM. **[8]**

b) Distinguish between Product Patent and Process Patent. How patent rights are different from copyright? Explain. **[8]**

Q6) Write short notes on: **[18]**

a) Flow process chart

b) FERA and FEMA

c) Law of Contract

OR

a) Explain the concept of Grantee and Warrantee. **[8]**

b) What is work measurement? Explain the need and advantages of work measurement. **[10]**

EEE

Total No. of Questions :12]

SEAT No. :

P2471

[Total No. of Pages :5

[5153] - 106
T.E. (Chemical)
CHEMICAL REACTION ENGINEERING -I
(2008 Course) (Semester - II)

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

Instructions to the candidates:

1) ***Answer any three questions each from section I and 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.***

SECTION -I

Q1) a) Explain temperature dependacy from Arrhenius Law of rate expression. What is Activation Energy E? How does it affects the temperature sensitivity of reaction? **[8]**

b) For a first order reaction the following data is available. Estimate activation energy for the reaction. **[8]**

Temperature ^oC	310	330
$K(sec)^{-1}$	0.000886	0.0139

Assume R = 8.314 J/mol K.

OR

Q2) a) How kinetic model is tested, explain rules for matching the predicted rate expression and found experimentally. **[4]**

b) On doubling the concentration of the reactant the rate of reaction triples. Find the reaction order. **[4]**

c) The rate constant of certain reaction are 1.6×10^{-3} and 1.625×10^{-2} sec-1 at 10^oC and 30^oC calculate the activation energy. **[4]**

d) Differentiate elementary and non-elementary reaction. **[4]**

P.T.O.

Q3) a) The first order reversible liquid reaction $A \rightarrow R$, C_{A0} = 0.5 mol/lit, C_{R0} = 0 takes place in a batch reactor. After 8 min, conversion of A is 33% while equilibrium is 66%. Find rate equation for this reaction. **[10]**

b) At certain temperature, the half life period and initial concentration for a reaction are **[6]**

$t_{½}$ = 420 sec, C_{A0} = 0.405 mol/lit

$t_{½}$ = 275 sec, C_{A0} = 0.64 mol/lit

Find the rate constant of reaction.

OR

Q4) a) Aqueous A at a concentration C_{A0} = 1 mol.lit is introduced into a batch reactor where it reacts away to form product R according to stoichiometry $A \rightarrow R$. The concentration of A in the reactor is monitored at various times as shown below. **[12]**

t(min)	0	100	200	300	400
C_A (mol/m^3)	1000	500	333	250	300

For C_{A0} = 500 mol/m^3, find the conversion of reactant after 5 hours in batch reactor.

b) Show that, $C_A = C_{A0}(1-X_A)$ **[4]**

Q5) a) Deduce the performance equation for Plug Flow Reactor. **[9]**

b) Derive performance equation of mixed Flow Reactor. **[9]**

OR

Q6) a) Deduce the performance equation for recycle reactor. **[9]**

b) Derive the performance equation for batch reactor. **[9]**

SECTION -II

Q7) a) Define instantaneous fractional yield and overall fraction yield. **[6]**

Find out instantaneous fractional yield of reaction (ψ)

$$A + B \xrightarrow{K1} R \qquad \frac{dC_R}{dt} = 1.0 C_A^{1.2} C_B^{1.4}$$

$$A + B \xrightarrow{K2} S \qquad \frac{dC_S}{dt} = 1.0 C_A^{0.6} C_B^{2.0}$$

b) The desired liquid phase reaction **[10]**

$$A + B \rightarrow P + T \qquad \frac{dC_P}{dt} = \frac{dC_T}{dt} = K_1 C_A^{1.5} C_B^{0.4}$$

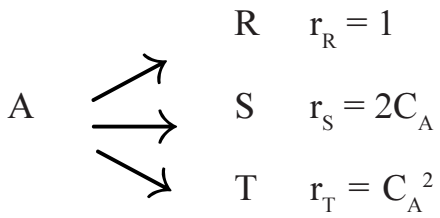
Is accompanied with undesirable side reaction.

$$A + B \rightarrow S + U \qquad \frac{dC_U}{dt} = \frac{dC_S}{dt} = K_2 C_A^{0.5} C_B^{1.8}$$

What contacting scheme (reactor type) would you use to carry above reaction to minimize concentration of undesired product?

OR

Q8) Often a desired reaction is accompanied by a variety of undesired side reactions, some of higher order some of lower order. To see which type of operation gives the best product distribution. Consider the parallel decomposition of A, $C_{A0} = 2$. **[16]**

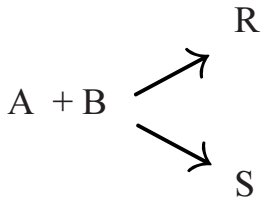


Find the maximum expected C_S for isothermal operations

a) In a mixed reactor.

b) In a plug flow reactor.

Q9) Consider the following aqueous reaction. **[16]**



$$\frac{dC_R}{dt} = 1.0\, C_A^{1.5} C_B^{0.3}$$

$$\frac{dC_S}{dt} = 1.0\, C_A^{0.5} C_B^{1.8}$$

For 90% conversion of A find the concentration of R in the product stream. Equal volumetric flow rates of the A and of B steam are fed to the reactor, and each stream has a concentration of 20 mol/lit of reactant . The flow in the reactor follow:

a) Plug flow

b) Mixed flow

c) Plug flow with low concentration of B when plug flow A with mixed flow B.

OR

Q10) Determine the equilibrium conversion for the following elementary reaction between 0°C to 100°C at 298 K. **[16]**

$$A \rightleftarrows R,\ \Delta G^0 = -14130 J/mol,\ \Delta H^0 = -75300\ J/mol, C_{PA} = C_{PR} = \text{constant}$$

a) Construct a plot of temperature vs conversion.

b) What restrictions should be placed on reactor operating isothermally if conversion of 85% or higher is desired?

Q11) A sample of the tracer hytane at 320 K was injected as a pulse to a reactor and the effluent concentration measured as a function of time resulting in the following data. **[18]**

t(min)	0	1	2	3	4	5	6	7	8	9	10	12	14
C (g/m^3)	0	1	5	8	10	8	6	4	3	2.2	1.5	0.6	0

a) Construct figures showing C(t) and E(t) as function of time.

b) Determine fraction of material leaving the reactor that has spent between 3 and 6 min in the reactor.

c) Determine fraction of material that has spent 3 min or less in reactor.

OR

Q12) Write notes on (any three): **[18]**

a) Tank in series model.

b) C and E curve.

c) Micro and macro mixing of fluids.

d) Seggregation model.

e) Dispersion flow model.

EEE

Total No. of Questions : 12]

SEAT No. :

P2472

[Total No. of Pages : 2

[5153]-107
T.E.(Chemical)
TRANSPORT PHENOMENA
(2008 Pattern) (Semester-II)

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

Instructions to the candidates:

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

SECTION-I

Q1) a) Explain time independent fluids and time dependent fluids. **[6]**

b) Derive expression of momentum flux, velocity and discharge for flow of Newtonian fluid through the vertical cylinder. **[12]**

OR

Q2) Consider adjacent flow of two immiscible incompressible Newtonian fluids in a narrow slit which is half filled with both fluids. Derive the expression of momentum flux, velocity and average velocity. **[18]**

Q3) Derive Eulers equation of motion. **[16]**

OR

Q4) An incompressible fluid flows turbulently in a circular tube of cross sectional area S_1 which empties into a large tube of cross sectional area S_2. Use macroscopic balances and derive expression for pressure rise and friction loss due to sudden expansion. **[16]**

P.T.O.

Q5) a) Derive the expression of heat flux, temperature rise and maximum temperature rise for electrical heat source. **[10]**

b) A Copper wire has a radius of 2 mm and a length of 5 m. For what voltage drop would the temperature rise at the wire axis be $10^{o}C$, if the surface temperature of the wire is $20^{o}C$. **[6]**

OR

Q6) a) State boundary conditions used in heat transfer problems. **[6]**

b) Derive the expression of temperature distribution for viscous heat source. **[10]**

SECTION-II

Q7) a) Derive Euler's equation in rectangular coordinate system. **[10]**

b) Explain scale factors in detail. **[6]**

OR

Q8) a) Show that rate of change of density at a fixed point is due to change in mass velocity vector. **[10]**

b) Explain different types of derivatives used in deriving equation of change. **[6]**

Q9) a) Derive expression of fanning friction factor. **[8]**

b) Derive Ergun equation. **[8]**

OR

Q10)a) Explain macroscopic mass balance equation. **[8]**

b) Derive expression of pressure rise for liquid-liquid ejector. **[8]**

Q11)a) Discuss transfer coefficients at high transfer rates by penetration theory. **[9]**

b) Explain binary mass transfer coefficient in one phase at low mass transfer rates. **[9]**

OR

Q12)a) Write analogies among heat, mass and momentum transfer. **[9]**

b) Explain diffusion in laminar falling film. **[9]**

Total No. of Questions : 12]

SEAT No. :

P2473

[Total No. of Pages :4

[5153]-108
T. E. (Chemical)
CHEMICAL ENGINEERING DESIGN - I
(2008 Course) (Semester-II) (309349)

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

Instructions to the candidates:

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

SECTION-I

Q1) a) What is proportioning of vessels? Derive volume relationship for optimum proportions of vessels with elliptical dished heads. **[10]**

b) Write a short note on Plastics as material of construction for chemical plants. **[6]**

OR

Q2) a) Explain any two non destructive testing methods. **[10]**

b) Explain post weld heat treatment. **[6]**

Q3) a) A pressure vessel is to be designed for an internal pressure of 0.3 N/mm^2. The vessel has nominal diameter of 1.2 m. The vessel is made up of stainless steel with permissible stress of 130 N/mm^2. No corrosion allowance is necessary. If the weight of vessel and contents is 3200 kg and torque due to offset piping is 500 N-m find the stresses due to combined loading. Also suggest suitable head. **[10]**

b) Explain in detail the design procedure used for the design of pressure vessel subjected to external pressure. **[6]**

OR

P.T.O.

Q4) a) With neat sketch explain the Reinforcement of nozzles. **[6]**

b) A vessel is to have one end closed by a blind flange calculate the minimum thickness of blind flange. Design Data - Design Pressure =170 kg/cm^2, Design Temp. = 121 ºC, Allowable bolt stress at gasket seating & Operating conditions = 1306 kg/cm^2, Inside dia. Of Gasket=34.4 m, Width of Gasket = 2.5 cm, m = 3, Ya = 680.3 kg/cm^2, Bolt circle dia. = 56.2 cm. **[10]**

Q5) a) A vessel is to be designed to with stand internal pressure of 150 MN/m^2. An internal diameter of 300 mm is specified and a steel having a yield point of 450 MN/m^2 has been selected. Calculate the wall thickness required by various theories with a factor of safety 1.5. **[8]**

b) Write note on Hortonspheres. **[6]**

c) Explain Autofrettage construction for high pressure vessels. **[4]**

OR

Q6) A Self supporting conical roof tank is to be designed for the storage of non volatile & non-corrosive liquid of density 1800kg/m^3. The storage capacity is 1130 MT corresponding to 100% fill up. A stiffening angle should be provided to the top shell course, at the junction of roof and shell to absorb the compressive stress in the roof plates as tensile load. The optimum thickness tank proportions are given as H/D =0.8. Workout the details of shell thickness of various courses. Check the suitability of using 12 mm thick plates for constructing the conical roof with permissible slope of 1 in 5. What thickness do you suggest for the bottom plates if the entire bottom plate is to be supported on RCC foundation? DATA - Material =Carbon steel, Welded joint efficiency = 70%, Superimposed load on roof =1250 N/m^2, Permissible stress = 142 N/mm^2, Density of steel = 7700 kg/m^3, Modulus of Elasticity = 2 x 10 11 N/m^2. Assume suitable plate dimensions but consider the thickness in discrete intervals as - minimum 5 mm, then 6,8, 10mm plus in the intervals of 5mm. **[18]**

SECTION-II

Q7) Skirt support is to be designed for tall vertical vessel having dia. 2.5 m and height 37m. Skirt dia. is equal to diameter of vessel while skirt is 3.5m high. The weight of vessel with all its attachments is 2,22,000 Kg. The minimum weight of vessel is 1,70,000 Kg. The wind pressure acting on the vessel is 130 Kg/cm^2. Seismic coefficient = 0.08, K for cylinder = 0.7, Permissible tensile stress of material = 1400 Kg/cm^2, Yield stress of material 2000 Kg/cm^2, Permissible stress of concrete = 45 Kg/cm^2, BCD is 32 cm greater than skirt diameter. No of bolts to be used 24. **[16]**

OR

Q8) a) Explain the saddle support and its design with all equations. **[10]**

b) Comment on selection of support for a vessel. **[6]**

Q9) 1.2 kg/sec of an organic liquid is to be cooled from 45ºC to 20ºC**.** The organic liquid is cooled by chilled water supplied from a refrigeration unit at a temperature of 50ºC and can be heated upto 10ºC. The properties of organic liquid and water are- **[18]**

Organic liquid - specific heat = 2150 J/kg K, Viscosity = $0.25*10^{-3}$ N.s/m^2, Density = 716 kg/m^3, thermal conductivity = 0.133 W/mk.

Water - Specific heat = 4180 J/kgK, Density = 1000 kg/m^3, viscosity = 0.8 mNs/m^2, Thermal conductivity=0.61 W/mk.

Fouling resistance = 0.0002 m^2k/W (Organic liquid), 0.0004 m^2/W (Water). Steel tubes with thermal conductivity of 45 W/mk are to be used. Tubes are available in the size of 12mm ID, 2mm thickness, length =1.6m. As a first estimate overall heat transfer coefficient can be taken as 590 W/m^2k. Design a 1-2 shell and tube heat exchanger.

OR

Q10) Liquid bottoms from a distillation column are to be cooled from 80ºC to 40ºC at the rate of 20,000 kg/hr cooling water is available at 30ºC and can be heated up to 35ºC. **[18]**

Data

Property	Organic liquid	Water
Heat capasity(J/kg ºK)	1400	4180
Thermal conductivity(W/mk)	0.096	0.62
Viscosity, (N-s/m)	$0.40X10^{-3}$	$0.67X10^{-3}$
Density (kg/m^3)	780	1000

Tubes having ID=16 mm, OD= 19 mm and effective length 3.0m are available. Tubes are to be arranged on 25mm triangular pitch. A 1:4 fixed tube sheet shell and tube heat exchanger is to be used for which LMTD correction factor is 0.92. As a first estimate overall heat transfer coefficient of 400 w/m^2 ºK can be used. Metal wall resistance can be neglected. Fouling resistances can be neglected.

Q11)a) A single effect evaporator is to concentrate 9070 kg/h of a 20% solution of sodium hydroxide to 50% solids. The guage pressure of the steam is 1.37 atm, the absolute pressure in the vapour space is to be 10mm Hg. The overall geat transfer coefficient is estimated to be 1400 w/m^2 ºC. The feed temperature is 37.8 ºC. Calculate the amount of steam consumed, the economy and the heating surface required. **[12]**

b) Explain forward feeding method for the triple effect evaporator system. **[4]**

OR

Q12)a) A single effect evaporator is to be operated 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 41% by weight, using saturated stem at 117° C as heating media. For such a system the overall heat transfer coefficient may be taken as 1.25 kW/m^2 ºC.
Data-Specific heat of feed = 4000 J/(kgºC), Specific heat of product =3260 J/(kgºC), Feed temperature =18º C, Density of boiling liquid = 1390 kg/m^3, Boiling point rise of solution = 30º C, The liquid level in the evaporator is 1200 mm above the heating surface. **[12]**

b) Explain boiling point rise. **[4]**

♦ ♦ ♦

Total No. of Questions : 12]

SEAT No. : ____

P2474

[Total No. of Pages : 4

[5153]-109
T.E. (Chemical)
MASS TRANSFER - II
(2008 Course) (Semester -II)

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

Instructions to the candidates:

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

SECTION -I

Q1) a) A liquid mixture containing 1200 gmole of mixture containing 30 mole % naphthalene and 70 mole % dipropylene glycol is subjected to differential distillation at pressure 100 mmHg and final distillate contain 55 mole % of feed solution the VLE data are: **[12]**

X	8.4	11.6	28.0	50.6	68.7	80.6	88
Y	22.3	41.1	62.9	74.8	80.2	84.4	88

b) Define all types of tray efficiencies? **[4]**

OR

Q2) a) Define distillation and differential distillation. Derive the Rayleigh equation. **[12]**

b) Define relative volatility and give significance. **[4]**

Q3) a) Derive equation of q-line and give its significance. **[9]**

b) Define reflux ratio and derive fenske's equation for number of theoretical stages at total reflux. **[9]**

OR

P.T.O.

Q4) a) Partially vaporized feed of composition 42 mole% heptanes and 58 mole% ethyl benzene is to be fractionated at 1 atm to give distillate containing 95 mole % heptanes and bottom containing 95 mole % ethyl benzene. The feed is 40% liquid and 60% vapor (all in mole basis) calculate

i) Value of q and slope of q-line,

ii) min. reflux ratio,

iii) Number of plates at R = 2.5, the equilibrium data is: **[12]**

X	0	0.08	0.25	0.485	0.79	1.0
Y	0	0.23	0.514	0.730	0.904	1.0

b) Derive equation of operating line for enriching section in fractionating column. **[6]**

Q5) a) Give detail procedure for finding the number of stages in multistage cross-current extraction. **[12]**

b) Define selectivity and explain. **[4]**

OR

Q6) If 100 kg of a solution of acetic acid (c) and water (A) containing 30 % of acid is to be extracted three times with isopropyl ether (B) at 20°C using 40 kg of solvent in each stage. determine the quantities and composition of the various streams. How much solvent would be required if the same final raffinate concentration were to be obtained with one stage? Horizontal lines i.e. the equilibrium data is **[16]**

Water Layer			Isopropyl Ether Layer		
Acetic Acid	Water	Iso. Ether	Acetic Acid	Water	Iso.Ether
0.69	98.1	1.2	0.18	0.5	99.3
1.41	97.1	1.5	0.37	0.7	98.9
2.89	95.5	1.6	0.39	0.8	98.4
6.42	91.7	1.9	1.93	1.0	97.1
13.30	84.4	2.3	4.82	1.9	93.3
25.50	71.1	3.4	11.40	3.9	84.7
36.70	58.9	4.4	21.60	6.9	71.5
44.30	45.1	10.6	31.1	10.8	58.1
46.40	37.1	16.5	36.20	15.1	48.7

SECTION -II

Q7) Oil is to be extracted from meal by means of benzene using continuous counter-current extraction unit. The unit is expected to treat 1000 kg of meal per hour the untreated meal contains 365 kg of oil and 30 kg of benzene. The solvent used contains 14 kg of oil and 590 kg of benzene. The exhausted solid are to contain 55 kg of unextracted oil. Experimental data on the extraction of oil from meal are as follows. **[16]**

Solution composition kg oil/ kg solution	0	0.10	0.20	0.30	0.40	0.50	0.60	0.70
Solution retained kg oil kg solid	0.5	0.505	0.515	0.530	0.550	0.571	0.595	0.620

Find the number of ideal stages required?

OR

Q8) a) What are the uses of leaching? Give factors affecting the rate of leaching. **[4]**

b) Roasted copper ore containing copper as $CuSO_4$ is to be extracted in a counter current extractor. The feed charge to be treated per hour comprises of 10 tones of gangue, 1.2 tons of copper sulphate and 0.5 tone of water. The strong solution produced is to consist of 90% H_2O and 10% $CuSO_4$ is to be 98% of that of ore. Pure water is to be used as the fresh solvent. After each stage one tone of gangue retains 2 tonnes of water plus copper sulphate dissolved in that water. Equilibrium is attained in each stage. How many stages are required? **[12]**

Q9) a) A solution of washed raw cane sugar is colored by the presence of small amounts of impurities. The solution is to be decolorized by treatment with an adsorptive carbon in a contact filtration plant. The original solution has a color concentration of 9.6 measured on an arbitrary scale and it is desired to reduce color of 0.96. Calculate the necessary dosage of the fresh carbon per 2000 kg solution for a single stage process. 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 in brief : **[6]**

i) Break through curve.

ii) Adsorption isotherm.

OR

Q10) a) Give detail material balance and its application to freundlich adsorption isotherm for multistage countercurrent adsorption. **[10]**

b) State application of adsorption and explain industrial adsorbents. **[6]**

Q11)a) State methods of super saturation and explain Miers super saturation theory. **[12]**

b) Explain Ultra filtration along with application? **[6]**

OR

Q12)a) Explain ion exchange process? **[6]**

b) A Solution contains 500 kg Na_2CO_3 and water has a concentration of 25% by wt. of salt. It is cooled from 335 K to 285 K in an agitated mild steel vessel. Wt. of the vessel is 750 kg. 2.0 % water is lost by evaporation crystals of Na_2CO_3. 10 H_2O are formed. Calculate the yield of crystals and the heat to be removed? **[12]**

Date: Solubility At 285K: 8.9 kg/ 100 kg water.

Heat capacity of solution: 3.6 kJ / kg K.

Heat Capacity of M.S: 0.5 kJ/ kg K.

Heat of Solution: 78.5 MJ / KMol.

Latent heat of Vaporization: 2395 kJ/ kg.

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Total No. of Questions : 12]

SEAT No. :

P2475

[Total No. of Pages :2

[5153]-110
T. E. (Chemical)
PROCESS INSTRUMENTATION AND CONTROL
(2008 Course) (Semester-II) (309351)

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

Instructions to the candidates:

1) ***Answer three questions from each section.***
2) ***Answers to the two sections should be written in separate answer books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Use of logarithmic tables, slide ruler, Mollier Charts, electronic pocket calculator and steam tables is allowed.***
6) ***Assume suitable data if necessary.***

SECTION-I

Q1) a) Explain functional elements of instruments. **[8]**

b) Explain need and scope of process instrumentation. **[8]**

OR

Q2) a) Give the classification of instruments. **[8]**

b) Explain the difference between accuracy and sensitivity in an instrument. **[8]**

Q3) a) Give classification of pressure measuring instruments. **[8]**

b) Explain with diagram, construction and working diaphragms. **[8]**

OR

Q4) a) Define temperature and give classification of temperature measuring instruments. **[8]**

b) Explain with diagram, construction and working filled-system thermometers. **[8]**

Q5) a) Explain classification of flow measuring instruments. **[9]**

b) Explain with diagram, construction and flow equation orifice meter. **[9]**

OR

Q6) a) Explain classification of level measuring instruments. **[9]**

b) Explain with diagram, construction and working direct method of level measurement. **[9]**

P.T.O.

SECTION-II

Q7) Describe with diagram the following techniques of composition analysis.

a) IR absorption spectroscopy

b) Ultraviolet absorption spectroscopy **[16]**

OR

Q8) Write note on. **[16]**

a) HPLC

b) Liquid chromatography

c) Refractometry

Q9) a) Describe the heat exchanger automatic control system with block diagram. **[8]**

b) Derive the dynamic response equation of first order system for step changes. **[8]**

OR

Q10)a) State the difference between first order and second order system. **[8]**

b) Explain servo & regulatory operation. **[8]**

Q11)a) An air to open valve on the inflow controls level in a tank. When the process is at the set point the valve opening is 50%. **[9]**

An increase in outflow results in the valve opening increasing to a new steady state value of 70%. What is the resulting offset in the controller PB is: i) 50% ii) 10%

b) Explain with equation, different control actions. **[9]**

OR

Q12)a) State the differences between feedback and feed forward control. **[9]**

b) Explain with diagram, temperature control system in reactor. **[9]**

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Total No. of Questions : 12]

SEAT No. :

P2476

[Total No. of Pages : 2

[5153]-111
T.E. (Polymer Engineering)
POLYMER CHEMISTRY-I
(2008 Pattern) (Semester - I) (309361)

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

Instructions to candidates:

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

SECTION-I

Q1) a) Explain the classification of polymers in detail with suitable examples for each class. **[8]**

b) Write a note on ultracentrifugation. **[8]**

OR

Q2) a) Describe any one method which determines MWD in detail. **[8]**

b) Explain the concept behind various average MW of polymers. **[8]**

Q3) a) Discuss free radical polymerization mechanism with the details of every step. **[8]**

b) How does chain transfer reaction help in MW control. Explain its significance. **[8]**

OR

Q4) a) Explain emulsion polymerization in detail. Enlist the ingredients and explain the role of each one. **[8]**

b) What is ionic polymerization? Explain the mechanism. **[8]**

Q5) a) What is gelation? Explain the equation associated with it. **[9]**

b) Explain RoP of epoxides. **[9]**

OR

P.T.O.

Q6) a) There is no need to maintain stoichiometry in interfacial polymerization to obtain high MW. Explain the concept. **[9]**

b) Explain polyaddition reaction with suitable examples. **[9]**

SECTION-II

Q7) a) Discuss Q-e scheme of Alfrey and price. **[8]**

b) Explain the relation between '*r*' and copolymerization behavior. **[8]**

OR

Q8) a) Write a note on copolymer composition at higher conversion. **[8]**

b) Explain copolycondensation with suitable examples. **[8]**

Q9) a) Explain crosslinking in rubber without sulphur. **[8]**

b) Write a note addition and substitution reactions in polymers. **[8]**

OR

Q10)a) Write a note on oxidative degradation. **[8]**

b) Explain degradation of polymers by high energy radiations. **[8]**

Q11)a) Write a note on isomerism. Explain tacticity in disubstituted ethylene. **[9]**

b) Discuss coordination polymerization. **[9]**

OR

Q12)a) Write a note on components of metallocene catalyst. Differentiate metallocene polymerization from ZN polymerization. **[9]**

b) Write a note on ZN catalyst components and discuss mechanism in detail. **[9]**

Total No. of Questions : 12]

SEAT No. :

P2477

[Total No. of Pages : 2

[5153]-112
T.E. (Polymer)
POLYMER MATERIALS - I
(2008 Pattern) (Semester -I)

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

Instructions to candidates:

1) ***Answer 3 questions from section - I. Answer 3 questions from section - II.***
2) ***Answers to the two sections should be written in separate answer books.***
3) ***Neat diagrams must be drawn whenever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Assume suitable data wherever necessary.***
6) ***Use of logarithmic tables, slide-rule, mollier charts, calculator and steam tables is allowed.***

SECTION-I

Q1) a) Explain concepts related to Thermoplastics & Thermosets and give few examples. **[6]**

b) Give Industrial manufacturing processes, properties, applications, and brief idea about compounding & processing for HDPE. **[12]**

OR

Q2) a) Explain concepts related to Commodity, Engineering & High performance polymers. **[6]**

b) Give Industrial manufacturing processes, properties, applications, and brief idea about compounding & processing for EVA. **[12]**

Q3) a) Give Industrial manufacturing processes, properties, applications, and brief idea about compounding & processing for HIPS. **[12]**

b) Give properties and applications of PTFE. **[4]**

OR

Q4) a) Give Industrial manufacturing processes, properties, applications, and brief idea about compounding & processing for ABS. **[12]**

b) Give properties and applications of PVDF. **[4]**

P.T.O.

Q5) a) Give Industrial manufacturing processes in brief for Acrylics. **[8]**

b) Give properties and applications of Acrylics. **[8]**

OR

Q6) a) Give Industrial manufacturing processes in brief for Polycarbonate. **[8]**

b) Give properties and applications of Polycarbonate. **[8]**

SECTION-II

Q7) a) Give basic principles and functional uses for Adhesives, paints & coatings. **[9]**

b) Write short note on types of adhesives. **[9]**

OR

Q8) a) Write the functions performed by Solvents, fillers, plasticizers, hardeners, primers, thickening agents used with adhesives. **[10]**

b) Explain terminology like paints, varnish, lacquer and primer. **[8]**

Q9) a) Give fundamentals of rubbers and explain what is raw rubber and how is it obtained and converted to final product. **[10]**

b) Molecular requirements for a material to function as an elastomer. **[6]**

OR

Q10)a) Explain the process used for mastication and compounding with its significance. **[10]**

b) Explain types of vulcanizing agents. **[6]**

Q11)a) Give Industrial manufacturing processes, properties, applications, for butyl rubber. **[8]**

b) Explain role of different additives required by an elastomer during compounding. **[8]**

OR

Q12)a) Give Industrial manufacturing processes, properties, applications, for SBR. **[8]**

b) Give Industrial manufacturing processes, properties, applications, for Thermoplastic Elastomers. **[8]**

Total No. of Questions :12]

SEAT No. :

P2478

[Total No. of Pages :3

[5153] - 113

T.E. (Polymer Engineering)

POLYMER STRUCTURE & PROPERTY RELATIONSHIP

(2008 Course) (Smester - I)

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

Instructions to the candidates:

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

SECTION -I

Q1) a) Give effect of chemical composition on mechanical properties. **[6]**

b) What are different types of additives and its role on end properties. **[6]**

c) What makes Nylon hygroscopic in nature. **[4]**

OR

Q2) a) Give effect of chemical composition on chemical and electrical properties. **[6]**

b) Explain the types of bonds in polymer structure & their effect on various properties. **[6]**

c) Explain effect of tactivity on properties. Explain why PP has high melting point than other olefins. **[4]**

Q3) a) Explain any one processing technique in which we can witness conversion from low to high molecular weight. **[6]**

b) Give the effect of molecular weight distribution on thermal conductivity and coefficient of thermal expansion. **[6]**

c) Explain narrow molecular weight and broad molecular weight role on polymer properties with example. **[4]**

OR

P.T.O.

