Total No. of Questions : 8] **SEAT No. :**

P4423 **[Total No. of Pages : 4**

[4858]-1
T.E. (Civil) (Semester - I)
STRUCTURAL DESIGN - I
(2003 Pattern)

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

Instructions to the candidates:

1) ***Attempt Q. 1 or Q. 2, Q. 3 or Q. 4 from Section - I and Q. 5 or Q.6. Q.7 or Q.8 from Section - II.***
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) ***Assume suitable data, if necessary.***
6) ***Use of electronic pocket calculator IS : 800 and steel table is allowed.***

SECTION - I

Q1) a) Define Pitch, gauge. edge distance, bolt line with suitable figure and state IS requirements for the same related to bolted connection. **[5]**

b) Find out the strength of a 6 mm fillet weld per mm length. A 200 mm wide plate is to be joined to another plate section 300mm wide, Find out the strength of the joint if the overlap of the plates is 150 mm. Both longitudinal and end fillet welds are provided. What will be the overlap required if only longitudinal fillet welds are provided? The plates are 8 mm thick. **[10]**

c) Design the joints of members of a roof truss with gusset plate 12 mm thick. **[10]**

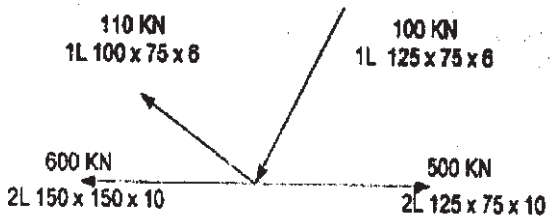


Fig. - 1

OR

Q2) a) What are the advantages and disadvantages of bolted connections? **[5]**

b) A column lSHB 200 @ 392.4N/m carries an axial compressive load of

P.T.O.

380 KN. Design the connections of the gusset plate with column section using HSFG bolts. **[10]**

c) Design a fillet weld to join a tension member consisting of 2 ISA 100×75×8 to a gusset plate 12 mm thick. The tensile load is 280 KN. **[10]**

Q3) a) Design channel section purlins for an industrial building roof for the following data, **[10]**

Distance between c/c of trusses = 5.0 m

Distance between c/c of purlins = 1.60 m

Inclination of roof sorface to the horizontal = 30 Degrees

Weight of G I Sheets = 133.1 N/mm^2

Wind load normal to the roof = 1500 N/m^2

f_y = 250 N/mm^2

b) Design a welded plate girder of 24 m span to carry uniformly distributed load of 100 KN/m along with central point load of 120 KN. Depth of girder is restricted to 2000 mm. Design should include economical cross section, welded connection between flange and web, vertical stiffener.**[15]**

OR

Q4) a) An ISLB 600 @ 976.1 N/m has been used as a simply supported beam over 4.20 m span. The ends of the beam are restrained against torsion but not against lateral bending. Determine the safe uniform load that the beam can carry. **[9]**

Assume f_y = 340 N/mm^2

b) Design a simply supported gantry girder to carry electric overhead traveling crane for the following data. Selected section should be safe for maximum bending moment due to vertical forces and lateral forces. **[16]**

Crane capacity - 280 KN

Weight of crane excluding trolly - 150 KN

Weight of trolly - 120 KN

Minimum approach of crane hook - 1.3m

Wheel Base - 3 m

Distance between center of gantry girders - 14 m

Longitudinal spacing of columns - 7 m

Weight of rail section - 0.3 KN/m

Height of rail section - 75 mm

SECTION - II

Q5) A foot over bridge is as shown in fig. 2. The walkway of concrete is 150 mm thick and pedestrian load is 3.8 KN/m^2. The cross girders are spaced at 2 meters centers. The clear walking width between main girders is 2.5 m calculate.

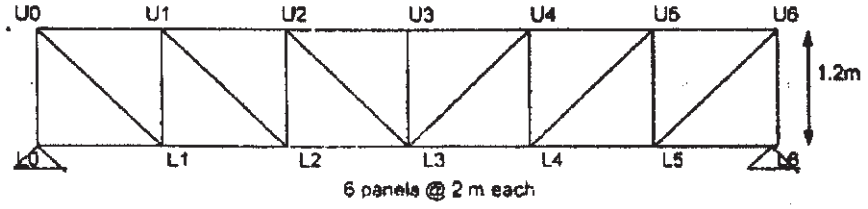


Fig. 2

a) Maximum force in top chord member and design the top chord member using double angle section. **[8]**

b) Find maximum force in vertical member and design it. **[6]**

c) Design the raker member provided at both the ends for lateral stability. **[6]**

d) Show schematic details of the member designed along with connections. **[5]**

OR

Q6) a) A roof truss for a factory building is of span 20 m and a pitch of L/5. The height of the truss at the eaves level is 10 m. the spacing of the trusses is 4.5 m. the factory building which is 30 m long is situated at Mumbai. Take yield stress as 250 N/mm^2 for steel sections. Assume suitable type of roof truss and calculate.

i) Dead load and live load per panel point assuming sheeting material. **[6]**

ii) Find the forces in bottom chord and rafter and design it using double angles & show the design details. **[6]**

iii) Design any one joint & show the design details. **[4]**

b) Design a column base for an axial load of 700 KN and a bending moment of 100 KN m. The column section provided is ISHB 400 @ 806.4 N/m. The bearing pressure from concrete may be assumed to be 3750 KN/m^2. **[9]**

Q7) a) Design a built-up column with four angles laced together. The effective length of the column is 7.20m and it supports a load of 1200 KN. **[12]**

Show the details with sketch. **[6]**

b) 'Design of compression members with light gauge steel', write a note. **[7]**

OR

Q8) a) Design a column section to be used in a public building. Column is 4.80 m long with its ends restrained in direction and position. The column is to support a 1800 KN load. **[12]**

b) Determine the sectional properties (Area, Moment of Inertia) of light gauge steel shown in fig. 3 by linear method. Also find percentage error. (Dimensions in mm) **[13]**

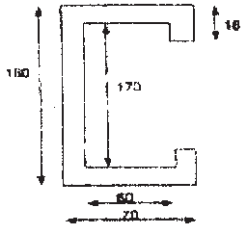


Fig. 3

Total No. of Questions : 12]

SEAT No. :

P2021

[Total No. of Pages : 4

[4858]-101

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

STRUCTURAL ANALYSIS - II

(2008 Pattern)

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 books.*
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.*

SECTION - I

Q1) Analyse the Continuous Beam Loaded as shown in Fig(1) by using Slope Deflection Method and sketch the BMD, Assume $2I_{AB}=I_{BC}=2I_{CD}$. **[16]**

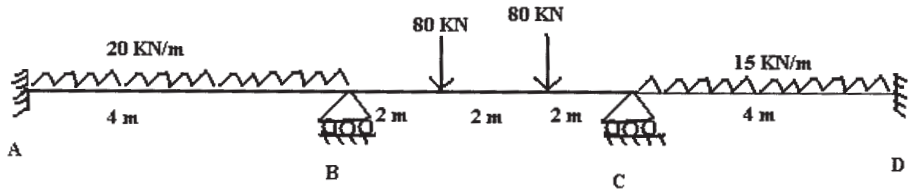


Fig (1)

OR

Q2) Analyse the structure as shown in fig(2) by using Slope Deflection Method and sketch the BMD. **[16]**

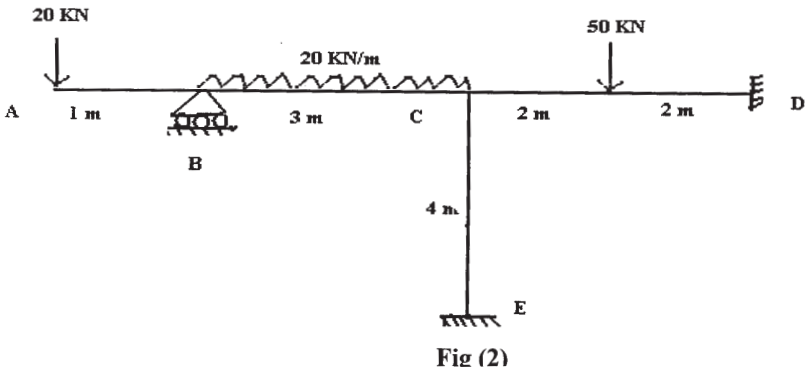


Fig (2)

P.T.O.

Q3) A simply supported beam ABCD, is 20 m long is simply supported at its ends and is propped at the same level at B and C as shown in fig (3), if support B is sink by 10 mm analyze the beam by using Moment Distribution Method and draw the B.M.D, Take E= 2.1×10^5 N/mm^2 and I= 85×10^4 mm^4. **[18]**

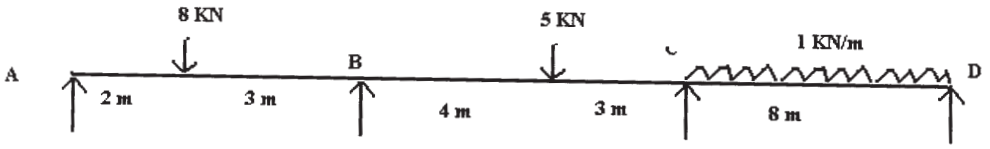


Fig-(3)

OR

Q4) Analyse the frame as shown fig (2) by using Moment Distribution Method and draw the S.F.D and B.M.D. **[18]**

Q5) A three hinged parabolic arch of 30 m span has its support at depths 4 m and 16 m below crown C. The arch carries a load of 80 KN at a distance of 5 m to the left of C, and second load of 100 KN at 10 m to the right of C, find the reactions at support and bending moment under the loads. **[16]**

OR

Q6) a) A two hinged parabolic arch of span (L) and rise (h), carries a triangular load whose intensity varies from Zero at left end to w/m at a distance **a** from left end determine the horizontal thrust. **[8]**

b) A two hinged parabolic arch of span 20 m and rise 4 m carries UDL of 5 KN/m on left half of the span find the reactions at support and the position and amount of maximum bending moment. **[8]**

SECTION - II

Q7) a) Explain the concept of flexibility matrix. **[4]**

b) Analyze the beam as shown in fig (4) by flexibility method, assume EI=constant. **[12]**

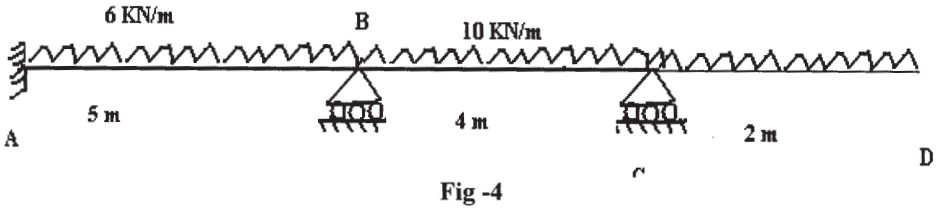


Fig -4

OR

Q8) Analyze the frame as shown in fig (5) by flexibility method. **[16]**

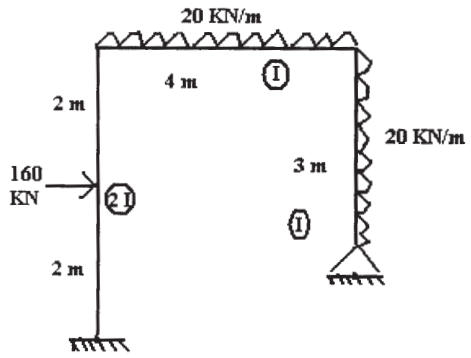


Fig-5

Q9) Analyze the beam as shown in fig (4) by using stiffness method take EI=Constant. **[16]**

OR

Q10) Analyze the frame as shown in fig (5) by Stiffness method. **[16]**

Q11) a) Determine the deflections at Nodal Points for beam AB loaded and supported as shown in fig (6) take 05 nodes. **[6]**

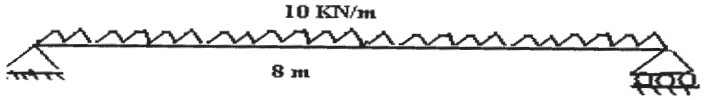


Fig-6

b) Analyze the frame by using Portal method as shown in fig (7) and draw the BMD -----. **[12]**

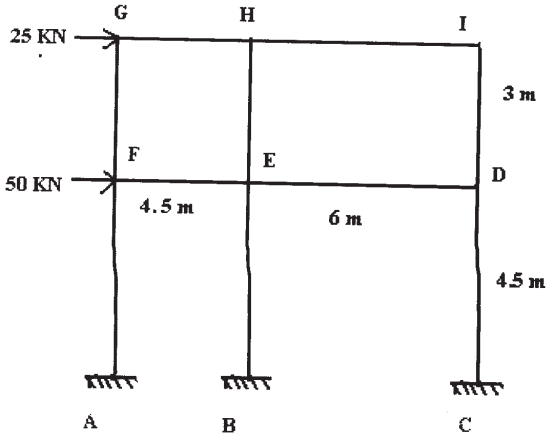


Fig-7

OR

Q12) a) Determine the deflections at Nodal Points for beam loaded and supported as shown in fig (8) take 05 nodes. **[6]**

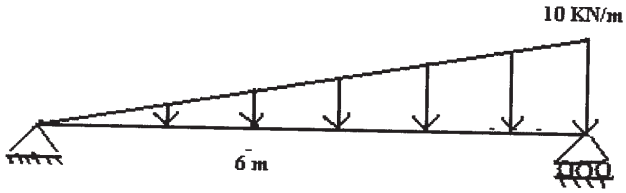


Fig-8

b) Analyze the frame by using Cantilever method as shown in fig (9) and draw the BMD, assume all columns are having same cross sectional Area. **[12]**

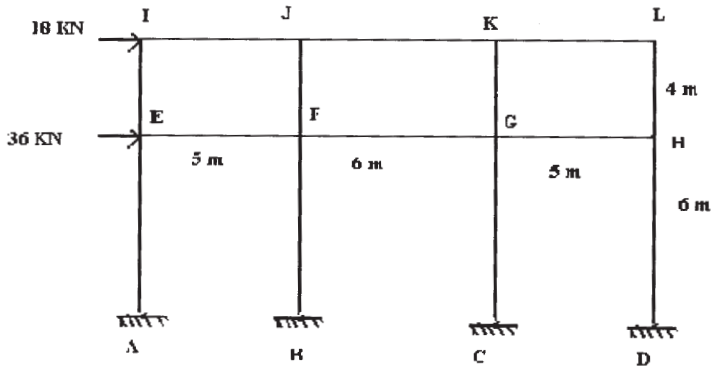


Fig-9

Total No. of Questions : 12] **SEAT No. :**

P3115 **[Total No. of Pages : 3**

[4858] - 102
T.E. (Civil Engg) (Semester - I)
ADVANCED SURVEYING
(2008 Pattern)

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.6from section I and Q. 7or Q.8, Q.9 or Q.l0, Q.11 or Q.l2from section II.***
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 meant by side equation? State the equations of condition which must be satisfied in the adjustment of a geodetic quadrilateral without central station. **[8]**

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

c) What are the various points to be considered for selection of a triangulation station? **[5]**

OR

Q2) a) The elevations of two triangulation stations A and B, 120 km apart, are 200m and l000m above m.s.1. The elevations of two peaks C and D on the profile between them are, respectively, 290m and 540m. the distance AC=50km and AD=80km. design a suitable signal required at B, so that it is visible from the ground station A. **[8]**

b) What are the various potential error sources that affect the GPS signal or result? **[5]**

c) Differentiate between Absolute positioning and Relative positioning. **[5]**

Q3) a) Explain the following terms: **[5]**

i) True Value, True error

ii) Most probable value, Residual error

iii) Conditioned equation,

b) Explain with neat sketch, spherical excess. **[5]**

P.T.O.

c) Angles were measured on a station and the observations were recorded as follows: **[6]**

A = 45°30’ 10” weight 2

B = 40° 20’ 20” weight 3

A + B = 85° 50’ 10”weight 1

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

OR

Q4) a) What do you mean by weight of an observation? State the rules of assigning weight to the field observations. **[5]**

b) Explain the following terms: **[5]**

i) Independent quantity ii) Direct observation

iii) Indirect observation iv) Weight of an observation

iv) Mistake

c) Define Geodetic Quadrilateral and describe methods of adjustment. **[6]**

Q5) a) Derive the expression for the difference of level between two points A and B a distance D apart, with the vertical angle as the angle of elevation from A to B. The height of the, instrument at A and that of the signal at B are equal. **[10]**

b) Explain with a neat sketch how the alignment of tunnel is transferred from surface to the underground. **[6]**

OR

Q6) a) Derive the expression for the difference of level between two points A and B a distance D apart, with the vertical angle as the angle of elevation from A to B. The height of the, instrument at A and that of the signal at B are equal. **[10]**

b) Describe in brief the location survey of a long bridge. **[6]**

SECTION - II

Q7) a) Describe with sketches the field work of a survey with a phototheodolite.