Q4) a) Explain what is weight average, number average and MWD and their effect on polymer mechanical properties. **[6]**

b) Give the effect of molecular weight distribution on chemical and optical properties. **[6]**

c) What is the effect of incorporation of plasticizer on Tg. **[4]**

Q5) a) What leads to molecular flexibility & freedom of rotation of bonds. Explain with examples. **[6]**

b) List the effect of copolymer & blends on polymer properties. **[6]**

c) What is the significance of super cooled state and its role during processing. Also explain fringed micelle theory. **[6]**

OR

Q6) a) With examples explain the structural restriction to rotation & thus its effect on properties. **[6]**

b) Explain what leads to intermolecular order and also what is 1st and 2 nd order transition. **[6]**

c) What are spherulites. How does their growth affect various properties. **[6]**

SECTION -II

Q7) a) Give the similarity and difference between crystallization & orientation. Also give the effect of orientation on various polymer properteis like mechanical, chemical, thermal, electrical, optical etc. **[6]**

b) Explain thermodynamic factors affecting rate of crystallization. **[6]**

c) Explain why Tg of PMA less tha PMMA. **[4]**

OR

Q8) a) Give factors leading to crystallinity & its effect on various properties like processing, mechanical, thermal etc. **[6]**

b) Explain what make a polymer amorphous or semicrystalline. Give examples. Also can one say that semi crystalline polymers have better mechanical strength than amorphous polymrs. Justify. **[6]**

c) Explain why Methylacetylene has less freedom of rotation than Neopentane. **[4]**

Q9) a) What are Intermolecular bonding forces. Explain induced & permanent Dipole and effect of these forces on structure & properties like solubility, melting, CED, permeability etc. **[6]**

b) Write a note on London Dispersion Forces and factors affecting them. **[6]**

c) What makes a polymer polar in nature and how does polarity affect properties. **[4]**

OR

Q10)a) Explain lonic bonding with example. **[6]**

b) Give the effect of cross linking and polarity on polymer properties like mechanical, chemical, thermal, electrical, optical etc. **[6]**

c) Explain role of Cohesive Energy Density and method used to find CED. **[4]**

Q11)a) Explain what is the meaning of the term multiple phases with any on example. **[7]**

b) Explain with example. How with size and shape polymer properties are influenced. **[7]**

c) Explain plastisols and give few of its applications. **[4]**

OR

Q12)a) Explain what is the meaning of the term macrostructure and its effect on properties with any one example. **[7]**

b) What are the different types of foams. Explain in detail. **[7]**

c) Why is temporary heterogeneity required for processing. Explain with examples. **[4]**

EEE

Total No. of Questions :12]

SEAT No. :

P2479

[Total No. of Pages :3

[5153] - 114

T.E. (Polymer)

DESIGN OF EQUIPMENTS AND MACHINE ELEMENTS

(2008 Course) (Semester - I)

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

Instructions to the candidates:

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

SECTION -I

Q1) a) The normal stresses on 2 planes at right angles to each other are 70MPa tensile and 60 MPa compressive with 25MPa shear stress. Find the maximum and minimum principal stresses and maximum shear stress using Mohr circle diagram. **[10]**

b) Give properties and applications of any three of the following alloys:**[8]**

i) Mond metal

ii) Duralumin

iii) Molybdenum high speed steel

iv) Gun metal

OR

Q2) a) Explain any three theories for bi-axial failure. **[10]**

b) Write a short note on high speed steel and cast iron. **[8]**

Q3) a) Derive an expression for flat open belt drive. **[8]**

b) Obtain an equation for diameters of a hollow shaft and solid shaft subjected to bending moment only from bending equation. **[8]**

OR

P.T.O.

Q4) a) Explain with the help of neat sketches, types of various flat belt drives. **[8]**

b) The shaft of an axial flow rotary compressor is subjected to maximum bending moment of 4000 Nm and maximum torque of 1600 Nm. The combined shock and fatigue factor in bending and torsion is 2 and 1.5 respectively. Design the shaft if shear stress is not to exceed 45 MPa. If ratio of outer and inner diameter is 1.5 design a hollow shaft for the compressor. **[8]**

Q5) a) With a neat sketch, explain wedge film and squeeze film journal bearings. **[8]**

b) Draw a sketch of plummer block and explain functioning of different ports. **[8]**

OR

Q6) a) Discuss the significance of bearing chracteristic number and bearing modulus in design of journal bearings. **[8]**

b) With the help of neat sketch, describe different types of ball bearings. **[8]**

SECTION -II

Q7) a) Explain the in-line ball type check valve system. **[8]**

b) With a neat hydraulic circuit diagram explain the traverse and feed (fast forward-slow feed and fast retraction). Explain any one typical application. **[8]**

OR

Q8) a) Draw a neat sketch of gear pump and explain its working. **[8]**

b) Write a detailed note on pressure control valves. **[8]**

Q9) a) Draw a hydraulic circuit showing only mould open (slow-fast-slow down) and Mould close (fast-slow and mould safety) operations. Explain how the circuit functions. **[8]**

b) With a neat circuit diagram, explain injection unit forward and backward operation. **[8]**

OR

Q10)a) Draw hydraulic circuit and give valve sequencing for the Injection fill and hold phase. **[8]**

b) Draw neat sketches of lock and block system with clamp cylinders on tie bars. **[8]**

Q11)a) Give design calculations for thickness for any three types of heads. **[9]**

b) With neat sketches explain different types of jackets used for reaction vessels. **[9]**

OR

Q12)a) Write short note on: **[9]**

i) nozzle reinforcement procedure

ii) supports for pressure vessels

b) Indicate the various stresses induced in a pressure vessel subjected to combined loading. State the method for thickness calculation for such a vessel. **[9]**

EEE

Total No. of Questions : 12]

SEAT No. :

P2480

[Total No. of Pages : 3

[5153]-115

T.E. (Polymer Engineering)

MASS TRANSFER AND REACTION ENGINEERING

(2008 Pattern) (Semester - I) (309365)

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

Instructions to the candidates:

1) ***Answers to the two sections should be written in separate books.***
2) ***Draw neat diagrams wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data, if necessary.***
5) ***Use of logarithmic table, electronic pocket calculators is allowed.***

SECTION-I

Q1) Explain Fick's Law of Diffusion. Oxygen (A) is diffusing through Carbon monoxide (B) under steady state condition, with the Carbon monoxide as non-diffusing. The total pressure is 1×10^5 N/m^2 and temperature 0°C. The partial pressure of Oxygen at two planes 2 mm apart is 13000 N/m^2 and 6500 N/m^2 respectively. The diffusivity for the mixture is $(D_{A-B})=1.87\times10^{-5}$m^2/sec. Find the rate of diffusion of oxygen through each square meter of the two planes. **[18]**

OR

Q2) a) Calculate rate of diffusion of acetic acid (A) across a film of non-diffusing water (B) solution 1 mm thick at 17ºC when the concentrations on opposite sides of the film are respectively, 9 and 3 wt % acid. The diffusivity of acetic acid in the solution is 0.95* 10^{-9}m^2/s. Density of 9% solution is 1012 kg/m^3 and 3% solution is 1003.2 kg/m^3 [Take molecular weight of M_A=60.03 and M_B=18.02]. **[10]**

b) Derive the expression for Steady State diffusion of gas A through non-diffusing gas B. **[8]**

Q3) Explain Raoults and Henrys law. Write a note on minimum liquid to gas ratio for gas absorber. Derive Rayleigh Equation for Simple Distillation. **[16]**

OR

P.T.O.

Q4) Which are the factors to be considered for the choice of solvent in gas absorption? Explain flash vaporization. **[16]**

Q5) Explain the purpose of drying operation and explain the methods of expressing moisture content. Explain psychometric chart and Explain the term Dry bulb temperature and wet bulb temperature. **[16]**

OR

Q6) Explain rate of drying curve.
A wet solid is to be dried from 35% to 10% moisture under constant drying condition in 5 hours. If equilibrium moisture content is 4% and critical moisture content is 14%. How long it will take to dry the solids to 6% moisture under same condition. **[16]**

SECTION-II

Q7) On doubling the concentration of reactant, the rate of reaction triples. Find the reaction order.

Discuss the followings: Order, Molecularity, Rate Constant, and Temperature Dependency of rate of reaction. **[18]**

OR

Q8) a) Explain temperature dependency from Collision, Transition and Arrhenius theory. Explain Elementary and Non-Elementary reaction with example. **[14]**

b) Explain in short factors affecting rate of reaction. **[4]**

Q9) Discuss the Integral Method of analysis of kinetics of constant volume batch reactor. **[16]**

OR

Q10)a) Discuss Half Life Method to determine overall order of reaction. **[8]**

b) Decomposition of a gas is second order. When the initial concentration of gas is $5^* 10^{-4}$ mo1/1, it is 40% decomposed in 50 min. Calculate the value of rate constant. **[8]**

Q11)Write a short note on design of polymer reactors. What is the performance equation of PFR in series. **[16]**

OR

Q12)Explain term space time and space velocity. Discuss performance equation for batch reactor and What are the advantages and disadvantages of batch reactor. **[16]**

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Total No. of Questions :12]

SEAT No. :

P2481

[Total No. of Pages :5

[5153] - 116

T.E. (Polymer Engineering)

MATHEMATICAL METHODS FOR POLYMER ENGINEERS

(2008 Course) (Semester - II)

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

Instructions to the candidates:

1) ***Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6 from section I and Q7 or Q8, Q9 or Q10 and Q11 or 12 from section II.***
2) ***Answers to the two sections should be written in separate answer books.***
3) ***Figures to the right indicate full marks.***
4) ***Neat diagrams must be drawn wherever necessary.***
5) ***Use of electronic pocket calculator is allowed.***
6) ***Assume suitable data if necessary.***

SECTION -I

Q1) a) Show that $\mu\delta = \frac{\Delta + \nabla}{2}$. **[3]**

b) The following data gives the melting point of an alloy of lead and zinc, where y is the temperature in ^{o}C and x is the percentage of lead in the alloy. **[7]**

x	40	50	60	70	80	90
y	184	204	226	250	276	304

Using Newton's interpolation formula, find the melting point of alloy containing 84% of lead.

c) Evaluate $\int_0^1 e^{-x^2} dx$, by dividing the range of integration into 4 equal parts, using Simpson's rule. **[7]**

OR

P.T.O.

Q2) a) Find the value of $f(x) = x\log x$, at $x = 5$ from the following data, by using Lagrange's formula. **[5]**

x	3	7	9	12
y	1.4313	5.9156	8.5881	12.9501

b) Find the derivative of $f(x)$ at $x = 0.4$ from the following table. **[6]**

x	0.1	0.2	0.3	0.4
$f(x)$	1.10517	1.22140	1.34986	1.49182

c) Using Simpson's rule find the value of $\int_0^4 e^x dx, h = 1,$ and compare your result with the exact value of the integral. **[6]**

Q3) a) Using the iteration method, calculate the root of the equation $4x = e^x$. **[5]**

b) Find a least squares straight line for the following data. **[6]**

X	1	2	3	4	5	6
Y	6	4	3	5	4	2

c) Solve the following system of equations by Gauss -Seidal method. **[6]**

$$8x_1 + x_2 - x_3 = 8$$
$$x_1 - 7x_2 + 2x_3 = -4$$
$$2x_1 + x_2 + 9x_3 = 12$$

OR

Q4) a) Using Regula -Falsi method, compute the real root of the equation $x^3 - 4x - 9 = 0$. **[5]**

b) Predict Y at X = 5, by fitting a least square straight line to the following data. **[6]**

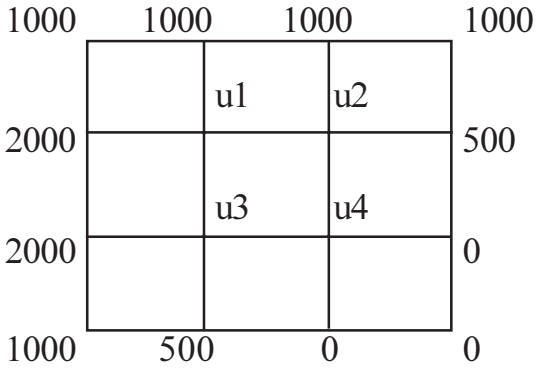
X	2	4	6	8	10	12
Y	1.8	1.5	1.4	1.1	1.1	0.9

c) Solve the following system of equations by Gauss - elimination method. **[6]**

$$10x - 2y + 3z = 23$$
$$2x + 10y - 5z = -33$$
$$3x - 4y + 10z = 41$$

Q5) a) Obtain the values of y at $x = 0.1, 0.2$ for the differential equation $\frac{dy}{dx} = -y$ given $y(0) = 1$ using R.K. method of 4th order. **[8]**

b) Given the values of $u(x, y)$ on the boundary of the square as in the figure below, evaluate the values of u at the pivotal points of this figure, given $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$. **[8]**



OR

Q6) a) Use modified Euler's method to solve $\frac{dy}{dx} = x - y^2 \quad y(0) = 1$ to calculate $y(0.4)$ taking $h = 0.2$. **[8]**

b) Solve the Poisson equation $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = -81xy \; 0 < x < 1, 0 < y < 1$ given that $u(0, y) = 0, u(x, 0) = 0, u(1, y) = 100, u(x, 1) = 100$ and $h = 1/3$. **[8]**

SECTION -II

Q7) a) Solve the following LPP by simplex method. **[10]**

Maximize: $Z = 20x_1 + 10x_2$

Subject to: $x_1 + 6x_2 \leq 300$

$2x_1 + 2x_2 \leq 150$

$4x_1 + x_2 \leq 240$

and $x_1, x_2 \geq 0$

b) Write the dual of the following LPP **[6]**

Maximize: $Z = x_1 + 2x_2$

Subject to: $x_1 - 2x_2 \leq 2$

$3x_1 - x_2 \leq 12$

$x_1 + 3x_2 \leq 17$

$x_1 + x_2 \leq 5$

and $x_1, x_2 \geq 0$

OR

Q8) a) Use simplex technique to solve the following LPP **[10]**

Maximize: $Z = 3x_1 + 2x_2$

Subject to: $x_1 + x_2 \leq 4$

$x_1 - x_2 \leq 2$

and $x_1, x_2 \geq 0$

b) Write the dual of the following **[6]**

Maximize: $Z = 1600x_1 + 1500x_2$

Subject to: $5x_1 + 4x_2 \leq 500$

$15x_1 + 16x_2 \leq 1800$

and $x_1, x_2 \geq 0$

Q9) a) Obtain regression lines for the following data. **[9]**

x	6	2	10	4	8
y	9	11	5	8	7

b) A coin is tossed 10 times. Find the probability of getting exactly 6 Heads, at least 6 Heads. **[8]**

OR

Q10)a) Compute correlation coefficient between supply and price of commodity using following data. **[9]**

Supply	152	158	169	182	160	166	182
Price	198	178	167	152	180	170	162

b) In a certain examination test, 2000 students appeared in a subject of mathematics. Average marks obtained were 50% with standard deviation 5%. How many students are expected to obtain more than 60% of marks, if the marks are distributed normally? [z = 2, A = 0.4772]. **[8]**

Q11)a) If A_r^{pq} and B_r^{pq} are tensors, prove that their sum and difference are tensors. **[6]**

b) Prove that contraction of the tensor A_q^p is a scalar or invariant. **[6]**

c) Prove that $\frac{\partial g_{pq}}{\partial x^m} = [p^m, q] + [q^m, p]$. **[5]**

OR

Q12)a) A covariant tensor has components xy, y^2 in rectangular coordinates. Find its covariant components in polar coordinates. **[6]**

b) Determine whether dx^k is a tensor, if so, find its type and rank. **[5]**

c) Show that $\left\{ \begin{matrix} s \\ pq \end{matrix} \right\} = \left\{ \begin{matrix} s \\ qp \end{matrix} \right\}$. **[6]**

EEE

Total No. of Questions : 12]

SEAT No. :

P2482

[Total No. of Pages : 2

[5153]- 117
T.E. (Polymer Engineering)
POLYMER CHEMISTRY - II
(2008 Pattern) (Semester -II)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) Explain the synthesis of backelite resin with reactions involved. **[8]**

b) Give the commercial formulation of any PF resin **[8]**

OR

Q2) a) Explain with suitable reactions curing in silicone polymers. Differentiate the properties of cured and uncured resin. **[8]**

b) Write a note on synthesis and applications of MF polymers. **[8]**

Q3) a) Explain the process involved in the synthesis of alkyd resin. **[8]**

b) Discuss the properties and applications of alkyd resin. Give any one curing reaction. **[8]**

OR

Q4) a) Compare saturated and unsaturated polyester resins w.r.t. monomers involved, properties and applications. **[8]**

b) Give the synthesis and curing reactions of vinyl ester resins. **[8]**

Q5) a) Give commercial uses of epoxy resins. Mention the contrasting characteristics of the same. **[9]**

b) Enlist various curing agents of epoxy resin and explain the curing reactions for each one of them and properties imparted. **[9]**

OR

P.T.O.

Q6) a) Give the examples of various isocynates and polyols used in the preparation of polyurethanes and their effect on properties. **[9]**

b) Write a note on properties and applications of polyurethanes. **[9]**

SECTION - II

Q7) a) Discuss applications of polyimides. Compare the properties with polymides. **[8]**

b) Explain the synthesis of polyamides. Enlist various modifications of the same. **[8]**

OR

Q8) a) What are polyacetals? How are they prepared? Give important features of this polymer. **[8]**

b) Write a note on formulation and curing of polyacetals. **[8]**

Q9) a) Write a note on synthesis, properties of PPO. **[8]**

b) Write a note on synthesis, applications of PPS. **[8]**

OR

Q10)a) Discuss polysulphones in detail. **[8]**

b) Compare the properties and applications of PEK and PEEK. **[8]**

Q11)a) What is LC phase? What are the structural requirements of a molecule to exhibit LC character? Give some examples. **[9]**

b) Explain the synthesis of conducting polymers. Also explain the structural requirements for a polymer to show conductivity. **[9]**

OR

Q12)a) What are nanocomposites? Why do they show superior properties in comparison with usual composites. **[9]**

b) Enlist the polymers used biomedical application. What are the qualifying criteria of a polymer to be used in this area? **[9]**

Total No. of Questions : 12]

SEAT No. :

P2483

[Total No. of Pages : 3

[5153]-118

T.E. (Polymer Engineering)

INSTRUMENTATION & PROCESS CONTROL

(2008 Pattern) (Semester-II) (309368)

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

Instructions to the candidates:

1) ***Answers to the two sections should be written in separate books.***
2) ***Draw neat diagrams wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data, if necessary.***
5) ***Use of logarithmic table, electronic pocket calculator is allowed.***

SECTION-I

Q1) a) Explain the term Signal conditioning with at least one example in detail. **[6]**

b) Explain the following: **[12]**

Dynamic error, Environmental error, observation error, Instrumental error, Minimization of error.

OR

Q2) a) A temperature transducer has a span of 20-250ºC. A measurement results in a value of 55ºC for the temperature. Specify the error if the accuracy is **[6]**

i) $\pm$ 0.5% full scale division

ii) $\pm$ 0.75% of span and

iii) $\pm$ 0.8% of reading.

What is the possible temperature in each case?

b) Explain the following term in detail: **[12]**

Repeatability, Reproducibility, Hysteresis, Drift, zero drift, Speed of response.

Q3) a) Explain with neat diagram Barometer and Enlarged leg manometer. **[10]**

b) Explain the principle of Thermocouple, RTD, and Bimetallic thermometer. **[6]**

OR

P.T.O.

Q4) Describe in detail with neat sketch Pyrometers. **[16]**

Q5) Draw the diagram and explain principle, construction, working, advantages and disadvantages of Rotameter. **[16]**

OR

Q6) Explain the importance of viscosity measurement in polymer industry and suggest one suitable method for viscosity. **[16]**

SECTION-II

Q7) a) A second order system is observed to exhibit an Under damped response giving the Ultimate Value = 25 and Minimum Value of the response = 1.5. Find the overshoot and Maximum value of the response for damping coefficient ξ = 0.8, 0.4, 0.2, 0.1, 0.05. **[10]**

b) A thermometer which is observed to exhibit the first order dynamics with time constant of 10 sec, which is placed in bath at temperature of 50 ºC and after reaching steady state, it is suddenly placed into hot water at 75 ºC. Find the response of the thermometer at time =5, 10, 15, 20, 25, 30 sec. **[8]**

OR

Q8) a) Explain significance of Process control and Differentiate between First Order system and second order system. **[9]**

b) Find out the response of same at time = 10,15,20,25,30 min. A thermometer which is obeserved to exhibit the first order dynamics with time constant of 15 sec, which is placed in bath at temperature of 50 ºC and after reaching steady state, temperature of bath linearly increases with time at 6 ºC/min. **[9]**

Q9) a) Explain Proportional and Integral Control action. **[8]**

b) If the Characteristics equation for given feedback loop control system is given by $s^3 + 3s^2 + (1+Kc)s + Kc = 0$. Determine the value of Gain which causes just Instability and also determine the location of pair of the roots for given control system. **[8]**

OR

Q10)a) Describe standard block diagram and standard symbols used for closed loop transfer function. **[8]**

b) Derive the necessary expression for overall transfer function for change in set point and change in load. **[8]**

Q11)Write a note on: **[16]**

a) Control of Polymer Processing

b) Programmable Logic control.

OR

Q12)Explain the following: **[16]**

a) Cascade Control of Liquid Level in a Tank.

b) Digital Control System.

c) Control Tuning.

♦ ♦ ♦

Total No. of Questions : 12]

SEAT No. :

P2484

[Total No. of Pages :3

[5153]-119
T. E. (Polymer)
POLYMER PROCESSING OPERATION-I
(2008 Course) (Semester-II)

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

Instructions to the candidates:

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

SECTION-I

Q1) a) Explain the fundamentals of extrusion process giving the steps involved in basic operation. **[9]**

b) Explain extruder die characteristics with a neat sketch. **[9]**

OR

Q2) a) Explain the effect of channel depth and helix angle in case of single screw extruder. **[9]**

b) Explain the general features of a barrier screw and with the help of development view, explain the constructional features of barrier section. **[9]**

Q3) a) With neat sketches, explain offset dies used for pipe extrusion. Explain winding unit used for blown film. **[8]**

b) Explain with any example the effect of processing parameters and their effect on product quality. **[8]**

OR

Q4) a) With a neat sketch, explain the caterpillar haul off system. **[8]**

b) Explain down stream equipment used for cast film extrusion. **[8]**

Q5) a) Explain PVT diagram and injection moulding cycle. **[8]**

b) Explain Orientation and its importance during injection moulding and its effects. **[8]**

OR

P.T.O.

Q6) a) Give characteristics of polymeric materials used for injection molding along with their processing parameters and their effects on product quality. **[8]**

b) Give trouble shooting in injection molding and their remedies. **[8]**

SECTION-II

Q7) a) Explain Gas assist injection moulding and its advantages over conventional injection molding . **[9]**

b) Explain dip coating, slush moulding and polymer casting process in short. **[9]**

OR

Q8) a) Explain injection moulding of thermosets with advantages and disadvantages it offers. **[9]**

b) Explain either reaction injection moulding or injection moulding of elastomers. **[9]**

Q9) a) Explain with neat sketches coil and cut off unit for coiled extrusions. **[8]**

b) Explain extrusion of cellular / foamed plastic products. **[8]**

OR

Q10)a) Explain extrusion process of hollow core panel and sandwich panel. **[8]**

b) Give the down stream equipments for foamed products. **[8]**

Q11)a) Explain compresssion molding process and its types. **[8]**

b) Give the effect of bulk factor, Flow properties, Cure time, temperature and pressure on Compression moulding cycle. **[8]**

OR

Q12)a) Explain Basic principle and working of transfer molding with advantages & limitation of the process. **[8]**

b) Write a note on DMC and SMC. **[8]**

♦ ♦ ♦

Total No. of Questions : 12]

SEAT No. :

P2485

[Total No. of Pages : 2

[5153]-120
T.E. (Polymer)
POLYMER RHEOLOGY
(2008 Course) (Semester - II)

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

Instructions to the candidates:

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

SECTION -I

Q1) a) Explain types of fluids with egs.of each. **[10]**

b) Give an example to explain stress and strain tensor. **[8]**

OR

Q2) a) Derive continuity equation. **[10]**

b) Explain normal stresses with any 3 examples. **[8]**

Q3) a) Explain Stress relaxation, relaxation modulus and creep compliance. **[8]**

b) Explain and derive Maxwell model. **[8]**

OR

Q4) a) Explain either Maxwell model or Voigt - Kelvin model. **[8]**

b) Explain WLF equation and what information can be obtained from it. **[8]**

Q5) a) Explain the Effect of pressure, temperature and molecular weight on viscosity. **[8]**

b) Explain the Effect of copolymerization,fillers and plasticizer on viscosity. **[8]**

OR

P.T.O.

Q6) a) Explain the Effect of crosslinking,crystallinity and branching on viscosity. **[8]**

b) Explain what is zero shear viscosity and also what is activation energy. **[8]**

SECTION -II

Q7) a) What is power law model.Derive equation for laminar flow through circular cross section. **[9]**

b) Explain Ryan Johnson criterion. **[9]**

OR

Q8) a) When does turbulent flow arise and how can it be determined.Also explain what is turbulence dumpling with an eg. **[9]**

b) Explain the swelling due to shear stresses and swelling due to tensile stresses. What are the factore that influence this effect and what are the effects due to swelling. **[9]**

Q9) a) Explain Cone and plate Rheometer and information can be obtained from this rheometer. **[8]**

b) Explain concentric cylinder Rheometer and information can be obtained from this rheometer. **[8]**

OR

Q10)a) Derive the viscosity equation for cone and plate viscometer. **[8]**

b) Deartive the viscosity equation for parallel plate viscometer. **[8]**

Q11)a) Explain how flow equation are applicable for injection molding process. What are the parameters that have effect on flow properties. **[8]**

b) Explain how flow equation are applicable for any extrusion process .What are the parameters that have effect on flow properties. **[8]**

OR

Q12)a) What is the difference in the extrusion process and thus Rheology durin extrusion of film and sheet. **[8]**

b) Explain Rheology in regards Compression and transfer moulding. **[8]**

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Total No. of Questions : 12]

SEAT No. :

P2486

[Total No. of Pages :5

[5153]-121
T.E. (Petroleum Engg.)
NUMERICAL METHODS AND GEO-STATISTICS
(2008 Pattern) (Semester - I)

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

Instructions to the candidates:

1) ***Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6 from Section I and Q7 or Q8, Q9 or Q10 and Q11 or Q12 from Section II.***
2) ***Answers to the two sections should be written in separate answer - books.***
3) ***Figures to the right indicate full marks.***
4) ***Neat diagrams must be drawn wherever necessary.***
5) ***Use of electronic pocket calculator is allowed.***
6) ***Assume suitable data if necessary.***

SECTION - I

Q1) a) If $v = 3x^2y - y^3$, find its harmonic conjugate u. Find $f(z) = u + iv$ in terms of z. **[5]**

b) Find the bilinear transformation which maps the points $-i$, 0, $2 + i$ of z plane on to the points 0, $-2i$, 4 of the z plane. **[6]**

c) Evaluate $\oint \frac{e^{3z}dz}{(z-1)(z-2)}$ where is C is the circle $|z| = 3$ **[5]**

OR

Q2) a) Show that analytic function with constant modulus of constant. **[5]**

b) Evaluate $\oint \frac{z^3 - 5}{(z+1)^2(z-2)} dz$ where C is the circle $|z| = 3$. **[6]**

c) Show that the transformation $w = z + 1/z - 2i$, maps the circle $|z| = 2$ into an ellipse. **[5]**

P.T.O.

Q3) a) Psychological tests of intelligence and of engineering ability were applied on 10 students results as below. Find the correlation coefficient between intelligence ratio (1.R) and engineering ratio (E.R). **[8]**

1.R	105	104	102	101	100	99	98	96	93	92
E.R	101	103	100	98	95	96	104	92	97	94

b) The first four moments about the working mean 28.5 of a distribution are 0.294, 7.144, 42.409 and 454.98. Calculate the moments about mean and also evaluate β_1 and β_2 and comment. **[9]**

OR

Q4) a) The regression equations are $8x - 10y + 66 = 0$ and $40x - 18y = 214$. The variance of x is 9.