Explain, how you would plot the survey? **[12]**

b) Explain with a sketch flight planning in aerial photogrammetry. **[6]**

OR

Q8) a) Two points A and B having elevations of 500m and 300m respectively above datum appear on the vertical photograph having focal length of 20cm and flying altitude of 2500m above datum. The corrected photographic coordinates are as follows; Determine the length of the ground line AB **[12]**

Point	Photographic	Coordinates
	X(cm)	Y(cm)
a	+2.65	+1.36
b	-1.92	+3.65

b) Write a note on digital photogrammetry **[6]**

Q9) a) Explain with the help of a neat sketch, an idealized remote sensing system. **[8]**

b) What do you understand by GIS and what are the essentials of a Geographical Information System? **[8]**

OR

Q10)a) Write a detailed note on applications of remote sensing. **[8]**

b) Write a note on linkage of GIS to remote sensing. **[8]**

Q11)a) Explain how will you plan and execute the shore line survey for stretch of 30 Km. **[8]**

b) Explain three point problem and its applicability in hydrographic surveying. **[8]**

OR

Q12)a) State various sounding equipment's and explain any three in detail. **[8]**

b) State step by step procedure to determine mean sea level (MSL) **[8]**

Total No. of Questions : 8]

SEAT No. :

P1362

[Total No. of Pages : 4

[4858] - 103

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

STRUCTURAL DESIGN - I

(2008 Pattern)

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

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4, from Section - I and Q.5 or Q.6, Q.7 or Q.8 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 indicates full marks.***
5) ***Assume suitable data, if necessary.***
6) ***Use of cell phone is prohibited in the examination hall.***
7) ***Use of electronic pocket calculator IS : 800 and steel table is allowed.***

Section - I

Q1) a) What are the advantage and disadvantage of construction in structural steel? **[5]**

b) An I-section use as a bracket connected to flange of column as shown in fig. 1 b. Column is carrying a load of 120 kN at free end at a distance of 250 mm from the column flange. Design the welded connection. **[12]**

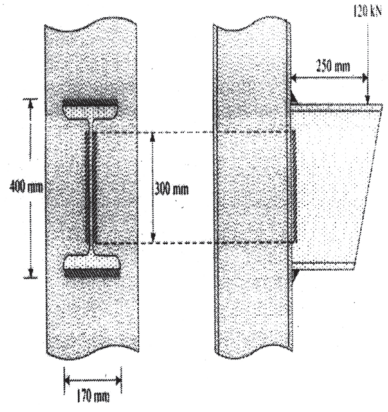


Fig. 1 b

P.T.O.

c) A tie member of a roof truss carries a load of 200 kN. Design a section using unequal angle with longer leg connected to gusset plate. Also design the bolted connection. **[8]**

OR

Q2) a) Differentiate between black bolt and HSFG bolts. Explain in details with Sketches. **[7]**

b) An ISLB 300 @ 37.7 kg/m secondary beam transmits an end reaction of 125 kN to the web of ISHB 400 @ 77.4 kg/m main beam. Design bolted framed connection. Top flange of both the beams are at same level. Draw the neat sketch showing design details. **[10]**

c) A strut of a tower carries an axial load of 200 kN resulting due to wind load. The unsupported length of member is 3 m. Design a single angle section with welded connection and draw the sketch with design details. **[8]**

Q3) a) State and explain the design steps for the design of gantry girder. **[9]**

b) A simply supported beam of 5 m effective span carries uniformly distributed load of 30 kN/m on entire span along with a central point load of 50 kN. Compression flange of beam is laterally supported only at ends and centre of beam. The ends are restrained against torsion. Design a cross section of beam and apply usual checks. **[16]**

OR

Q4) a) Calculate the moment resisting capacity of a built up beam comprising of ISMB 450 @ 72.4 kg/m with a flange plate of 250 mm × 12 mm one each on both flange. Also calculate maximum superimposed uniformly distributed load the beam can carry on simply supported span of 6 m. The compression flange is laterally restrained throughout the length. **[12]**

b) Design cross section of a welded plate girder carrying uniformly distributed load of 120 kN/m on entire span of 18 m. The compression flange is laterally restrained throughout the length. Also design the end bearing stiffener. **[13]**

Section - II

Q5) a) A truss as shown in Fig. 5 a is used for an industrial building situated at Nashik. The truss is covered with A C sheet. Calculate Panel point dead load, live load and wind load for the truss. Assume k1 = 1, k2 = 0.9, k3 = 1, cpe = –0.7 cpi = + 0.5 and spacing of truss = 3 m. **[15]**

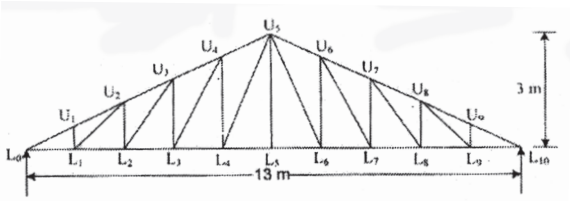


Fig. 5 a

b) A foot over bridge as shown in Fig. 5 b is subjected to live load of 5kN/m^2 and dead load of 1.2 kN/m^2. The clear available width is 2.8m and height of truss is 2m. Design the cross beam for the bridge. **[10]**

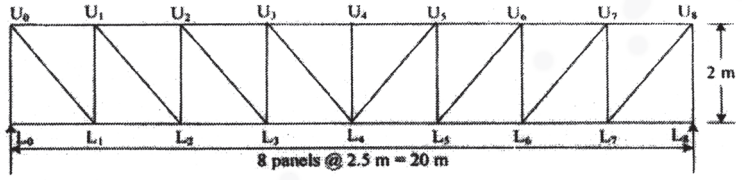


Fig. 5 b

OR

Q6) a) For the truss shown in Fig. 5 a, panel point dead load, live load and wind load are as follows. Design members U4U5, L4L5 and U5L4. **[13]**

S. N.	Type of load	Intermediate panel point load in (kN)
01	Dead load	03
02	Live load	02
03	Wind load	05 (suction)

b) For the foot over bridge shown in Fig. 5 b, design the members U4U5, L4L5 and U5L4. RCC slab of 120 mm thick is provided as flooring. Clear width is 2.8 m and live load is 4 kN/m^2. **[12]**

Q7) a) A column consists of two channel sections placed face to face subjected to an axial force of 800 kN. The unsupported length is 10 m. Assuming column to fixed at both ends, design the section. Also design suitable lacing system and draw the design sketches. **[20]**

b) Explain merits and demerits of cold formed light gauge section. **[5]**

OR

Q8) a) Design a column base for an axial load of 400 kN and bending moment of 75 kNm. A section ISHB 400 @ 77.4 kg/m is used as a column. The bearing stress in concrete is 4 N/mm^2. **[15]**

b) Explain following term with respect to light gauge section. **[10]**

i) stiffened element

ii) unstiffened element

iii) multiple stiffened element

iv) flat width ratio

v) effective design width.

❄❄❄

Total No. of Questions : 12]

SEAT No. :

P1363

[Total No. of Pages : 4

[4858] - 104

T.E. (Civil) (Theory)

FLUID MECHANICS - II

(2008 Pattern) (Semester - 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, from Section - I Answer Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12 from Section - II.***
2) ***Answer three questions from Section - I and three questions from Section - II.***
3) ***Answers to the two sections should be written in separate books.***
4) ***Neat diagrams must be drawn wherever necessary.***
5) ***Figures to the right indicate full marks.***
6) ***Assume suitable data, if necessary.***
7) ***Your answers will be valued as a whole.***
8) ***Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***

Section - I

Q1) a) Define and discuss drag and lift phenomena. **[4]**

b) Discuss in detail about Magnus effect. **[8]**

c) An airplane having its span of 15m and chord of 2m flies with a velocity of 80m/s. Using the data given below determine the lift and drag forces involved. **[4]**

Coefficient of lift = 0.85 Coefficient of drag = 0.06

Angle of attack = 6° ρ = 0.8 kg/m^3

d) Define streamline body and bluff body. **[2]**

OR

Q2) a) Discuss about water hammer in case of a pipe. State the factors affecting the pressure development due to water hammer. **[4]**

b) With a neat sketch derive an expression for pressure growth due to gradual closure of the valve in a pipe. **[6]**

c) An orifice is situated at the base of a hemispherical tank. Determine the time required to empty it when no flow is allowed into the tank. **[8]**

P.T.O.

Q3) a) In case of a jet striking at the center of the moving curved vane prove that for the maximum efficiency the velocity is one-third the jet velocity. **[8]**

b) For a centrifugal pump the impeller has diameter and width at the periphery 35cm and 6cm respectively. The tip angles of blades incline backwards 50º from the radius. The pump delivers 300lps of water with 1200 rpm rotations of impeller. Calculate **[8]**

i) speed and direction of water when it leaves the impeller

ii) torque exerted

iii) shaft power required. Assume

The pump is designed to admit radially

Hydraulic efficiency = 80% Mechanical efficiency = 95%

OR

Q4) a) Classify the centrifugal pump based on **[8]**

i) Specific speed ii) Working head

iii) Direction of flow of liquid iv) Number of entrances

b) A square plate weighing 150N with uniform thickness and 40 cm edge is hung. A horizontal jet of 2cm diameter impinges on the plate with a velocity of 20m/s. The centerline of the jet is 20 cm below the upper edge of the plate. The jet strikes the plate normally and at its center when the plate is vertical. Determine the force at the lower edge that is required to keep the plate vertical. Also determine the inclination to the vertical that the plate will assume under the action of jet. **[8]**

Q5) a) Write short notes on

i) Cavitation in turbines. **[4]**

ii) Model testing of hydraulic turbines. **[4]**

b) A jet of 100mm diameter when impinges on the buckets of a Pelton wheel, is deflected through an angle of 160° by the buckets. With the following data find

i) The force exerted by the jet on the buckets in tangential direction

ii) The power developed.

Head available = 350m Coefficient of velocity = 0.97 Speed ratio = 0.48 Reduction in relative velocity while passing through buckets = 15%. **[8]**

OR

Q6) a) A Pelton wheel under a net head of 150m and at speed of 250rpm develops 6000kW. Determine **[8]**

i) The discharge

ii) Diameter of wheel

iii) Diameter and number of jets required

iv) Specific speed. Assume

Coefficient of velocity = 0.97

Hydraulic efficiency = 94%

Mechanical efficiency = 75%

Speed ratio = 0.48

Ratio of jet diameter to wheel diameter 1/9.

b) With a neat sketch write a note on draft tube considering following points **[4]**

i) Its structure

ii) Its purposes

iii) Its types

c) Derive an expression of unit speed of turbine. **[4]**

SECTION - II

Q7) a) Give the classification of flow in open channels. **[4]**

b) Explain how the flow through open channel is different from that through a pipe. **[4]**

c) A 3.5m wide rectangular channel conveys 15 cumec of water at a depth of 2.2m. Calculate : **[10]**

i) Specific energy ii) Conjugate depth

iii) Critical depth iv) Froude number.

State the type of flow.

OR

Q8) a) Define specific energy. With a neat sketch discuss specific energy curve. **[8]**

b) Determine dimensions of a most economical trapezoidal channel section to carry discharge of 20cumec. Assume bed slope 1:3000, Manning's N = 0.015. **[10]**

Q9) a) Define Froude's number. Give the flow classification based on Froude number. **[4]**

b) A hydraulic jump forms at the d/s end of spillway carrying 30 cumec discharge. If the depth before jump is 1.2m determine the depth after jump and energy loss. **[4]**

c) Write a note on venturiflume stating its use, structure etc. Differentiate between venturiflume and standing wave flume. **[8]**

OR

Q10) a) Define a hydraulic jump. State its engineering applications. **[4]**

b) The width of a rectangular channel is 3m and it carries a flow of 5 m^3/s at a depth of 1 .2m. A contraction of the channel width is proposed at a section. Find the smallest allowable contracted width that will not affect the u/s flow conditions. **[8]**

c) Derive the conditions when the rectangular channel section is most economical. **[4]**

Q11) a) Write a note on assumptions made in the derivation of dynamic equation for GVF. **[4]**

b) State different methods developed for integrating the varied flow equation. Discuss any one of them. **[8]**

c) Compare GVF and RVF. **[4]**

OR

Q12) a) A rectangular channel is 6m wide and has a uniform flow depth of 1.8m. It has a bed slope of 1 in 4000. If a weir is constructed at the d/s end of the channel, water surface at a specific section is raised by 0.75m. Determine the water surface slope with respect to horizontal at this section. Assume Manning's roughness coefficient as 0.02. **[10]**

b) With neat sketches discuss surface profiles. **[6]**

❄❄❄

Total No. of Questions : 12] **SEAT No. :**

P3116 **[Total No. of Pages : 3**

[4858] - 105
T.E. (CIVIL)
Infrastructure Engineering and Construction Techniques
(2008 Pattern)

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

Instructions to the candidates:

1) ***Answer 3 questions from each section.***
2) ***Answers to the two sections should de 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, electontic pocket calculator, and steam table is allowed.***
6) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Write a note on organization of Indian Railways and also mention the various zones of Indian railways. **[6]**

b) Explain in brief the necessity of uniformity of gauge in our country. **[6]**

c) Define Ballast. State the various test carried out on ballast to check their suitability. **[4]**

OR

Q2) a) Define formation. State & explain various reasons of failure of formation **[6]**

b) Explain in brief the advantages & disadvantages of concrete sleepers. **[6]**

c) Explain in brief the role of transportation in Infrastructure development of a country. **[4]**

Q3) a) Define the following terms : **[6]**

i) Actual cant

ii) Cant Excess

iii) Negative superelevation

b) Write a short note on Measure shovel packing **[6]**

c) What do you mean by Grade Compensation on Horizontal Curve. Why it is necessary. **[4]**

P.T.O.

OR

Q4) a) Explain with a neat sketch overriding and undercut switches. **[6]**

b) What are the various types of rail maintenance. Also state the Importance of track maintenance **[6]**

c) Draw a neat labeled diagram of Left Hand Turnout. **[4]**

Q5) a) What is Tunnel. State the merits and demerits of Tunnel. **[6]**

b) Explain in brief Heading and Bench Method of Tunnelling **[6]**

c) Define Harbour. What are the requirements of a good harbour. **[6]**

OR

Q6) a) What are Tunnel portals. What points are considered while designing portals **[6]**

b) Write a short note on Types of Harbours **[6]**

c) Explain in brief the folloiwng : **[6]**

i) Buoys

ii) Dolphins

iii) Breakwater wall

SECTION - II

Q7) a) Explain in brief the need of automation in the constructoin industry. Also state the merits and demerits **[6]**

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

i) Precast concrete

ii) Antoclave curing

c) Explain in brief the importance of construction sector in the economic development of the country **[4]**

OR

Q8) a) Draw a neat labelled sketch of static tower crane **[4]**

b) Differentiate between Labour oriented work and Equipment oriented work **[6]**

c) What is the importance of joint in precast construction? Draw typical joint connections in prefabricated structure for **[6]**

i) Column-Beam and

ii) Beam-Slab

Q9) a) What are the various factors that are considered for selection of an equipment for a particular work **[6]**

b) Explain in brief the factors affecting the output of dragline **[4]**

c) What do you mean by depreciation of an equipment. Explain any one method in brief. **[6]**

OR

Q10)a) Explain in brief the following : **[6]**

i) Repair cost

ii) Economic Life

iii) Labour cost

b) Explain in brief the methods of finding out productivity of equipment **[4]**

c) What is work cycle. Explain the work cycle of a dumper **[6]**

Q11)a) Explain in brief the vaccume dewatering system **[6]**

b) Differentiate between Guniting and Shot creting **[6]**

c) Write a short note on : **[6]**

i) Drilling Equipments

ii) Grouting

OR

Q12)a) Draw a schematic diagram of RMC plant. Also state the advantages of RMC plant **[6]**

b) Explain in brief the vaccume dewatering system **[6]**

c) Write a short note on Tremie Pipe method of concreting **[6]**

Total No. of Questions : 12]

SEAT No. :

P3508

[Total No. of Pages : 3

[4858] - 106
T.E. (Civil) (Semester - II)
Hydrology & Water Resources Engineering
(2008Pattern)

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

Instructions to the candidates:

1) ***Answer any 3 questions from each section.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***

SECTION - I

Q1) a) Explain with neat and labelled figure weighing bucket type rainguage. **[8]**

b) State various methods of measuring evaporation. Discuss the factors affecting infiltration. Explain flooding type infiltrometer. **[10]**

OR

Q2) a) What is stream guaging? Explain Area-Velocity method with sketch and explain its application in water resource engineering. **[10]**

b) State different forms and types of precipitation. Explain frontal type of precipitation. **[8]**

Q3) a) State various formulae to determine flood and explain any 2 methods. **[8]**

b) Given below are the observed flow from a storm of 6 hours duration with drainage area of 300 sq. km. Assume a constant base flow of 16 cumecs. Derive and plot a 6 hours duration unit hydrograph. **[8]**

Time (Hr)	0	6	12	18	24	30	36	42	48	54	60	66
Flow (Cumec)	17	113.2	254.3	198	145	112.8	87.7	69.9	54.2	42.8	31.1	17

P.T.O.

OR

Q4) a) Explain factor affecting run off. **[8]**

b) Explain with a neat sketch Synthetic Unit Hydrograph. **[8]**

Q5) a) Define trap efficiency of reservoir. Describe how the time required to reservoir to fill up with sediments is calculated. **[8]**

b) Explain various zones of reservoir with a neat sketch. **[8]**

OR

Q6) a) Explain with a neat figure how the economic height of dam is fixed. **[8]**

b) What is apportionment of total cost of reservoir? Explain various methods of the same. **[8]**

SECTION - II

Q7) a) Explain crop area and volumetric methods of assessing canal revenue. And state merits and demerits. **[8]**

b) The following table gives data for crop. Calculate **[10]**

i) Delta for each crop.

ii) Volume of water required for each crop.

iii) Volume of water stored in reservoir.

Crop	Base period (Days)	Field Duty (ha/cumec)	And under Crop (hectare)	Remark
Wheat	120	1800	4800	Transist losses = 15%
Sugar cane	360	800	5600	Reservoir losses = 25%
Cotton	200	1400	2400	

OR

Q8) a) Define : **[8]**

i) Time factor,

ii) Duty,

iii) Paleo Irrigation,

iv) Kor depth.

b) Find the frequency of irrigation if **[10]**

i) Field capacity of soil = 30%.

ii) Permanent witting percentage = 10%.

iii) Mass density of soil = 1300 kg/m^3.

iv) Effective depth of root zone = 800 mm.

v) Daily consumptive use of water = 15 mm.

vi) Reality available moisture = 15%.

Q9) a) State Dapits assumptions. Derive equation for discharge from well through confined aquifer. **[8]**

b) Explain pumping and recuperation test. What should be a diameter of well to give yield of 5 litres/sec?

Assume head = 3.75 m, and specific yield of sub-soil = 0.5 / hour. **[8]**

OR

Q10) a) Explain different types of tube wells and dug wells. Explain strainer type with a neat sketch. **[8]**

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

Q11) a) What are major, minor & medium irrigation projects? What are advantages and disadvantages of irrigation. **[8]**

b) What is lift irrigation? Explain the design considerations of components. **[8]**

OR

Q12) a) What are co-operative water distribution society's state rules for equitable distribution of water to farmers. **[8]**

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

Total No. of Questions : 12] **SEAT No. :**

P3117 **[Total No. of Pages : 3**

[4858] - 107
T.E. (Civil)
FOUNDATION ENGINEERING
(2008 Pattern) (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) ***Use of logarithmic tables, slide rule, electronic calculator is allowed.***
5) ***Assume suitable data if necessary.***

SECTION - I

Q1) a) Explain why density index is a significant parameter in Foundation Engineering. **[4]**

b) How is the number and depth of exploratory holes determined? **[5]**

c) What are penetration methods of investigations? Are they reliable in all soils? **[5]**

d) What are the factors that influence SPT data? **[4]**

OR

Q2) a) What are the objectives of soil investigation? **[6]**

b) State various types of soil samplers. What is area ratio? State its significance. **[6]**

c) What is meant by geophysical methods of soil exploration? Explain anyone of them with neat sketch. **[6]**

Q3) a) Distinguish between elastic settlement and consolidation settlement and explain how they are estimated? **[6]**

b) What is "active zone' in soil? Explain it with reference to the pressure bulb concept? **[6]**

c) Define preconsolidation pressure & explain how it is determined. **[4]**

P.T.O.

OR

Q4) a) With a neat sketch explain laboratory consolidation test and list the various consolidation parameters of soil obtained from test data. **[8]**

b) Explain, with neat sketch, square root of time fitting method to find coefficient of consolidation. **[4]**

c) Define the terms normal consolidation, over consolidation & under consolidation pressure in detail. **[4]**

Q5) a) What are the basic characteristics of failure mechanisms in general shear and local shear failure. Explain with neat sketch. **[6]**

b) Explain how water table and depth influence bearing capacity. **[5]**

c) Explain the concept of floating foundation with a neat sketch. **[5]**

OR

Q6) a) Describe a plate load test as carried out in the field with a neat sketch of experimental Setup. **[6]**

b) Explain how SPT test data is used to find bearing capacity of cohesion less soil. **[5]**

c) Explain the concept of floating foundation with a neat sketch. **[5]**

SECTION - II

Q7) a) Explain in detail with sketches fivefold classification of piles foundation. **[6]**

b) Explain with a sketch the concept of negative skin friction & state how you would determine the same in non-cohesive soil. **[6]**

c) State the advantages and disadvantages of piers in comparison of pile foundation. **[6]**

OR

Q8) a) What is caisson disease? Mention what precautions should be taken to avoid caisson disease. **[6]**

b) Explain with sketches the following difficulties met during sinking of well. **[6]**

i) Sand blow

ii) Rectification of tilt.

c) Enlist five important component parts of open caisson & explain with sketches design considerations involved in them. **[6]**

Q9) a) Compare in tabular form cantilever & anchored sheet piles on five different points. **[5]**

b) Draw in cross-section of braced excavation indicating component parts. State forces & design Principles involved. **[5]**

c) Derive an expression for depth of embedment of cantilever pile by making simplified assumptions. **[6]**

OR

Q10)a) With reference to Black cotton soil explain: **[6]**

i) Free swell index.

ii) Differential free swell index.

iii) Swelling potential.

b) Explain the construction procedure for under-reamed piles. **[6]**

c) Enlist typical characteristics of Black cotton soils & give their approximate values. **[4]**

Q11)Write detailed notes on any four of following with sketches. **[4 marks each]**

a) Liquefaction.

b) Factors affecting ground motion.

c) Types of Earthquake.

d) Geotextile in drains.

e) Requirements reinforced soil mechanism.

OR

Q12)Write detailed notes on any four of following with sketches if required. **[4 marks each]**

a) Hazards of mitigation.

b) Seismic waves.

c) Types of Geosynthetics.

d) Geotextiles in foundations.

e) Geotextiles in embankment.

Total No. of Questions : 12]

P3540

SEAT No. :

[Total No. of Pages : 4

[4858] - 108
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) ***Answer 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, electronics pocket calculator and steam tables is allowed.***
6) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Give in tabular form, the design period adopted for various components of a water supply project justify the same with brief explanation for each. **[8]**

b) Enlist 4 types of pipe materials used in water supply. Write a detailed note on use of CI pipes in water supply project with reference to manufacturing jointing availability advantages and disavantages. **[10]**

OR

Q2) a) Give the permissible limit for following parameters in drinking water as per IS: 10500 and their adverse effect if they are in excess **[4]**

i) Chlorides

ii) Iron

iii) Fluorides

iv) Nitrites

b) Enlist various valves used in rising mains. Also state their location and functions. **[5]**

c) Enumerate the various methods of forecasting future population of a town and explain the incremental increase method. **[9]**

P.T.O.

Q3) a) Draw the flow sheets of water treatment processes adopted for following conditions. **[8]**

i) GW source with excess Fe, CO_2 and odorous gases.

ii) Conventional WTP in urban area with river as raw water source.

b) Maximum daily demand for water in a city is 130. MLD. Design cascade aerator for the same. Draw plan and elevation of the aeration fountain. Assume the inlet pipe diameter as 1.1m. **[8]**

OR

Q4) a) Explain with a neat sketch, various types of settling observed during sedimentation. **[4]**

b) Design clariflocculator using following data and design criteria: **[12]**

i) Desired average outflow from clarifiocculator = $300m^3/hr$

ii) Water lost in desludging = 2%

iii) Detention period = 20minutes

iv) Average value of velocity gradient, G = $40S^{-1}$

Q5) a) Enlist various types of filters based on **[8]**

i) Driving force and

ii) Type of media used. Explain each in brief

b) A filter unit of size 5m × 10m is backwashed after filtering 12500 m^3 of water in 24 hours. The filter is backwashed at a rate of 15 1/sec/sq.m, for 15 minutes. Compute the average flow rate, quantity and percentage of treated water used in washing. Also, find the rate of wash water flow in each trough if 4 troughs are provided. **[8]**

OR

Q6) Write short notes on: **[6+5+5 = 16]**

a) Break point Chlorination

b) Slow sand filters

c) Operational problems in Rapid sand gravity filters.

SECTION - II

Q7) a) Defferentiate between carbonate and non carbonate hardness **[5]**

b) Write short note on fluoridation and defluoridation **[5]**

c) Discuss in detail water treatment of swimming pools. **[6]**

OR

Q8) a) Explain different methods of desalination. **[5]**

b) Elaborate various methods to remove odour and taste from water. **[5]**

c) Enumerate the methods of water softening. Describe Zeolite process of softening water in detail. **[6]**

Q9) a) Explain different layouts of distribution pipe network. **[4]**

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

Daily demand = 2,50,000 litres

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

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%

c) Discuss need of Rain water harvesting system **[4]**

OR

*Q10)*a) Give functions of Elevated Service Reservoir. **[4]**

b) Design balancing reserve of a service reservoir with the following data:

Time	6 am to 10 am	10 am to 6 pm	6 pm to 10 pm	10 pm to 6 am
Consumption in percentage of day's demand	35	20	40	05

Designed demand of 15MI/day is to be pumped at a uniform rate to the reservoir for all 24 hours. State the time: **[8]**

i) When FSL is reached and

ii) When LWL is reached in the reservoir

c) With the help of neat figure explain various component of rain water harvesting system. **[4]**

Q11)a) Draw the neat sketch of typical cyclone separator and label the parts. **[6]**

b) Explain fabric filter with sketch and its advantages and disadvantages. **[6]**

c) Explain different methods of odour control **[6]**

OR

Q12)a) Define plume and explain with sketches different types of plume behavior. **[6]**

b) Write effects of oxides of sulphur on human health, vegetation and materials. **[6]**

c) Explain the effects of noise pollution. **[6]**

Total No. of Questions : 8]

SEAT No. :

P1364

[Total No. of Pages : 8

[4858] - 109

T.E. (Civil Engineering)

STRUCTURAL DESIGN - II

(2008 Pattern) (Semester - II)

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

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2 and Q.3 or Q.4 in Section - 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 calulator 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) The term 'balanced section' is used in both WSM and LSM. Discuss the difference in meaning.

ii) Justify the code specification for the limiting neutral axis depth in LSM.

iii) Why is it uneconomical to use high strength steel as compression reinforcement in design by WSM?

[9]

b) A rectangular, singly reinforced beam, 230mm wide and 567mm effective depth is used as a simply supported beam over an effective span of 8m. The reinforcement consists of 4 bars of 16mm diameter at tension face. If the beam carries a load of 15kN/m, inclusive of its self weight, determine, the stresses developed in concrete and steel using WSM. Use M25 concrete and Fe415 steel. **[8]**

P.T.O.

c) A rectangular beam 300 mm wide and 565 mm effective depth is reinforced with 4 No. 20 mm diameter bars. Find, **[8]**

i) Depth of neutral axis

ii) Moment of resistance.

The materials are M25 grade of concrete and HYSD reinforcement of grade Fe500.Use L.S.M.

OR

Q2) a) Calculate the design constants for the following materials considering the balanced design for singly reinforced section. The materials are grade M 30 concrete and Fe 500 grade steel reinforcement. Use LSM. **[6]**

b) An isolated T beam having effective flange width 1300 mm, rib width 250 mm, flange thickness 125 mm and effective depth of 650 mm is reinforced with 4-20 mm diameter bars. The effective span of the beam is 8m, Find **[12]**

i) Depth of Neutral Axis

ii) Moment of Resistance

iii) Uniformly distributed load beam can carry in addition to self weight

Use : M25 Grade Concrete Fe415 grade reinforcement

Adopt working Stress method

c) Explain with sketches, why do continuous T-beam at support have to be designed as rectangular section? Draw the cross section of continuous T-beam at support and midspan. **[7]**

Q3) Design floor slabs S7 and S11 only for flexure and torsion. Refer the structural plan given in Figure 1. Width of all beams is 230mm. Consider live load = 3 kN/m^2, Floor finish = 1.5 kN/m^2. **[25]**

Use M25 grade of concrete and Fe 415 grade of steel. Draw neat sketches showing details of main reinforcement and torsional reinforcement in two way slab.

OR

Q4) a) Design the one flight of a dog legged staircase as shown in figure 1 using the following data : **[17]**

i) No of risers in each flight = 9

ii) Floor to floor height = 3.15m

iii) Live load = 4 kN/m^2

iv) Floor finish = 1kN/m^2

Materials : M25 Grade of concrete, Fe 415 grade of reinforcement.

Show detailed load calculations. Draw the reinforcement details in sectional elevation of only one flight.

b) Explain with neat sketches the design concepts of horizontally spanned and longitudinally spanned staircases. **[8]**

SECTION - II

Q5) A continuous R.C.C. floor beam B14-B15-B16 (Refer Fig.1) is simply supported at end supports (C17 and C20) and continuous through column C18 and C19. Consider live load on slab 3kN/m^2 and floor finish 1.5 kN/m^2. Assume slab thickness 130 mm for load calculation. Consider 230 mm thick brick wall on these beams. Floor to floor height is 3.15m. Show detailed load calculations and determine support moments, maximum span moments for all beams, using 20% redistribution of moments. Draw bending moment diagram and design the beam only for flexure. Show the reinforcement details along the length of beam with suitable cross sections. **[25]**

Material- Concrete of grade M20, Fe 500 reinforcement.

OR

Q6) a) A rectangular RC beam of size 300 mm × 750 mm with effective cover 40 mm is subjected to following actions : **[15]**

i) Factored BM = 150 kN.m

ii) Factored SF = 90 kN

iii) Factored Torsional Moment = 40 kN.m

Design the beam using M 25 & Fe 500 grade materials.

b) Explain the terms bond stress and development length. Calculate development length for 16 mm diameter bar in compression and tension by both methods (WSM and LSM). Use M30 concrete and Fe 500 steel. **[10]**

Q7) a) Design an axially loaded short square column with material M25 and Fe 415 to carry a working load of 900 kN. The unsupported length of column is 3.5 m. The column is held in position and not restrained against the rotation at both ends. Also design the footing for this column. Take SBC = 150 kN/m^2. Show detailed design calculations and reinforcement details in plan and sectional elevation. **[17]**

b) Draw columns cross sections for following data **[8]**

i) Size 230 × 600 with longitudinal reinforcement

(4– #20 + 2– # 16 + 4 – #12) equally distributed along all sides.

Transverse reinforcement – #8@150C/C

ii) Size 230 × 380 with longitudinal reinforcement (6– #12) distributed along two parallel edges to resist bending moment about axis bisecting the depth of column.

Transverse reinforcement – #8@190C/C.

OR

Q8) Design a bi-axial short column by limit state method with material M25 and Fe 500 to carry a working load of 800 kN, working moment of 60 kN-m about major axis bisecting the depth of column and 30 kN-m about minor axis bisecting the width of column. The unsupported length of column is 4.0 m. 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]**

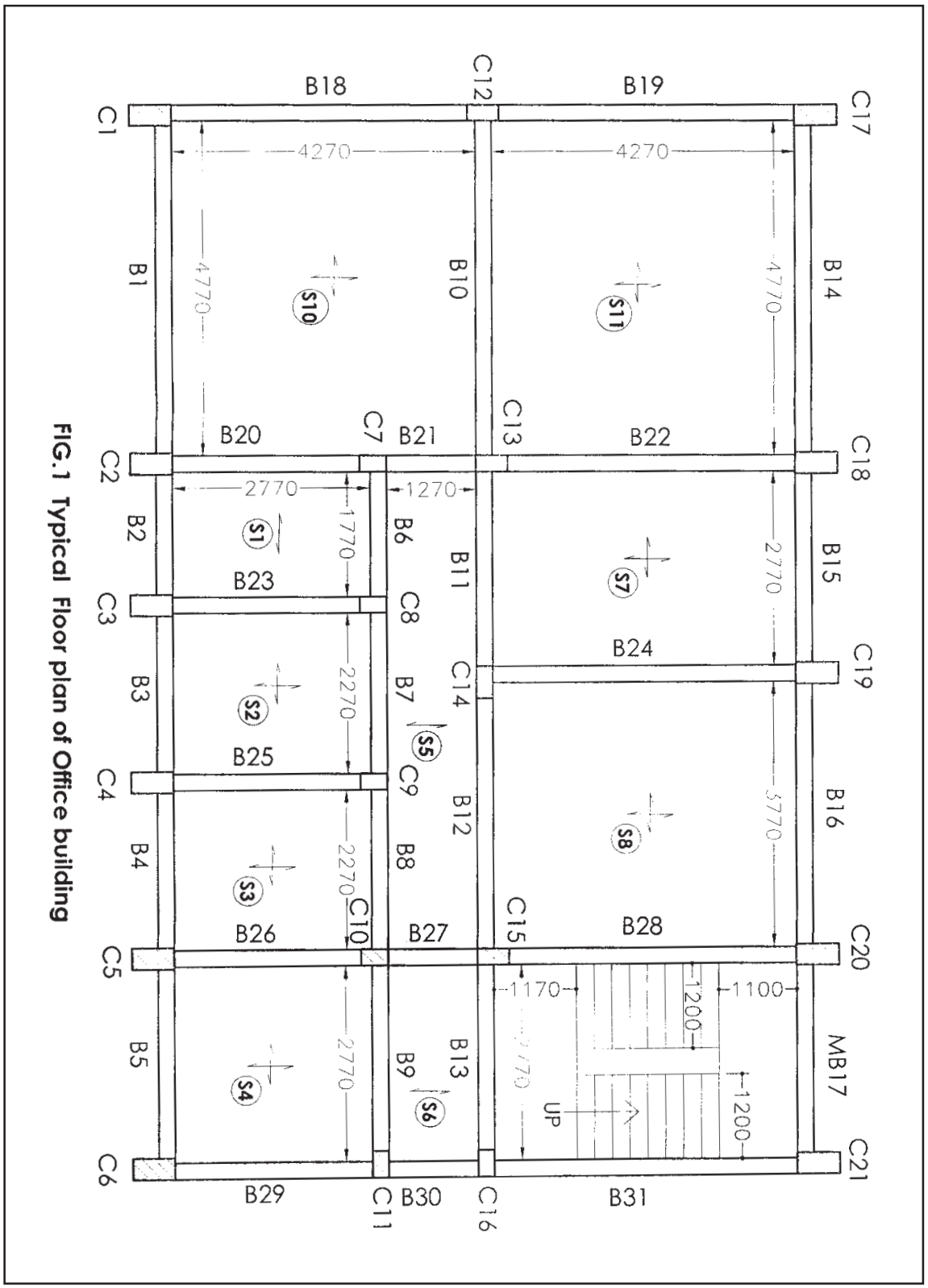


FIG.1 Typical Floor plan of Office building

Chart - 13 Interaction Diagram for Combined Bending and Compression Rectangular Section - Equal Reinforcement on All Sides.