Find

i) Mean value of x and y

ii) The correlation of x and y and

iii) Standard deviation of y. **[8]**

b) If $\Sigma f = 27$, $\Sigma fx = 91$, $\Sigma fx^2 = 359$, $\Sigma fx^3 = 1567$, $\Sigma fx^4 = 7343$, first find the working moments and then the four central moments and β_1 and β_2. **[9]**

Q5) a) On an average a box containing 10 articles is likely to have 2 defectives. If we consider a consignment of 100 boxes, how many are expected to have three or less defectives. **[5]**

b) In an intelligence test administered to 1000 students the average score was 42 and standard deviation 24. Find the number of students with score lying between 30 and 54. (Given $z = 0.5$ area = 0.1915). **[6]**

c) An envelope contains 6 tickets with numbers 1, 2, 3, 5, 6, 7 and another envelope contains 4 tickets with numbers 1, 3, 5, 7. An envelope is chosen at random and a ticket is drawn from it. Find the probability that the ticket bears the number **[6]**

i) 2 or 5 and

ii) 2

OR

Q6) a) In sampling a large number of parts manufactured by a machine, the mean number of defective in a sample of 20 is 2. Out of 1000 such samples, how many would be expected to contain at least 3 defective parts. **[5]**

b) X is a normal variate with mean 30 and S.D. 5, find the probabilities of $26 \le X \le 40$ and $X \ge 45$. **[6]**

Area = 0.4772 when $z = 2$

Area = 0.2881 when $z = 0.8$

Area = 0.4986 when $z = 3$

c) If a random variable has a Poisson distribution such that P (1) = P (2) find **[6]**

i) Mean of the distribution and

ii) P (4)

SECTION - II

Q7) a) Establish the following results **[9]**

i) $\mu^2 = 1 + \frac{\delta^2}{4}$

ii) $\Delta = \mu\delta + \frac{1}{2}\delta^2$

iii) $E = 1 + \frac{\delta^2}{2} + \delta\left\{1 + \frac{\delta^2}{4}\right\}^{1/2}$

b) Use Simpson's $\frac{1}{3}^{rd}$ rule to find the area of the circle of radius 1. **[8]**

OR

Q8) a) Find Newton's interpolating polynomial passing through the data. **[9]**

x	0	1	2	3	4	5
y	1	2	9	28	65	126

a) Evaluate $\int_0^3 \frac{dx}{1+x}$ by using Simpson's $\frac{3}{8}^{th}$ rule (take $h = 0.5$) **[8]**

Q9) a) Obtain the root of the equation $x^3 - 4x - 9 = 0$, correct to four decimal places by using Newton-Raphson method. **[8]**

b) Solve the system of equations, using Gauss - Seidal method $10x + y + 2z = 13$, $2x - 20y + 5z = -13$, $2x + 3y + 30z = 35$. **[8]**

OR

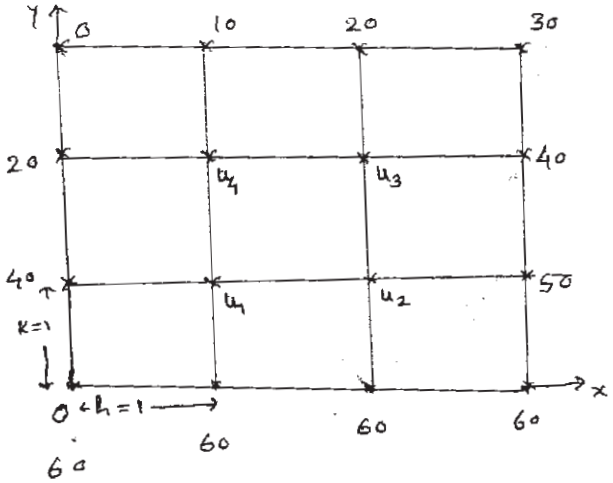
Q10)a) Fit a straight line of the form $y = mx + c$ to the following data **[8]**

x	0	1	2	3	4	5	6
y	–4	–1	2	5	8	11	14

Using method of least squares.

b) Use Runge-Kutta method of fourth order to solve the equation $\frac{dy}{dx} = \sqrt{x + y}$ with $y(0) = 1$, $h = 0.2$. Find y at $x = 0.2$ **[8]**

Q11)a) Solve the equation $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$ Corresponding to the grid shown below. **[9]**



b) Maximize $z = 3x_1 + 2x_2$ **[8]**

Subject to $x_1 + x_2 \leq 4$

$x_1 - x_2 \leq 2$

and $x_1, x_2 \geq 0$.

Using simplex technique.

OR

Q12)a) Explain Explicit finite difference method to solve the equation. $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$

with $u\ (0, t) = 0$, $u\ (1, t) = 0$

$$u\ (x, 0) = 2x,\ 0 \le x \le \frac{1}{2}$$

$$= z\ (1 - x),\ \frac{1}{2} \le x \le 1$$

$$\delta x = 0.1, \delta t = 0.001$$ **[8]**

b) Use simplex method to solve following LPP

Maximize $z = 3x_1 + 6x_2 + 2x_3$

Subject to $3x_1 + 4x_2 + x_3 \le 2$ **[9]**

$x_1 + 3x_2 + 2x_3 \le 1$

and $x_1, x_2, x_3 \ge 0$

Total No. of Questions : 10]

SEAT No. : ____

P3607

[Total No. of Pages : 3

[5153]-122

T. E. (Petroleum Engineering) (Semester - 1)

PETROLEUM GEOLOGY - I

(2008 Pattern)

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

Instructions to the candidates:

1) ***Answers to the two sections should be written in separate answer books.***
2) ***Q.1 is compulsory and Attempt Q2 or 3, and Q4 or 5 from Section-I. From Section-II, Q. 8 is compulsory and Attempt Q. 6 or7, Q 9 or 10.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right side indicate full marks.***

SECTION - I

Q1) Write short notes on (Any Five) : **[20]**

a) Hydrolysis

b) Hydration

c) Primary Minerals

d) Current Bedding

e) Ripple Marks

f) Divergent Plate boundary

g) Relative abundance of different rocks in terms of Volume proportion.

h) Mineral maturity index

i) Internal structure of the earth

j) Earthquake waves

P.T.O.

Q2) a) What is Rock Cycle? Explain with suitable diagram **[7]**

b) How are sedimentary rocks differentiated from igneous and metamorphic rocks? **[8]**

OR

Q3) a) What are the different observations carried out on sedimentary rocks? **[8]**

b) What are intrusive and extrusive igneous rocks? **[7]**

Q4) a) Discuss the quantification of fractures. **[5]**

b) Give classification of folds based on lnterlimb angle. **[10]**

OR

Q5) a) What is a fault? How faults are interpreted in the absence of any visible displacement? **[7]**

b) Discuss and Draw a neat diagram to explain Midoceanic ridge and Oceanic trenches. **[8]**

SECTION - II

Q6) a) What are different criteria's used in deciding the textural maturity of clastic sedimentary rocks. **[8]**

b) Discuss the classification sedimentary rocks based on the triangular diagram of lime-sand-clay/mud. **[7]**

OR

Q7) a) Describe the Dunham's Scheme of classification of carbonate rocks using a neat diagram. **[10]**

b) What is Dolomitization? **[5]**

Q8) Write short noted on (Any TWO) : **[15]**

a) Mode of preservation of fossils

b) Use of Trace fossils in the exploration of hydrocarbons

c) Use of microfossils as an indicator of environment of deposition

d) Marine depth zones

Q9) a) What is an unconformity? Explain the different types of unconformities with the help of neat sketches. **[10]**

b) What is progradation and retrogradation? **[10]**

OR

Q10)a) Write Geological Time Scale in a tabular form with important.event in each era. **[10]**

b) Explain in brief with suitable diagrams, geological conditions that lead to regression, transgression and aggradation of sediments? **[10]**

Total No. of Questions : 6]

SEAT No. :

P2487

[Total No. of Pages : 1

[5153]-123
T.E.(Petroleum Engineering)
DRILLING OPERATIONS
(2008 Pattern) (Semester - I)

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

Instructions to the candidates:

1) ***Write section I and II on separate answer sheets.***
2) ***All questions are compulsory.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right side indicate full marks.***
5) ***Assume Suitable data if necessary.***

SECTION - I

Q1) a) Explain Hoisting system on a rig in detail. **[10]**

b) Discuss IADC classification of drilling bit. **[8]**

Q2) a) What is kick? Write causes of kick. **[8]**

b) Explain Reciprocating pump working principle in detail. **[8]**

Q3) Discuss reasons of the directional drilling and types of directional wells. **[16]**

SECTION - II

Q4) a) Discuss cement rheology and basic data required for design of cement slurry. **[10]**

b) Discuss types of casings and API 5CT standards **[8]**

Q5) a) Discuss oil base mud in detail. **[14]**

b) Well depth=10,500ft, density=11ppg. Find out bottom hole pressure. **[2]**

Q6) a) Draw circulation system of drilling rig. **[8]**

b) Write note on optimum hydraulics. **[8]**

Total No. of Questions :12]

SEAT No. :

P2488

[Total No. of Pages :3

[5153] - 124

T.E. (Petroleum Engineering)

HYDROCARBON PROPERTIES AND THERMODYNAMICS

(2008 Course) (Semester - I) (312384)

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

Instructions to the candidates:

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

SECTION-I

Q1) a) Explain the concept of entropy. **[8]**

b) Water flows over a waterfall 100 m in height. Take 1 kg of water as the system and assume that it does not exchange energy with its surroundings. **[8]**

i) What is the potential energy of the water at the top of the falls with respect to the base of the hill?

ii) What is the kinetic energy of the water just before it strikes the bottom?

iii) After the 1 kg of water enters the river below the falls, what change has occurred in its state?

OR

Q2) a) What is the significance of Joule's experiment in the formulation of the first law of thermodynamics? **[8]**

b) Explain reversible and irreversible processes with examples. **[8]**

P.T.O.

Q3) a) Discuss the P-T diagrams for various types of reservoirs. **[9]**

b) What are compressibility charts? Give their significance. **[9]**

OR

Q4) Using the virial equation, claculate the molar volume and compressibility factor of isopropanol vapour at 460 K and 15 bar. **[18]**

The virial coefficients are $B = -3.88 \times 10^{-4}$ m^3/mol and $C = -2.6 \times 10^{-8}$ m^6/mol^2.

Q5) a) What are the Maxwell's equations and what is their importance in establishing relationships between thermodynamic properties? **[8]**

b) Derive the clausius Clayperon equation. **[8]**

OR

Q6) a) The density of gaseous ammonia at 473 K and 50 bar is 24.3 kg/m^3. Estimate its fugacity. **[4]**

b) Explain the need for partial molar properties. Also explain the methods for measuring them **[8]**

c) What is chemical potential? Give its significance. **[4]**

SECTION-II

Q7) a) With proper phase diagrams, distinguish between minimum and maximum boiling azeotropes. **[9]**

b) What is meant by a tie line? How does the tie line help in determining the amount of liquid and vapour in eqilibrium? **[9]**

OR

Q8) The vapour pressures of benzene **[18]**

a) and ethyl benzene

b) can be evaluated by the Antoine equations

$$\ln P_1^S = 13.8858 - \frac{2788.51}{T - 52.41}$$

$$\ln P_2^S = 14.0045 - \frac{3279.47}{T - 60.00}$$

Where T is in K and P is in kPa. construct the T-x-y diagram at 101.3 kPa.

Q9) a) Give the effect of wettability on vapour pressure in a capillary. **[8]**

b) Define Knudsen diffusivity. Give its significance. **[8]**

OR

Q10)a) State the Kelvin eqution. What are its limitations? **[8]**

b) Derive the Laplace Young equation. **[8]**

Q11)a) With the help of neat diagrams, explain the solid liquid equilibrium phenomena. **[8]**

b) Give the various models for asphaltene precipitation. **[8]**

OR

Q12)a) Write a note on the gas hydrate formation equilibria. **[8]**

b) Discuss the various methods of determining WAT (Wax Appearance Temperature) **[8]**

EEE

Total No. of Questions :12]

SEAT No. :

P2489

[Total No. of Pages :2

[5153] - 125

T.E. (Petroleum)

PETROLEUM PRODUCTION OPERATIONS

(2008 Course) (Semester - I) (312385)

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

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, from section - I and Q.No.7 or Q.No.8, Q.No.9 or Q.No.10, Q.No.11 or Q.No.12 from section - II.***
2) ***Answers to the two sections should be written in separate answer books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right side indicate full marks.***
5) ***Use of calculator is allowed.***
6) ***Assume suitable data if necessary.***

SECTION-I

Q1) a) Write the selection and design considerations for well head equipment and Christmas tree. **[10]**

b) Draw neat schematic sketch of a typical Chrismas tree and indicate various features of it. **[8]**

OR

Q2) a) Draw neat schematic sketch of a typical subsea well head equipment. Indicate all the features of it. **[8]**

b) Write and explain the operating procedure for a producing wellbore to start and shut various valves of its Christmas tree. **[10]**

Q3) Draw typical schematic sketches of any four downhole equipments of a completion string. **[16]**

OR

Q4) Explain working and applications of any four down hole tools or equipments of a completion string. **[16]**

P.T.O.

Q5) Discuss VLP and choke performance analysis in detail. **[16]**

OR

Q6) Write short notes on: **[16]**

a) Optimum GLR

b) Heading cycle

c) Choke performance

d) Critical production rate

SECTION-II

Q7) Explain: **[18]**

a) Well activation

b) Well swabbing

c) Well circulation

d) API grades for production tubing

OR

Q8) Discuss, different types of well perforation operations in detail. **[18]**

Q9) Explain with graph, any four PVT properties of oil, gas and water. **[16]**

OR

Q10) Explain, formation damage, its causes and solution in detail. **[16]**

Q11) Classify and list twenty workover problems for a wellbore. **[16]**

OR

Q12) Write short notes on: **[16]**

a) Sand control

b) Artificial lift methods

c) Well stimulation

d) Nitrogen applications in workover job

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Total No. of Questions : 10

SEAT No. :

P2490

[Total No. of Pages : 2

[5153]-126
T.E.(Petroleum Engineering)
PETROLEUM GEOLOGY –II
(2008 Pattern) (312386) (Semester-II)

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

Instructions to the candidates:

1) ***Answer to the Two sections should be written in separate books.***
2) ***Question no 5 of Section I and Question no 10 of Section II is compulsory. Solve any other two questions from remaining from each section.***
3) ***Figures to the right indicate full marks.***
4) ***Draw neat diagrams wherever necessary.***

SECTION-I

Q1) a) With the help of neat diagrams give important types of subsurface occurrences of petroleum. **[10]**

b) What are the different ways in which commercial quantities of natural gas can be found? **[5]**

OR

Q2) Explain important physical and chemical properties of crude oil. **[15]**

Q3) a) What is kerogen? Explain types of kerogen. How does type of kerogen affect final product? **[10]**

b) Give any two classifications of oilfield water. **[5]**

OR

Q4) How does transformation of organic matter to hydrocarbons take place in nature? Draw a neat illustrative diagram. **[15]**

Q5) What is the need to assume that migration of hydrocarbons takes place from the source rocks? Give evidences of short distance and long distance migration. Explain the migration mechanisms known to you. **[20]**

P.T.O.

SECTION-II

Q6) What are the different carbonate depositional environments? Explain any one of them with neat figures and examples. **[15]**

OR

Q7) Write in brief about spatial and temporal occurrence of hydrocarbons. **[15]**

Q8) Write notes on ***any three*** of the following: **[15]**

a) Geological occurrence of gas hydrates.

b) Abnormal pressure in sediments.

c) Plate tectonics in relation to occurrence of oil and gas.

d) Significance of transgressive and regressive cycles in relation to petroleum occurrence.

OR

Q9) Describe geology and hydrocarbon potential of (a) Krishna-Godavari basin or (b) Mumbai Offshore or (c) Cambay basin of India. **[15]**

Q10) Write in brief **any two** of the following: **[20]**

a) Draw generally accepted symbols to show different types of sedimentary rocks and types of wells.

b) How is gas analysis carried out at the drill site? Which gases are generally looked for?

c) Explain different types of subsurface maps.

d) Give importance of Geo-Technical Order (Well Plan) and give its contents in general.

Total No. of Questions : 8]

SEAT No. :

P2491

[Total No. of Pages : 2

[5153]- 127
T.E. (Petroleum Engineering)
RESERVOIR ENGINEERING - I
(2008 Pattern) (Semester - II)

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

Instructions to the candidates:

1) ***Answers to the two sections must be written in separate answer books.***
2) ***Questions No 2(two) and 8(eight) are compulsory.***
3) ***Figures to the right indicate full marks.***
4) ***Answer 3 questions from section I and 3 questions from Section II***
5) ***Neat diagrams should be drawn wherever necessary.***
6) ***Use of a non-programmable calculator,log-log, and semi-log paper is allowed.***
7) ***Assume suitable data if necessary.***

SECTION - I

Q1) a) What is gas solubility? Draw graph of Rs vs. Pressure. **[4]**

b) Explain following fluids types and hence draw volume vs.pressure graph.

i) Incompressible Fluids

ii) Compressible Fluids

iii) Slightly compressible Fluids **[8]**

c) Calculate the API gravity of a crude oil system with a measured density of 53 Ib/ft^3 at standard conditions. The density of the water is approximately 62.4 Ib/ft^3. **[4]**

Q2) a) Write short note on saturation. **[2]**

b) Derive an expression for flow rate of a slightly compressible fluid flowing inside a porous media. **[8]**

c) Determine the oil flow rate in a radial system with the following set of conditions: **[8]**

K = 400 md, r_e = 300 ft, h = 20 ft r_w =0.5 ft,P_e = 2500 psia, P_w = 1,740 psia, μ = 1.3 cp.

P.T.O.

Q3) Explain in detail capillary pressure and Permeability. Show how quality of reservoir can be determined using capillary and relative permeability curves? **[16]**

Q4) Draw phase diagrams of single, two, three and multiphase fluids and explain. **[16]**

SECTION -II

Q5) Write a note on techniques for estimating oil initial in place and explain drawbacks involved in respective methods. **[16]**

Q6) Derive P/z expression for initial gas in place. Show effect water drive on P/z vs Gp graph. **[16]**

Q7) Explain drive mechanims and drives indices for different reservoirs by showing various graphs. What do you mean by GOR, and how does a particular drive mechanism affect the GOR? **[16]**

Q8) Derive oil material balance equation. **[18]**

Total No. of Questions : 12] SEAT No. :

P2492 **[5153]-128** [Total No. of Pages : 2

T.E. (Petroleum)

PETROLEUM PRODUCTION ENGINEERING-I

(2008 Course) (Semester-II) (312388)

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

Instructions to the candidates:

1) ***Anwer Q1 or Q2, Q3 or Q4, Q5 or Q6, from Section-I and Q7 or Q8, Q9 or Q10, Q11 or Q12 from Section-II.***
2) ***Answers to the two sections should be written in separate answer books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right side indicate full marks.***
5) ***Use of Calculator is allowed.***
6) ***Assume suitable data if necessary.***

SECTION-I

Q1) Classify and explain the basic principle and working of different artificial lifting techniques. **[18]**

OR

Q2) Discuss usability of PCP, plunger lift and SRP only in terms of excellent/ good/fair/poor in a tabular form for following well conditions. Low PI, high GOR, offshore applications, capability to produce sand, high volume lift capability and ability to handle viscous fluids. **[18]**

Q3) a) Write the advantages and disadvantages of gas lifting over other methods of artificial lifting. **[8]**

b) Draw schematic sketch and explain in brief operation of continuous gas lifting system. **[8]**

OR

Q4) a) Which method or methods of artificial lifting you will propose for the following requirements and Why? Explain, **[8]**

i) wells producing viscous oil

ii) light oil production with high GOR

b) Explain graphical method to determine depth of point of gas injection for a continuous flow injection. **[8]**

P.T.O.

Q5) Discuss design and working of electrical submersible pump in detail. **[16]**

OR

Q6) a) What is the effect of gas and sand production on the functioning of Electrical pumping system? Explain. **[8]**

b) Draw neat schematic sketch of a progressive cavity pumping system. **[8]**

SECTION-II

Q7) Discuss operating and workover problems of sucker rod pumping system in detail. **[18]**

OR

Q8) Draw and explain sucker rod pumping system in detail. **[18]**

Q9) Draw neat schematic sketch and describe the petroleum production system in detail. **[16]**

OR

Q10) What is nodal analysis? Explain in detail, applications of nodal analysis for a typical petroleum production system. **[16]**

Q11) Discuss planning, design and field execution of matrix acidizing job in detail. **[16]**

OR

Q12) Write short notes on, **[16]**

a) Formation damage

b) Selection of proppant

c) Fracturing fluid and additives

d) Fracture geometry

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Total No. of Questions : 12]

SEAT No. :

P2493

[Total No. of Pages :5

[5153]-129
T. E. (Petroleum Engineering)
NATURAL GAS ENGINEERING
(2008 Pattern) (Semester-II) (312389)

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

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 from section-I and Q7 or Q8, Q9 or Q10, Q11 or Q12 from section-II.***
2) ***Answers to the two sections should be written in separate answer books.***
3) ***Figures to the right indicates full marks.***
4) ***Neat diagram should be drawn wherever necessary.***
5) ***Use a non programmable calculator.***
6) ***Assume suitable data if necessary and clearly state it.***

SECTION-I

Q1) a) How does viscosity, Bg, Cg and viscosity vary with pressure. Explain? **[6]**

b) How does an ideal gas differ from a real gas? Explain in detail. **[5]**

c) Calculate the reserves in a gas field of 3000 acres, with 320ft sand thickness, 15% porosity, 15%water saturation, BHP = 2000 Psi gauge, BHT = 200 F. The natural gas has the following weight composition: Ci=0.85, C2=0.05, N2=0.1. **[7]**

OR

Q2) a) Find viscosity, molecular weight, specific gravity, pseudocritical properties, Z factor, Bg. Gas data: Pci, Tci are: 668,708,493 psia: 343, 520, 227R. ωi and μi are 0.01, 0.09, 0.04 and 0.001, 0.002, 0.0015cp respectively. Explain the chart you use to see to correct for water? Draw the graph of viscosity and Z factor versus pressure. **[13]**

b) What is the significance of Pseudo critical & Pseudo reduced gas pressure and temperatures? **[5]**

Q3) a) How is an isochronal and modified isochronal test different from each other? **[4]**

b) What is the importance of pseudo-critical properties in natural gas engineering? **[8]**

c) Explain cricondentherm and cricondenbar in detail. **[4]**

OR

P.T.O.

Q4) a) What is the use of an orifice meter? Explain the elements of orifice meter. Draw orifice meter diagram. **[8]**

b) A 50-in x 200 Ib gauge has a differential pressure range of Rh = 60 inches and static pressure range of Rp = 100 psi. If a square root chart shows a reading of 7.2 for differential pressure and 9.4 for static pressure, calculate differential pressure and static pressure. **[4]**

c) Write short notes on square root charts. **[4]**

Q5) a) For a well with a following parameter: D = 5790ft, gas gravity is 0.7, Pts = 2300 Psia, and average temperature of the flow string is 117 F. Gas flow rate = 5 MMscfd, Dia = 2 inches, Twf = 160 F, Ttf = 83 F, Ptf = 2122 psia, length of tubing = 5700 ft, well is vertical. State your assumed values clearly and only do one iteration to find the flowing bottom hole pressure, static bottom hole pressure and temperature. Tpc=358 R, Ppe=672 psia, f=0.015, z=0.82. **[8]**

b) Explain tubing pressure transverse with figure? **[4]**

c) Explain Tubing pressure loss for liquid, gas and multiphase with figure? **[4]**

OR

Q6) a) What do you mean by sonic and subsonic flow. **[4]**

b) How does the temperature at choke vary? **[4]**

c) A 0.65 specific gravity gas from a 2.5-in pipe through a 1-in orifice-type choke. The upstream pressure and temperature are 900 psia and 85 F, respectively. The downstream pressure is 200 psia (measured 2 ft from the orifice). The gas-specific heat ratio is 1.3.

i) What is the expected daily flow rate?

ii) Does heating need to be applied to assure that the forst does not clog the orifice?

iii) What is the expected pressure at the orifice outlet?

C = 0.62, assume NRe is very high, μ = 0.01245 **[8]**

SECTION-II

Q7) a) What is the criterion for choosing a CO_2 removal process? Draw a process flow diagram showing the removal of carbondioxide and explain the process? **[8]**

b) Write short note on design of a horizontal separator? **[4]**

c) Write chemical reactions involved in sponge iron process and Alkanolamine process? **[4]**

OR

Q8) a) Draw the process diagram for glycol dehydration and explain the design considerations. **[6]**

b) Explain selection and working of spherical separator with a neat sketch? **[6]**

c) Explain amine sweetening process with a neat process flow diagram? **[4]**

Q9) a) Explain in detail two stages compressor cycle. **[4]**

b) Draw a diagram of a centrifugal compressor and name its parts. **[4]**

c) What is the HP required in compressing 1 MMSCFD from 100 psia and 80 F to 1600 psia using adiabatic equation? The gas is cooled to 80 F between stages. What is the discharge temperature of the gas? k = 1.28, gas gravity = 0.6, Z at 400 and 1600 psia are 0.985, 0.94 respectively. **[8]**

OR

Q10)a) Find the horsepower required with and without intercooling when compressing 16,000 cfm of natural gas, k = 1.28, measured at 60 F and 14.7 psia from atmospheric pressure of 14.4 to 125 psig. Inlet temperature is 70 F. Allow a 4% discharge at each stage. **[7]**

b) Write a note on reciprocating compressors. **[3]**

c) Write note on Compressor selection. **[3]**

d) Explain the use of Mollier charts in compressor design. **[3]**

Q11)a) Calculate the gas flow rate in cubic ft / hr through a horizontal pipeline. Data given: D = 12.09, L = 1000 miles, e = 0.0006 in, T = 80 F, Specific gravity of gas = 0.7, Tb = 520 R, Pb = 147 psia, P1 = 600 psia, P2 = 200 psia, f = 0.01223, Z = 0.9188, μ = 0.0099 cp. **[6]**

b) Explain effect of liquid loading in gas wells? **[3]**

c) Explain Turner's method in detail? **[3]**

d) Write short note on In-line inspection tools? **[3]**

e) Explain inspection and maintenance of natural gas pipeline? **[3]**

OR

Q12)a) Write short note on Pipeline efficiency? **[3]**

b) Write short note on Transmission factor? **[3]**

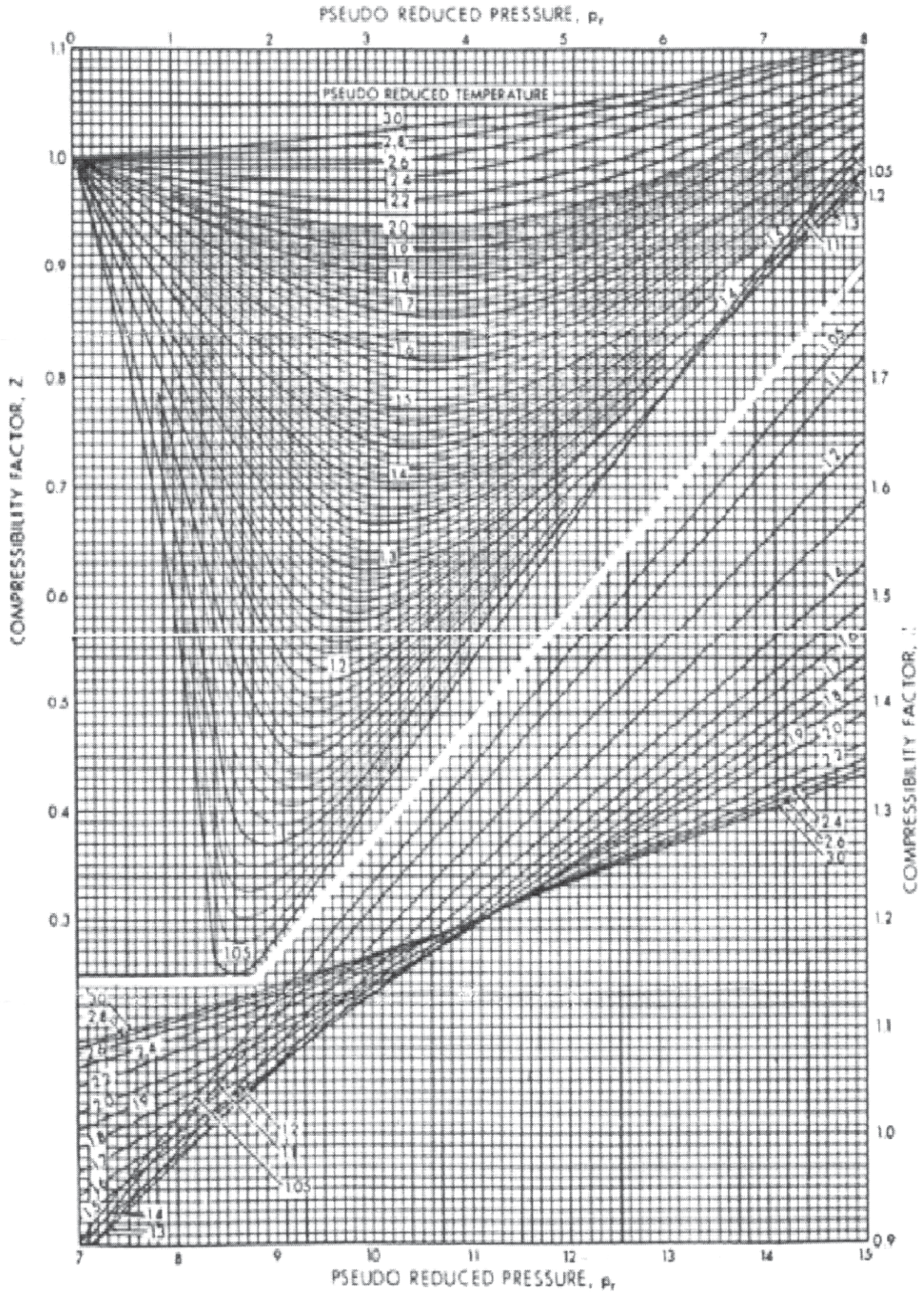
c) Give solutions for liquid loading problem? **[3]**

d) Write note on preventing hydrate formation? **[3]**

e) Write short note on pipeline cleaning and utility pigs? **[3]**

f) Write short note on pipeline economics. **[3]**

Compound	Chemical Composition	Symbol (for calculations)	Molecular Weight	Critical Pressure (psi)	Critical Temp. (R)
Methane	CH_4	C_1	16.04	673	344
Ethane	C_2H_6	C_2	30.07	709	550
Propane	C_3H_8	C_3	44.09	618	666
iso-Butane	C_4H_{10}	i-C_4	58.12	530	733
n- Butane	C_4H_{10}	n-C_4	58.12	551	766
iso-Pentane	C_5H_{12}	i-C_5	72.15	482	830
n-Pentane	C_5H_{12}	n-C_5	72.15	485	847
n-Hexane	C_6H_{14}	n-C_6	86.17	434	915
n-Heptane	C_7H_{16}	n-C_7	100.2	397	973
n-Octane	C_8H_{18}	n-C_8	114.2	361	1024
Nitrogen	N_2	N_2	28.02	492	227
Carbon Dioxide	CO_2	CO_2	44.01	1,072	548
Hydrogen Sulfide	H_2S	H_2S	34.08	1,306	673


PSEUDO REDUCED PRESSURE, p_r
PSEUDO REDUCED TEMPERATURE
COMPRESSIBILITY FACTOR, Z
PSEUDO REDUCED PRESSURE, p_r

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Total No. of Questions : 12]

SEAT No. :

P2494

[Total No. of Pages : 3

[5153]-130

T.E. (Petroleum Engineering)

PETROLEUM EQUIPMENT DESIGN AND DRAWING

(2008 Course) (Semester -II)

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

Instructions to the candidates:

1) ***Answer 3 questions from Section-I and 3 Questions from Section-II.***
2) ***Answers to the two sections should be written in separate answer books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the write indicate full marks.***
5) ***Assume suitable data, if necessary.***

SECTION -I

Q1) a) Discuss the following types of keys: **[9]**

i) Feather key

ii) Saddle keys

iii) Tangent keys

b) Discuss design fundamentals applied to petroleum equipment. **[9]**

OR

Q2) Design a cast iron protective type flange coupling to transmit 15 kW at 900 rpm from an electric motor to a compressor. The service factor may be assumed as 1.35. The following permissible stresses may be used: Shear stress for shaft, bolt and key material = 40 MPa. Crushing stress for bolt and key = 80 Mpa. Shear stress for cast iron = 8 Mpa. Assume appropriate suitable width & thickness for Key. **[18]**

Q3) a) Discuss application of mechanical break in drawworks. **[8]**

b) Discuss different types of pulley and uses of pulleys on drilling rig. **[8]**

OR

P.T.O.

Q4) Design a rubber belt drive a dynamo generating 20 kW at 2250 r.p.m. and fitted with a pulley 200 mm diameter. Assume dynamo efficiency to be 85%. **[16]**

Allowable stress for belt	= 2.1 MPa
Density of rubber	= 1000 kg/m^3
Angle of contact of dynamo pulleys	= 165°
Coefficient of friction between belt and pulleys	= 0.3

Q5) a) Write short notes on: **[8]**

i) Rotary compressor

ii) Pressure relief valve

b) Discuss selection of drilling rig mud pump in details. **[8]**

OR

Q6) a) Discuss different parameters have to be considered to design a pipeline for oil and gas transportation. **[8]**

b) What are the different types springs? Discuss compression helical in detail. **[8]**

SECTION -II

Q7) A pressure vessel is to be designed for some chemical process. The total volume of shell required is 7.5 m^3. A vessel operates at a pressure of 2.5 kg/cm^2. Material is used for fabrication has an allowable stress 1060 kg/cm^2. Joint efficiency is 8.5%. Corrosion allowance is 3mm. Weight of vessel is 600 kg. The torque exerted over the vessel is 75 kg-m. Bending moment induced is negligible. The vessel is closed by two elliptical heads and major to minor axis ratio is 2. **[18]**

OR

Q8) a) Discuss design consideration of separators. **[9]**

b) Discuss design factors considered for pressure vessel. **[9]**

Q9) a) Discuss transverse baffles and longitudinal baffles in heat exchanger. **[8]**

b) Discuss design criteria of jackets and coil. **[8]**

OR

Q10) Calculate the different stresses which are to be considered while designing half coil jacket with the help of given data,

Coil: Diameter = 120 mm, Internal pressure =0.4 N/mm^2 (inside the jacket)

Shell: internal pressure in shell = 0.4 N/mm^2, Internal diameter = 2500mm, Thickness of shell = 9mm

Material is same for both shell and jacket having permissible stress value = 100 N/mm^2. **[16]**

Q11)a) Design of fixed roof cylindrical storage tank. **[8]**

b) Write shorts notes on: **[8]**

i) Agitators

ii) Liquefied gases

OR

Q12)a) Discuss design consideration for mixing. **[8]**

b) Write shorts notes on: **[8]**

i) highly volatile HC

ii) sulphur containing fluids

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Total No. of Questions : 12]

SEAT No. :

P2495

[Total No. of Pages :6

[5153]-131
T.E. (Petrochemical Engineering)
NUMERICAL AND STATISTICAL METHODS
(2008 Pattern) (Semester - I)

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

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 from Section I and Q7 or Q8, Q9 or Q10, Q11 or Q12 from section II.***
2) ***Answers to the two sections should be written in separate answer books.***
3) ***Neat diagram must be drawn necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Use Electronic Pocket Calculator is allowed.***
6) ***Assume suitable data wherever necessary.***

SECTION - I

Q1) a) Use simplex method to solve following Linear Programming Problem: **[10]**

Maximize $z = 5x_1 + 3x_2$

Subject to the constraints

$$x_1 + x_2 \le 2$$
$$5x_1 + 2x_2 \le 10$$
$$3x_1 + 8x_2 \le 12$$
$$x_1, x_2 \ge 0.$$

b) Find all basic solutions to the system of equations: **[6]**

$x_1 + x_2 + 2x_3 = 4$

$2x_1 - x_2 + x_3 = 2$

OR

Q2) a) Apply principle of Duality, to solve the following Linear programming problem: **[10]**

Maximize $z = 3x_1 + 4x_2$

Subject to the constraints

$$x_1 - x_2 \le 1$$
$$x_1 + x_2 \ge 4$$
$$x_1 - 3x_2 \le 3$$
$$x_1, x_2 \ge 0.$$

P.T.O.

b) Obtain the dual of the following: **[6]**

Maximize $Z = 3x_1 + 2x_2$

Subject to $x_1 + x_2 \geq 1$

$x_1 + 2x_2 \leq 7$

$x_1 + x_2 \leq 10$

$x_2 \leq 3$

$x_1, x_2 \geq 0.$

Q3) a) Solve the following assignment problem for minimum assignment time. The estimated time each machine requires is given below: **[6]**

		Job				
		I	II	III	IV	V
Machine	A	6	5	8	11	16
	B	1	13	16	1	10
	C	16	11	8	8	8
	D	9	14	12	10	16
	E	10	13	11	8	16

b) Ram construction company needs 3, 3, 4 and 5 million cubic feet of fill at four earthern dam sites in Punjab. It can transfer the fill from three mounds A, B and C where 2, 6 and 7 million cubic feet of fill is available respectively. Costs of transporting one million cubic feet of fill from the mounds to the four sites in lakhs are given below. Find the minimum transportation cost. **[10]**

		To			
		I	II	III	IV
From	A	15	10	17	18
	B	16	13	12	13
	C	12	17	20	11

OR

Q4) a) A car hire company has one car at each of five depots a, b, c, d and e. A customer in each of the five towns A, B, C, D and E requires a car. The distance (in miles) between the depots (origins) and the towns (destinations) where the customers are, is given in the following distance-matrix. How should the cars be assigned to the customers so as to minimize the distance travelled? **[6]**

	a	b	c	d	e
A	160	130	175	190	200
B	135	120	130	160	175
C	140	110	125	170	185
D	50	50	80	80	110
E	55	35	80	80	105

b) Solve the following transportation problem for minimum cost. Use Vogel's Approximation method for initial basic feasible solution. **[10]**

		To				
		A	B	C	D	Available
From	P	10	12	15	8	130
	Q	14	11	9	10	150
	R	20	5	7	18	170
	Requirement	90	100	140	120	

Q5) a) Find the coefficient of correlation for the following data: **[7]**

x :	10	14	18	22	26	30
y :	18	12	24	06	30	36

b) If the probability of a bad reaction from a certain injection is 0.001, determine the chance that out of 2000 individuals more than two will get a bad reaction. **[5]**

c) Assume that on the average one telephone number out of fifteen called between 2 p.m. and 3 p.m. on week-days is busy. What is the probability that if 6 randomly selected telephone numbers are called **[6]**

i) More than 3

ii) At least 3 of them will be busy.

OR

Q6) a) Obtain the line of regression for following data for y on x. Hence obtain an estimate of y when $x = 6.2$ **[7]**

x :	1	2	3	4	5	6	7	8	9
y :	9	8	10	12	11	13	14	16	15

b) In a test on 2000 electrical bulbs, it was found that the life of a particular make, was normally distributed with an average Life of 2040 hrs. and standard deviation of 60 hrs. Estimate the number of bulbs likely to burn for more than 2150 hrs. Given z = 1.83, Area = 0.4664. **[5]**

c) Among 64 off springs of a certain cross between guinea pigs, 34 were red, 10 were black and 20 were white. According to model, they should be in ratio 9:3:4. Is the data consistent with the model at 5% level. Given $\chi^2_{2:0.05} = 5.99$ **[6]**

SECTION - II

Q7) a) With usual notation prove the following. **[8]**

i) $(1+\Delta)(1-\nabla)=1$

ii) $\mu\delta = \frac{1}{2}\,\mathrm{DE}^{-1} + \frac{1}{2}\,\Delta$

b) Given that **[9]**

x :	1.0	1.1	1.2	1.3	1.4	1.5	1.6
y :	7.989	8.403	8.781	9.129	9.451	9.750	10.031

Find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ at $x = 1.1$.

OR

Q8) a) Given the values **[8]**

x :	5	7	11	13	17
$f(x)$:	150	392	1492	2366	5202

Evaluate $f(g)$ using Lagrange's formula.

b) The velocity v (km/min) of a body which starts from rest, is given as below at time t. **[9]**

t :	0	2	4	6	8	10	12	14	16	18	20
v :	0	10	18	25	29	32	20	11	5	2	0

Estimate approximately the distance covered by simpson rule.

Q9) a) Solve by Gauss Elimination method, the following system. **[9]**

$10x - 7y + 3z + 5u = 0$

$-6x + 8y - 4u = 5$

$3x + y + 4z + 11u = 2$

$5x - 9y - 2z + 4u = 7$

b) Find a real root of the equation $x^3 - 2x - 5 = 0$ by the method of false position. **[8]**

OR

Q10)a) Find Newton - Rapson method, the real root of the equation $3x = \cos x + 1$. **[8]**

b) Apply Gauss-Seidel iteration method to solve the equation. **[9]**

$20x + y - 2z = 17$

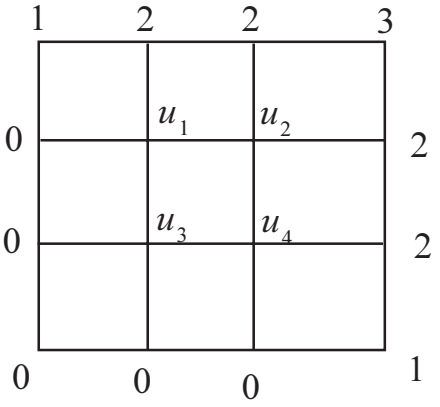
$3x + 20y - z = -18$

$2x - 3y + 20z = 25.$

Q11)a) Using Runge-Kutta method of order 4, find y for $x = 0.1$ and 0.2, given

$$\frac{dy}{dx} = xy + y^2 \quad y(0) = 1.$$ **[8]**

b) Solve $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$ for the square mesh with boundary values as shown in the figure. **[8]**



OR

Q12)a) Solve the Poisson equation. **[8]**

$\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = -81xy, 0 < x < 1, 0 < y < 1$ given $u(0, y) = 0$, $u(x, 0) = 0$, $u(1, y) = 100$ $u(x, 1) = 100$ and $h = 1/3$.

b) Using modified Euler's method find an approximate value of y, when $x = 0.2$ given $\frac{dy}{dx} = x + y$ and $y = 1$ when $x = 0$. **[8]**

Total No. of Questions :12]

SEAT No. :

P2496

[Total No. of Pages : 2

[5153]-132

T.E. (Petrochemical Engineering)

APPLIED HYDROCARBON THERMODYNAMICS

(2008 Pattern) (Semester-I) (312402)

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

Instructions to the candidates:

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

SECTION-I

Q1) a) Distinguish between state and path functions with examples. **[8]**

b) Formulate the first law of thermodynamics for flow systems. **[8]**

OR

Q2) a) A hot hydrocarbon oil (C_p=2.512 kJ/kg K) is cooled from 422 K to 339 K in a heat exchanger at the rate of 2500kg/h. Cooling water at the rate of 5000 kg/h enters the exchanger at 294 K. Assume that there is no heat loss in the exchanger.

i) What is the total change in entropy?

ii) How much work could be obtained if the cooling of the oil were carried out by a reversible Carnot engine rejecting heat to a sink at 294 K? **[8]**

b) Write a note on the Clausius Inequality. **[8]**

Q3) a) With the help of neat diagrams, discuss the PVT behaviour of pure fluids. **[8]**

b) Write a note on the Virial equation. **[8]**

OR

P.T.O.

Q4) Determine the molar volume of gaseous methane at 300 K and 600 bar using the van der Waals equation. Given: 'a' = 0.2285 Nm^4/mol^2; 'b' = $4.27 \times 10^{-5} m^3/mol$. **[16]**

Q5) a) Differentiate between reference properties, energy properties and derived properties . **[9]**

b) What are the Maxwell's equations and what is their importance in establishing relationships between thermodynamic properties? **[9]**

OR

Q6) a) Explain any three methods for estimating the fugacity of a pure gas. **[9]**

b) What is meant by the activity of a pure fluid? How would you estimate the activity of an incompressible substance? **[9]**

SECTION-II

Q7) a) How do you estimate the bubble point temperature and bubble point pressure for a multicomponent system? **[9]**

b) For a heterogeneous multicomponent system, what is the general criterion of phase equilibrium? Explain the various cases. **[9]**

OR

Q8) a) An equimolar solution of benzene and toluene is totally evaporated at a constant temperature of 363 K. At this temperature, the vapour pressures of benzene and toluene are 135.4 and 54 kpa respectively. What are the pressures at the beginning and at the end of the vaporization process? **[9]**

b) Give the procedure for obtaining the boiling point diagram. **[9]**

Q9) a) Give the methods of determining partial molar properties. **[8]**

b) Discuss the Gibbs Dubem equation and its various forms. What are the major fields of application of the Gibbs-Duhem equation? **[8]**

OR

Q10)a) An organic liquid solution containing A (molecular weight 46) and B (molecular weight 78) form an azeotrope containing 52% by weight A at 333 K and 101.3 kpa. Vapour pressures of A and B are 69.31 kpa and 68 kpa respectively. Determine the van Laar constants. **[8]**

b) Write a note on Margules equation. **[8]**

Q11) Industrial grade methanol can be produced according to the reaction

$$CO(g)+2H_2O(g) \leftrightarrow CH_3OH(g)$$

For this reaction ΔG^0=-1.3484 kJ. If an equimolar mixture of CO and H_2 is fed to a reactor maintained at 400 K and 1 bar, determine the fraction of CO that is converted to CH_3OH at equilibrium, Assume that the reaction mixture behaves as an ideal gas. **[16]**

OR

Q12) a) What do you mean by extent of reaction? How is extent of reaction related to mole fraction of the species in the reaction mixture? **[8]**

b) What is the phase rule for a reacting system? How do you determine the number of independent reactions in a reacting system? **[8]**

Total No. of Questions : 8]

SEAT No. :

P2497

[Total No. of Pages : 4

[5153]-133
T.E. (Petrochemical)
MASS TRANSFER - I
(2008 Course) (Semester - I)

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

Instructions to the candidates:

1) ***Attempt any three questions from each section.***
2) ***Answer to the two sections should be written in two separate answer books.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data where ever necessary.***
5) ***Use of steam tables and electronic calculator is allowed.***

SECTION - I

Q1) Answer the following questions in brief: **[16]**

a) Correlations for gas diffusivity prediction.

b) Explain relation between turbulence and convective mass transfer.

c) State Fick's first and second laws of diffusion.

Q2) In absorption of an acidic component A from air into an aqueous solvent, at a particular point in the column, the partial pressure of A on gas side is P_{AG} = 0.02 atm and concentration of A on liquid side is C_{AL} = 0.05 mol/m^3. The Henry's constant for A in the solvent is 52 atm. cm^3/ mol. The overall gs side mass transfer coefficient is given as 3×10^{-6} gmol / cm^2. sec atm. It is also given that 60% of the total resistance to mass transfer lies in the liquid film. **[18]**

Determine:

a) Which way the mass transfer will take place.

b) Molar flux of A across the interface.

Q3) In an instantaneous irreversible catalytic gas phase reaction $A \rightarrow 2B$, reaction rate at the catalyst surface is controlled by the transfer of A to the surface. Calculate observed reaction rate is Kmol A per hr per m^2 surface area of the catalyst.

DATA: Gas side contains 60% A and the rest inerts. Pressure and temperature: 500 KPa and 150 C respectively. Assume film thickness to be 3×10^{-4}m and diffusivity of A through the film to be 1×10^{-9} m^2/s. **[16]**

P.T.O.

Q4) a) Discuss graphical method for solving liquid-liquid extraction problems involving cascaded stages of cross-flow contact between two phases.

b) Define mass transfer coefficient and state its significance in process design.

[16]

SECTION - II

Q5) A flow of air with a bulk velocity of 25m/sec at 170 kPa pressure and 300 K is flowing over the top surface of a thin flat sheet of solid naphthalene of length 0.27m and width of 0.02 m. Calculate: **[16]**

a) The mass transfer coefficient expected.

b) The possible rate of loss of naphthalene from the surface.

Data:-

Kinematic viscosity of air = 1.7×10^{-5} m^2/s

Mass diffusivity of naphthalene vapour in air = 5.0×10^{-6} m^2/sec.

Vapor pressure of naphthalene at 320K = 0.15 mm Hg

Q6) A batch of solids is to be dried from 45% on wet basis to the moisture content that is 5% higher than the equilibrium moisture. The initial weight of the wet solids is 250 Kg and the drying surface is reported to be 0.55 m^2 per 50 kg of dry weight. The critical moisture content is 25% dry basis and constant drying rate is 0.30 kg/hr.m^2. For the falling rate period data available are given in the table below: **[16]**

x	25	22	19	16	13.6	11	8.2	7.5	6.4
N	0.3	0.27	0.24	0.21	0.18	0.15	0.07	0.044	0.025

x is % moisture content on dry basis and N is drying rate is Kg/m^2. hr. Calculate the batch time required for given drying duty.

Q7) Answer the following by using psychrometric chart for air-water system with reference to the air having dry bulb temperature of 35C and wet bulb temperature of 20C. **[18]**

a) Report relative saturation.

b) Report humid volume.

c) Calculate heat to be added per kg of dry air so as to decrease the relative saturation by 30%.

Q8) Write notes: **[16]**

a) Cooling tower types.

b) Tray dryer.

c) Spray Chamber.

d) Flooding and weeping.

PSYCHROMETRIC CHART
v'_H = humid volume, m^3/kg dry air
H' = enthalpy, kJ/kg dry air
Y' = absolute humidity, kg water vapor/kg dry air
H' = enthalpy, kJ/kg dry air
Adiabatic saturation curve
Enthalpy of dry air
100% humidity
Saturated air
Enthalpy of saturated air
Saturated humid volume
Specific volume of dry air
2%
5%
10%
20%
30%
40%
50%
60%
70%
80%
90%

Total No. of Questions :8]

SEAT No. :

P2498

[Total No. of Pages :2

[5153] - 134
T.E. (Petrochemical)
PETROCHEMICAL PROCESSES - I
(2008 Pattern) (Semester - I)

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

Instructions to the candidates:

1) ***Attempt any three questions from each section.***
2) ***Answers to the two sections should be written in two separate answer books.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data wherever necessary.***
5) ***Use of steam tables and electronic calculator is allowed.***

SECTION -I

Q1) Discuss in detail the uses and potential growth of the following important petrochemicals at global and national level: **[16]**

a) LDPE

b) PP

c) LAB

d) PVC

Q2) Discuss the engineering challenges involved in the process of toluene nitration. **[16]**

Q3) Discuss pertinent properties, consumption pattern, and method of production and engineering problems therein for **[16]**

a) Nitrobenzene

b) Ethanol

Q4) a) Write a brief note on reactive separation.

b) Explain engineering challenges involved in styrene production.

[18]

P.T.O.

SECTION -II

Q5) a) Discuss how the so-called petrochemicals can be produced from agroresodues.

b) Describe in brief lactic acid production from a bio-resource.

[16]

Q6) a) Explain in detail suspension polymerization.

b) Discuss in detail how molecular weight distribution can decide the properties of polymers.

[16]

Q7) a) Explain in breif properties and synthesis of carbon nanotubes(CNT).

b) Write a note on possible applications of CNT in chemical industry.

[18]

Q8) Write notes: **[16]**

a) Bioreactor

b) Catalyst for Polyethylene Manufacture.

c) Uses of Ethyl Benzene.

d) Handling of Ethylene Oxide.

EEE

Total No. of Questions :6]

SEAT No. :

P2499

[Total No. of Pages :3

[5153] - 135

T.E. (Polymer/Petroleum/Petrochemical))

INSTRUMENTATION & INSTRUMENTAL ANALYSIS

(2008 Course) (Semester - I)

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

Instructions to the candidates:

1) ***Attempt Q1 A or B, Q2 A or B, Q3 A or B, Q4 A or B, Q5 A or B, Q6 A or B.***
2) ***Figures to the right indicate full marks.***
3) ***Use of electronic calculators is allowed.***
4) ***Draw neat sketch wherever necessary.***

SECTION -I

Q1) A) a) Explain the types of measurement uncertainties in detail. **[8]**

b) Define: Accuracy, Precision, Repeatability, Reproductibility, Hysterisis, Drift, fidelity, Dead zone. **[8]**

OR

B) a) Give the classification of the measuring instruments. **[8]**

b) Explain hierarchy of standards and calibration. **[8]**

Q2) A) a) Explain the principle, construction and working of a radiation pyrometer. **[8]**

b) Explain pressure measurement using different types of manometers. **[8]**

OR

B) a) Explain the various types of level indicators using magnetic properties. **[8]**

b) Write a note on electromagnetic flow meter. **[8]**

P.T.O.

Q3) A) a) Explain the use of psychrometric chart. **[6]**

b) What do you mean by 'inherent characteristics' of control valves? **[6]**

c) Write a note on the programmable logic controller. **[6]**

OR

B) a) Write a note on hygrometer. **[6]**

b) What are the factors to be considered while selecting a control valve? **[6]**

c) Explain feed back control loop in automatic process control. **[6]**

SECTION -II

Q4) A) a) Describe the various sampling techniques. **[8]**

b) Write a note on HPLC. **[8]**

OR

B) a) Classify analysis instruments. **[8]**

b) Write a note on NMR spectroscopy. **[8]**

Q5) A) a) Zirconia cells are now frequently used as oxygen analysis cells, specially in power plants. Describe this method of analysis. **[8]**

b) Explain the method of analysis using thermal conductivity. **[8]**

OR

B) a) Discuss CO analyzer. **[8]**

b) Write a note on the mass spectrometer. **[8]**

Q6) A) a) Differentiate between turbidity meter and nephelometer. **[6]**

b) Describe the principle of FTIR and hence describe IR spectroscopy. **[6]**

c) Discuss Orsat analysis. **[6]**

OR

B) a) Explain composition analysis using refractive index method. **[6]**

b) Describe in brief pH measurement. **[6]**

c) Discuss the various methods of density measurement. **[6]**

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Total No. of Questions : 10]

SEAT No. :

P2500

[Total No. of Pages : 3

[5153]-136

T.E. (Petrochemical Engineering)

TRANSPORT PHENOMENA

(2008 Course) (Semester - II)

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

Instructions to the candidates:

1) ***Answer any three questions from each section.***
2) ***Answers to the two sections should be written in separate answer books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Use of logarithmic tables, slide rule, Mollier Charts, elecrtonic pocket calculator and steam table is allowed.***
6) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Express equations that give the analogies between Heat, Mass and Momentum transfer. Why do we need these analogies? **[8]**

b) What is the role of dimensionless numbers in transport phenomena? Express at least two dimensionless numbers in Heat, Mass and Momentum transport with the significance of each term involved. **[8]**

Q2) a) With help of neat diagram explain the flow of a falling film across inclined wall. Derive the momentum balance equation and indicate all the necessary conditions required to solve the derived mathematical expression. **[10]**

b) Write a Short note on Film theory in mass transfer. **[6]**

Q3) a) Helium diffuses through a plane, plastic membrane 1 mm thick. The concentration of helium in the membrane is 0.02 kmol/m^3 at the inner surface and 0.005 kmol/m^3 at the outer surface. If the binary diffusion coefficient of helium with respect to the plastic is 10^{-9} m^2/sec, What is the diffusion flux of helium through the plastic? **[8]**

b) Derive Momentum transfer boundary layer equation. **[8]**

Q4) a) Derive Navier Stokes equation and give the significance of each term involved in it. **[8]**

P.T.O.

b) A stream of air at 100 kPa pressure and 300 K is flowing on the top surface of a thin flat sheet of solid naphthalene of length 0.2 m with a velocity 20 m/sec. mass diffusivity of naphthalene vapor in air is 6×10^{-6} m^2/sec. kinematic viscosity of air is 1.5×10^{-5} m^2/sec. concentration of naphthalene at the air solid naphthalene interface is 1×10^{-5} kmol/m^3. **[8]**

Calculate:

i) The average mass transfer coefficient over the flat plate.

ii) The rate of loss of naphthalene.

Q5) a) Derive Mass transfer boundary layer equation. **[8]**

b) Explain with help of neat sketch what is turbulence. Discuss the importance of turbulence and briefly discuss the models of turbulence and how the turbulence models need to be incorporated into real-time flow modeling. **[10]**

SECTION - II

Q6) a) It is desired to agitate a liquid having viscosity of 1.5×10^{-3} Pa.s and density 969kg/m^3 in a tank having a diameter of 0.91 m. The agitator will be a six-blade open turbine having a diameter of 0.305 m operating at 180 rpm. The tank has four vertical baffles, each with a width J of 0.076 m. Also $W = 0.0381$ m. Calculate the required kW. (Use the graph provided at the end). **[10]**

b) Name various types of agitator normally used – provide a comparative study of them. **[6]**

Q7) a) With help of suitable industrial examples explain the purpose of agitation. **[8]**

b) With help of a neat sketch derive the mathematical expression for 1-Dimensional Unsteady State Molecular Diffusion through a slab. Discuss how will you solve the derived expression numerically. **[8]**

Q8) a) Obtain the shell balance equation for a Fixed – bed axial flow reactor with exothermic reaction taking place. Draw a neat diagram. Provide the relevant Boundary Conditions as well. **[8]**

b) Name various numerical techniques can be employed to solve the above defined problem. Discuss any of these methods in details and provide the temperature profile expected. **[8]**

Q9) a) A slab material 1.0 m thick is at uniform temperature of 100 ºC. The front surface is suddenly exposed to a constant bulk temperature of 0 ºC.The convective resistance is zero and back surface of the slab is insulated. Considering thermal diffusivity (α) of 2.0×10^{-5} m^2/s. Using five slices of thickness 0.2 m each, calculate the temperature profile at $t = 6000$ s. **[10]**

b) Obtain the generalized Unsteady state Conduction Equation. **[6]**

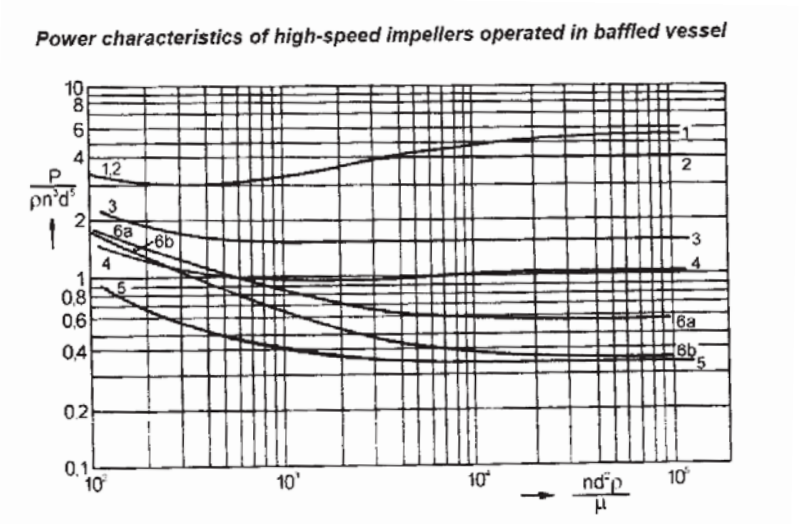
Q10) Write short notes on: **[18]**

a) Finite Difference Discretization to solve PDE.

b) Turbulent Mass Diffusivity.

c) Steps to be followed while implementing CFD.

d) Design issues of stirred tank vessel for process industries.