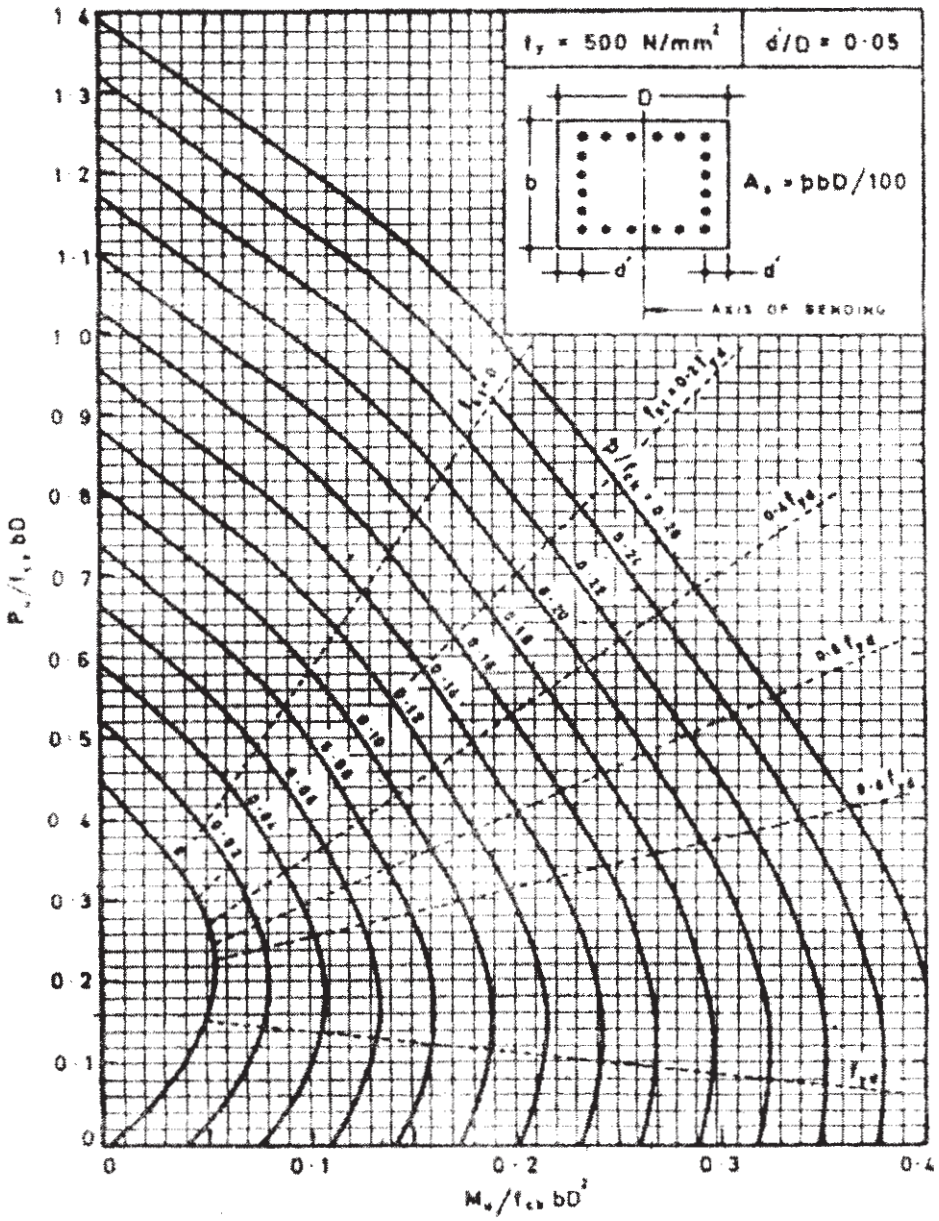


Chart - 14 Interaction Diagram for Combined Bending and Compression Rectangular Section - Equal Reinforcement on All Sides.

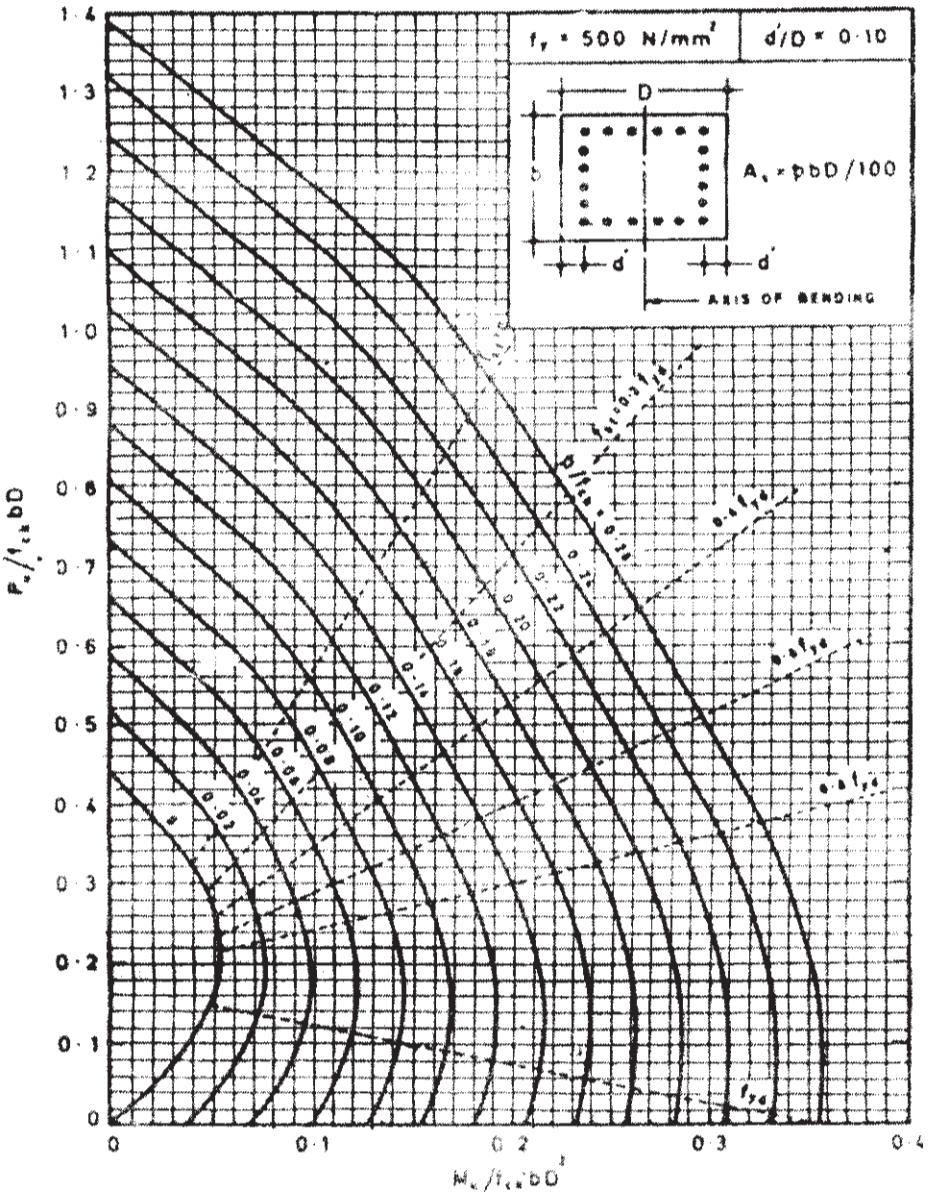
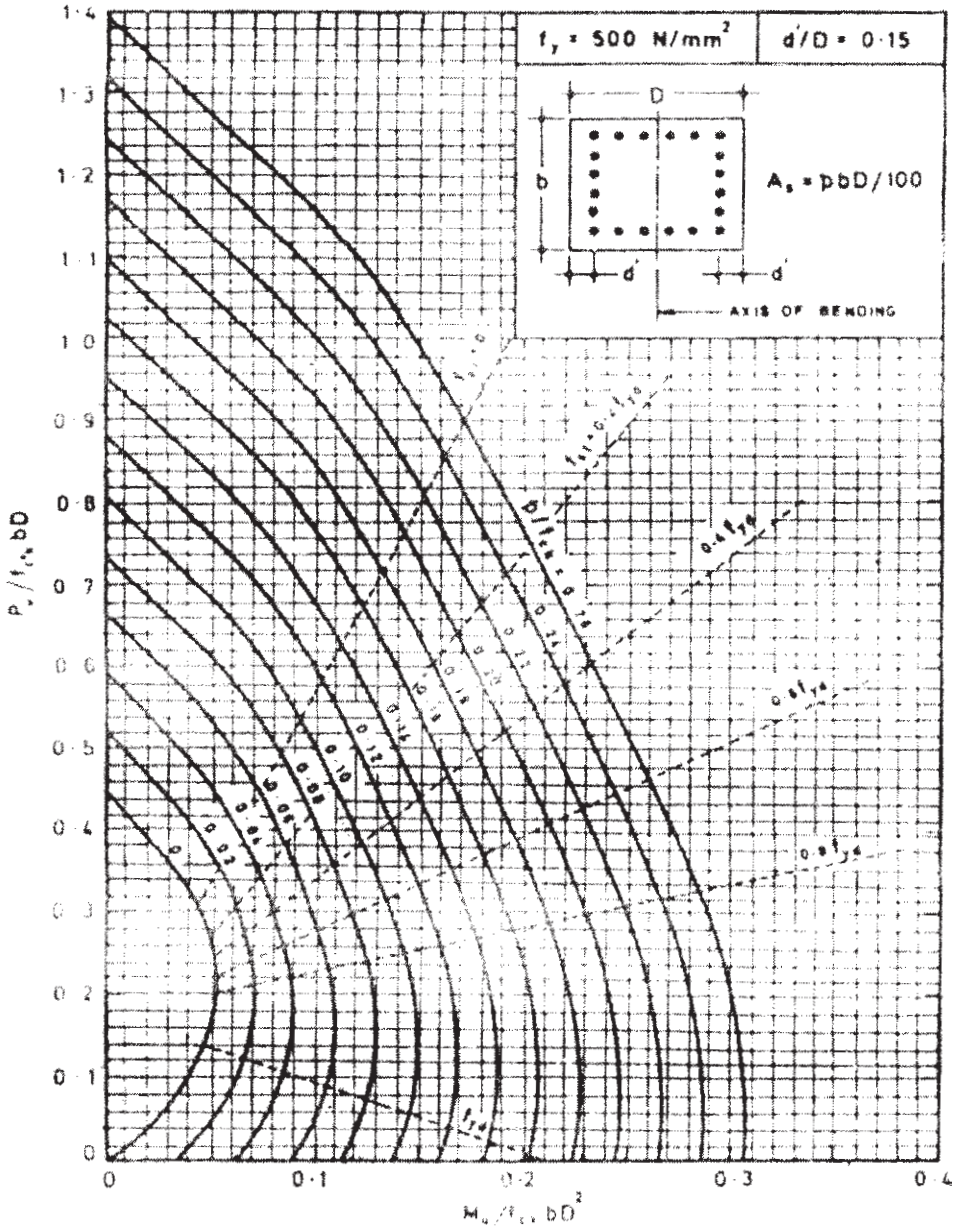


Chart - 15 Interaction Diagram for Combined Bending and Compression Rectangular Section - Equal Reinforcement on All Sides.



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Total No. of Questions : 12]

SEAT No. :

P2014

[Total No. of Pages : 4

[4858] - 110

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

PROJECT MANAGEMENT AND ENGINEERING ECONOMICS

(2008 Pattern)

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.***

SECTION - I

Q1) a) What are the functions of management? **[4]**

b) Differentiate between CPM and PERT. **[4]**

c) Draw network diag. Mark critical path and calculate project duration, total float for the data as follows: **[10]**

Activity →	1-2	1-3	1-4	2-5	3-4	3-5	4-5	5-6
Duration (Days) →	2	6	4	8	Dummy	6	3	5

OR

Q2) a) Explain Gantt chart and state its limitations. **[4]**

b) Define an Activity, event diagrammatically with help of suitable example. **[4]**

c) Construct the project network and find critical path with expected project completion time. **[10]**

Activity →	A	B	C	D	E	F	G
Immediate Predecessor →	-	-	-	A	A,B	C	D,E,F
Duration (weeks) (to,tm,tp)	6,7,8	1,2,9	1,4,7	1,2,3	1,2,9	1,5,9	4,4,4

P.T.O.

Q3) a) What do you understand by resource smoothing and resource levelling? **[6]**

b) From the given data Draw EST squared network and histogram diag. for EST solution. **[10]**

Activity →	1-2	2-3	2-4	3-5	4-5
Duration (Days) →	5	7	9	5	4
Men/day →	10	2	6	5	4

OR

Q4) a) Define updating of network diag. & explain the conditions under which updating is carried out. **[6]**

b) Following data pertains to a small construction work. **[10]**

Activity →	1-2	1-3	2-3	2-4	3-4	3-5	4-6	5-6	6-7
Duration (Days) →	3	2	4	7	6	7	3	9	7

i) Draw a network, calculate project duration and mark critical path.

ii) At the end of 13 days, review was taken which indicates activities 1-2, 1-3, 2-3, 2-4, 3-4 completed as per originally planned and no other activities are started yet. Draw updated network, calculate project duration and show critical path. How much is the change in project duration?

Q5) a) List out the functions of material manager any six. **[6]**

b) As a site engineer what care should you take about material procurement & resources before casting of concrete slab? **[5]**

c) Explain the step by step procedure to seggregate material by their annual usage. **[5]**

OR

Q6) a) If you are the head of store dept. How can you purchase and store the material? **[6]**

b) Define E.O.Q. and derive expression for it. **[5]**

c) Define inventory. Explain the costs associated with inventory problems with sketch. **[5]**

SECTION - II

Q7) a) What are the causes of accidents on construction site? **[6]**

b) Define with help of formulaes I.F.R. I.S.R. and injury index. **[6]**

c) What are the guidelines to prepare safety programme related to construction? **[6]**

OR

Q8) a) What are the various causes of accidents that may take place during tunneling operation? How it can be avoided? **[6]**

b) Elaborate importance of engineering, education, enforcement in safety programme. **[6]**

c) Define site layout. What are the factors affecting on a site layout? **[6]**

Q9) a) Explain importance of economy in construction industry with help of pie chart. **[6]**

b) Explain law of diminishing marginal utility with help of suitable example. **[5]**

c) Describe law of Demand and supply with help of diagram. **[5]**

OR

Q10)a) Define engineering economics and explain the importance of it in civil engg. **[6]**

b) Give definitions of the following; Cost, Price, Value, Goods, Wants. **[5]**

c) 'Niwant tailor Mayani'produces 1000 shirts and sells them at Rs. 300/- each. The variable cost Rs. 50/- and fixed cost Rs. 2 lakh. Calculate Breakeven quantity and breakeven sales. **[5]**

Q11)a) What are the steps involved in preparing feasibility study report of a construction project? **[6]**

b) Define the following terms simple interest, compound interest profit, gross profit, net profit. **[5]**

c) Explain cashflow diag. and state the formula to find out future sum (F) after 'n' years from a single investment (P) when rate of interest (i). **[5]**

OR

Q12)a) Define Annuity explain sinking fund annuity with the help of example. **[6]**

b) Write a short note on any two : **[10]**

i) NPV method with example.

ii) Benefit cost ratio method with example.

iii) Pay back period method with example.

Total No. of Questions : 12]

SEAT No. :

P1365

[Total No. of Pages : 5

[4858] - 111

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

MACHINE DESIGN - I

(2008 Pattern)

Time : 4 Hour] *[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 indicates full marks.***
5) ***Use of logarithmic tables & electronic pocket calculator is allowed.***
6) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Explain the steps for design of Protected type of Flange Coupling. **[4]**

b) A shaft is supported between two bearings 750 mm apart. Power is supplied to the shaft through a coupling located to the left of left hand bearing. Power is transmitted through the shaft by means of a belt pulley, of 450 mm diameter, which is located at a distance of 200 mm to the right of right hand bearing. The pulley is keyed to the shaft and the key effect may be assumed to be extending up to bearing support. The weight of the pulley is 300 N and the ratio of belt tensions of tight and slack side is 2 : 1. The belt tensions act in vertically downward direction. The shaft transmits 12.5 KW power at 300 rpm. The shaft material has yield strength of 300 MPa and ultimate strength of 550 MPa. Assuming combined shock and fatigue factors for bending and torsional moment as 1.5 and 1.0 respectively. Determine – Shaft diameter using ASME code and the various stresses in rectangular key, if key selected has 12 mm width, 10 mm height and 60 mm length. **[14]**

OR

P.T.O.

Q2) a) A steel shaft made of 40C8 is used to drive a machine. The pulley X, Y and bearings A, B is located as shown in fig.1. Determine the diameter of the shaft using ASME code. The yield strength of the shaft material is 330 N/mm^2 and ultimate tensile strength is 600 N/mm^2. Take Kb = 1.5, Kt = 1.2. **[14]**

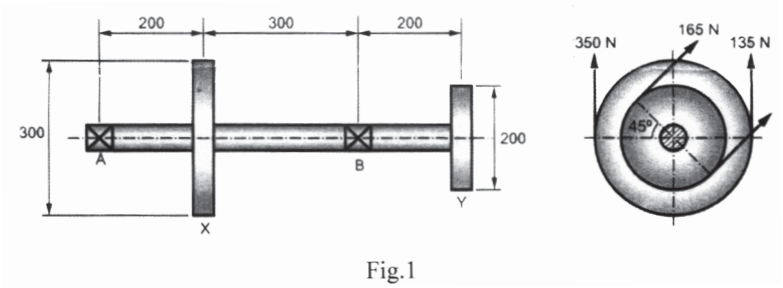

Fig.1

b) Explain the design procedure of Splined shaft. **[4]**

Q3) a) Compare between square thread, Vee threads, Trapezoidal threads and Buttress threads on the following basis: - Manufacturing, Strength, Efficiency, Applications. **[6]**

b) A triple – threaded power screw, used in a screw jack has a nominal diameter of 50 mm and a pitch of 8 mm. The threads are square and the length of nut is 48 mm. The screw jack is used to lift a load 7.5 KN. The coefficient of friction at the threads is 0.12 and the collar friction is negligible. Calculate **[10]**

i) The maximum shear stress in the screw body.
ii) The direct shear stress in the screw and the nut and
iii) The unit bearing pressure.

State weather the screw is self locking.

OR

Q4) a) How does the helix angle influence the efficiency of square threaded screw. What are the various types of screw threads used for power screws? **[4]**

b) A 26 × 5 square threaded, single start power screw is used to support a load of 12 KN. The effective diameter of the collar is 46 mm and the coefficient of friction is 0.15. The nut is made of phosphor bronze having 0.12 as coefficient of friction and 6 MPa as allowable bearing pressure. The length of the handle is 300 mm. Calculate : **[12]**

i) The force required to raise the load.
ii) The force required to lower the load.
iii) The yield strength of material for a factor of safety of 4.
iv) The overall efficiency of the screw.
v) The number of threads in nut.

Q5) a) What is preloading of bolts? State its advantages. Give two applications of preloading of bolts. **[4]**

b) A rectangular bar of cross - section 200 mm × 150 mm is fillet welded to a plate as shown in fig.2. Determine the size of welded joint if the permissible shear stress of the weld is 79 MPa. **[12]**

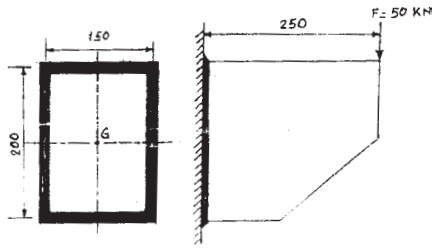

Fig.2

OR

Q6) An offset column is fixed to steel column as shown in fig. 3 by means of four bolts. The bracket is subjected to an inclined pull of 10 KN. Determine the diameter of bolts by assuming allowable tensile stress in bolt to be 150 N/ mm^2. **[16]**

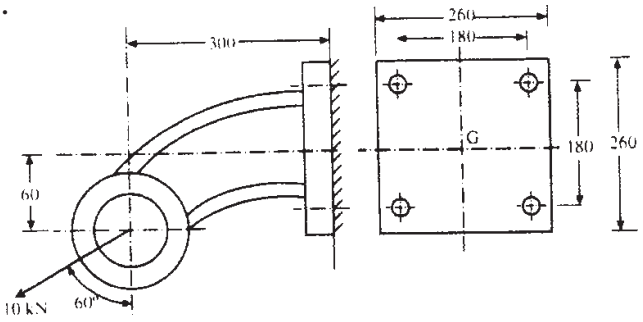

Fig.3

SECTION - II

Q7) A machine is driven by a constant torque electric motor running at a mean speed of 720 rpm. The load torque of the machine is given by 1000 + 400 Sin θ Nm, where θ is the angle of rotation of shaft. A rimmed flywheel made of grey cast iron FG200 (ρ = 7050 Kg/m^3) is used to limit the coefficient of fluctuation of speed to 0.02. The rim contributes 90 % of the flywheel effect. The rim has a rectangular cross-section with width to thickness ratio of 1.5. The number of arms is 6 having elliptical cross-section with major axis twice the minor axis. If the factor of safety is 8. Design the flywheel and find the required power rating of an electric motor. The allowable shear stress for the flywheel shaft is taken as 115 N/mm^2. Assume the limiting linear rim speed at mean radius (V) ≤ 30 m/s. **[18]**

OR

Q8) The T-θ diagram for a four stroke gas engine can be assumed to be consists of four triangles. The areas measured are : 600, 50, 30 and 150 mm^2 for power, exhaust, suction and compression strokes respectively. The scale for the T-θ diagram is 1 mm^2 = 10 J. The engine is running at a mean speed of 500 rpm. The load torque is constant throughout the cycle. A rimmed flywheel made of grey cast iron FG150 (ρ = 7000 Kg/m^3) is used to limit the fluctuation of speed to 3% of the mean speed. The mean diameter of the flywheel rim is limited to 1 m. The rim contributes 90% of the required mass moment of inertia. The rim has a rectangular cross-section with width to thickness ratio of 2. The number of arms is 6 having elliptical cross-section with major axis twice the minor axis. If the factor of safety is 5, design the flywheel and find the power developed by the engine. The allowable shear stress for the flywheel shaft is taken as 40 N/mm^2. **[18]**

Q9) Design a close-coiled helical compression spring for a service load ranging from 2250 N to 2750 N. The axial deflection of the spring for the load range is 6 mm. Assume a spring index of 5. The permissible shear stress intensity is 420 MPa and modulus of rigidity is 84 KN/mm^2. End style for the spring is squared and ground. Neglect the effect of stress concentration. **[16]**

OR

Q10) a) Design a helical Compression spring using following data: **[12]**

Maximum load on spring = 4460 N

Mean coil diameter = 85 mm

Spring stiffness = 67 KN/m

Permissible shear stress = 265 N/mm^2

Modulus of rigidity = 81.5 KN/mm^2

Standard wire diameters are ....,14.5,15,15.5,16,16.5,17,...

b) Explain whether following statements are true or false giving reasons : **[4]**

i) Helical torsion spring is subjected to torsional shear stresses.

ii) Helical compression spring is subjected to compressive stress.

Q11) Two parallel shafts are to be connected by an open flat belt. The diameter of pulleys is 400 mm and 800 mm and they are 1 m apart. The initial tension in the belt when it is stationary is 2 KN. The mass of the belt is 2 Kg/m. The coefficient of friction between the belt and the pulley is 0.3. Calculate the power transmitted if the smaller pulley rotates at 1000 rpm. Also suggest the speed of the smaller pulley for maximum power transmission by the belt. Determine this maximum power. **[16]**

OR

Q12) A V-belt drive is used transmit 30 KW power from an electric motor running at 1440 rpm to a machine running at 480 rpm. The central distance between the shafts is 1 m. Groove angle for pulley is 38° and coefficient of friction between the belt and the pulley is 0.2. The density of the belt material is 1000 Kg/m^3 and allowable tensile stress for the belt is 1.53 N/mm^2. The cross-sectional dimensions of the belt are as follows : **[16]**

Width of the belt at the top = 37 mm,

Width of the belt at the bottom = 19 mm and

Depth of the belt 25 mm. Find :

i) Diameter of the pulleys

ii) Minimum numbers of belt required

Assume maximum power transmission capacity condition for belts.

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Total No. of Questions : 12]

SEAT No. :

P1366

[Total No. of Pages : 3

[4858] - 112

T.E. (Mechanical and Automobile Engineering)

COMPUTER ORIENTED NUMERICAL METHODS

(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) ***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) Draw Flow chart for 'Successive approximation Method'. **[8]**

b) Use Simpson's 1/3 rule to evaluate using 6 strips. **[8]**

$$I = \int_{2.2}^{3.4} x^3 - 2x^2 + 7x - 5\,dx$$

OR

Q2) a) Draw Flow chart for Double Integration using Trapezoidal Rule. **[8]**

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

$f(x) = x^4 - 5x^3 + 9x^2 - 7x + 2$ to an accuracy of 0.001, take $x1 = 0.5$.

P.T.O.

Q3) a) Draw flowchart for 'Lagrange's Interpolation'. **[8]**

b) Determine y' and y'' at $x = 3$ for following data **[8]**

x	1	2	3
y	3.2	8.05	13

OR

Q4) a) Draw flowchart for 'Newton's Backward differentiation'. **[8]**

b) Find f(3.5) using Newton's Forward Interpolation method. **[8]**

X	3	4	5	6	7
F(x)	1.59	2.76	3.195	2.73	1.988

Q5) a) Draw Flow Chart for Gauss Siedel method. **[8]**

b) Solve following set of equations using Gauss Elimination Method. **[10]**

$15X + 3Y - 2Z = 85$

$2X + 10Y + Z = 51$

$X - 2Y + 8Z = 5$

OR

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

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

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

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

$2X + Y + 9Z = 12$

SECTION - II

Q7) a) Explain error propagation with suitable example. **[4]**

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

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

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

OR

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

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

x	2000	3000	4000	5000	6000
y	15	15.5	16	17	18

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

b) Solve the equation $\frac{dy}{dx} = -2xy^2$, find y(0.4) taking step size of 0.1 using Runge Kutte 2nd order method. Given the initial condition as y(0) = 1. **[8]**

OR

Q10) a) Draw flow chart to solve simultaneous first order differential equations using RK2 method. **[8]**

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

Q11) a) Draw flow chart to solve Parabolic Equation by Explicit Method. **[8]**

b) Solve the Poisson's equation $\nabla^2 = 2x^2y^2$ Over the square with $0 \le x \le 3$ and $0 \le y \le 3$, with $u = 0$ on the boundary and h = 1. **[10]**

OR

Q12) a) Draw flow chart to solve Laplace Equation for given no of iterations. **[8]**

b) Solve the Parabolic Equation $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$ subject to condition $u(x, 0) = \sin\pi x$, $0 \le x \le 1$, $u(0, t) = u(1, t) = 0$ using Crank-Nicolson method, do two iterations taking $h = 1/3$, $k = 1/36$. **[10]**

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Total No. of Questions : 12]

SEAT No. :

P1367

[Total No. of Pages : 4

[4858] - 113

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

HEAT TRANSFER

(2008 Pattern)

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) ***Draw neat diagrams wherever necessary.***
4) ***Assume suitable data, wherever necessary.***
5) ***Figures to the right indicate full marks.***

SECTION - I

Q1) a) Differentiate between : **[6]**

i) Steady and Unsteady state heat transfer

ii) Conduction and Convection

b) Derive a general three dimensional heat conduction equation in Cartesian coordinate system. Reduce it as **[10]**

i) Poisson equation,

ii) Fourier equation,

iii) Laplace equation.

OR

Q2) a) A steel tube of 5 cm inner diameter and 8 cm outer diameter (k = 16 W/mK), is covered with an insulation of 3 cm thickness (k = 0.3 W/mK). A hot gas at 350°C with h = 400 W/m^2K flows inside the tube. Outer surface of the insulation is exposed to air at 30°C with h = 60 W/m^2K. Calculate the heat loss from the tube for 20 meter length. Also calculate the temperature at the interface of insulation and steel. **[8]**

P.T.O.

b) A carbon steel plate (thermal conductivity = 45 W / m°C) 600 mm × 900 mm × 2.5 mm is maintained at 310°C. Air at 15°C blows over the hot plate. If convection heat transfer coefficient is 22 W / m^2 C and 250 W is lost from the plate surface by radiation, calculate the inside plate temperature. **[8]**

Q3) a) Explain the concept of Thermal contact resistance. What are the methods to minimize the thermal contact resistance? Give examples where thermal contact resistance is desirable and where it is undesirable. **[10]**

b) A 3mm diameter stainless steel wire (k = 20 W/m°C, resistivity 'ρ' = 10×10^{-8} Ωm) 100 metres long has a voltage of 100 V impressed on it. The outer surface of the wire is maintained at 100 °C. Calculate the centre temperature of the wire. If the heated wire is submerged in a fluid maintained at 50°C, find the heat transfer coefficient on the surface of the wire. **[8]**

OR

Q4) a) Derive an expression for critical radius of insulation for sphere with usual notations. Explain the significance of critical radius. **[10]**

b) A flat furnace wall is constructed of 114 mm layer of sil-o-cel brick, with a thermal conductivity of 0.138 W/mK backed by 229 mm layer of common brick (k = 1.38 W/mK). The temperature of inner face of wall is 760 °C and that of the outer face is 76 °C. Determine heat loss through the wall. If contact between two brick layers is poor and that a contact resistance of 0.09 °C/W is present, what would be the heat loss. **[8]**

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

i) Fin efficiency ii) Fin effectiveness

iii) Biot Number iv) Fourier Number

b) Derive the expression for Lumped heat capacity with usual notations. **[8]**

OR

Q6) a) Two long rods of the same diameter, one made of brass (k = 85 W / m °C) & other made of copper (k = 375 W / m °C) have one of their ends inserted into furnace. Both of the rods are exposed to the same environment. At a distance 105 mm away from the furnace end, the temp of brass rod is 120 °C. At what distance from the furnace end the same temperature would be recorded in the copper rod? **[8]**

b) A solid copper sphere of 10 cm diameter (ρ = 8954 kg/m^3, Cp = 383 J/kgK, k = 386 W/mK) is initially at a temperature of 250 °C is suddenly immersed in a well stirred fluid which is maintained at a uniform temperature of 50 °C. The heat transfer coefficient between the sphere and the fluid is h = 200 W/m^{2}K. Verify, whether lumped heat capacity method is applicable. If yes, determine the temperature of the copper sphere 5 minutes after the immersion. **[8]**

SECTION - II

Q7) a) Two large parallel plates with ε = 0.5 each, are maintained at different temperatures and are exchanging heat only by radiation. Two equally large radiation shields with surface emissivity 0.05 are introduced in parallel to the plates. Find the percentage reduction in net radiative heat transfer. **[8]**

b) Explain : **[10]**

i) Shape factor

ii) Emissivity

iii) Wien's Law

iv) Radiosity

v) Lambert's cosine law

OR

Q8) a) A filament of a 75 W light bulb may be considered as a black body radiating into a black enclosure at 70 °C. The filament diameter is 0.1 mm and length is 5 cm. Considering the radiation, determine the filament temperature. **[4]**

b) Determine the rate of heat loss by radiation from a steel tube of outside diameter 70 mm and 3 m long at a temperature of 227 °C if the tube is located within a square brick conduit of 0.3 m side and at 27 °C. Take ε_{steel} = 0.79 and ε_{brick} = 0.93 **[8]**

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

Q9) a) Explain the significance of : **[8]**

i) Nusselt Number, ii) Prandtl Number,

iii) Reynolds Number, iv) Grashoff Number

b) Air at 2 atmosphere pressure and 200 °C is heated as it flows at a velocity of 10 m/s through a tube with diameter of 3 cm with constant heat flux maintained at the wall with wall temperature 20 °C above the air temperature all along the length of tube. Calculate heat transfer per unit length of tube. **[8]**

Use $Nu = 0.023 (Re)^{0.8} (Pr)^{0.4}$

Properties of air are Pr = 0.681, $\mu = 2.57 \times 10^{-5}$ Ns/m^2, k = 0.0386 W/mK, Cp = 1.025 kJ/kgK.

OR

Q10) a) Compare Natural Convection with Forced Convection. **[6]**

b) Differentiate between Nusselt Number and Biot Number. **[4]**

c) Calculate the heat transfer from a 60 W incandescent bulb at 115 °C to ambient air at 25°C. Assume the bulb as a sphere of 50 mm diameter. Also find the percentage of power lost by free convection. **[6]**
Use $Nu = 0.6 (GrPr)^{1/4}$

Properties of air are k = 0.02964 W/mK, Pr = 0.694, $\upsilon = 20.02 \times 10^{-6}$ m^2/s.

Q11) a) Determine heat transfer surface area and length for a heat exchanger constructed from a 25.4 mm O.D. tube to cool 6.93 kg/min of a 95 % ethyl alcohol solution (Cp = 3810 J/kgK) from 65.6°C to 39.4 °C. Water at 10 °C is available as coolant at a flow rate of 6.3 kg/min. Take U = 568 W/m^{2}K. Calculate for **[8]**

i) Parallel flow ii) Counter flow

b) Derive the expression of LMTD for parallel flow heat exchanger with usual notations. **[8]**

OR

Q12) a) Explain Pool Boiling curve. **[8]**

b) In a tube type parallel flow heat exchanger, hot water at 80 °C is cooled to 65 °C by cold water entering at 20 °C and leaving at 35 °C. What would be the exit temperature if the flow rate of water is doubled? **[8]**

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Total No. of Questions : 12]

SEAT No. :

P1368

[Total No. of Pages : 5

[4858] - 114

T.E. (Mechanical / Automobile Engg./ Mech-SW)

THEORY OF MACHINES - II

(2008 Pattern) (Semester - 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) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of Nonprogrammable calculator is allowed.***
5) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Explain Friction in four bar mechanism. **[4]**

b) Derive an expression for frictional torque of a truncated conical pivot bearing assuming uniform pressure & uniform wear theory. **[6]**

c) A single plate clutch, effective on both sides, is required to transmit 25 kW at 3000 r.p.m. Determine the outer and inner radii of frictional surface if the coefficient of friction is 0.255, the ratio of radii is 1.25 and the maximum pressure is not to exceed 0.1 N/mm^2. Also determine the axial thrust to be provided by springs. Assume the theory of uniform wear **[8]**

OR

Q2) a) Write short note on belt transmission Dynamometer. **[4]**

b) Explain centrifugal clutch with the help of neat sketch. **[4]**

c) A band and block brake, having 14 blocks each of which subtends an angle of 15° at the centre, is applied to a drum of 1 m 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, find : **[10]**

P.T.O.

i) Maximum braking torque,

ii) Angular retardation of the drum, and

iii) Time taken by the system to come to rest from the rated speed of 360 r.p.m.