1 – six-blade turbine with disk (Ruschton turbine) (CVS 69 1021). 2 – six-blade open turbine. 3 – pitched six-blade turbine with pitch angle 45 (CVS 69 1020). 4 – Pitched three-blade turbine with pitch angle 45° (CVS 69 1025.3). 5 – propeller (CVS 60 1019). 6a,b – high shear stress impeller (CVS 69 1038.1.2)

Fig 1: Graph to be used for Problem 6(a)

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Total No. of Questions : 8]

SEAT No. :

P2501

[Total No. of Pages : 2

[5153]- 137
T.E. (Petrochemical)
MASS TRANSFER - II
(2008 Pattern) (Semester - II)

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

Instructions to candidates:

1) ***Attempt any three questions from each section.***
2) ***Answers to the two sections should be written in two separate answer-books.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data where ever necessary.***
5) ***Use of steam tables and electronic calculator is allowed.***

SECTION - I

Q1) Feed to distillation column consists of mixture of 60% by mol benzene and 40% by mol toluene. The column is supposed to recover bottom and top products at 96% purity each. For 1500 Kmol/hr of saturated vapor feed,

a) Calculate column material balance

b) Assuming relative volatility of benzene as 3.0 with respect to toluene,calculate the number of theoretical stages required and the optimum feed plate location. **[18]**

OR

Q2) Feed to flash chamber consists of mixture of A (20 Mol %) and B (80 Mol%) at the flow rate of 1000Kmol/hr. It is reported that the top vapor purity is 25 mol% A and the bottom liquid purity is 15 mol%A. **[16]**

Calculate

a) Relative volatility of A with respect toB

b) Percent vaporization of feed

c) Percent recovery of A in the distillate

d) Material balance of the chamber

Q3) Write notes (Any Two) **[16]**

a) Steam Distillation Governing Equation.

b) Separation of azeotropes

c) Extractive Distillation

OR

P.T.O.

Q4) With reference to distillation, state the significance of: **[16]**

a) Tray as a Theoretical Stage

b) Ideality and non-ideality of the solution

c) Optimum Reflux Ratio

SECTION - II

Q5) Calculate the number of ideal stages required for the absorber if it is being designed for removing acidic vapors from a gas mixture. Feed gas flow rate is 150.0m^3/s at NTP and contains 2% by volume acidic vapors. Expected removal is 98%. Solvent (MW 210) fed counter-currently is pure and is fed at the rate of 1.5 times the minimum. Henry's law statement is given as: y = 0.115x, where y is gas side mol fraction of the acid gas and x is its solvent side mol fraction at equilibrium. **[18]**

OR

Q6) Nicotine in water is to be recovered using pure kerosene as solvent. Distribution law for nicotine in water and kerosene at equilibrium is given by : Y = 0.75 X where Y is kg nicotine/kg kerosene and X is kg nicotine/kg water at equilibrium. Water and kerosene are immiscible with each other. The scheme of extraction is to contact 150 kg of the aqueous solution containing 2 wt% nicotine with 90kg pure kerosene in a single stage contact. Calculate maximum possible % recovery of nicotine from food solution. **[16]**

Q7) With reference to adsorption as a unit operation write the following notes:**[16]**

a) Langmuir Isotherm

b) Characteristics of adsorbent

c) Industrial Use

OR

Q8) Write notes **[16]**

a) Equilibrium vs Rate based scoarations

b) Choice of Equipment for liquid extraction

c) Triangular Diagram in LLE

Total No. of Questions : 8]

SEAT No. :

P2502

[Total No. of Pages : 3

[5153]-138
T.E. (Petrochemical Engineering)
REACTION ENGINEERING - I
(2008 Course) (Semester - II) (312409)

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

Instructions to the candidates:

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

SECTION - I

Q1) Attempt any three from the following: **[18]**

a) A human being (70 kg) consumes about 6000 kJ of food per day. Assume that the food is all glucose and that the overall reaction is given by:

$$C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O, \quad -\Delta H_r = 2816 \text{ kJ}$$

(O_2: from air; CO_2: breathed out)

Find man's metabolic rate (the rate of living, loving, and laughing) in terms of moles of oxygen used per m^3 of person per second.

b) At 400 K, the rate of a bimolecular reaction is ten times the rate at 300K. Determine the activation energy of this reaction:

i) From Arrhenius Law

ii) From Collision theory

c) Derive an expression for a first order irreversible reaction taking place in an isothermal variable volume batch reactor.

d) Discuss in brief integral and differential method for analyzing kinetic data.

P.T.O.

Q2) a) The first order reversible liquid reaction A=R, $C_{A0} = 0.5$ mol/lit, $C_{R0} = 0$ takes place in a batch reactor. After 8 minutes, conversion of A is 33.3% while equilibrium conversion is 66.7%. Find the rate equation for this reaction. **[8]**

b) A certain reaction has a rate given by $-r_A = 0.005C_A^2$, mol/cm^3. min. If the concentration is to be expressed in mol/liter and time in hours, what would be the value and units of the rate constant? **[8]**

Q3) a) A homogeneous gas phase decomposition reaction $3A \rightarrow B + 5S$ takes place in an isothermal plug flow reactor. The reaction rate is , $-r_A = kC_A$ with $k = 0.12$ sec^{-1}; feed concentration of A = 0.15 mol/m^3; feed flow rate = 0.25 mol/sec. Determine the size of reactor in order to achieve 60% conversion. **[8]**

b) The first order homogeneous gaseous reaction $A \rightarrow 3.5$ R is carried out in an isothermal batch reactor at 2 atm pressure with 20 mole % inerts present, and the volume increases by 50% in 20 min. In case of constant volume reactor, determine the time required for the pressure to reach 8 atm if the initial pressure is 5 atm, 2 atm of which consists of inerts. **[8]**

Q4) a) Derive the performance equation for constant volume batch reactor where first order reaction takes place. Give the graphical representation also.**[8]**

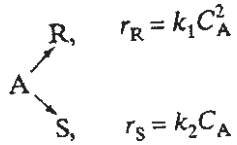
b) Find the first-order rate constant for the disappearance of A in the gas reaction $A \rightarrow 1.75$ B if the volume of the reaction mixture, starting with pure A increases by 60% in 6min. The total pressure within the system stays constant at 1.4 atm, and the temperature is 25°C. **[8]**

SECTION - II

Q5) a) Discuss the effect of temperature on equilibrium conversion as predicted by thermodynamics keeping pressure fixed and discuss optimum temperature progression. **[8]**

b) How does the concentration level of reactants affect the product distribution in parallel reactions? Explain with suitable examples. **[8]**

Q6) Substance A in the liquid phase produces R and S by the following reactions:



The feed (C_{A0} = 1.0, C_{R0} = 0, C_{S0} = 0.3) enters two mixed flow reactors in series (τ_1 = 5 min, τ_2 = 15 min.)

Knowing the composition in the first reactor (C_{A1} = 0.45, C_{R1} = 0.25, C_{S1} = 0.65), find the composition leaving the second reactor. **[16]**

Q7) A liquid-phase reaction involving the following two parallel steps is to be carred out in an isothermal plug flow reactor (PER) operated at steady state:

$$A \xrightarrow{k_1} P; \quad r_P = k_1 C_A$$
$$P \xrightarrow{k_2} Q; \quad r_Q = k_2 C_P$$

Assume that the feed contains only A at a concentration of 1.0 mol/liter. Space-time of the PFR is 30 min. Specific reaction rates are k_1 = 0.05 per min and k_2 = 0.01 per min. Determine the concentrations of P and Q in the exit stream leaving the PFR. **[16]**

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

a) Product Distribution and Temperature in Multiple Reactions.

b) Causes of Nonideal Flow

c) Optimum Temperature Progression.

Total No. of Questions : 12]

SEAT No. :

P2503

[Total No. of Pages : 3

[5153]-139
T.E.(Petrochemical Engineering)
PETROCHEMICAL PROCESSES-II
(2008 Pattern) (Semester -II) (312410)

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

Instructions to the candidates:

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

SECTION-I

Q1) a) Explain the reasons for failure of the inorganic theory of Petroleum formation. **[8]**

b) Give the classification of crude oil. **[8]**

OR

Q2) a) Write the co-relations for the following: **[8]**

i) Watson Characterization factor.

ii) Correlation Index.

iii) Smoke point.

b) Give a brief overview of the alternative feed stock sector. **[8]**

Q3) a) Discuss the electrostatic process for the desalting of crude. **[8]**

b) Discuss with diagrams the various methods of reflux in the ATU. **[8]**

OR

P.T.O.

Q4) a) With the help of a neat flow diagram explain the NMP extraction process. **[8]**

b) Discuss the hydrofluoric acid process for alkylation. **[8]**

Q5) a) Write a note on the catalysts used in the catalytic cracking process. **[9]**

b) Write a note on petroleum coke. Also discuss the uses of petroleum coke. **[9]**

OR

Q6) a) Write a note on the Claus and the SCOT process for sulphur recovery from refinery gases. **[9]**

b) Discuss the process of air blowing of bitumen. **[9]**

SECTION-II

Q7) a) Describe in brief the various sections in the steam cracking process technology for olefins. **[9]**

b) Write a note on the recovery of C_8 aromatics. **[9]**

OR

Q8) a) Explain the semi regenerative process for catalytic reforming. **[9]**

b) Give the various processes for the recovery of hydrogen from various gas streams. **[9]**

Q9) a) Classify polymerization reactions. **[8]**

b) Describe in brief the manufacture of urea formaldehyde resin. **[8]**

OR

Q10)a) Describe in brief the manufacture of polyvinyl chloride by emulsion polymerisation and suspension polymerisation. **[8]**

b) Describe the Union Carbide processes for the manufacture of polypropylene. **[8]**

Q11)a) Give the various routes for the manufacture of caprolactum. **[8]**

b) Describe the process for the manufacture of adipic acid by two step oxidation process. **[8]**

OR

Q12)a) Describe the process of manufacture of polyester from DMT. **[8]**

b) Give the process steps involved in the manufacture of nylon 6 with a flow diagram. **[8]**

Total No. of Questions : 12]

SEAT No. : ____

P2504

[Total No. of Pages : 4

[5153]-140

T.E. (Petrochemical Engineering)

PROCESS EQUIPMENT DESIGN & DRAWING

(2008 Course) (Semester -II)

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

Instructions to the candidates:

1) ***Answer Three questions from each section.***
2) ***Answers to the two sections should be written in separate books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Use of logarithmic tables, slide rule, Mollier Charts, electronic pocket calculator and steam table is allowed.***
6) ***Assume Suitable data, If necessary.***

SECTION -I

Q1) a) What do you mean by Code & Standard? Write the names of Standard organization? What is importance of Codes & Standards? **[7]**

b) Discuss the important mechanical properties useful for selection of material of construction. **[7]**

c) Which different engineering sections are associated with design engineer till the final delivery of any equipment? **[2]**

OR

Q2) a) What do you mean by stress concentration? What are the causes of stress concentration? How it can be reduced? **[8]**

b) How codes and standard provides facility to design engineer? Name 8 organizations which create Code and Standards. **[8]**

Q3) An open belt 100 mm wide connects two pulleys mounted on parallel shafts with their centers 2.4 m apart. The diameter of the larger pulley is 450 mm and that of the smaller pulley 300 mm. The coefficient of friction between the belt and the pulley is 0.3 and the maximum stress in the belt is limited to 14 N/mm width. If the larger pulley rotates at 120 r.p.m., find the maximum power that can be transmitted. **[16]**

OR

P.T.O.

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

a) Types of belt drives and their selection criteria.

b) Advantages & disadvantages of chain drives over belt drive

c) Different theories of failure. (minimum three)

d) Stress concentration and methods to reduce it.

Q5) Design a Shell of Pressure vessel with following details: **[18]**

Internal Diameter (Approx)	= 1400 mm
Permissible stress at 150ºC	= 140 N/mm^2
Internal pressure	= 0.35 N/mm^2
Weight	= 38000N
Joint Efficiency	= 0.85
Torque offset piping	= 500 N-m

Material used is stainless steel.

OR

Q6) A Pressure vessel having outer diameter 1.3 m and height 3.8 m is subjected to an internal pressure of 12 kg/cm^2, If the vessel is fabricated as class B vessel joint efficiency is 85%; if the vessel is fabricated as class C vessel, with welded joint efficiency is 70% and 50%; if the vessel is provided with a strip all along the longitudinal joint, joint efficiency is 100%. Calculate the vessel thickness under these conditions and find out how much is the % material saving by welding a strip along the longitudinal joint. Allowable stress of the material = 1020 kg/cm^2 Corrosion allowance is 1 mm. **[18]**

SECTION -II

Q7) a) How fouling occurs in Heat Exchangers? Discuss different types of fouling in details. **[8]**

b) Discuss the detailed classification of heat exchangers and the techniques for performance evaluation. **[4]**

c) Discuss the method of performance evaluation of any heat exchanger. **[4]**

OR

Q8) a) Explain the classification of heat exchangers and the techniques for performance evaluation. **[4]**

b) A heat exchanger with installed heat transfer surface area of 8.1 m^2 is to be used for heating process liquor available at 16.5 ºC. The heating is to be performed with water available at 93 ºC from another part of the plant. The arrangement of the unit is such that the fluids flow in true counter current manner. The flow rates of the process liquor and water are 3.1 kg.sec and 1.1 kg/sec. respectively. Previous experience indicates that an overall heat transfer coefficient of 450 W/m^2 K is suitable. Estimate the exit temperatures of the two fluids and determine the effectiveness of the heat exchanger. **[12]**

Q9) a) Discuss the various types of losses in storage vessels. **[8]**

b) Discuss the importance of bottom plate and different thickness course needed to build the storage tank. **[8]**

OR

Q10)a) Draw various types of roofs used in storage vessel along with conditions in which it is used. **[8]**

b) A cylindrical storage tank has diameter 30 m and the tank height is 15 m. Liquid stored in the tank has a density 810 kg/m^3. Material of construction is carbon steel having permissible stress 1300 kg/cm^2. Density of material used for fabrication is 7700 kg/m^3.

The plates of size 3 m x l.2 m in varying thickness are available for fabrication. Welded joints efficiency is 85% and corrosion allowance is not necessary. Calculate the cylindrical shell thickness of the tank at different height. Also estimate the total number of plates required. **[8]**

Q11) Design a Shell of Pressure vessel with following data **[18]**

Shell Data:

Internal diameter (Approx)	= 1400 mm
Material	= Stainless Steel
Permissible stress at 150º	= 140 N/mm^2
Internal pressure	= 0.35 N/mm^2
Weight	= 38000 N
Joint efficiency	= 0.85
Torque Offset piping	= 500 N-m

OR

Q12) Write Short Notes on (Any four): **[18]**

a) Use of Wind girders in Storage tank (With Sketch).

b) Pipeline color codes for different pipe lines.

c) IS Code for design of equipment.

d) Stress Concentration.

e) Steps in design activity.

f) ASME & TEMA CODES.

⊗⊗⊗

Total No. of Questions : 6]

SEAT No. :

P2505

[Total No. of Pages : 2

[5153]-141
T.E.(Printing)
OFFSET MACHINES-I
(2008 Pattern) (Semester-I) (308281)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Answers to two sections should be written in separate answer books.***

SECTION-I

Q1) Explain the perfecting system on sheet-fed machines with neat diagram. **[16]**

a) State packing materials used for plate and blanket cylinder.

b) Explain compressible blanket construction. What is weft and warp direction.

OR

Explain the following (16 marks)

a) Eccentric bushing for blanket cylinder.

b) Cylinder Gears.

c) Cylinder gap of blanket cylinder.

d) Pitch circle diameter.

Q2) a) Explain in brief factors affecting exposing and developing of P.S. plates. **[8]**

b) Explain in brief the step by step procedure of preparing the Positive working PS plate. **[8]**

OR

a) Explain the role of anodized layer and silver halide in CTP plate. **[8]**

b) Explain internal drum imaging in CTP. **[8]**

P.T.O.

Q3) a) Explain the different methods of setting rollers in sheet fed offset inking unit. **[9]**

b) Draw a neat diagram of central drum inking system. Label all rollers with diameters. Explain the purpose of various roller diameters used in offset. **[9]**

OR

a) Explain the function of ductor and oscillators in inking system with diagram. **[9]**

b) List down various parts of inking system and explain in detail used in offset machines. **[9]**

SECTION-II

Q4) Explain importance of pH, conductivity, surface tension and temperature of F.S. **[18]**

OR

a) With help of Diagram explain plate feed continuous flow dampening system. **[9]**

b) Explain effect of IPA on surface tension graphically. **[9]**

Q5) a) What is an UV curing? Explain construction. **[8]**

b) Explain working of front lay stops. Explain swing arm gripper. **[8]**

OR

a) Explain various parts in delivery system of offset machine. **[8]**

b) Explain sequence of operation in single sheet feeder. **[8]**

Q6) a) What is the difference between premakeready and make ready. **[8]**

b) Explain waste generated in makeready and measures to reduce them. **[8]**

OR

Explain in brief the importance of quality control aids used for plate production. **[16]**

❄ ❄ ❄

Total No. of Questions : 6]

SEAT No. :

P2506

[Total No. of Pages : 2

[5153]-143
T.E.(Printing)
COLOUR MANAGEMENT AND STANDARDIZATION
(2008 Pattern) (Semester - I) (308283)

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

Instructions to the candidates:

1) ***Answer to the two sections should be written in separate books.***
2) ***Neat diagrams must be drawn wherever necessary***
3) ***Figures to the right indicate full marks.***

SECTION - I

Q1) Answer any two. **[18]**

a) Explain advantages and disadvantages of trapping for color reproduction. Write down the equation for two color trapping.

b) Explain ink impurities of yellow, magenta and cyan process inks.

c) Explain the concept of gray balance.

Q2) Solve any two **[16]**

a) Explain the Drawbacks of Human vision system.

b) Explain CIE standard Illuminant. Write and explain color temperature of CIE standard Illuminant.

c) Explain Hering color vision theory.

Q3) Answer any two **[16]**

a) Explain Natural color system with their two advantages and two disadvantages.

b) Calculate chromaticity co-ordinates for D65 and D50 Illuminants.

c) Explain two degree and ten degree CIE standard observer.

P.T.O.

SECTION - II

Q4) Answer any One **[16]**

a) Explain Instrumental color Assessment.

b) Explain the term color tolerance. How to find out color tolerance limit.

Q5) Explain any two **[16]**

a) Explain the concept of color management.

b) How to do soft proofing with the help of Photoshop software.

c) Explain the calibration of monitor system.

Q6) Explain any two **[18]**

a) Explain the without color management and with color management color reproduction workflow.

b) Calculate L, a, b, C and h for given sample.

Sample 1:X=60, Y=75, Z=20 and

c) Explain the concept of hard proof. How to do hard proofing with starproof software.

Total No. of Questions :6]

SEAT No. :

P2507

[Total No. of Pages :3

[5153] - 144

T.E. (Printing)

MANAGEMENT INFORMATION SYSTEM & COST ESTIMATION

(2008 Course) (Semester - I)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Answers to the two sections should be written in separate books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
6) ***Assume suitable data if necessary.***

SECTION -I

Q1) Explain the functions of management with examples. **[16]**

OR

Explain elements of Competitive Environment with examples. **[16]**

Q2) Explain the Heidelberg Prinect workflow. **[16]**

OR

Differentiate between the terms Order Qualifier and Order Winner with reference to MIS. **[16]**

Q3) Explain the application of DBMS in MIS with suitable examples. **[18]**

OR

Explain any one DBMS software in detail. **[18]**

P.T.O.

SECTION -II

Q4) Write short notes on (Any 4): **[16]**

a) Data Definition language

b) Data Manipulation Language

c) Data Dictionary

d) Data warehouse

e) Data mining

f) Data Base Management System

Q5) Prepare the cost sheet with reference to the following data: **[16]**

Direct material: 27300

Direct labor: 15600

Direct expenses: 6420

Factory overheads are charged at 75% on labor cost.

Administration overheads are charged at 25% on factory cost.

Selling and Distribution overheads are 40% on total cost.

Profit 10% of the cost of sales.

OR

Write short note on (Any 4): **[16]**

a) Direct cost

b) Indirect cost

c) Material cost

d) Labor cost

e) Overhead cost

f) Fixed cost

g) Variable cost

Q6)a) Estimate the cloth roll of 60cms wide and 40 meter in length will be required for making 5000 books in A4 size and with 25 mm spine. **[9]**

b) How many boards of 20" × 30" size will be required for making cases for 10,000 books in Demy 1/4 size? **[9]**

OR

Explain in detail with suitable example the difference between Order Qualifier and Order Winner suitable examples. **[18]**

EEE

Total No. of Questions :12]

SEAT No. :

P2508

[Total No. of Pages :2

[5153] - 145

T.E. (Printing Engg. & Graphics Communication)

DESIGN OF PRINTING MACHINECOMPONENTS

(2008 Course) (Semester - I) (302284)

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

Instructions to the candidates:

1) ***Answers to the two sections should be written in separate answer books.***
2) ***Figures to the right side indicate full marks.***
3) ***Assume suitable data if necessary.***

SECTION -I

Q1) a) What are preferred series? Explain R-10 series. **[8]**

b) Explain BIS system of designation of steel. **[8]**

OR

Q2) With the help of an illustration, explain briefly various phases involved in design of printing machine. **[16]**

Q3) Explain factor of safety and factors to be considered while selecting FOS. **[16]**

OR

Q4) Explain ASME code for shaft Design with example. **[16]**

Q5) Explain step by step procedure for Knuckle joint. **[18]**

OR

Q6) What is the importance of limits, fits in machine design? What are different types of tolerances? Show how to give such tolerance of machine elements. **[18]**

P.T.O.

SECTION -II

Q7) Explain in detail design of screw jack. **[16]**

OR

Q8) Explain construction and applications of recirculating ball screws. **[16]**

Q9) Explain in detail threaded and welded joint. **[16]**

OR

Q10)Explain basic types of screw fastening. **[16]**

Q11)Explain types, material and applications of springs. **[18]**

OR

Q12)Explain Helical torsion spring. **[18]**

EEE

Total No. of Questions : 6]

SEAT No. :

P2509

[Total No. of Pages : 3

[5153]-146
T.E.(Printing)
OFFSET MACHINES-II
(2008 Pattern) (Semester-II)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Answers to the two sections should be written in separate answer books.***

SECTION-I

Q1) Explain the following related to roll to web processing: **[16]**

a) Different parts of reel.

b) Reel stands.

c) Festoon.

d) Sensors used in splicing.

OR

Explain the following:

a) What conditions are considered at the time of selection of a specific splice pattern. **[8]**

b) Explain the significance of the following: **[8]**

i) Paster brush

ii) Pressure arm

iii) Knife

Q2) a) Describe procedure to check roller settings by strip method in inking. **[8]**

b) Describe problem of roller stripping. Explain use of durometer. **[8]**

OR

P.T.O.

Explain: **[16]**

a) Y type configuration.

b) Vertical press.

c) Blanket cylinder construction in web offset.

d) Satellite press.

Q3) Explain setting of heatset inks. Describe open flame type of dryer. **[18]**

OR

a) Explain double former folding mechanism and its use in commercial printing. **[10]**

b) Write significance of Tucker blades and jaws. **[8]**

SECTION-II

Q4) State effects on web tension due to ink water conditions on press and due to moisture in web. **[18]**

OR

State effect of former board settings on web tension. **[18]**

Q5) Explain use of chillers in web offset. How temperature control is done for the web on heatset press. **[16]**

OR

Explain why: **[16]**

a) Use of Web Preheaters.

b) Web break sensors are placed on the same side.

c) Antistatic devices.

d) Pyrometers are used.

Q6) Explain following troubles: **[16]**

a) Curved edges.

b) Blistering.

c) Tone value increase.

d) Poor drying of ink.

OR

Explain problems occurring duo to following defects: **[16]**

a) Damaged roll edges.

b) Soft end and baggy end.

c) Telescoped roll.

d) Dimensional stability changing.

Total No. of Questions :6]

SEAT No. :

P2510

[Total No. of Pages :3

[5153] - 147
T.E. (Printing)
STATISTICAL PROCESS CONTROL
(2008 Course) (Semester - II)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Answers to the two sections should be written in separate books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
6) ***Assume suitable data if necessary.***

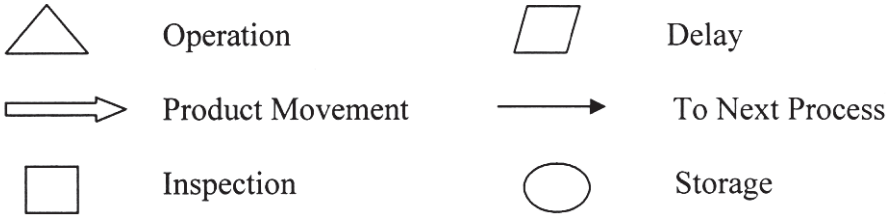
SECTION -I

Q1) a) Explain different tools used in SPC. **[8]**

b) Explain the concept Quality and TQM with suitable examples. **[8]**

OR

With following symbols, prepare a flowchart for the process of 'Pre make ready Operations on single color offset machine'. **[16]**



Q2) a) Explain Histogram in short? **[4]**

b) With suitable examples, explain the different shapes of Histogram. **[12]**

OR

P.T.O.

From the given data, arrange the data, prepare frequency distribution table and draw the Histogram on the graph paper. **[16]**

0.912	0.910	0.904	0.905	0.910	0.911
0.914	0.912	0.910	0.913	0.908	0.914
0.907	0.909	0.913	0.912	0.909	0.913
0.902	0.906	0.909	0.907	0.906	0.908
0.915	0.909	0.910	0.911	0.912	0.909
0.910	0.909	0.908	0.910	0.909	0.907

Note: From G Chart, the recommended number of groups should be 7 for number of measurements between 30 to 40.

Q3) Explain process variation concept. And also types of variations with diagram and suitable examples. **[18]**

OR

Explain the following: **[18]**

a) Measures of Accuracy or Centering.

b) Measures of Precision or Spread.

c) Normal Distribution.

SECTION -II

Q4) Prepare X - MR chart from the given data. **[16]**

Sample No.	1	2	3	4	5	6	7	8	9	10
Measurements	.0218	.0243	.0232	.0256	.0247	.0255	.0282	.0261	.0244	.0252

Sample No.	11	12	13	14	15	16	17	18	19	20
Measurements	.0265	.0267	.0254	.0238	.0249	.0275	.0265	.0232	.0294	.0281

Note: Use n = 2

Shewhart's Constant: $E_2 = 2.659$

$D_3 = 0$

$D_4 = 3.267$

OR

Prepare Zone / Pre control / Rainbow chart from the given data and prepare the decision table. **[16]**

1	2	3	4	5	6	7	8	9	10	11	12
.2145	.2140	.2145	.2150	.2140	.2140	.2125	.2152	.2120	.2120	.2125	.2120

13	14	15	16	17	18	19	20	21	22	23	24
.2123	.2124	.2125	.2118	.2140	.2136	.2134	.2139	.2138	.2138	.2139	.2135

25	26	27	28	29	30	31	32	33	34	35	36
.2136	.2138	.2135	.2130	.2139	.2137	.2138	.2133	.2135	.2135	.2140	

37	38	39	40	41	42	43	44	45

Specification limits are 0.212 to .218

Goal is to remain within specification limits. Measurements are sampled hourly.

Q5) Make two pareto Charts for the data in the following list, one for the number of defectives and one for dollar loss. In each case, include a cumulative percentage graph. **[16]**

Department	Defectives	Dollar Loss
A	20	100
B	120	60
C	80	800
D	100	500
E	50	200
F	30	90

OR

Explain the Concept of PCR, Cp and Cpk with suitable diagrams. **[16]**

Q6) Explain the concept of DOE, and its various applications with suitable examples from printing industry. **[18]**

OR

Explain various problem solving tools in SPC in detail with suitable examples. **[18]**

EEE

Total No. of Questions : 6]

SEAT No. :

P2511

[Total No. of Pages : 2

[5153]-148
T.E. (Printing)
DIGITAL WORKFLOW & IMAGE SETTING
(2008Course) (Semester-II)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Write answers to different sections on seperate answer sheets.***
3) ***Figures to the right indicate full marks.***

SECTION-I

Q1) What is jobflow. Explain the different steps used in the same. **[16]**

OR

Q1) Compare and contrast between conventional and digital workflow. **[16]**

Q2) Write short notes on: **[16]**

a) Pre-flight check

b) OPI/APR software

OR

Q2) Explain following in details: **[16]**

a) Archiving-Purpose and ways of doing it

b) Trapping

Q3) What are different modules used in workflow? Explain each in details **[18]**

OR

Q3) Write short notes on: **[18]**

a) JDF workflow

b) PDF workflow

P.T.O.

SECTION-II

Q4) Explain rational and irrational screening with neat diagrams **[18]**

OR

Q4) Explain raster image processor in terms of **[18]**

a) Objectives

b) Functions

Q5) Explain fundamental steps in digital image processing with neat diagram. **[16]**

OR

Q5) What is image compression? Why it is required? What are different ways of compression? **[16]**

Q6) Explain: **[16]**

a) Drop on demand

b) Continuous flow types inkjet printer with principle diagram of working.

OR

Q6) Explain the working principle with neat diagram for electro photographic printer. **[16]**

♦ ♦ ♦

Total No. of Questions : 6]

SEAT No. :

P2512

[Total No. of Pages : 1

[5153]-149
T.E. (Printing)
TECHNOLOGY OF FLEXOGRAPHY
(2008 Course) (Semester - II)

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

Instructions to the candidates:

1) ***Answer to the two sections should be written in separate answer books.***
2) ***Draw neat diagram wherever necessary.***

SECTION - I

Q1) Explain the making and properties of rubber plates. **[18]**

OR

Explain the reasons of abrasion of flexo plate. **[18]**

Q2) Explain the mounting technique for flexo plates. **[16]**

OR

Calculate % shortening and new negative length for 2.84 mm plate thickness having printed length of 30 cm. **[16]**

Q3) Explain the process of making conventional photopolymer plate. **[16]**

OR

Explain standardization test for Back Exposure. **[16]**

SECTION - II

Q4) Explain the making of 1.7 mm flexo plate. **[16]**

OR

Explain the effect of wash-out used for plate reproduction. **[16]**

Q5) Explain in detail Stack Flexo process. **[18]**

OR

Describe in detail flexo press used for flexible packaging. **[18]**

Q6) Explain in detail role of Anilox cell structures on flexo print quality. **[16]**

OR

Explain in detail doctor blade inking system of a flexo press. **[16]**

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Total No. of Questions : 12]

SEAT No. : ____

P2513

[Total No. of Pages : 4

[5153]-150

T.E. (Printing Engineering)

THEORY OF PRINTING MACHINE & MACHINE DESIGN

(2008 Course) (Semester -II) (302290)

Time : 4 Hours] ***[Max. Marks : 100***

Instructions to the candidates:

1) ***Answer Three questions from section-I and Three questions from section-II.***
2) ***Answers to the two sections should be written in separate answer books.***
3) ***Figures to the right indicate full marks.***
4) ***Use of electronics pocket calculator is allowed.***
5) ***Assume suitable data if necessary.***

SECTION -I

Q1) a) What do you mean by interference and undercutting? **[8]**

b) Derive the expression for length of path of contact of involute gears and length of arc of contact of involute gears. **[8]**

OR

Q2) a) State and derive the law of gearing. **[6]**

b) Two gear wheels of diameters 75 mm and 250 mm have involute teeth of 5 mm module and 20 angle of obliquity. The addenda are equal and are as large as possible while avoiding interference. Find:

i) The addendum

ii) The contact ratio

iii) The sliding velocity at the start of contact, if the pinion is driving at 2000rev/min. **[10]**

P.T.O.

Q3) In the epicyclic train (fig Q3), the wheel E is a fixed wheel. Wheel C and D ate integrally cast and mounted on one pin. If the arm A rotates at 1000 rev/min in clockwise direction, determine the speed and direction of rotation of wheels B and F. **[16]**

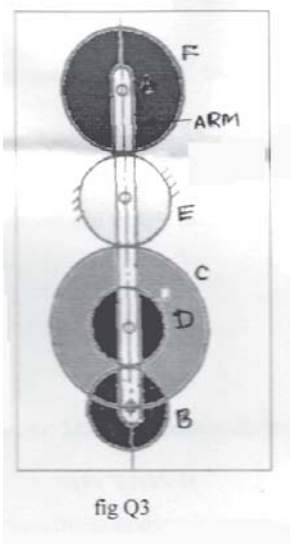

fig Q3

ELEMENT	B	C	D	E	F
TEETH	20	35	15	20	30

OR

Q4) Fig. Q4 shows an epicyclic gear train with two inputs. One of the inputs is through the arm and the second input is through gear A. Determine the speed of the output shaft F and its direction of rotation if both the input shafts rotate in counter clockwise e direction. **[16]**

ELEMENT	A	B	C	D	E	F
TEETH	28	32	58	48	50	56

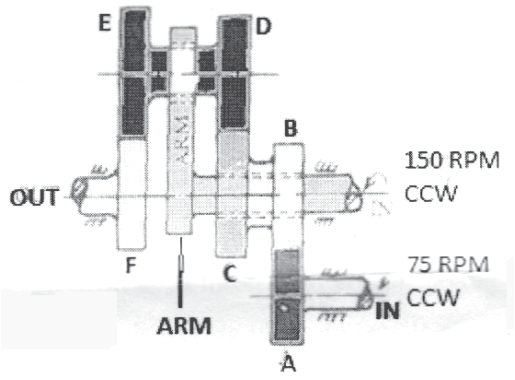

Fig. Q4

Q5) a) Derive the expression for displacement, velocity and acceleration for simple harmonic motion of follower. **[8]**

b) Derive the expression for displacement, velocity and acceleration for cycloid motion of follower. **[10]**

OR

Q6) The following data relate to a cam profile with knife edge follower moving with uniform acceleration and retardation during ascent and simple harmonic motion during descent.

Min radius of cam: 30 mm

Lift: 40 mm

Angle of ascent: 60^o

Angle of descent: 90^o

First dwell: 45^o

Speed of cam: 200 rpm.

Draw cam profile and find max velocity, Max acceleration during both strokes. **[18]**

SECTION -II

Q7) a) Differentiate between the various forms of dynamic loading. **[8]**

b) A transmission shaft of cold drawn steel 27 Mn2 (Sut = 490 MPa and Syt = 300 MPa) is subjected to a fluctuating torque which varies from -100 N-mm to + 400 N-mm. The factor of safety is 2 and the expected reliability is 90%. Neglecting the effect of stress concentration, determine the diameter of the shaft.

Take Ka = 0.8, Kb = 0.85, Kc = 0.897

Assume the distortion energy theory of failure. **[8]**

OR

Q8) a) Explain the terms with neat sketches: **[8]**

i) Soderberg diagram

ii) Goodman diagram

iii) Modified Goodman diagram

b) What is Stress concentration? What are its causes and explain the methods of reducing stress concentration. **[8]**

Q9) A spur pinion having 20 teeth is to mesh with a gear having 43 teeth. The pinion and gear are to be made of plain carbon steels having ultimate tensile strengths of 600 MPa and 410 MPa respectively. The pinion is to be driven by a three phase induction motor having a speed of 1440 r.p.m. and 10 kW rating. The starting torque of the motor is 1.5 times the working torque. If the surface hardness of the gear pair is to be 400 BHN, design a gear pair with a factor of safety of 1.5.

Assume velocity factor accounts for the dynamic load.

Assume 20^o full depth involute tooth system.

$Y = 0.484 - (2.87/Z)$ and $b = 10m$

First choice of std. modules in mm recommended by ISO:

1, 1.25, 1.5, 2, 2.5, 3, 4, 5, 6, 8, 10, 12, 16, 20, 25, 32, 40.

$K = 0.16\ [BHN/100]^2$ $K_a = 2$ and $K_m = l$ **[18]**

OR

Q10)a) Draw the free body diagram when spur pinion and gear are in mesh and derive the relationship between the radial, tangential and resultant forces acting on them. **[8]**

b) Draw the free body diagram when Helical pinion and gear are in mesh and derive the relationship between various forces acting on them. **[10]**

Q11) Write short note on: **[16]**

a) Bearing Materials

b) Causes and remedies of bearing failure

c) Mounting of bearing.

OR

Q12)a) Explain bearing life with the help of graph of percentage bearings in operation Vs the bearing life. **[8]**

b) Describe with neat sketches, the different rolling contact bearings. **[8]**

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Total No. of Questions : 12]

SEAT No. :

P2514

[Total No. of Pages : 2

[5153]-151

T.E. (Production Engineering)

METROLOGY AND MECHANICAL MEASUREMENTS

(2008 Pattern)(Semester -I) (311081)

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

Instructions to the candidates:

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

SECTION-I

Q1) a) Differentiate between Line & End. **[6]**

b) Sketch the set up and explain working principal of Autocollimator. **[10]**

OR

Q2) a) Explain working principal of sine bar for angle measurement. **[6]**

b) Explain different alignment test for lathe machine. **[10]**

Q3) a) What is fit? Explain any three types of fit. **[8]**

b) Design and make drawing of general purpose Go and No GO plug gauge for Inspecting a hole of 25D8. Use data with usual notations. FD = $+16D^{0.44}$. **[10]**

OR

Q4) a) Explain NPL flatness testing. **[8]**

b) Design a workshop type GO and NO GO ring gauge for inspection of 30f8 shaft. Use the following data with usual notations: **[10]**

i) $i=0.45\sqrt[3]{D}+0.001D$

ii) The standard tolerance for grade IT8=25i.

iii) Fundamental deviation for F shaft = $-5.5D^{0.41}$

P.T.O.

Q5) a) Explain with neat sketch working principal of Taylor Hobson surface meter. **[10]**

b) Explain the use of Laser in metrology. **[6]**

OR

Q6) a) Sketch and explain constant chord method for checking chord length. **[8]**

b) Write a short notes on; **[8]**

i) Profile projector.

ii) Floating carriage micrometer.

SECTION-II

Q7) a) Differentiate between Sensor and Transducer. **[8]**

b) Explain different measurement methods. **[10]**

OR

Q8) a) Explain the importance of mechanical measurement system with the help of generalized block diagram. **[10]**

b) State and explain inductive transducer. **[8]**

Q9) a) Explain Bourdon tube pressure gauge with sketch. **[8]**

b) What is thermister? Give characteristic of thermister. **[8]**

OR

Q10)a) Explain with neat sketch construction and working of pitot tube. **[8]**

b) Explain with neat sketch construction and working of McLeod gauge. **[8]**

Q11)a) Explain different types of maintence for measuring equipment. **[8]**

b) Discuss basic methods of force measurements and explain maintenance replacement of measuring equipments. **[8]**

OR

Q12)a) State the importance of liquid level measurements. **[8]**

b) State and explain Wheatstone bridge. **[8]**

Total No. of Questions : 12]

SEAT No. :

P2515

[Total No. of Pages :4

[5153]-152

T.E. (Production)

KINEMATICS OF MANUFACTURING MACHINES

(2008 Course) (311082) (Semester-I)

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

Instructions to the candidates:

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

SECTION-I

Q1) a) Explain kinematic analysis of bevel gear generator. **[8]**

b) Design a four bar mechanism to co-ordinate three positions of input and output links as follows:- **[8]**

$\theta_1=20°$ $\theta_2=35°$ $\theta_3=50°$

$\varphi_1=35°$ $\varphi_2=45°$ $\varphi_3=60°$

OR

Q2) a) Explain kinematic structure (E-33 type) for milling machine. **[8]**

b) Design a slider crank mechanism to co-ordinate three positions of input and output links as follows:- **[8]**

$\theta_1=35°$ $\theta_2=50°$ $\theta_3=65°$

$S_1=90mm$ $S_2=70mm$ $S_3=40mm$

Q3) a) Discuss various methods used to avoid interference in involute gears. **[8]**

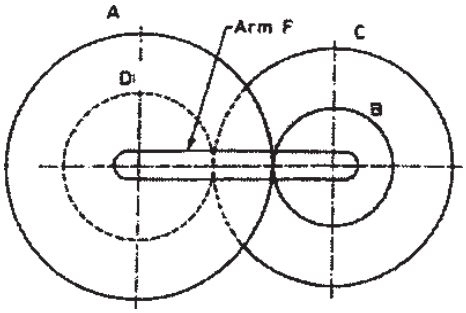
b) Two 20° involute spur gears have module of 8 mm. Gear ratio 2.5, speed of gear wheel 120 rpm, number of teeth on gear wheel 80. The addendum is such that the path of approach and Path of recess on each side are 40% of maximum possible length each. Determine the addendum for pinion and wheel. Also determine length of arc of contact. **[10]**

OR

P.T.O.

Q4) a) Compare involute and cycloidal gear tooth profile. **[8]**

b) In a reverted epicyclic train, the arm F carries two wheels A and D and a compound wheel B-C. The wheel A meshes with wheel B and wheel D meshes with wheel C. The number of teeth on wheel A,D,B and C are 80, 48,40 and 72 respectively. Find the speed and direction of wheel D when wheel A is fixed and arm F makes 200 rpm clockwise. **[10]**



Q5) a) Derive an equation for maximum fluctuation of energy (ΔE) **[8]**

$$\Delta E = mv^2 C_s$$

where , m-mass of flywheel in kg

v- Linear velocity of rim flywheel at mean radius in m/s

C_s – co-efficient of fluctuation of speed.

b) The turning moment diagram for multi-cylinder engine has drawn to a scale of 1mm =325 Nm vertically and 1mm=3° horizontally. The areas above and below the mean torque line are –26, +378, –256, +306, –302, +244, –380, +261 and –225 mm^2. The engine is running at mean speed of 600 rpm. The total fluctuation of speed is not to exceed ± 1.8% of mean speed. If radius of gyration of flywheel is 0.7 m, find mass of flywheel.**[8]**

OR

Q6) a) Explain turning moment diagram for single cylinder double acting steam engine. **[6]**

b) A machine is required to punch 5 holes of 40 mm diameter in a plate of 30 mm thick per minute. The work required is 700 Nm per square cm of sheared area. The punch has stroke of 10 cm. The maximum peripheral speed of the flywheel at its radius of gyration is 30 m/sec. Find the mass of flywheel such that the speed does not fall below 28 m/sec at its radius of gyration and calculate power of motor for punching operation. **[10]**

SECTION-II

Q7) a) Explain with neat sketches various types of cams. **[6]**

b) Following data relate to a cam profile, in which the follower moves with uniform velocity during the lift and returning it with uniform acceleration and deceleration. **[10]**

The minimum cam radius=50 mm.
The diameter of a roller =20 mm
Lift of roller follower=45 mm
Offset of follower axis=12 mm towards right
Angle of ascent =70°
Angle of descent=120°
Angle of dwell between ascent and descent=45°
Cam speed=200 rpm. Draw cam profile.

OR

Q8) a) What are the different types of motions with which a follower can move for machine tool application? **[6]**

b) The following data refers a cam profile used to lift a knife edge follower through 40 mm. The follower gets lifted to its maximum position for 80° of cam rotation. Then it remains in lifted position for the next 60° of cam rotation and returns its original position during next 90° of the cam rotation. Remaining is a dwell period. Follower is required to be lifted with SHM whereas during return, it is expected to follow cycloidal motion. Minimum cam radius is 35 mm and follower axis is offset by 10 mm. Draw cam profile. **[10]**

Q9) a) Explain partially primary balancing of reciprocating masses in I C engine. **[8]**

b) A three cylinder radial engine has cylinders located 120° from neighboring cylinder. Reciprocating mass of each cylinder is 1.2 kg. Length of crank is 75 mm and each connecting rod is 250 mm long. Find out maximum primary and secondary unbalance forces if engine runs at 2500 rpm. **[10]**

OR

Q10) a) Describe the procedure of balancing several masses rotating in same plane. **[8]**

b) Four masses m_1,m_2,m_3, and m_4 are 100 kg, 175 kg, 200 kg and 25 kg respectively are fixed to the cranks of 200 mm radius and revolve in the planes ,12,3 and 4. The angular positions of the cranks in planes 2,3 and 4 with respect to crank in plane 1 are 75°, 135° and 200° taken in same sense. The distances of the planes 2,3 and 4 from plane 1 are 0.6 m, 1.86 m and 2.4 m respectively. Determine position and magnitude of the balance masses at radius of 0.6 m in plane L and M located at the middle of planes 1 and 2 and 3 and 4 respectively. **[10]**

Q11)a) What do you mean by vibration damping? Discuss free vibration with viscous damping. **[8]**

b) In a damped free vibrating system, mass is 2 kg and spring stiffness is 100 N/m. It is observed that the initial amplitude of 100 mm is reduced to 1 mm in 10 oscillations. Find the damping constant. Also determine the natural frequency and damped frequency of vibration. **[8]**

OR

Q12)a) Define following terms: **[8]**

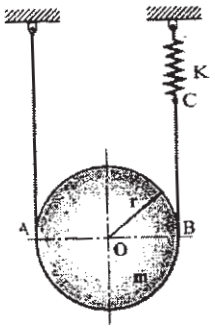
i) Damping Coefficient.

ii) Logarithmic decrement.

iii) Resonance.

iv) Forced damped vibration.

b) A cylinder of mass 'm' and radius 'r' is suspended from a looped cord as shown in fig. One end of cord is attached directly to a rigid support, while the other end is attached to a spring 'k'. Determine the frequency of vibration of the cylinder. Assume the cord to be inextensible. **[8]**



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Total No. of Questions :12]

SEAT No. :

P2516

[Total No. of Pages :3

[5153] - 153

T.E. (Production)

MATERIAL FORMING

(2008 Course) (Semester - I) (311083)

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

Instructions to the candidates:

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

Q1) a) Derive the equation for elastic work done (Welastic) and plastic work doen (Wplastic). **[8]**

b) Explain and differentiate between *hot forming* and *cold forming*. **[8]**

OR

Q2) a) Derive the equation for and state the relationship between True stress and engineering stress and True strain and Engineering strain. **[8]**

b) Explain '*Slab analysis*' method to carryout analysis of forming operation. **[8]**

Q3) a) Explain the following forging operations with neat sketch **[8]**

i) Fullering,

ii) edging and

iii) blocking

iv) Finishing.

b) State the advantages and limitations of forging over casting process.**[8]**

OR

P.T.O.

Q4) Derive an equation for maximum pressure (P_{max}) Considering plane strain and sticking friction condition in open die. Where, **[16]**

2L:length of work piece to be forged,

μ: Coefficient of friction at die and work piece interface,

h: thickness of work piece.

Q5) a) Explain multi stage *wire drawing machine* with neat sketch and state advantages and limitations. **[9]**

b) Calculate drawing load required to draw a rod of 5 mm diameter to 3 mm diameter. The die angle is 16^o and the coefficients of friction at die and wire interface is 0.2. The flow stress of wire material is 340 N/mm^2. Also calculate motor power required if the drawing speed is 1 m/s. **[9]**

OR

Q6) Tube of 14 mm external diameter and 2 mm thickness is reduced to 12 mm external diameter and 1.5 mm thickness. The die angle is 26^o and plug angle is 20^o. The coefficients of friction at die and tube interface and tube and plug (moving mandrel) interface is 0.5. The flow stress of tube material is 430 N/mm^2. Also calculate and compare the drawing load if the tube drawing operation is carried out using **[18]**

a) Fixed plug

b) Floating plug,

c) Moving cylindrical mandrel.

Q7) Explain the following with neat sketch

a) Tandem mill **[6]**

b) Sendzimer mill **[6]**

c) Planetory mill **[4]**

OR

Q8) a) Explain various rolling defects with neat sketch. **[8]**

b) Explain Automatic Gauge Control (AGC). **[8]**

Q9) a) Explain Cold extrusion with neat sketch. **[8]**

b) Explain various extrusion defects with neat sketch. **[8]**

OR

Q10)a) Explain impact extrusion with neat sketch. **[8]**

b) Explain important process parameters of extrusion. **[8]**

Q11)a) Explain High Energy Rate forming with neat sketch. **[9]**

b) Explain various types of spinning process with neat sketch. **[9]**

OR

Q12) a) Explain High velocity forming with neat sketch. **[9]**

b) Explain various types of stretch forming process with neat sketch. **[9]**

EEE

Total No. of Questions : 12]

SEAT No. :

P2517

[Total No. of Pages : 4

[5153]-154
T.E. (Production)
PRODUCTION MANAGEMENT
(2008 Pattern) (Semester - I) (311084)

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

Instructions to the candidates:

1) ***Answer to the two sections should be written in separate answer book.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Solve Q1 or Q2, Q3 or Q4,Q5 or Q6,Q7 or Q8, Q9 or Q10, and Q11 or Q12.***
5) ***Use of electronic pocket Calculator is allowed.***
6) ***Assume Suitable data if necessary.***

SECTION-I

Q1) a) List chronological history of Production and Operations management. **[9]**

b) Explain the relationship of production department with Finance, Purchasing and Marketing department. **[9]**

OR

Q2) a) Discuss the scope and objectives of production management. **[9]**

b) What are the different types of Production Systems? Compare these systems. **[9]**

Q3) a) Explain the concept of Product Design and Product Cost giving suitable example. **[8]**

b) Explain the concept of Concurrent Engineering. **[8]**

OR

Q4) a) With the help of figure explain stages in Life Cycle of Product. **[8]**

b) Define Production Planning and Control (PPC). State the objectives of PPC. **[8]**

P.T.O.

Q5) a) Explain the need of computerized layout planning. Explain in brief any one type of computerized layout planning. **[8]**

b) A company is engaged in the assembly of a Machine on a continuosly moving conveyor, 24 Machine assemblies are required per shift of 8 hours. The other information is given below regarding assembly steps and precedence relationship. **[8]**

Operation Number	Immediate precedenceTask	Duration (Min)
1	---	5
2	1	3
3	1	7
4	1	5
5	1	6
6	3,7	3
7	2	4
8	4,5	6
9	6	12
10	7,8,9	9

i) Draw the precedence diagram.

ii) What is the desired cycle time?

iii) What is the theoretical number of work stations?

iv) What is the efficiency and balance delay of the solution obtained?

OR

Q6) a) Define Plant Layout. Explain the objectives of good plant layout. **[8]**

b) Explain principles of material handling. **[8]**

SECTION-II

Q7) a) Define sales forecasting. Explain in detail Delphi technique and Seasonal forecasting giving suitable example. **[9]**

b) The demand for a product is given below. The forecast for the August was 350 units. Forecast the demand for the month of November taking the value of α=0.4. **[9]**

Month	August	September	October
Demand	310	370	420

OR

Q8) a) Explain with the help of figure various demand patterns used in sales Forecasting, **[9]**

b) Find the coefficient of correlation between cost of production and the sales price for which data is as: **[9]**

Period	1	2	3	4	5	6	7	8
Cost	100	118	130	142	160	175	165	180

i) Calculate the demand for 9 the month using simple Moving Average Method for the moving average period of 3 months.

ii) Calculate MFE (Mean Forecast Error).

Q9) a) What are the different priority rules? Give suitable example for each. **[8]**

b) There are seven jobs, each of which has to go through the machines A and B in the order of BAC. Processing times in hours are given as:

Job	1	2	3	4	5	6
Machine A	2	7	6	7	8	5
Machine B	7	8	10	7	5	10
Machine C	9	11	11	10	13	8

Find the total elapsed time and idle time. **[8]**

OR

Q10)a) Define the following: **[8]**

i) Forward and Backward Scheduling

ii) Finite Loading

iii) Critical Ratio Scheduling.

b) A project consists of eight activities, Precedence relation and activity times are given. Draw the network diagram and compute the critical path for the activites. **[8]**

Activity	Immediate predecessor	Activity Time (Week)
A	--	8
B	--	12
C	--	16
D	C	8
E	A,B	16
F	E,D	8
G	D	6
H	F,G	6

Q11) Write short note on (any two): **[16]**

a) Just-In-Time

b) Concept of World class Manufacturing.

c) Concept of Waste Management

d) Energy audit

OR

Q12) Write short note on (any two): **[16]**

a) Lean Manufacturing

b) Advanced Manufacturing Philosophies

c) Computerized Production Management

d) Energy Conservation

Total No. of Questions :12]

SEAT No. :

P2518

[Total No. of Pages :3

[5153] - 155

T.E. (Production Engineering)

CUTTING TOOL ENGINEERING

(2008 Course) (Semester - I) (311085)

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

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

SECTION-I

Q1) a) Draw with neat sketch for forces on single point tool and its measurement. **[10]**

b) Draw Merchant circle diagram and prove that, $\mu = (F_c \tan\alpha + F_t) / (F_c - F_t \tan\alpha)$ Where, μ= coefficient of friction, F_c = cutting force, F_t = Thrust force, α= Rake angle. **[10]**

OR

Q2) a) In an orthogonal cutting, the cutting velocity is 20 m/min and chip velocity is 10 m/min. the rake angle of tool is 12^o, cutting force is 900 N and feed force is 400 N, cutting chip thickness is 0.5 mm, uncut chip thickness is 0.2 mm. **[10]**

i) Chip thickness ratio,

ii) Shear plane angle,

iii) Shear force,

iv) Coefficient of friction,

v) Shear velocity

b) Explain types of chips with suitable sketches. **[10]**

P.T.O.

Q3) a) Explain following tool angle specification systems with suitable sketches. **[8]**

i) German system,

ii) ISO system.

b) Enumerate the essential requirements of a tool material. What is the role of chromium, molybdenum, vanadium in tool material? **[7]**

OR

Q4) a) Explain with suitable sketch the nomenclature of plain milling cutter. **[7]**

b) State some of the important characteristics of following tool materials **[8]**

i) High speed steel,

ii) Carbide,

iii) Ceramic,

iv) Stellite.

Q5) a) Explain different factors affecting on tool life. **[10]**

b) Define Machinability and its rating, criteria for Machinability. **[5]**

OR

Q6) a) Explain types of Chip breakers with suitable sketches. **[7]**

b) Discuss selection of cutting fluids. **[8]**

SECTION-II

Q7) a) Explain the various design aspect of single point tool. **[8]**

b) Explain the various design aspect of milling cutter. **[7]**

OR

Q8) a) The hole size prior to broaching in an alloy steel component is 32.25 mm with tolerance +0.05 and -0.00mm. The required finish broached size is 32.75 mm with tolerance +0.01 and -0.00. If the length of bore is 35 mm and the cutting speed is 0.15 m/s. Determine the power for broaching and design the broach. Assume, s=.05 mm, C =45 N/mm^2 & B=1.30. **[8]**

b) Design flat form tool for a given job by graphical method when, rake angle = 20° and relief angle = 30°. Raw material - Aluminum. **[7]**

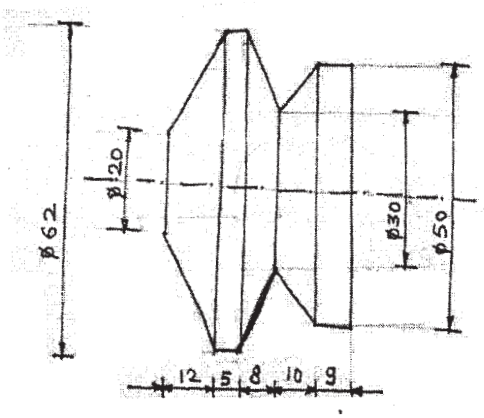

Fig No.1

Q9) a) Explain types of drill bushes with suitable sketches. **[10]**

b) Explain redundant location with suitable sketches. **[5]**

OR

Q10)a) Explain solid clamp, clamp with heel pin, clamp with adjustable heel pin, three point clamp with suitable sketches. **[10]**

b) Write note on economic of fixture. **[5]**

Q11)Design a jig for a given job to drill symmetrically placed four holes on 100 PCD of size Φ 8 mm. Draw F.V. and T.V. **[20]**

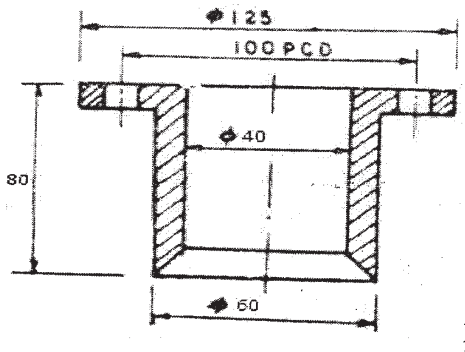

Fig.No.2

OR

Q12) Design a fixture for boring of size Φ 8 mm for part shown fig no.2. Draw F.V. and S.V. **[20]**

EEE

Total No. of Questions : 12]

SEAT No :

P2519

[Total No. of Pages :2

[5153]-156
T. E. (Production)
MACHINE TOOL ENGINEERING
(2008 Pattern) (Semester-II) (311087)

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

Instructions to the candidates:

1) ***Answer to the Two sections should be written in separate answer books.***
2) ***Neat diagrams must be drawn wherever necessary***
3) ***Figures to the right side indicate full marks.***
4) ***Solve Q1 or Q2,Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10, and Q11 or Q12.***
5) ***Use of electronic pocket calculator is allowed.***
6) ***Assume suitable data , if necessary.***

Q1) a) List the procedure for drawing cams for turret type automat. **[6]**

b) Explain parallel action multispindle automat. **[6]**

c) Explain automated production line. **[6]**

OR

Q2) a) How does an automates differ from a Capstan Lathe? **[6]**

b) Explain collets used in automate. **[6]**

c) Explain with figure rotary type transfer machine. **[6]**

Q3) a) Explain positioning system in Computer Numerical Controlled (CNC) machining. **[8]**

b) Explain difference between NC, CNC & DNC. **[8]**

OR

Q4) a) Explain open loop system and closed loop system of numerical control with suitable diagram. **[8]**

b) Write note on Machining Centre and Turning Centre. **[8]**

Q5) a) Explain principles of material handling. **[8]**

b) Write short note on Automated Guided Vehicle system (AGVS). **[8]**

OR

Q6) a) Explain with neat sketch Machine Vision System. **[8]**

b) Write short note on Automated Storage and Retrieval System (AS/RS). **[8]**

P.T.O.