The coefficient of friction between blocks and drum may be taken as 0.25.

Q3) a) Draw a cam profile to drive an oscillating roller follower to the specifications given below : **[16]**

i) Follower to move outwards through an angular displacement of 20° during the first 120° rotation of the cam;

ii) Follower to return to its initial position during next 120° rotation of the cam;

iii) Follower to dwell during the next 120° of cam rotation.

The distance between pivot centre and roller centre 120 mm; distance between pivot centre and cam axis 130 mm; minimum radius of cam = 40 mm; radius of roller = 10 mm; inward and outward strokes take place with simple harmonic motion.

OR

Q4) a) Write short note on cam jump phenomenon. **[4]**

b) What do you mean by advanced cam curves? Explain. **[4]**

c) Derive expressions for displacement, velocity and acceleration for circular are cam operating a flat faced follower : **[8]**

i) When the contact has on the nose.

Q5) a) Write short note on : **[8]**

i) Hunting of governor and

ii) Governor effort & Governor power.

b) A ship propelled by a turbine rotor which has a mass of 5 tonnes and a speed of 2100 r.p.m. The rotor has a radius of gyration of 0.5 m and rotates in a clockwise direction when viewed from the stern. Find the gyroscopic effects in the following conditions : **[8]**

i) The ship sails at a speed of 30 km/h and steers to the left in a curve having 60 m radius.

ii) The ship pitches 6 degree above and 6 degree below the horizontal position. The bow is descending with its maximum velocity. The motion due to pitching is simple harmonic and the periodic time is 20 seconds.

iii) The ship rolls and at a certain instant it has an angular velocity of 0.03 rad/s clockwise when viewed from stern.

Determine also the maximum angular acceleration during pitching. Explain how the direction of motion due to gyroscopic effect is determined in each case.

OR

Q6) a) Derive from the first principles an expression of the gyroscopic couple. **[8]**

b) A Porter governor has equal arms each 250 mm long and pivoted on the axis of rotation. Each ball has a mass of 5 kg and the mass of the central load on the sleeve is 25 kg. The radius of rotation of the ball is 150 mm when the governor begins to lift and 200 mm when the governor is at maximum speed. Find the minimum and maximum speeds and range of speed of the governor. **[8]**

SECTION - II

Q7) a) Derive an expression for minimum number of teeth on a pinion to avoid interference in terms of addendum of the gear, module, gear ratio and pressure angle. **[6]**

b) Two involute gears in a mesh have a module of 6 mm and a pressure angle of 20°.The larger gear has 56 while the pinion has 24 teeth. If the addenda on pinion and gear have wheels are equal to one module, find the **[10]**

i) contact ratio(the number of pairs of teeth in contact)

ii) angle of action of the pinion and the gear wheel

iii) ratio of the sliding to rolling velocity at the

1) beginning of contact

2) pitch point

3) end of contact.

OR

Q8) a) Compare the cycloidal and involute gear tooth profiles. **[4]**

b) A pair of involute spur gears with 20°pressure angle and pitch of module 8 mm in mesh. The number of teeth on pinion is 18 and its rotational speed is 240 rpm when the gear ratio is 1.8. Find : **[12]**

i) The addenda on pinion and gear wheel which are equal and larger possible while avoiding interference

ii) The length of path of contact.

iii) The maximum velocity of sliding of teeth on either side of the pitch point.

Q9) a) Derive the relation for virtual number of teeth of helical gear. **[4]**

b) A two-start worm rotating at 600 rpm drives a 26 tooth worm gear. The worm has a pitch diameter of 60 mm and a pitch of 20 mm. If the coefficient of friction (μ) is 0.06,find the **[12]**

i) helix angle of the worm

ii) speed of the gear

iii) centre distance

iv) lead angle for maximum efficiency

v) efficiency

vi) maximum efficiency

OR

Q10) a) Define the terms related to bevel gears. **[6]**

i) Pitch cone angle

ii) Base cone angle

iii) Shaft angle

iv) Face width with neat sketch.

b) The following data relate to two spiral gears in mesh : Shaft angle = 90°, centre distance = 180 mm (approx.), Normal circular pitch = 6 mm, Gear ratio = 3, Friction angle = 5°. For maximum efficiency of the drive, determine the **[10]**

i) Spiral angles of the teeth

ii) Number of teeth

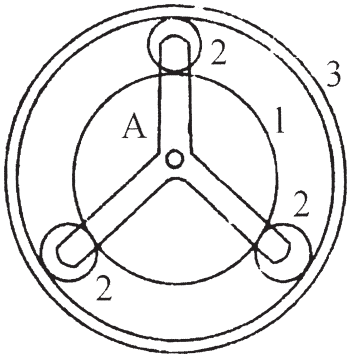
iii) Centre distance (exact)

iv) pitch diameters

v) Efficiency.

Q11) a) Explain inertia of geared system. **[6]**

b) The pitch circle diameter of the annular gear in the epicyclic gear train shown in fig. Q.11 (B) is 425 mm and the module is 5 mm.When the annular gear 3 is stationary; the spindle A makes one revolution in the same sense as the sun gear 1 for every 6 revolutions of the driving spindle carrying the sun gear. All the planet gears are of the same size. Determine the number of teeth on all the gears. **[12]**



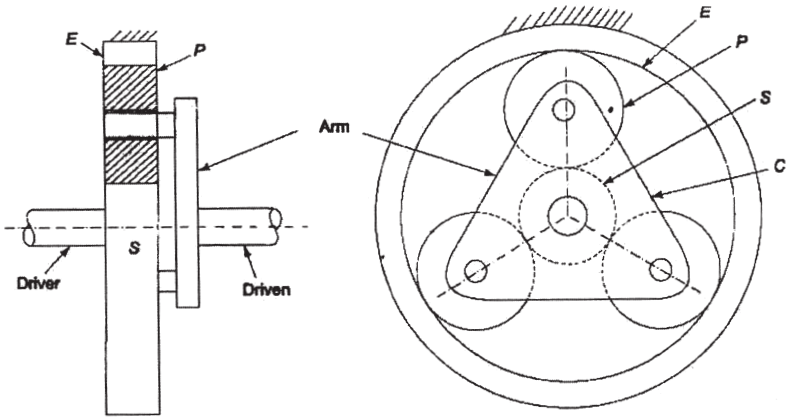
OR

Q12) a) Explain working of Epicyclic gear train with neat sketch. Also give its applications. **[6]**

b) An epicyclic gear train consists of a sun wheel S, a stationary annular wheel E and three identical planet wheels P carried on s star – shaped carrier C, as shown in fig.Q.12 (B).The size of the different toothed wheels is such that the planet carrier C rotates at $1/5^{th}$ of the speed of the sun wheel S. The minimum number of teeth on any wheel is 18. The driving torque on the sun wheel is 120N-m. Determine **[12]**

i) number of teeth on different wheels of the train, and

ii) torque necessary to keep the internal gear stationary.



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Total No. of Questions : 12]

SEAT No. :

P1369

[Total No. of Pages : 3

[4858] - 115

T.E. (Mechanical)

INDUSTRIAL ENGINEERING AND TECHNOLOGY MANAGEMENT

(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 one question from 1&2, 3&4, 5&6, 7&8, 9&10 and 11&12.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right side indicates full marks.***
5) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Discuss the characteristics of Management Science. **[10]**

b) Explain Maslow's hierarchy of needs. **[6]**

OR

Q2) a) Explain in brief different types of plant layouts. **[10]**

b) Write a note on "Leadership". **[6]**

Q3) a) What is productivity? What are different method to improve productivity? **[10]**

b) What is time study? Explain its procedure. **[6]**

OR

Q4) a) What is Work sampling, Qualified worker, Rating and Standard time? Explain. **[10]**

b) Discuss Method study in brief. **[6]**

P.T.O.

Q5) a) Discuss functions of PPC. **[10]**

b) Discuss any two forecasting models. **[8]**

OR

Q6) Write short notes on any three of following : **[18]**

a) CPM and PERT

b) Break even analysis

c) Inventory control

d) ABC analysis

e) Standard costing

SECTION - II

Q7) a) Explain Importance of Technology on society and Business. **[10]**

b) Discuss advantages of new technology. **[6]**

OR

Q8) a) Discuss evolution and growth of technology. **[10]**

b) Discuss Intellectual Property. **[6]**

Q9) a) What do you mean by Technological Forecasting? Explain various techniques used in Technology Forecasting. **[10]**

b) List the various methods of Technology Acquisition. Explain any two in detail. **[6]**

OR

Q10) a) Explain the following : **[10]**

i) Technological Leadership

ii) Technology Monitoring

iii) Mission Flow diagram

b) What do you mean by Technology Assessment? **[6]**

Q11) a) Explain the steps involved in formulating technology planning. **[10]**

b) Explain the various key principles for developing technology strategy. **[8]**

OR

Q12) Write notes on any three of following : **[18]**

a) Technology transfer

b) IPR

c) Technology adoption

d) Technology diffusion

e) Technology absorption

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Total No. of Questions : 12]

SEAT No. :

P1370

[Total No. of Pages : 7

[4858] - 116

T.E. (Mechanical)

MACHINE DESIGN - II

(2008 Pattern) (Semester - II)

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 indicates full marks.***
5) ***Use of electronic pocket calculator is allowed.***
6) ***Use of programmable calculator is not permitted.***
7) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Derive Stribeck's equation for the basic static capacity of bearing. State the assumption made. **[9]**

b) A single row deep groove ball bearing operates with the following work cycle : **[7]**

Element No.	Element Time,%	Radial Load 'Fr' kN	Thrust Load 'Fa' kN	Radial Factor 'X'	Thrust Factor 'Y'	Race Rotating	Service Factor	Speed rpm
1	50	3.0	1.0	0.56	1.4	Inner	1.5	720
2	20	2.5	1.0	0.56	1.6	Outer	2.0	1440
3	Remaining	No load	No load	-	-	Outer		720

If the expected life of the bearing is 14000 hours with a reliability of 95%, calculate the basic dynamic load rating of the bearing so that it

P.T.O.

can be selected from the manufacturers catalogue based on 90 % reliability. If there are six such bearings in a system, what is the probability that all bearing will survive for 14000 hours?

Use following relation,

$$L = 4.48\ L_{10}\ [Log_e\ (1/R)]^{1/1.5}$$

OR

Q2) a) With the help of neat sketches, explain the methods of mounting the rolling contact bearings. **[8]**

b) What is preloading of rolling contact bearing? Why it is necessary? **[4]**

c) A transmission shaft is supported by two deep groove ball bearings at two ends. The center distance between the bearings is 160 mm. A load of 300 N acts vertically downwards at 60 mm distance from the left hand bearing whereas a load of 550 N acts horizontally at 50 mm distance from the right hand bearing. Shaft speed is 3000 rpm and expected life of the bearings is 7000 hours with a reliability of 95%. It is intended to use same bearing at both ends of the shaft. Calculate dynamic load rating of the bearing so that it can be selected from manufacturer's catalogue. **[6]**

Use following relation,

$$L= 4.48\ L_{10}\ [Log_e\ (1/R)]^{1/1.5}$$

Q3) a) Derive Petroff' equation for hydrodynamic bearing. **[8]**

b) State any four important properties of lubricant .Explain the effect of temperature and pressure on viscosity of the lubricating oil. **[8]**

OR

Q4) a) Explain the significance of following variables in connection with hydrodynamic bearing : **[6]**

i) l/d ratio

ii) Unit bearing pressure

iii) Radial clearance

iv) Minimum oil film thickness

b) The following data is given for a 360° hydrodynamic bearing : **[10]**

Journal diameter = $50^{-0.080}_{-0.119}$

Bearing diameter = $50^{+0.039}_{+0.000}$

Bearing length = 50 mm

Journal speed = 1500 rpm

Radial load = 5 kN

The bearing is machined on a lathe from bronze casting, while the steel journal is hardened and ground. The surface roughness (c.l.a.) values for turning and grinding are 3.2 and 0.8 microns respectively. For thick film hydrodynamic lubrication, the minimum film thickness should be six times the sum of surface roughness values for the journal and bearing. Determine quality and quantity of the lubricant required.

Table - 1 Dimensionless Parameters for Full Journal bearings

l/d	ho/c	ϵ	S	(r/c)f	Q / rcn$_s$l	Qs / Q	Pmax /p
1	0.03	0.97	0.00474	0.514	4.82	0.973	6.579
	0.1	0.9	0.0188	1.05	4.74	0.919	4.048
	0.2	0.8	0.0446	1.70	4.62	0.842	3.195
	0.4	0.6	0.121	3.22	4.33	0.680	2.409
	0.6	0.4	0.264	5.79	3.99	0.497	2.066
	0.8	0.2	0.631	12.8	3.59	0.280	1.890
	0.9	0.1	1.33	26.4	3.37	0.150	1.852

Q5) a) What is endurance strength of material? **[4]**

b) A transmission shaft carries a pulley midway between the two bearings. The bending moment at the pulley varies from 200 Nm to 600 Nm as the torsional moment in the shaft varies from 70 Nm to 200 Nm. The frequencies of variation of bending and torsional moments are equal to the shaft speed. The shaft rotates at 1440 rpm.The shaft is made of plain carbon steel (σ_{ut} = 540 N/mm^2 and σ_{yt} = 400 N/mm^2). The corrected endurance limit of the shaft is 200 N/mm^2. Determine the diameter of the shaft using a factor of safety of '2'. **[12]**

OR

Q6) a) Define : **[4]**

i) Notch sensitivity

ii) Endurance Limit

b) A solid circular shaft, 15 mm in diameter is subjected to torsional shear stress, which varies from 0 to 35 Mpa and at the same time is subjected to an axial stress that varies from – 15 Mpa to 35 Mpa. The frequency of variation of these stresses is equal to the shaft speed. The shaft is made of steel with S_{ut} = 540 Mpa and S_{yt} = 400 Mpa and corrected endurance strength of the shaft is 200 Mpa. Determine the factor of safety. **[12]**

SECTION - II

Q7) a) Draw a neat labeled sketch of cone clutch. **[4]**

b) A centrifugal clutch transmitting 20 KW at 750 rpm consist of four shoes, the clutch is to be engaged at 500 rpm. The inner radius of drum 165 mm. The radius of centre of gravity of shoe is 140 mm, when the clutch is engaged. The coefficient of friction is 0.3 while the permissible pressure on friction lining is 0.1 N/mm^2. Assume shoe subtended angle is 70° Calculate, **[12]**

i) Mass of each shoe

ii) Dimensions of friction lining

OR

Q8) a) Explain self locking & self energizing brake. **[4]**

b) A Caliper disk brake is to designed for front wheel of sport car. 'The required braking capacity of each brake is 450 N-m. The inner & outer radii of friction pads are 100 mm & 150 mm respectively. The coefficient of friction between the pads & rotating disk is 0.4 while the limiting intensity of pressure is 1.1 N/mm^2. Determine the required number of pads if, the pads are annular segments with subtended angle 60º per pad at centre of disk. Draw the sketch showing disk & annular pads. **[8]**

Q9) a) What are the effects of increasing & decreasing pressure angle in design of gear pair. **[4]**

b) A spur gear pair with 20° full depth involute tooth profile consist of 18 teeth pinion meshing with 36 teeth gear .the pinion & gear is made of steel with ultimate tensile strength 600 N/mm^2 & 510 N/mm^2 respectively, the module is 5 mm while the face width is 10 × module. The surface hardness of pinion & gear are 330 BHN & 280 BHN respectively. **[14]**

Calculate :

i) Beam strength

ii) Wear strength

iii) Rated power that the gear can transmit and

iv) Maximum static load on gear.

Use following Data -

- Servicefactor - 1.5,
- Factor of safety – 2
- pinion speed – 1440 rpm
- Lewis form factor – Y = 0.484 - 2.87/Z
- Velocity factor - $V = \frac{5.6}{5.6 + \sqrt{V}}$.

OR

Q10) a) What is formative number of teeth in helical gear. Derive the expression for formative number of teeth in helical gear. **[4]**

b) A helical pinion 14 teeth made of alloy steel with S_{ut} =800N/mm^2 is mesh gear made of plain carbon steel with S_{ut} = 720 N/mm^2 . The gear is required to transmit 30KW power from an electric motor running at 720 rpm to machine at 225 rpm. The application factor & load concentration factor are 1.3 & 1.1 respectively while the factor of safety is 2.0 The face width is 10 × normal module & tooth system is 20° full depth involute . The deformation factor is 11000 × e N/mm. Design the gear pair by using velocity factor & Buckingham's equation for dynamic load. Also suggest the surface hardness for gear pair.

Use following Data-

Lewis form factor – $Y = 0.484 - \frac{2.87}{Z}$

Velocity factor – $V = \frac{5.6}{5.6 + \sqrt{V}}$

For grade 7, $e = 11 + 0.9\ [Mn + 0.25\ \sqrt{d}\ ]$ um

Load stress factor $K = 0.16\ [BHN/100]^2$

Buckingham s equation - $P_d = \frac{21V(bC.\cos^2\psi + P_{t\max})\cos\psi}{21V + \sqrt{bc.\cos^2\psi + P_{t\max}}}$

Standard module in mm, 1, 1.25, 2, 3, 4, 5, 6, 8, 10, 12, 14

Q11) a) What are different types of mounting of bevel gear. Explain any one with sketch. **[4]**

b) A pair of bevel gear with 20° full depth involute tooth profile consist of 24 teeth pinion meshing with 48 teeth gear. the axes of pinion & gear are right angle to each other . The module at large end of the tooth is 6 mm while the face width is 50 mm .The gear pair is made of gray cast iron FG220. The teeths are generated, the surface hardness of gear pair is 250 BHN. The application factor & factor of safety are 1.5 & 2.0 respectively. The pinion rotates at 300 rpm. Assuming velocity factor accounts for dynamic load, Determine **[12]**

i) Beam strength

ii) Wear strength

iii) Maximum static load on gear. and

iv) Rated power that the gear can transmit

OR

Q12) a) In a design of worm gear pair why worm gear governs the design. **[3]**

b) A double start worm made of case hardened alloy steel l6Ni80Cr60 (S_{ut} = 700N/mm^2) is to mesh with worm gear to be made of phosphor bronze (S_{ut} = 240N/mm^2). The gear pair is required to transmit 5kW power from an electric motor running at 1500rpm to a machining running at 75 rpm. The service factor is 1.25, while the factor of safety required is 2.0. The face width of worm gear is 0.73 times the pitch circle diameter of worm. The worm gear factor is 0.685 N/mm^2, while the diametrical quotient is l0. The normal pressure angle is 14.5°. If the coefficient of friction between worm and worm gear teeth is 0.03, design the gear pair and find the power lost. Would you recommend a fan for the gear box? Assume the permissible temperature rise is 50°C. **[13]**

Use following data :

- Lewis form factor -- $Y = 0.39 - \frac{2.15}{Z_G}$
- Velocity factor, $C_v = \frac{6}{6 + V_G}$
- Area of housing, A = 1.14 × 10^{-4} × (a)$^{1.7}$ m^2, where a = centre distance in mm

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Total No. of Questions : 12]

SEAT No. :

P1371

[Total No. of Pages : 5

[4858] - 117

T.E. (Mech. / Mech-SW)

TURBO MACHINES

(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, Q.11 or Q.12.***
2) ***Answer to the two sections should be written in separate books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right side indicate full marks.***
5) ***Use of electronic pocket calculator is allowed.***
6) ***Assume suitable data, if necessary.***

SECTION - I

UNIT - I

Q1) a) How do you classify water turbines? What is the difference between the Reaction and Impulse turbines? **[6]**

b) A jet of oil having sp.gravity 0.8 of 40mm diameter strikes a stationary plate inclined at an angle 30º 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 : **[6]**

i) Normal to plate

ii) Along the X-axis and Y-axis

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

c) Prove that the theoretical number of buckets required on a runner of impulse turbine is given as : $Z = 360°/\Psi$ where, $\Psi = \cos^{-1}((m + 1)/(m + 1.2))$ in which m represents the jet ratio. **[4]**

OR

P.T.O.

Q2) a) 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 10º and 5 m/s. Draw 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

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]**

UNIT - II

Q3) a) What is draft tube? Why it is used in a reaction turbine? Describe with neat sketch two different types of draft tubes. **[6]**

b) 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,

iv) Width of the wheel at inlet.

OR

Q4) a) A Kaplan turbine working under a head of 20m develops 11772 kW shaft power. The outer diameter of the runner is 3 .5m 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) 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) Specific speed of the machine,

ii) Power generated, and

iii) Type of turbine.

UNIT - III

Q5) a) Explain ,with the help of h-s diagram, the effect of friction on flow through a steam nozzle. **[4]**

b) Define nozzle efficiency and state the factors on which it depends. **[4]**

c) 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 18°, 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]**

OR

Q6) a) Show that in a 50% reaction turbine, the maximum stage efficiency is $\frac{2\cos^2 \propto}{1+\cos^2 \propto}$ where, $\propto$ is the nozzle angle. **[8]**

b) A 50% reaction turbine runs at 3000 rpm.The angles at exit of fixed bladings and inlet of moving bladings are 20° and 30° 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.

SECTION - II
UNIT - IV

Q7) a) Show that the optimum pressure ratio for maximum work output between fixed temperature limits of the Joule cycle is given as : **[6]**

$$r_p = \left\{ \frac{T_{max}}{T_{min}} \right\}^{\frac{\gamma}{2(\gamma-1)}}$$

b) 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% repectively.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 γ = 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.

OR

Q8) a) 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]**

b) A gas turbine plant of 800 kW capacities takes the air at 1.01 bar and 15°C. The pressure ratio of the cycle is 6 and maximum temperature is limited to 700°C. 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]**

UNIT - V

Q9) a) Derive an expression for the minimum speed for starting a centrifugal pump and minimum diameter of impeller for this condition. **[6]**

b) A centrifugal pump is to deliver water from a tank against a static head of 40m. The suction pipe is 50 m long and 25 cm diameter. The delivery pipe is 20 cm diameter and 1600m long. The pump characteristics can 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]**

OR

Q10) a) Explain various efficiencies related to centrifugal pumps. **[6]**

b) 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 40°.The pump delivers 0.98 m^3 of water per second under an effective head of 35m.If the pump is driven by a 500 kW motor. Determine : **[10]**

i) The Manometric efficiency

ii) The overall efficiency

iii) The Mechanical efficiency

UNIT - VI

Q11) a) Explain the terms slip factor and power input factor in a centrifugal compressor. **[6]**

b) A single sided centrifugal compressor for a gas turbine is required to deliver 10 kg/s of air while operating with a total pressure ratio of 4.5 while turning 18000 rev/min. Initial conditions of air are 1.013bar 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.

OR

Q12) a) Explain the term degree of reaction for an axial flow compressor. Why is the degree of reaction generally 50%? **[6]**

b) A 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 20°C 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) Balde angles.

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

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Total No. of Questions : 12]

SEAT No. :

P1372

[Total No. of Pages : 4

[4858] - 118

T.E. (Mechanical Engineering)

MECHATRONICS

(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 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.12 from section-II.***
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 and mention it clearly.***

SECTION - I

Q1) a) Level of liquid inside a tank is to be measured using capacitive level sensor. For this, draw the set-up and explain the principle of working. **[6]**

b) Using a suitable block diagram explain the working of a Measurement System. **[6]**

c) A rotary potentiometer is used for measurement of angular position. The range of the potentiometer is 300º and the Potentiometer is supplied with 12 Volts. If the angular position is 40°, calculate the output voltage. **[6]**

OR

Q2) a) Draw a suitable diagram and explain the construction of a strain gauge type load cell. Also, explain its working and list its advantages and applications. **[9]**

b) List the static and dynamic characteristics of a sensor. Also, explain any five static characteristics in detail. **[9]**

P.T.O.

Q3) a) Draw suitable diagrams and explain the construction and working of the LVDT. **[8]**

b) With respect to construction, working and advantages explain Potentiometer for linear position measurement. **[8]**

OR

Q4) a) Classify, in detail, the sensors for measurement of displacement. **[4]**

b) Write six distinct points of comparison between Thermocouple and RTD. **[6]**

c) Draw a suitable diagram and explain the working of Optical Encoder. **[6]**

Q5) a) Draw suitable diagrams and explain the construction and working of 6 bit SAR type Analog to Digital Converter. **[10]**

b) A 6-bit DAC has a reference voltage of 0 to 10 V. The binary input is 101100. Find the analog output voltage. **[6]**

OR

Q6) a) Explain resistance, inductance and capacitance as basic electrical elements with derivation of their transfer functions. Hence derive the transfer function of R-L-C arranged in parallel. **[8]**

b) Discuss the following two concepts in detail : **[8]**

i) Sample & Hold Circuit

ii) SCADA

SECTION - II

Q7) a) Using a suitable diagram discuss the application of closed loop control in position control. **[8]**

b) Figure Q.7 (b) shows a block diagram. Simplify and find the transfer function : **[8]**

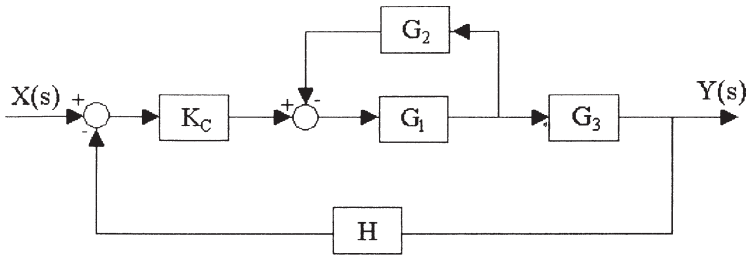


Figure Q7 (b)

OR

Q8) a) Draw suitable diagram and explain the construction of open loop control system. Also, explain the working and list the advantages of open loop control. **[8]**

b) Explain the detail, following four terms : **[8]**

i) Process Load

ii) Process Lag

iii) Dead Time

iv) Control Parameter Range

Q9) a) A proportional controller is used to control temperature within 50°C to 130°C with a set point of 73.5°C. The set point is maintained with 50% controller output. The offset error is corresponding to load change which causes 55% controller output. If the proportional gain is 2 find the % controller output if the temperature is 61°C. **[10]**

b) Discuss, in detail, the effect of the P, I and D control on following transient specifications : **[6]**

i) % Overshoot

ii) Steady State Error

iii) Rise Time

OR

Q10) a) Draw a suitable block diagram and derive the transfer function of the PID controller. Also, derive the equation for the control signal, u, for the controller. **[10]**

b) Define : **[6]**

i) Proportional Band

ii) Integral Action Time

iii) Derivative Action Time

Q11) a) Consider two NO type push buttons switches S1 and S2, two lamps namely RED and GREEN and write the PLC ladder diagram to achieve following objectives : **[12]**

i) When S1 is pushed and S2 is not pushed RED lamp is ON and latched.

ii) When RED lamp is latched ON and S2 is pushed, RED lamp is De-latched and GREEN lamp is ON and Latched.

iii) When both the buttons are pushed or not pushed, both the lamps are OFF and Delatched.

b) With the help of a block diagram explain the basic structure of PLC. **[6]**

OR

Q12) a) Considering suitable example, draw the ladder diagram and explain the working of : **[12]**

i) Timer

ii) Counter

b) Explain various factors to be considered for selection of PLC. **[6]**

❄❄❄

Total No. of Questions : 12]

SEAT No. :

P1373

[Total No. of Pages : 3

[4858] - 119

T.E. (Mechanical)

METROLOGY AND QUALITY CONTROL

(2008 Pattern) (Semester - II)

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

Instructions to the candidates:

1) ***Answer any three questions from each section.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of logarithmic tables, slide rule, electronic non programmable pocket calculator is allowed.***
5) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Differentiate between Line and End Standards. **[4]**

b) Explain Different types of Errors in Measurement. **[8]**

c) What is the difference between Alignment test & performance test? Explain with neat sketch any one such tests on a Lathe machine **[4]**

OR

Q2) a) Explain construction, working, application, advantages and limitations of Johansson's Microkator Comparator. **[8]**

b) Describe with neat sketches of autocollimator & sine bar. **[8]**

Q3) a) Difference between primary & secondary texture. **[4]**

b) Explain concept of RMS value for surface roughness. **[6]**

c) Design and make a drawing of general purpose GO and NOGO plug gauge for inspecting hole of $70H_8$. Data with usual notation. **[8]**

i) i (micron) = $0.45 * \sqrt[3]{D} + 0.001D$,

ii) Diameter step 50 to 80 mm

iii) The value of tolerance for $IT_8 = 25i$

P.T.O.

OR

Q4) a) What are optical flat? How are patterns of fringes interpreted? **[5]**

b) Explain working of LASER interferometer with neat sketch. **[5]**

c) Design GO and NOGO limit plug gauge for checking a hole having $50^{+0.06}_{-0.00}$ Size Assume gauge maker's tolerance equal to 10% of work tolerance and wear allowance equal to 10% of gauge maker's tolerance. **[8]**

Q5) a) Calculate the constant chord length & its distance below the tooth tip for gear of module 5mm & pressure angle 20º. **[6]**

b) Describe working of universal measuring machine **[4]**

c) Write a short note on computer controlled co-ordinate measuring machine. **[6]**

OR

Q6) a) Derive the relation for Best wire size for M24 × 3 mm external threads. Calculate the Diameter of the best wire size and the difference between the size under the wires and effective diameter. **[6]**

b) Write short note on (Any Two) : **[10]**

i) Machine Vision.

ii) Lasers in Metrology.

iii) Gear tooth Vernier caliper.

SECTION - II

Q7) a) What are different quality costs? Explain cost of quality and value of quality. **[6]**

b) Explain : Quality policy. **[5]**

c) Explain what you understand by concurrent engineering. **[5]**

OR

Q8) a) Describe malcom national Quality awards. **[4]**

b) Write a note on quality circle. **[6]**

c) State seven quality control tools and explain any two. **[6]**

Q9) a) What do you mean by FMECA ? Explain in detail. **[8]**

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

i) Quality Audit

ii) Kaizen

OR

Q10) a) Explain ISO 9000 Quality system standards. **[6]**

b) Write a short note on Total quality management. **[5]**

c) What is JIT ? Explain in details its applications. **[5]**

Q11) a) Compare 'P' chart and 'c' chart. **[6]**

b) Explain DMAIC uses in six sigma. **[6]**

c) Explain operating characteristics curve with LTPD, AQL, Producer's risk (α) Consumer's risk (β). **[6]**

OR

Q12) a) Calculate the sample size AOQ for a single sampling plan. **[6]**

i) Probability of acceptance for 0.5% defectives in a lot is 0.525.

ii) Lot size N = 10,000 units.

iii) Acceptance number = 1

iv) nP' = 1.6

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

b) A machine producing plastic moulded components is checked up for the statistical stability. Draw 'P' chart for machine and comment upon the process. Sample size = 200 Nos. **[6]**

Sample No.	1	2	3	4	5	6	7	8	9	10
Defectives	11	8	22	15	12	27	10	15	10	2

c) Explain Statistical process control (SPC). **[6]**

❄❄❄

Total No. of Questions : 12]

SEAT No. :

P1374

[Total No. of Pages : 7

[4858] - 120

T.E. (Mechanical)

REFRIGERATION AND AIR-CONDITIONING

(2008 Pattern) (Semester - II)

Time : 3 Hour] *[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) ***Use of psychrometic chart is allowed.***
7) ***Assume suitable data if necessary, state clearly he assumption made.***

SECTION - I

Q1) a) Explain : **[8]**

i) Vortex tube refrigeration

ii) Thermoelectric refrigeration

b) A refrigeration system operated on Bell Coleman cycle produces 20 kW with cooler pressure of 11 bar and refrigerated space at 1.05 bar. The temperature of air leaving the cooler is 38°C and the air suction to compressor is 16°C. Calculate **[8]**

i) mass of air circulated per min.

ii) compressor and expander displacement

iii) COP

iv) kW/TR

OR

Q2) a) Explain various processes in Bell-Coleman cycle. Derive the expression for COP of Bell Coleman cycle. **[8]**

P.T.O.

b) A cold storage is to be maintained at –5°C while surrounding are at 35ºC. The heat transfer from the surrounding into the cold storage is estimated to be 29 kW. The actual COP of the refrigeration plant is 1/3rd of an ideal COP of the plant working between the same temperature. Find actual COP and power required to drive the plant. Determine percent change in COP and power required when surrounding temperature is 55°C keeping all other conditions same. **[8]**

Q3) a) Draw actual vapour compression cycle on T-s and p-h diagram. Explain the various losses in VCC. **[8]**

b) A refrigeration plant of 100 TR capacity uses R-22 as refrigerant. The evaporator temperature is -30°C and condensing temperature is 30°C. The refrigerant enters the condenser as dry saturated and leaves the condenser, subcooled by 10°C. If Actual COP is 70% of the theoretical, find : **[8]**

i) theoretical and actual COP

ii) mass circulation of R-22 in kg/s

iii) power input to compressor

Use following properties of R-22.

T_s, °C	p, bar	h_f, kJ/kg	h_g, kJ/kg	S_f, kJ/kgK	S_g, kJ/kgK
-30	1.64	116.1	393.1	0.8698	1.803
+30	11.82	236.7	414.5	1.125	1.712

C_{pv} = 0.55 kJ/kgK, C_{pl} = 1.19 kJ/kgK.