Q7) a) Explain with neat diagram Electric Discharge Machine (EDM). Also explain RC circuit used in EDM. **[8]**

b) What are the different elements of Electro Chemical Machining (ECM).If iron is being machined using NaCl solution. Explain various reactions those will take place on anode and cathode. **[8]**

OR

Q8) a) Classify Nontraditional machining processes .Explain with neat sketch Ion Beam machining process. **[8]**

b) Explain the principle of Plasma Arc Machining with sketch and state its application. **[8]**

Q9) a) Write short note on Reliability analysis of machine tool. **[8]**

b) Explain with neat diagram Adaptive control system in CNC machine. **[8]**

OR

Q10)a) Explain various factors considered while designing the foundation of machine tool. Explain the method of vibration isolation. **[8]**

b) Explain maintenance policy, procedure adopted for CNC machine tool. **[8]**

Q11)a) Explain helical gear machining by using left hand/right hand hob. **[9]**

b) Explain with neat sketch bevel gear munufacturing by generation method. **[9]**

OR

Q12)a) Describe the working principle of Gear shaper machine with suitable example. **[9]**

b) Why it is necessary to use Gear finishing operation? Explain any one gear finishing process. **[9]**

Total No. of Questions :12]

SEAT No. :

P2520

[Total No. of Pages :4

[5153] - 157
T.E. (Production)
TOOL DESIGN
(2008 Course) (Semester - II) (311088)

Time : 4 Hours] *[Max. Marks :100*

Instructions to the candidates:

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

Q1) a) Explain any two types of presses used for sheet metal working operation with neat sketch. **[8]**

b) Explain various factors to be considered while laying out the strip. **[8]**

OR

Q2) a) Explain types of stopper used in press working operation with neat sketch. **[8]**

b) Explain and differentiate various types of strip layout. **[8]**

Q3) a) Define spring back. Explain various methods to overcome spring back. **[8]**

b) Calculate blank size by graphical method for the component as shown in figure 1. **[10]**

OR

Q4) Design a Drawing die for the component as shown in figure 1.

a) Calculate blank size by area method. **[6]**

b) Calculate number of draws, cup diameter and height in each draw. **[6]**

c) Determine press capacity **[6]**

(Assume stock thickness=1 mm, yield strength of material =420 N/mm^2)

P.T.O.

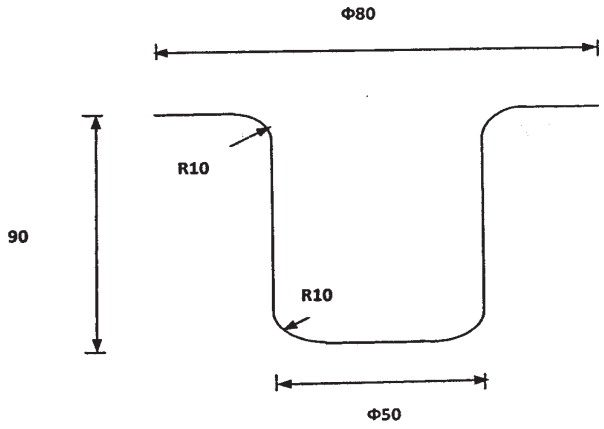

Figure1

Q5) a) Explain Submerged plunger die casting machine with neat sketch. **[8]**

b) Explain various types of pilots. **[8]**

OR

Q6) a) Explain Gooseneck type die casting machine with neat sketch. **[8]**

b) Explain various methods of piloting and conditions suitable for indirect piloting. **[8]**

Q7) Explain the following with neat sketch: **[18]**

a) Forging hammer (any one)

b) Forging press (any one)

c) Upsetters.

OR

Q8) Design a upsetting die for the component shown in Figure 2 **[18]**

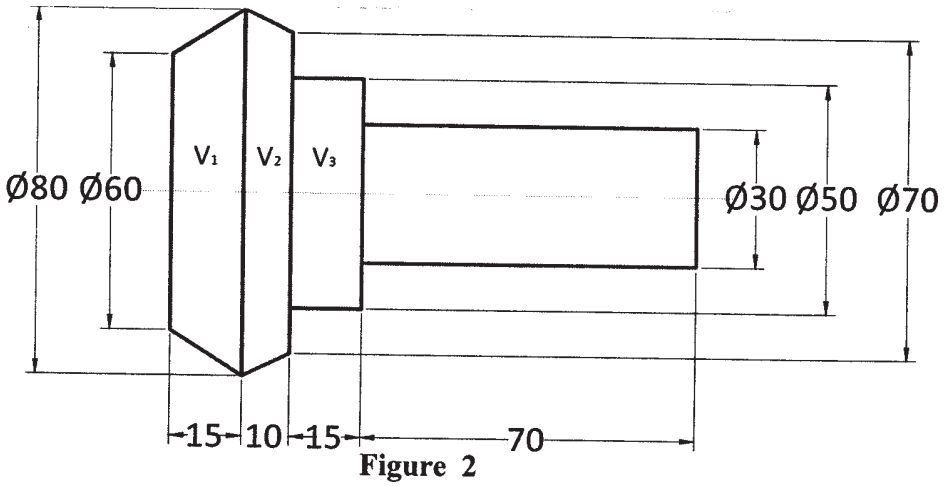

Figure 2

Q9) a) Explain Blow Molding with neat sketch. **[8]**

b) Explain Compression Molding with neat sketch. **[8]**

OR

Q10)a) Explain Transfer molding with neat sketch. **[8]**

b) Explain Rotational molding with neat sketch. **[8]**

Q11)a) Determine number of impressions for minimum cost for injection molding of component having weight 100 gm. Shot weight handling capacities for various molding machines along with machine hour rate is given below:**[8]**

Capacity (kg)	1	2	3	4
machine hour rate (Rs.)	50	60	70	80

Given that: Quantity to be produced =200000 Cycle time = 20 sec,

Cost of producing one impression = Rs. 2000.

b) State various runner profiles with neat sketch. Explain the important factors to be considered while runner designs. **[8]**

OR

Q12)The cup is to be formed by injection molding process. Cup Material is ABS. The following data is available:

Thickness of cup : 3mm

Runner diameter : 6.25mm

Thermal diffusivity α for *ABS* = 8.69×10^{-8}

Melt Temperature = $239^{o}C$

Cooling Temperature = $60^{o}C$

Ejection Temperature = $97.6^{o}C$

Mass of molding (Cup + runner) = 62.6gm

plastic specific heat, C_p = 2340 (J/kg^{o}C)

Coolant: Water

Water specific heat, Cp =4200(J/kg^{o}C)

Density of Water, ρ = 1000 kg/m^3

Viscosity of Water, μ = 0.001 Pa.s

Number of cooling lines = Four (2 lines per side)

Total length of cooling line = 604mm

Assume Reynold Number, Re = 4000

Determine:

a) Heat to be removed **[8]**

b) Heat transfer rate (cooling power) **[8]**

ℰℰℰ

Total No. of Questions : 11]

SEAT No. :

P2521

[Total No. of Pages :4

[5153]- 158

T.E. (Production & Industrial Engg.)

INDUSTRIAL ENGINEERING AND QUALITY ASSURANCE

(2008 Pattern) (Semester - II) (311089)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***assume suitable data wherever necessary.***

SECTION - I

Q1) a) Define basic work content. Explain various factors which increases the basic work content. **[8]**

b) Define Industrial Engineering. Explain in detail the contribution of F.W. Taylor and Gantt in the development of Industrial Engineering. **[10]**

OR

Q2) a) Explain in detail the factors affecting productivity. **[8]**

b) What are the functions of Industrial Engineering discuss in detail? **[10]**

Q3) a) What are the reasons of excess work content? Explain in detail? **[8]**

b) Explain in brief the steps involved in the method study. **[8]**

OR

Q4) a) What are different aspects to be considered for selection of the job for Method study? **[8]**

b) Explain with example flow process chart and SIMO charts used in method study. **[8]**

P.T.O.

Q5) a) What are the steps involved in Time study? Explain in detail. **[8]**

b) Explain with neat sketch the equipments used for doing the time study. **[8]**

OR

Q6) a) What is PMTS in time study? What are the factors to be considered while doing time study? **[8]**

b) Explain in detail the allowances used in time study. **[8]**

SECTION - II

Q7) a) What do you know by cost of quality and value of quality? How to balance them? **[8]**

b) A machine is working to a specification of 12.58 ± 0.05 mm. A study of 50 consecutive pieces shows the following measurements: **[8]**

1	2	3	4	5	6	7	8	9	10
12.54	12.58	12.61	12.57	12.57	12.58	12.60	12.65	12.60	12.65
12.58	12.57	12.60	12.61	12.60	12.59	12.62	12.57	12.59	12.61
12.62	12.60	12.64	12.56	12.62	12.59	12.61	12.57	12.60	12.60
12.56	12.60	12.58	12.59	12.61	12.56	12.67	12.56	12.63	12.62
12.59	12.61	12.64	12.59	12.58	12.57	12.60	12.61	12.56	12.62

i) Determine the process capability.

ii) Determine $\overline{X}$ and R control limits.

iii) State whether the machine is capable of meeting the tolerances?

iv) Calculate the % defective, if any.

v) Suggest the possible ways by which the percent defective can be reduced.

Assume:

1) Normal distribution

2) d_2 for sub-group size 5 is 2.326

OR

Q8) a) Explain the following as applied to quality control: **[8]**

i) Appraisal Cost ii) Prevention Cost

iii) Failure Cost iv) Optimum Cost.

b) In a manufacturing process, the number of defectives found in the inspection of 15 lots of 400 items each are given below: **[8]**

Lot no.	No.of defectives	Lot no.	No.of defectives
1	2	9	18
2	5	10	8
3	0	11	6
4	14	12	0
5	3	13	3
6	0	14	0
7	1	15	6
8	0		

i) Determine the trial control limits for *np* chart and state whether the process is in control.

ii) What will be new value of mean fraction defective if some obvious points outside control limits are eliminated. What will be the corresponding upper and lower control limits and examine whether the process is still in control or not.

Q9) a) What is definition of quality in Total Quality Management? Discuss in detail Deming's and Juran approaches. **[10]**

b) Explain concept of Six Sigma with appropriate manufacturing example.**[6]**

OR

Q10) a) What do you mean by term Reliability? **[4]**

b) What is Design of experiments? What are objectives for performing Design of experiment? **[6]**

c) Explain with neat sketch cause and effect diagram used in quality assurance system. **[6]**

Q11) Write short note on (Any 3) **[18]**

a) Different ISO standards.

b) Total Productive Maintenance (TPM)

c) Process Capability & Process Capability Index.

d) Operating Characteristic Curve (OC)

e) Pareto Analysis & Quality circle

Q11)a) Using the calculus of finite differences. find the sum of the following series

$1^3 + 2^3 + 3^3 + ...+n^3$. **[9]**

b) Solve the equation $\frac{dy}{dx} = x + y$ with initial condition y(0) = I by

Runge-Kutta rule. From x = 0 to x = 0.4 with h = 0.1. **[9]**

OR

Q12)a) Solve $y' = - xy^2$ and By Runge-Kutta Fourth Order Method, find y(0.6) given that y =1.7231 at x = 0.4. Take h = 0.2. **[9]**

b) Prove that the solution of $y^1 = y$, y (0) = 1 by Second Order Runge-Kutta Method **[9]**

▲ ▲ ▲

Q6) a) How Artificial Intelligence represent knowledge? Discuss some major areas of Al applications. **[10]**

b) State the benefits of Expert Systems. Discuss the problems and limitations of' it. **[8]**

SECTION -II

Q7) a) Calculate the value of $x^2 + 2x - 2$ and $(2x - 2) + x^2$, where

$x = 0.7320$ E 0:using normalized floating point arithmetic and prove that they are not the same. Compare with value of $(x^2 - 2) + 2x$. **[8]**

b) Using Newton-Raphson method, find correct to 3 decimal places, the root between 0 and 1 of the equation $x^3 - 6x + 4 = 0$. **[8]**

OR

Q8) a) Solve the following system of equation using Gauss - Seidal method correct to three decimal places. **[8]**

$x + y + 54z = 110$, $27x + 6y - z = 85$, $6x + 15y + 2z = 72$.

b) Solve the system of equations $x - 2y = 0$, $2x + y = 5$ by Gauss elimination method. **[8]**

Q9) a) By means of Lagrange's formula. prove that $y_1 = y_3 - 0.3 (y_5 - y_{-3}) + 0.2(y_{-3} - y_{-5})$ **[8]**

b) By the method of least squares. find the straight line that best fits the following data :

x :	1	2	3	4	5
y :	14	27	40	55	68

[8]

OR

Q10)a) State Newton's formula to find f (x) using the forward differences. **[8]**

b) Using Lagrange's interpolation formula. find y(10) from the following table : **[8]**

x :	5	6	9	11
y :	12	13	14	16

Total No. of Questions : 12] SEAT No. :

P4839

[Total No. of Pages : 3

[5153]-159
T.E. (Production Sandwich Engineering)
NUMERICAL TECHNIQUES AND DATABASE
(2008 Course)

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

Instructions to the candidates:-

1) ***Answer to the sections should be written in separate answer books.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of non-programmable electronic pocket calculator is allowed.***
5) ***Assume suitable data, if necessary.***
6) ***Solve Q1 or Q2, Q3or Q4, Q5 or Q6, Q7or Q8, Q9 or Q10, Q11 or Q12.***

SECTION -I

Q1) a) Discuss various organization and components of DBMS. **[8]**

b) What is the meaning of Database Retrieval? How it is attained in DBMS? **[8]**

OR

Q2) a) Draw an E-R Diagram for database of a School management system. **[8]**

b) Explain hierarchical & nework databases. **[8]**

Q3) a) Explain the dependencies and their impact on Database Design. **[8]**

b) State salient features of SQL. **[8]**

OR

Q4) a) How to avoid redundancy in Databases? **[8]**

b) What are aggregate functions used for? Explain with appropriate example. **[8]**

Q5) a) Discuss in brief the Electronic Funds Transfer Technologies and Services. **[8]**

b) What is e-commerce? How does it differ from e-business? Where does it intersect with e-business? State the unique features of e-commerce technology? **[10]**

OR

P.T.O.

Total No. of Questions : 12]

SEAT No. :

P2522

[Total No. of Pages : 3

[5153]-160
T.E. (Production Engineering)
PRODUCTION METALLURGY
(Common to Production S/W)
(2008 Course) (Semester -II) (311091)

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

Instructions to the candidates:

1) ***Answer Q 1 or Q2, Q3 or Q4, Q5 or Q6 from Section I and Q7 or Q8, Q9 or Q 10, Q 11 or Q12 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.***

SECTION -I

Q1) a) Explain the Eutectic reaction. Draw only Eutectic region of the diagram. Calculate the amount of phases by lever rule. **[6]**

b) Explain the following: i] AISI 2440 ii] En3l iii] Fe 520 K iv] 80Tl1 v]St50 vi] 25C5. **[6]**

c) What are the different specifications for steels? Give one example for each specification. **[6]**

OR

Q2) a) Calculate the amounts of phases in hypoeutectoid 0.6% C steel at room temperature, assuming equilibrium cooling condition. Draw the microstructure and define those phases. **[6]**

b) State and explain in brief the mechanism of etching of sample. **[6]**

c) Explain the following :- 80Tl1, 20Ni55Cr50Mo20, 20MnCrl, AISI 2440, Fe4l0K and En31 **[6]**

Q3) a) Explain the transformation of Austenite to Bainite. **[8]**

b) Explain the different stages of tempering with a neat diagram. **[8]**

OR

P.T.O.

Q4) a) Compare TTT curves with CCT curves for eutectoid steel alongwith diagram. **[8]**

b) Write shortnotes on : **[8]**

i) Secondary hardening

ii) Temper embrittlement

Q5) a) Compare Carburising with Nitriding. **[8]**

b) Write shortnotes: **[8]**

i) Austempering

ii) Martempering.

OR

Q6) a) Write short notes on: i] Induction Hardening ii] Isoforming. **[8]**

b) What are the property changes due to gas carbonitriding. Explain **[8]**

SECTION -II

Q7) a) Draw only microstructures: **[8]**

i) Ferritic Malleable cast iron

ii) Spheroidal graphite cast iron

b) Compare Ferritic stainless steels, Austenitic stainless steels and Martensitic stainless steels. **[10]**

OR

Q8) a) Write Shortnotes: **[8]**

i) Weld decay in stainless steels

ii) High Speed Tool Steels

b) Write a short note on various alloy cast irons. **[10]**

Q9) a) Give the composition, one property and two applications: **[8]**

i) Monel

ii) LM l 1

b) Draw microstructures: **[8]**

i) Cartridge Brass

ii) Aluminium Bronze

OR

Q10)a) Explain Coring? Justify that Tin bronzes show pronounced coring. **[8]**

b) Give the composition, one property and two applications: **[8]**

i) Bell Metal

ii) Alnico

Q11)a) State the properties and applications of Biomaterials. **[8]**

b) Write shortnote on sports materials. **[8]**

OR

Q12)a) Explain how Nanomaterials play an important role in electronics industry. **[8]**

b) What are composites? What unique properties they have over the conventional materials. Explain fibre reinforced composites. **[8]**

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Total No. of Questions : 6]

SEAT No. :

P2523

[Total No. of Pages : 2

[5153]-161
T.E.(Production S/W)
MANUFACTURING TECHNOLOGY(Self Study)
(2008 Pattern) (Semester - I) (311122)

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

Instructions to the candidates:

1) ***Section-1 and section II should be written in separate Answer books***
2) ***Figures to the right indicate full marks.***
3) ***All questions are compulsory.***
4) ***Assume suitable data wherever necessary.***

SECTION - I

Q1) Explain the need of non-convetional machining processes. Give detailed classification of non-convetional machining processes with respect to real life examples. **[16]**

OR

Draw only sketch of experimental setups of

a) Ion Beam Machining b) Plasma Arc Machining **[16]**

Q2) Why plastic processing is required ? Explain various moulding processes in detail. **[16]**

OR

Write a note on

a) Calendaring and Thermoforming

b) Laminating and reinforcing. **[16]**

Q3) What is MEMS? What are its practical applications? For MEMs explain necessity of semiconductor and silicon, Crystal Growing and Wafer Preparation **[18]**

OR

P.T.O.

Explain

a) Lithography

b) Nano-Technology

c) Top down and bottom Up Manufacturing. **[18]**

SECTION - II

Q4) Compare between Electrical, Optical and Pnuematic Comparators. **[16]**

OR

For measurements by light wave interference, draw various types of fringe patterns. **[16]**

Q5) Draw only sketch showing measurement setup of (Any Two) **[16]**

a) Sine Bar

b) Surface Finish Measurement

c) Spirit Level

OR

Explain working principle of Angle Dekkor **[16]**

Q6) Explain objectives and functions of cost estimating and enumerate estimating procedures. **[18]**

OR

Write Short notes on: **[18]**

a) Classification methods of depreciation

b) Time and value of money

c) Replacement Techniques

Total No. of Questions : 12]

SEAT No. :

P2524

[Total No. of Pages : 6

[5153]-164

T.E.(Production Sandwich)

KINEMATICS DESIGN OF MACHINES

(2008 Pattern) (Semester-II)

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

Instructions to the candidates:

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

SECTION-I

Q1) a) In a slider crank mechanism, the crank AB=100mm and the connecting rod BC=400mm. The line of the stroke of the slider is offset by a perpendicular distance of 25mm. If the crank rotates at an angular velocity of 20rad/s and angular acceleration of 12 rad/s^2 when the crank is inclined at an angle of 30°, determine the following: **[8]**

i) The linear velocity and acceleration of the slider and

ii) The angular velocity and angular acceleration of the connecting rod.

b) Explain the following Kinematic chain representation with figure: **[8]**

i) E-21

ii) C-13

iii) K-25

iv) K-23.

OR

P.T.O.

Q2) a) Explain with neat sketch the Kinematic analysis of gear shaping machine. **[10]**

b) Explain the following terms related to Kinematic Synthesis. **[6]**

i) Function Generation

ii) Dimensional Synthesis

iii) Path Generation.

Q3) a) What is cumulative fatigue damage? How the life of component subjected to different values of fluctuating stresses in cycle is estimated by using Miner's equation? **[8]**

b) A steel bar is subjected to two dimensional stresses; the tensile stress along the X-axis varies from 45MPa to 100 MPa, where as the tensile stress along the Y-axis varies from 5MPa to 75MPa. The corrected endurance strength of the component is 260MPa. The ultimate strength is 650MPa. Determine the factor of safety by maximum distortion energy theory. Use the Goodman's fatigue criterion for failure. **[8]**

OR

Q4) a) What is cumulative fatigue damage? How the life of component subjected to different values of fluctuating stresses in cycle is estimated by using "Miners Equation". **[8]**

b) A cantilever beam of circular cross section, made of cold drawn steel (S_{ut}=550N/mm^2) is fixed at one end and subjected to a completely reverse force of 1000 N at the free end. The force is perpendicular to the axis of the beam. The distance between the fixed end and free end of the cantilever beam is 400mm. If the desired life of the beam is 40,000 cycles. Determine the diameter of the beam. **[8]**

Q5) a) A spur gear pair is to transmit 10Kw power from an electric motor running at 1440 rpm to machine tool expected to run exactly at 600 rpm. The pinion and gear are made up of alloy steel (Sut=800N/mm^2) the gears are machined to meet the specification of grade7. The pinion and gear are to be hardened to 350BHN. Design the gear pair by using the dynamic factor and Spott's Equation.

Use following data:

Service factor = 1.5

Factor of safety = 1.5

Face width = 10 module

Tooth system = 20^o full depth involute

Load distribution factor = 1.4

Kv = 6/6+V

For Grade 7, $e = 11.0 + 0.9(m + 0.25\sqrt{d})$

Lewis Factor, $Y = 0.484 - \frac{2.87}{Z}$

$$Fd = \frac{e.\, n_p\, .Z_p .\, b.\, r_p .\, r_g}{2527\sqrt{r_p^2 + r_g^2}} \times \cos\phi$$

Notations have usual meaning. **[14]**

b) What is the significance of formative number of teeth in the design of helical gear? **[4]**

OR

Q6) a) The following data is given for a pair of helical gears made of steel:**[12]**

Normal Module	= 5 mm
Face Width	= 50mm
Number of pinion & Gear teeth	= 30&60
Centre distance	= 245mm
Normal pressure angle	= 20^o
Pinion Speed	= 1000rpm
Permissible bending stress for pinion & gear material	= 150N/mm^2
Surface hardness	= 300BHN
Factor of safety & Service Factor	= 2.0&1.5

Grade of machining 8,

Determine

i) Helix angle

ii) Beam Strength

iii) Wear Strength

iv) Dynamic Load Spott's Equation

v) Power transmitting capacity.

Use following data:

$$e = 16.0 + 1.25[m_n + 0.25\sqrt{d}]$$

Lewis Factor, $Y'_p = 0.3851$

b) What are different types of gear tooth failures explain? **[6]**

SECTION-II

Q7) a) A Single row deep groove ball bearing is subjected to the following work cycle: **[12]**

Element No.	Element Time%	Radial Load 'Fr' KN	Thrust Load 'Fa' KN	Radial Factor 'X'	Thrust Factor 'Y'	Race Rota ting	Service Factor	Speed in rpm
1	20	5.0	1.5	0.56	2.0	inner	1.5	720
2	50	7.0	1.0	1.0	0	outer	1.25	1440
3	10	7.5	2.5	0.56	1.8	inner	1.5	720
4	20	No load	No load	-	-	inner	-	360

If the dynamic capacity of the bearing is 108 KN, Calculate:

i) Rating life of the bearing in hours

ii) Average speed of operation, &

iii) Life of the bearing in hours, if the required reliability is 95%.

b) How you will select bearing from manufacturer's catalogue, explain in detailed? **[6]**

OR

Q8) a) Explain the following terms as applied to journal bearings. **[6]**

i) Bearing characteristic number

ii) Bearing modulus

b) Describe following bearings with neat sketch: **[12]**

i) Spheroidal bearing

ii) Taper roller bearing

iii) Needle Roller Bearing

iv) Plumber block

Q9) The areas of the turning moment diagram for one revolution of a multi cylinder engine with reference to the mean turning moment below and above the line are –32, +408, –267, +333, –310, +226, –374, +260 & –244 mm^2. The mean speed is 300 rpm with a percentage speed fluctuation of $\pm$1.5%. Determine suitable diameter and cross section for the flywheel, assuming that the width is equal to four times the thickness. Neglect the effect of the boss and arms.

Use following data;

Scale for abscissa 1mm = 2.4^o

Scale for abscissa 1mm = 650Nm

Hoop stress in the material = 5.6MPa

Density of the material = 7200kg/mm^3. **[16]**

OR

Q10)a) Explain the working of flywheel in four stroke internal combustion engine with neat sketch. **[8]**

b) Explain the construction of flywheel in detail with sketch. **[8]**

Q11)In a light weight equipment, a shaft is transmitting a torque of 900Nm and is to have a rigidity of 90Nm degree. Assume a factor of safety of 1.5 based on yield stress. Design the shaft with minimum weight. Assume maximum shear stress theory of failure. Use the following data for the materials. **[16]**

Material	Mass Density (Kg/m^3)	Material Cost (Rs/N Weight)	Yield Strength (Mpa)	Shear modulus (Gpa)
Steel Alloy	8500	16	130	80
AL-Alloy	3000	32	50	26.7
Titanium Alloy	4800	480	90	40
Magnesium Alloy	2100	32	20	16

OR

Q12)a) Explain the following terms with suitable example. **[9]**

i) Material parameter

ii) Limited parameter

iii) Unspecified and unlimited parameter.

b) Explain the difference between the design tolerance and natural tolerance. How the designer should select a tolerance for minimum rejection of component? **[7]**

Total No. of Questions : 12]

SEAT No. :

P2525

[Total No. of Pages : 3

[5153]- 165

T.E. (Production Sandwich Engineering)

MATERIAL FORMING AND MOULD DESIGN

(2008 Pattern) (Semester - II) (Theory) (311125)

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

Instructions to the candidates:

1) ***Answers to the two sections should be written in separate answer books***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
5) ***Assume suitable data if necessary***
6) ***Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10, Q11 or Q12***

SECTION - I

Q1) a) Explain behavior of metal when it is subjected to stress with neat sketch. **[8]**

b) A metal body is in plastic state under the action of following stress state.

$$T=\begin{bmatrix}160 & 60 & 40\\ 50 & -120 & 30\\ 40 & 30 & 80\end{bmatrix}$$

[8]

Determine the yield strength of material in tension & shear according to von mises yield condition. The stresses are in N/mm^2.

OR

Q2) a) Derive the expression for work done during tensile testing. **[8]**

b) Explain Mohr's circle with suitable diagram. **[8]**

Q3) a) Explain various process parameters in extrusion. **[8]**

b) Explain following (Any two) **[8]**

i) Flash & Flash gutter in forging

ii) Rotary swaging

iii) Press Forging

OR

P.T.O.

Q4) a) Calculate work done in extruding an aluminum billet of 800 mm diameter, 1500 mm long to eight square bars of 30 mm side. Flow stress of aluminum is 60 N/mm^2, coefficient of friction between billet and container is 0.38. If process to be completed in 8 minutes calculate power utilization. **[8]**

b) Explain various forgability tests. **[8]**

Q5) a) Explain stock preparation required before wire drawing operation. **[8]**

b) Explain Explosive forming in detail with neat sketch. **[10]**

OR

Q6) a) Calculate the drawing load required to achieve 40% reduction in area of 50 mm X 10 mm annealed mild strip using straight tapered die having semi-die angle 26.5°, coefficient of friction is 0.1, yield stress of material is 300 N/mm^2 **[10]**

b) Explain Electro-Hydraulic forming in detail with neat sketch. **[8]**

SECTION - II

Q7) a) Explain following in case of rolling **[8]**

i) Angle of bite

ii) Neutral Plane

iii) Backward slip

iv) Forward slip

b) Explain Roll Flattening & Roll Camber in rolling. **[8]**

OR

Q8) a) Determine rolling load based on deformed roll radius of CI rolls 600 mm diameter while rolling copper strip of 800 mm wide & 75 mm thick to give 30% reduction given that yield stress of copper is 675 N/mm^2 **[8]** Assume young's modulus (E) = 1.005 MN/mm^2 and Poissons ratio (r) = 0.35.

b) Show that for rolling process **[8]**

$$(\Delta h)_{max} = \mu^2 R$$

Where, h = draft in rolling

μ = coefficient of friction

R = Roll radius

Q9) a) What points are to be considered while designing pouring basin in sand casting. **[8]**

b) Explain ejection system in Die casting process with neat sketch. **[8]**

OR

Q10)a) Explain various elements of gating system with neat sketch **[8]**

b) Explain heat transfer and cooling consideration in die casting. **[8]**

Q11)a) Briefly explain various steps in Forging design. **[10]**

b) What factors are considered while designing a gate in injection moulding. **[8]**

OR

Q12)a) Explain any two types of gate used in injection moulding with neat sketch. **[8]**

b) Explain various allowances considered in forging die design. **[5]**

c) Explain any one ejection technique used in injection moulding with suitable sketch. **[5]**

Total No. of Questions : 12]

SEAT No :

P2526

[Total No. of Pages :2

[5153]-166

T.E. (Production Sandwich Engineering)

PRODUCTION & INDUSTRIAL MANAGEMENT-II

(2008 Course) (Semester-II)

Time : 3 Hours *Max. Marks : 100*

Instructions to the candidates:

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

SECTION-I

UNIT-I

Q1) a) What happens when an entrepreneur starts his business without conducting a market survey. **[8]**

b) What is Market research? **[6]**

c) What are the different forms of Money? **[4]**

OR

Q2) a) Explain the functions of Marketing management. **[8]**

b) Explain Law of Diminishing Marginal Utility. **[6]**

c) Explain Law of Supply. **[4]**

UNIT-II

Q3) a) Discuss Time estimate and Time standard. **[8]**

b) What are the functions of process engineering? **[8]**

OR

Q4) a) Differentiate between Special purpose and General purpose machines. **[8]**

b) What are the functions of process engineering? **[8]**

UNIT-III

Q5) a) Discuss standard tooling and Special tooling. **[8]**

b) Explain Dimensional analysis. **[8]**

OR

Q6)a) What is the purpose and utilization of Tolerance chart? **[8]**

b) Explain Six point location system? **[8]**

P.T.O.

SECTION-II

UNIT-IV

Q7) a) Explain the following terminologies. **[8]**

i) Sampling Plan

ii) Sampling Inspection

b) Draw and explain Operation Characteristic Curve. **[8]**

OR

Q8) a) Discuss Double sample plan with the help of flow chart. **[8]**

b) What is meant by variation and discuss the reasons of variations in manufacturing. **[8]**

UNIT-V

Q9) a) Explain 7 QC Tools. **[12]**

b) What is Quality Circle? **[4]**

OR

Q10)a) Discuss in detail Total Productive Maintenence (TPM). **[12]**

b) What is 5'S? **[4]**

UNIT-VI

Q11) a) Write down the short note on Design of Experiments. **[8]**

b) State the elements of Quality System. **[8]**

c) Define: Fault Tree Analysis (FTA). **[2]**

OR

Q12) a) State advantage and disadvantages of ISO 9000. **[8]**

b) Explain Taguchi Method. **[8]**

c) What is "continual improvement"? **[2]**

Total No. of Questions : 11]

SEAT No. :

P2527

[Total No. of Pages : 2

[5153]-171
T.E.(Biotechnology)
GENETIC ENGINEERING
(2008 Pattern) (Semester - I)

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

Instructions to the candidates:

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

SECTION-I

Q1) Explain the process of flow cytometry and its applications in Genetic Engineering. **[16]**

OR

Q2) Explain the method of PCR and its application in details. **[16]**

Q3) What do you mean by cloning vectors? Write short note on Plasmids as a cloning vector. **[16]**

OR

Q4) Write short notes: **[16]**

a) Phagemids.

b) Multiple Cloning sites.

Q5) What are the steps involved in forming a Genomic DNA library? **[18]**

OR

Q6) What are various methods of synthesizing C-DNA library? **[18]**

P.T.O.

SECTION-II

Q7) a) Why is it important to screen libraries? Explain library screening techniques in details. **[16]**

OR

Q8) Give an account of PCR in cloning. **[16]**

Q9) Answer in Brief: **[16]**

a) Transfection

b) Transformation

OR

Q10) What is Golden Rice? Explain role of genetic engineering in development of Golden rice. **[16]**

Q11) Write notes on: (Any 2) (9M Each) **[18]**

a) Gene Therapy

b) BT Cotton

c) RAPD

d) AFLP

❄ ❄ ❄

Total No. of Questions :12]

SEAT No. :

P2528

[Total No. of Pages :3

[5153] - 172
T.E. (Biotechnology)
MASS TRANSFER
(2008 Course) (Semester - I)

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

Instructions to the candidates:

1) ***Answer any three from section I and any three from section II.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***
5) ***Use graph sheets wherever required.***

SECTION-I

Q1) a) Discuss in brief the design principles to be considered while selecting any mass transfer operation. **[8]**

b) Explain Dankwarts Surface renewal theory. **[8]**

OR

Q2) Derive equations for the following with proper nomenclature and assumptions. **[16]**

a) Steady state molecular diffusion in liquids at rest.

b) Steady state equimolal.

Q3) a) Write short notes on distillation column internals. **[8]**

b) A simple batch still is used to distill 1000 kg of a mixture containing 60 mass% ethyl alcohol and 40 mass% of water. After distillation the bottom product contains 5 mass % of alcohol. Determine the composition of the overhead product, its mass and mass of the bottom product. Equilibrium data is with respect to weight percentage values. Data is given as, **[8]**

x	5	10	20	30	40	50	60
y	36	51.6	65.5	71	74	76.7	78.9

OR

P.T.O.

Q4) a) What are azeotropes? Explain azeotropic system with neat temperature and equilibrium diagrams. **[8]**

b) Define differential distillation. Derive Rayleigh's equation with necessary assumptions and nomenclature. **[8]**

Q5) a) Define the following: **[6]**

i) Murphree tray Efficiency

ii) Overall Tray Efficiency

iii) Point Efficiency

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

i) Flash distillation

ii) Total reflux ratio

iii) Optimum reflux ratio

OR

Q6) a) Give short note on Vapour - Liquid equilibrium for non-ideal systems. **[9]**

b) Write a short note on factors which influence the design of a binary distillation column. **[9]**

SECTION-II

Q7) a) What are different methods of absorption? Explain with neat diagrams and concentration profiles. **[9]**

b) 10000 kg/hr of a SO_2-air mixture containing 15% by volume of SO_2 is to be scrubbed with 2,00,000 kg/hr of water in a packed tower. The exit conc. of SO_2 is reduced to 0.40%. The tower operates at 1 atm. The equilibrium relation is given by: $Y^* = 30X$, Where Y = Mole SO_2/Mole Air and X=Mole SO_2/Mole water. **[9]**

If the packed bed height of tower is 0.52 m, calculate the height of transfer unit.

OR

Q8) a) Write a short note on Absorption with Chemical Reaction. **[9]**

b) Explain in detail concept of L_{min} in absorption column and write importance of L_{min} in absorption. **[9]**

Q9) a) Explain equilibrium moisture curve? **[8]**

b) Explain in detail equipment design and working of a rotary drum dryer. **[8]**

OR

Q10) a) Define following terms: **[8]**

i) Bound Moisture

ii) Relative humidity

iii) Wet Bulb Temperature

iv) Critical Moisture content

b) Write enthalpy balance equation for continuous drying operation. **[8]**

Q11) Explain Mier's supersaturation theory with diagram. What is the importance of rate of cooling in crystallization and how it can affect growth of crystals? **[16]**

OR

Q12) A Crystallizer is charged with 7500 kg of an aqueous solution at 377 K, 29.6% by weight of which is an hydrous sodium sulphate. The solution is cooled. During the cooling operation, 6% of the initial water is lost by evaporation. As a result crystals of Na_2SO_4, $10H_2O$ crystallize out. If the mother liquor is found to contain 18.3% by weight anhydrous Na_2SO_4. Calculate the yield of crystals and quantity of mother liquor. **[16]**

Data Mol. Wt. Na=23, S=32, O=16, H=1.

EEE

Total No. of Questions : 12]

SEAT No. :

P2529

[Total No. of Pages : 3

[5153]-173
T.E. (Biotechnology)
HEAT TRANSFER
(2008 Pattern) (Semester - I)

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

Instructions to the candidates:

1) ***Answer any three from section I and any three from section II.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume Suitable data, if necessary.***
5) ***Use graph sheets wherever required.***
6) ***Use of logarithmic tables, slide rules, Mollier charts, electronic pocket calculator and steam table is allowed.***

SECTION-I

Q1) a) How is dimensional analysis useful in data reduction and data analysis? **[4]**

b) What is Reynold's analogy and j-factor analogy? Give importance of these transfer analogies and their application. **[12]**

OR

Q2) a) Explain Fourier's law of heat conduction and Newton's law of cooling. **[6]**

b) Based on Fourier's law of heat conduction derive an expression for temperature variation in case of infinite slab. **[10]**

Q3) a) Show that when a system contains several different heat transfer resistances in series, the overall resistance is equal to the sum of the individual resistance. **[8]**

b) Calculate the critical radius of insulation for asbestos (K= 0.17 W/m°C) surrounding a pipe and exposed to room air at 20°C, 5cm diameter pipe when covered with the critical radius of insulation and without insulation. **[8]**

OR

Q4) a) What is the purpose of extended surfaces in heat exchange equipments? Derive an equation for calculating effectiveness and efficiency of pin fin. **[8]**

b) Write a short note on Heat losses through pipe. **[8]**

P.T.O.

Q5) a) What is boiling? What are types of boiling? Explain the different regimes in pool boiling. **[9]**

b) What is insulation? Explain in detail critical radius and optimum thickness of insulation. **[9]**

OR

Q6) a) Give physical significance of following nos. **[8]**

i) Prandtl No.

ii) Reynold's No.

iii) Nusselt No.

iv) Grashof No.

b) Distinguish between dropwise condensation and film condensation. **[6]**

c) Define : i) Overall Heat transfer Co-efficient ii) Thermal Conductivity.**[4]**

SECTION-II

Q7) a) Two parallel black plates 0.5 by 1 m are spaced 0.5 m apart. One plate is maintained at 1000ºC and the other at 500ºC. What is the net radient heat exchange between the two plates? (F_{12}=0.285 and σ=5.667 × 10^{-8}).**[4]**

b) Explain in detail wein's law and derive an expression λ_{max} T=0.0029 mk. **[6]**

c) Suppose a sphere of surface area A_1 is completely enclosed by an irregular surface of area A_2, Determine the shape factors F_{12}, F_{21}, F_{11} and F_{22}.**[6]**

OR

Q8) a) Define the following: **[6]**

i) Absorptivity

ii) Grey body

iii) Shape factor

b) Derive the equation for net exchange of radient hat flux between two infinite parallel diffuse grey surfaces which are maintained at absolute temperatures T_1 and T_2 and have emissivities ε_1 and ε_2 respectively.**[10]**

Q9) a) Derive an expression for the mean film temperature difference in a parallel flow heat exchanger in which inlet and exit temperature on the hot side are T_{hi} and T_{he} and on the cold side are T_{ci} and T_{ce}, respectively. **[4]**

b) Draw and explain tube in tube type of heat exchangers. Why countercurrent flow is considered to be effective over co current flow.**[12]**

OR

Q10)a) Counter flow concentric heat exchanger is used to cool lubricating oil. (Specific heat 2131 J/kg K) for large industrial gas turbine engine. Flow rate of cooling water (Specific heat 4178 J/kg K) through the inner tube is 0.2 kg/sec. (tube diameter of 25 mm) while lubricating oil flows through the annulus (outer tube diameter 45 mm) with flow rate of 0.1 kg/sec. Oil and water enter at temperature of 100ºC and 30ºC respectively. How long must the tubes be made if outlet temperature of oil is to be 60ºC? Compute the length by using LMTD method if U=380W/m^2K. **[8]**

b) What is a concept of log mean temperature difference (LMTD). Derive an expression for countercurrent flow using LMTD method. **[8]**

Q11)a) Write material and energy balance equations over a single effect evaporator. **[12]**

b) Draw and explain feed forward and feed backward feeding method in multiple effect evaporator. **[6]**

OR

Q12)a) A single effect evaporator is used to concentrate on aqueous solution from 5% to 25% solids content by weight using saturated steam at 2 bar gauge pressure. If overall heat transfer co-efficient is 2 kW/m^2ºC, Calculate capacity, steam consumption, economy and heat transfer area required. Assume that feed is 4000 kg/hr at 50ºC. Vapour space pressure remains constant at 1.013 bar absolute. **[8]**

Data Given: Heat capacity of feed = 4.2kJ/kgºC.

Pressure of steam is 2 bar (gauge) T_s=135.55ºC and λ_s = 2163.9 kJ/kg.

Feed at 1.013 bar , T_{sat} = 100ºC and λ_v=2256 kJ/kg

b) Write short notes on 'Boiling point Elevation' and Duhring's plot. **[6]**

c) Define and explain Evaporator capacity and Economy. **[4]**

Total No. of Questions : 12]

SEAT No. :

P2530

[Total No. of Pages : 2

[5153]-174
T.E. (Biotechnology)
FERMENTATION TECHNOLOGY-I
(2008 Pattern) (Semester - I) (315464)

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

Instructions to the candidates:

1) ***Answer three questions from section I and three questions from section II.***
2) ***Answers to the two sections should be written in separate answer books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Assume Suitable data, if necessary.***

SECTION-I

Q1) What is industrial fermentation? Explain in detail the types of products produced by industrial fermentation along with applications. **[16]**

OR

Q2) Explain in detail methods of screening and isolation of microorganisms. **[16]**

Q3) What is nutrient medium? How are media classified? Describe various media optimisation strategies currently used fermentation industries. **[16]**

OR

Q4) What is a need for sterilization? Explain in detail kinetics of sterilization. **[16]**

Q5) Explain in detail activites of lactic acid bacteria and industrial production of lacticacid. **[18]**

OR

Q6) Enlist alcoholic beverages produced by Fermentation Technology. Write in detail about Beer production with the help of following points: **[18]**

a) Microorganism.
b) Medium Composition.
c) Inoculum preparation.
d) Production process.

P.T.O.

SECTION-II

Q7) Explain in detail mechanism of action of following antibiotics: **[16]**

a) Penicillin
b) Streptomycin
c) Chloromycetin
d) Tetracycline

OR

Q8) Explain Single cell protein. Explain production, recovery and applications of SCP in detail. **[16]**

Q9) What is solid state and liquid state fermentation? How are they different from each other? Enlist the products of solid and liquid state fermentation. **[16]**

OR

Q10) What is Solid State Fermentation? Describe the types of solid state bioreactors in detail. Explain the process with the help of any one production process. **[16]**

Q11) Explain the concept of scale up with the help of following points. **[18]**

a) Principles
b) Theoretical considerations.
c) Techniques used.

OR

Q12) Why economics of any fermentation process is important? Explain the concept with one case example. **[18]**

Total No. of Questions : 12]

SEAT No. :

P2531

[Total No. of Pages : 3

[5153]-175

T.E. (Biotechnology)

COMPUTATIONAL TECHNIQUES AND BIOSTATISTICS

(2008 Pattern) (Semester - I)

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

Instructions to the candidates:

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

Q1) a) Find the values of A and Y which best fit the equation A=mY + x by using the following data. **[9]**

A	12	15	21	25
Y	50	70	100	120

b) Find the values of "a", "b" and "c" so that $Y = a + bx + cx^2$ is the best fit to the data. **[9]**

X	0	1	2	3	4
Y	1	0	3	10	21

OR

Q2) a) Find the constants "a", and "b" by least squares method to fit straight line of the form. **[9]**

$Y = a + bx$ using following data.

X	0	1	2	3
Y	2	5	8	11

b) While testing a centrifugal pump the following data is obtained. It is assumed to fit the equation $y = a + bx + cx^2$, where "x" is the discharge in lit/sec and "y" is the head in meters of water. Find the values of a, b and c. Fit a function of the form $y = ax^b$ to the following data. **[9]**

x	2	2.5	3	3.5	4	4.5	5	5.5	6
y	18	17.8	17.5	17	15.8	14.8	13.3	11.7	9

P.T.O.

Q3) a) Applying Lagrange's formula and find a polynomial which approximates the following data. **[10]**

X	–2	–1	2	3
f(x)	–12	–8	3	5

b) Evaluate $\Delta^2(ab^x)$ **[6]**

OR

Q4) a) Given the set of tabulated points (1,–3), (3,9), (4,30) and (6,132). Obtain the value of y when x is 2 using Newton's divided difference formulae.**[10]**

b) Evaluate $\Delta^2(x^3)$. **[6]**

Q5)Find $\int e^{-x^2}$ dx between limits 0 and 0.6 by taking seven ordinates by using .**[16]**

a) Simpsons's1/3rd rule,

b) Weddle's rule

c) Trapezoidal rule

d) Simpson's 3/8 rule

OR

Q6) a) Determine the maximum error in evaluating the integral $\int \cos x\,dx$ from 0 to $(\pi/2)$ by trapezoidal rule using four sub intervals. **[8]**

b) By using simpson's 1/3rd rule find the value of the function e^{-x^2} dx by taking five coordinates. **[8]**

Q7) a) Define Quasi random sampling method? How can it be formed? When is it used? What is the working procedure adopted for sampling under this method? **[12]**

b) Define **[4]**

i) Bias ii) Statistics

OR

Q8) Find the real root of $xe^x - 2 = 0$ correct to three decimal places by using **[16]**

a) Newton's iterative method.

b) Regular falsi method

Q9) Explain the factors considered while choosing a suitable diagram for the representation of any data. **[16]**

OR

Q10)a) Write short notes on **[8]**

i) Law of statistical regularity

ii) Law of inertia of large numbers.

b) Write a short note on "Semi logarithmic graphs". **[8]**

Q11)a) Calculate the median for the following data. **[9]**

Weight (gms)	410-419	420-429	430-439	440-449	450-459	460-469	470-479
No.of apples	14	20	42	54	45	18	7

b) Give in a flow chart of various sampling methods. **[9]**

OR

Q12)Evaluate **[18]**

$$I = \int_0^1 \frac{1}{1+x}\,dx,$$

Correct to three decimal places. Solve this example by both the trapezoidal and Simpson's rule with h = 0.5, 0.25 and 0.125 respectively. Compare the results in each case and test the accuracy for both methods.

Total No. of Questions : 12]

SEAT No. :

P2532

[Total No. of Pages : 3

[5153]-176
T.E. (Biotechnology)
REACTION ENGINEERING
(2008 Course) (Semester - II) (315466)

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

Instructions to the candidates:

1) ***Answers to the two sections should be written in separate answer books.***
2) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 from section I and Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12 from section II.***
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 data, if necessary.***

SECTION - I

Q1) a) Write short note with suitable example on **[8]**

i) Molecularity

ii) Parallel reaction

b) The activation energy of biochemical reaction is 17982 cal/mol in absence of catalyst, and 12980 cal/mol with a catalyst. By how many times will the rate of reaction will increase in the presence of catalyst, if a reaction proceeds at 25°C? **[8]**

OR

Q2) a) Write details note on collision theory. **[8]**

b) Differentiate between Molecularity and order of reaction. **[8]**

Q3) a) Discuss in details integral method of analysis of kinetic data. **[8]**

b) Derive the performance equation for mixed flow reactor. **[8]**

OR

Q4) a) In studying the kinetic of decomposition of a reaction, the concentration of a reaction were determined analytically at different times. The following result was obtained.

Time, min	0	10	20	40	100	125
Conc. mol/lit	0.1	0.0714	0.0356	0.0385	0.02	0.0167

Determine the order of reaction. **[8]**

b) What are different types of reactor? Explain any two with neat sketch. **[8]**

P.T.O.

Q5) a) Considering laminar flow condition with first order reaction with K = 0.1 S^{-1} and θ = 10s taking place calculate the conversion in plug flow reactor. **[8]**

b) For pulse input experiments following results were obtained. Calculate the conversion of reactant A in the plug flow reactor. **[10]**

$$A \rightarrow \text{Product}, \quad -r_A = 0.10\ C_A$$

Data :

t, min	0	1	2	3	4	5	6	7	8	9	10	12	14
Cpulse, gm/cu.m.	0	1	5	8	10	8	6	4	3	2.2	1.5	0.6	0

OR

Q6) a) Discuss in details about Dispersion and Segregated flow model. **[10]**

b) Discuss about state of aggregation. **[8]**

SECTION - II

Q7) a) Derive overall rate equation for a given system **[10]**

$$A_{(1)} + B_{(S)} \rightarrow R_{(1)}$$

Dilute A diffuses through a stagnant liquid film onto a plane surface consisting of B, react to produce R which diffuses back into a main stream. Develop overall rate expression for liquid solid reaction

b) Determine the amount of catalyst required in packed bed reactor for 90% conversion of 900 mol/min if C_{A0} = 10 mol/m^3 of feed. **[8]**

OR

Q8) a) Discuss about shrinking core model. **[12]**

b) What are the factors affecting on heterogeneous reactions? **[6]**

Q9) a) Derive the performance equation for porous catalyzed reaction. **[8]**

b) Explain pore diffusion resistance combined with surface kinetics with example. **[8]**

OR

Q10)a) Discuss the significance and limiting cases for thiele modulus? **[8]**

b) Give short note on packed bed catalytic reactor and trickle bed reactor. **[8]**

Q11)a) Discuss about microbial fermentation process. **[8]**

b) Discuss about competitive and Non-competitive inhibition. **[8]**

OR

Q12)Discuss the following: **[16]**

a) Factors affecting growth kinetics.

b) Substrate limiting microbial fermentation.

x x x

Total No. of Questions : 12]

SEAT No. :

P2533

[Total No. of Pages : 3

[5153]-177
T.E.(Biotechnology)
FERMENTATION TECHNOLOGY - II
(2008 Pattern) (Semester-II)

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

Instructions to the candidates:

1) ***Answer any three from section I and any three from section II.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume Suitable data if necessary.***
5) ***Use graph sheets wherever required.***

SECTION-I

Q1) a) How sulphite oxidation method is used for the determination of K_{La} in fermentation broths? Discuss in detail. **[8]**

b) Explain factors affecting diffusion in bioprocessing. **[8]**

OR

Q2) Write short notes on: **[16]**

a) Bubble column reactor

b) Air lift Reactor.

Q3) a) What is OTR? Deduce the equation for OTR. How does it influence the fermenter performance? **[8]**

b) Explain in detail gassing out technique in order to determine mass transfer co-efficients in a fermenter? **[8]**

OR

P.T.O.

Q4) a) Derive Ruth equation describing the rate of filtration for rotary filters. **[8]**

b) Write a short note on construction and working of packed bed towers. List out its applications. **[8]**

Q5) Write short notes on: **[18]**

a) Langmuir adsorption isotherm

b) Freundlich adsorption isotherm

OR

Q6) A volume of $1m^3$ contains a mixture of air and acetone vapour. The temperature is 30^oC and the total pressure is 10^5 N/m^2. If the relative saturation of the air by acetone vapour is 40%, determine the quantity of activated carbon that must be added to the space for reducing the relative saturation to 5% at 30^oC. If 1.6 kg of carbon is added what will be the percent relative saturation of the equilibrium mixture assuming temperature to be the same? **[18]**

SECTION-II

Q7) Explain graphical representation of the following equilibrium conditions in adsorption. **[18]**

a) Solids in overflow, variable underflow

b) No solids in overflow, constant underflow

OR

Q8) List out the equipments used for leaching of fine solids. Explain the construction and working of Ball man extractor. **[18]**

Q9) What is membrane fouling? Explain factors which decrease the flux through a membrane. How it can be prevented? **[16]**

OR

Q10) Explain in detail pervaporation and give parameters which are used to assess pervaporation process. **[16]**

Q11) a) Write a short note on ternary liquid equilibria? When is it useful and how? **[8]**

b) Derive the operating line equation for a single phase extractor and show graphical representation of the same. **[8]**

OR

Q12) What are factors affecting solvent extraction? How to choose solvent for extraction. How these factors are correlated with efficiency of extraction? **[16]**

Total No. of Questions : 10]

SEAT No. :

P2534

[Total No. of Pages : 2

[5153]-178
T.E.(Biotechnology)
BIOSEPARATION-I
(2008 Pattern) (Semester - II)

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

Instructions to the candidates:

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

SECTION-I

Q1) a) Give introduction to Bioseparation techniques. **[8]**

b) Explain any two chemical/biological cell disruption technique. **[8]**

OR

Q2) a) Describe mechanical cell disruption technique in details. **[8]**

b) Explain the mechanism of Adsorption in details. **[8]**

Q3) a) Write in details theory of Chromatography. **[8]**

b) Differentiate between planner versus column chromatography. **[8]**

OR

Q4) What is chromatography? Draw chromatogram and explain all terms related to it. **[16]**

P.T.O.

Q5) Write short notes on:(Any 2) (9 M Each) **[18]**

a) Sedimentation.

b) Microfiltration.

c) Filtration.

d) Reverse Osmosis.

SECTION-II

Q6) Write short notes on: (8M Each) (Any 2) **[16]**

a) Crystallization

b) Lyophilzation

c) Leaching

d) Drying

Q7) Draw "Typical flow diagram of a protein production facility" and explain the process of Insulin Production. **[16]**

OR

Q8) Write importance of Bioseparations in Biotechnology and write notes on Economics of Bioseparation Process. **[16]**

Q9) Explain Cell Disruption methods used in Diary Industry. **[18]**

OR

Q10) Elaborate on recent industrial advances in Bioseparation processes with example of secondary metabolite product like Steroids. **[18]**

Total No. of Questions : 12]

SEAT No. :

P2535

[Total No. of Pages :2

[5153]-179
T. E. (Biotechnology)
IMMUNOLOGY AND DIAGNOSTICS
(2008 Course) (Semester-II) (315469)

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

Instructions to the candidates:

1) ***Both sections compulsory.***
2) ***Draw diagrams wherever necessary.***
3) ***Maximum marks for each question is given in brackets.***

SECTION-I

Q1) Describe structure and function of any one of each of primary, secondary and tertiary lymphoid organs. **[18]**

OR

Q2) Discuss the major attributes that make a substance a good antigen? **[18]**

Q3) Describe the principle, methodology and clinical applications of RIA with suitable examples. **[16]**

OR

Q4) Give detailed account of structure and functions of Immunoglobulins. **[16]**

Q5) Write notes on any two **[16]**

a) Monoclonal antibody

b) IgA

c) Innate Immunity

OR

Q6) With the help of diagram describe the process of B cell maturation and activation. **[16]**

P.T.O.

SECTION-II

Q7) With the help of diagram of describe Graft versus host rejection. **[18]**

OR

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

a) Anaphylaxis

b) Ig E

Q9) Enlist different types of vaccines and describe advantages and disadvantages of various types. **[16]**

OR

Q10) Write notes on **[16]**

a) DNA vaccine

b) Adjuvants

Q11) What is autoimmunity? Name two systemic and two organ specific autoimmune diseases. **[16]**

OR

Q12) Write notes on **[16]**

a) Cell mediated immunity in HIV

b) Diagnostic test for HIV

♦ ♦ ♦

Total No. of Questions : 12]

SEAT No. :

P2536

[Total No. of Pages : 2

[5153]-180
T.E. (Biotechnology)
BIOINFORMATICS AND MANAGEMENT
(2008 Pattern) (Semester - II) (End Semester)

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

SECTION - I

Q1) Explain in brief the following: **[18]**

a) Object oreinted database model.

b) Relational databases.

OR

Q2) What is Pubmed? What is the information which is available through this database, and how is it organized? **[18]**

Q3) How is the DNA sequencing carried out? What are the different methods and strategies for sequencing? **[16]**

OR

Q4) Explain Genbank as a database. Explain in detail organization of the data on the query result page. **[16]**

Q5) Describe the secondary protein databases PROSITE, PRINTS and BLOCKS. Explain the organization of data in these databases. **[16]**

OR

Q6) How is the data organization in PDB? How can the 3D structures be retrieved from the database, how does it help in protein research? **[16]**

P.T.O.

SECTION - II

Q7) Describe in detail: **[18]**

a) Needleman Wunsch Algorithm.

b) Smith Waterman Algorithm.

OR

Q8) What are Substitution matrices? Explain how these matrices are used. **[18]**

Q9) Describe phylogenetic tree construction with respect to rooted and unrooted trees. **[16]**

OR

Q10) How is bioinformatics analysis and various tools used for the development of Vaccines, explain with help of an example. **[16]**

Q11) In a biotechnology company how is the management of resources done and why it is so important in biotechnology industry? How is the organization of various components in a Tissue culture based company? **[16]**

OR

Q12) Describe the various disciplines of management. Explain Operations management in detail. **[16]**