OR

Q4) a) Explain the use of the following in VCRS. **[6]**

i) accumulator

ii) receiver

iii) suction line heat exchanger

b) With neat schematic explain the water-ammonia vapour absorption refrigeration system. Why deflagmeter is used in this system? Compare water-ammonia system with Li-Br system. **[10]**

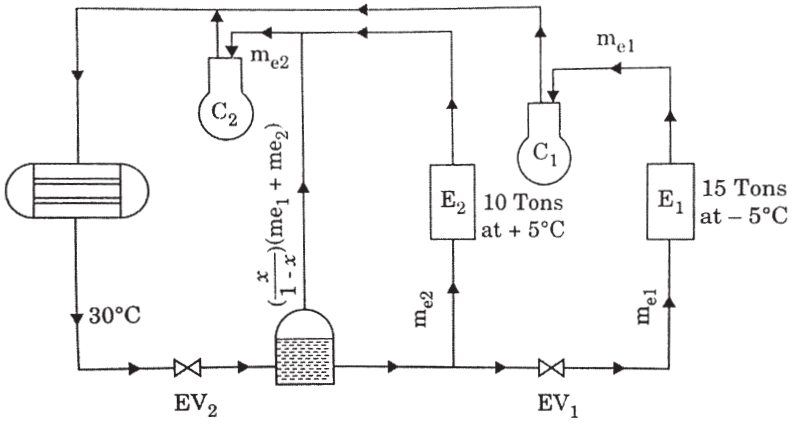
Q5) a) Classify the refrigerants. Explain the desirable properties of refrigerant when considered for VCRS. **[8]**

b) A refrigeration system as shown on Fig. with R-12 as refrigerant. Find the following : **[10]**

i) power required to run the system

ii) COP

iii) Mass circulation in each evaporator, kg/min



OR

Q6) a) A 25 TR two stage VCRS with flash chamber -as flash gas removal operates with ammonia as refrigerant. The evaporating and condensing temperature are -30°C and 40°C respectively. Estimate COP and power input. **[10]**

What is percent change in compressor work if compression is carried out in single stage?

b) Explain ODP and GWP of refrigerants. What are the alternatives to R- 12 refrigerant? **[8]**

SECTION - II

Q7) a) Explain comfort chart. **[6]**

b) Define : **[6]**

i) RSHF,

ii) ESHF and

iii) ADP

c) Write a note on Evaporative Cooling. What is saturating efficiency? **[6]**

OR

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

i) wet bulb temperature and

ii) specific humidity with their notations and units.

b) Write a note on ventilation requirement and infiltration air. **[6]**

c) In an industrial air conditioning system, 20 cmm of air at 30°C DBT, 75% RH is first cooled and dehumidified and then heated to obtain 20°C DBT and 60% RH. **[8]**

Show the process on the psychrometric chart and find :

i) Cooling coil capacity in TR,

ii) Capacity of the heating coil in kW,

iii) Amount of water removed from air.

Q9) a) Compare unitary and central air conditioning systems. **[6]**

b) Write a note on 'All Air System'. **[5]**

c) Explain any one expansion device used in refrigeration and air conditioning. **[5]**

OR

Q10) a) What are the different types of condensers used in refrigeration and air conditioning? Explain any one with neat sketch. **[8]**

b) Name the different types of compressors and evaporators used in refrigeration and air conditioning. **[3]**

c) Explain summer air conditioning. **[5]**

Q11) a) What are the different methods for designing ducts? Explain any one. **[7]**

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

c) Calculate the frictional drop through 40 m of 30 cm x 50 cm rectangular duct for flow rate of 100 m^3 per minute at a density of 1.2 kg/m^3. Assume friction factor of 0.005. **[5]**

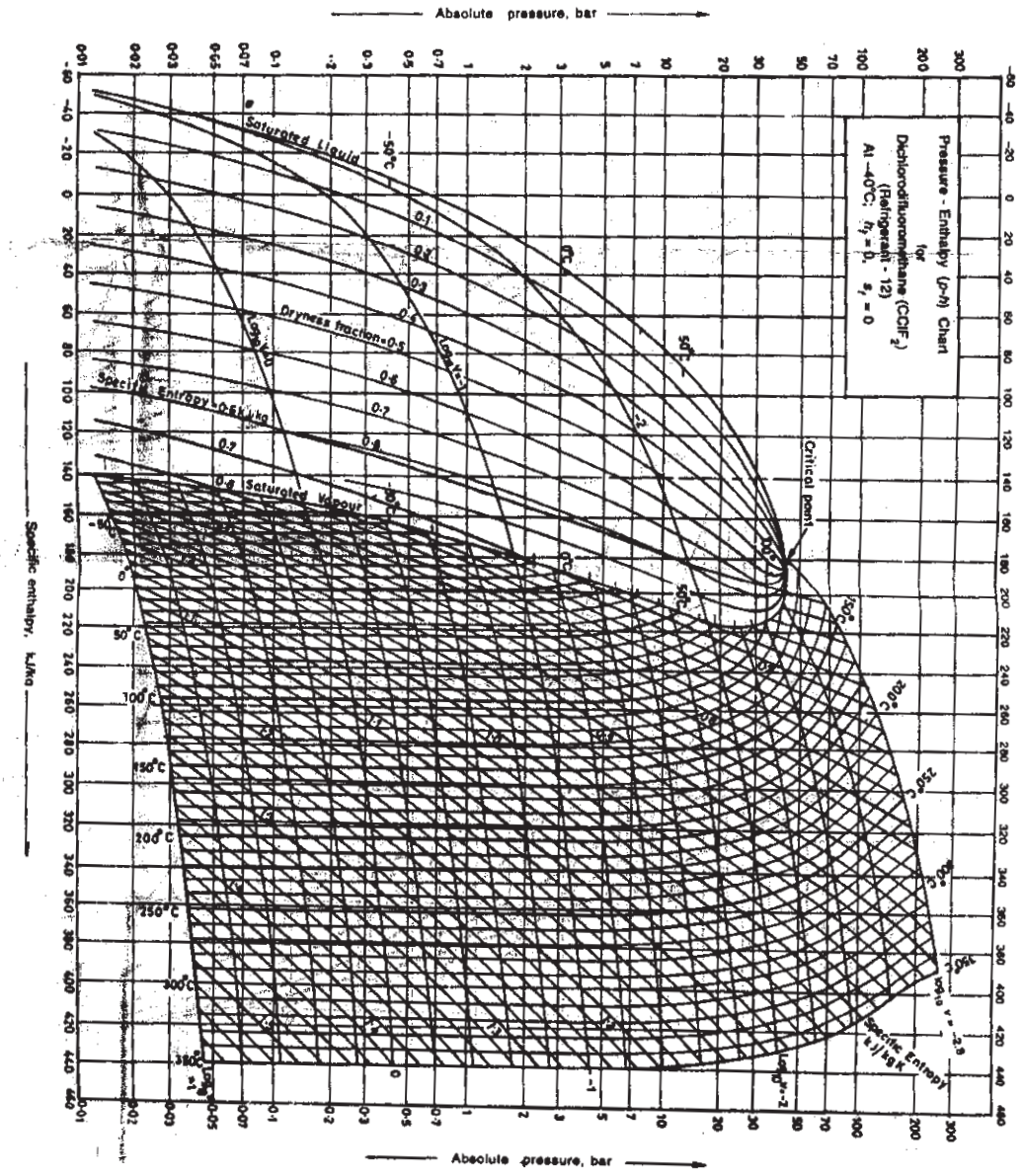
OR

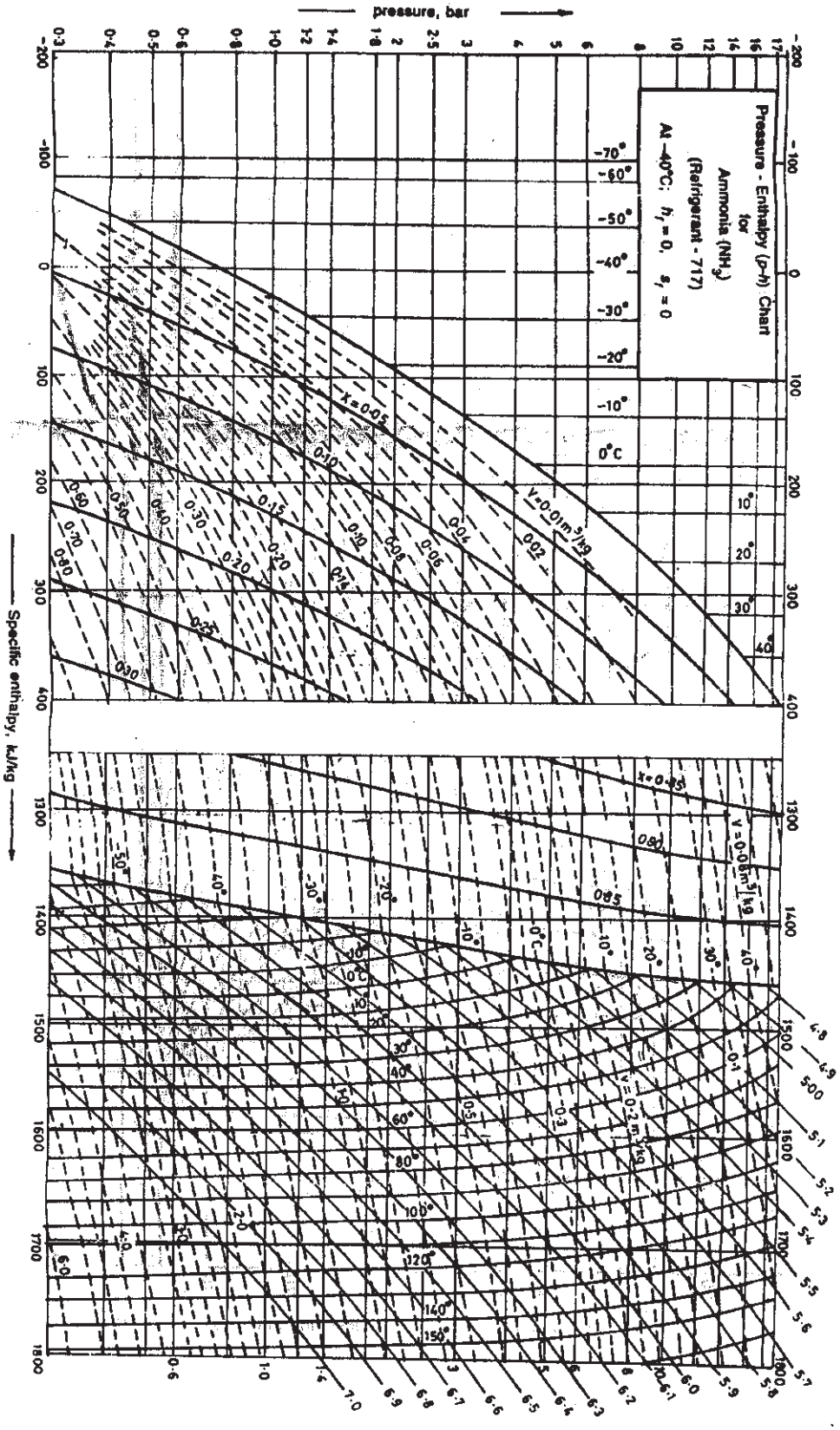
Q12) a) How ducts are classified? **[4]**

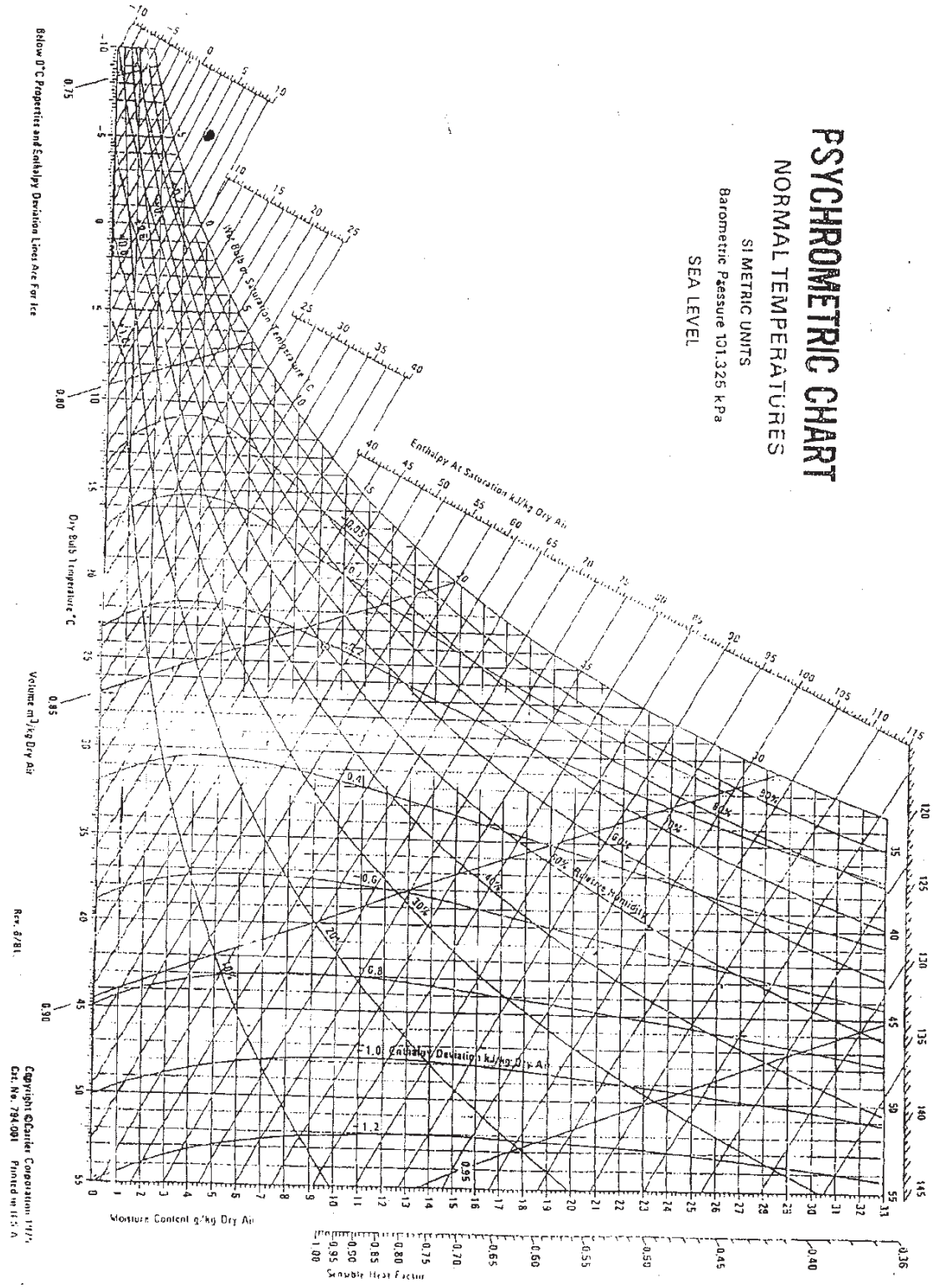
b) Prove that for a rectangular duct of side a and b, the equivalent diameter D of a circular duct for same flow velocity is given by **[6]**

$$D = \frac{2ab}{a+b}$$

c) Discuss the various methods of food preservation. **[6]**


Absolute pressure, bar
Pressure - Enthalpy (p-h) Chart
for
Dichlorodifluoromethane (CCl2F2)
(Refrigerant - 12)
At -40°C; η = 0, x = 0
Saturated Liquid
Saturated Vapour
Dryness fraction=0·5
Critical point
Specific enthalpy, kJ/kg
Specific Entropy kJ/kg K
Absolute pressure, bar


pressure, bar
Specific enthalpy, kJ/kg
Pressure - Enthalpy (p-h) Chart
for
Ammonia (NH_3)
(Refrigerant - 717)
At −40°C: $h_f = 0$, $s_f = 0$


PSYCHROMETRIC CHART
NORMAL TEMPERATURES
SI METRIC UNITS
Barometric Pressure 101.325 kPa
SEA LEVEL
Below 0°C Properties and Enthalpy Deviation Lines Are For Ice
Wet Bulb or Saturation Temperature °C
Enthalpy At Saturation kJ/kg Dry Air
Dry Bulb Temperature °C
Volume m³/kg Dry Air
Relative Humidity
Moisture Content g/kg Dry Air
Enthalpy Deviation kJ/kg Dry Air
Sensible Heat Factor
Rev. 8/81
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Total No. of Questions : 11]

SEAT No. :

P1375

[Total No. of Pages : 2

[4858] - 122

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

PRODUCTION MANAGEMENT (Self Study)

(2008 Pattern) (Elective - I - (a))

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

Instructions to the candidates:

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

SECTION - I

Q1) a) What is scientific management? Explain principles of scientific management (any three). **[8]**

b) Explain Functions & types of organization. **[8]**

OR

Q2) a) What is group dynamics? What are the types and their characteristics of group dynamics? **[8]**

b) Explain private and public trusts in detail. **[8]**

Q3) a) What is production planning & control? Explain its functions. **[8]**

b) What is production management? Explain elements of production function and productivity. **[8]**

OR

Q4) a) Define Industrial Engineering. What are the duties of Industrial engineering? **[8]**

b) Explain principles of material handling. **[8]**

P.T.O.

Q5) a) Define & Explain with example of standard time and performance rating. **[10]**

b) What do you understand by facilities planning? What is the importance of it? **[8]**

OR

Q6) a) Define method study. What are its objectives? **[10]**

b) Explain SIMO chart and chronocylo graph. **[8]**

SECTION - II

Q7) a) What is importance of control chart? Explain control chart for variables. **[8]**

b) Explain meaning of 'Quality'. Why is it important to maintain quality? **[8]**

OR

Q8) a) Define work sampling. Explain procedure for conducting work sampling. **[8]**

b) What is Acceptance Quality Level (AQL)? What is its significance. **[8]**

Q9) a) What are quality circles? What are its benefits? **[8]**

b) Explain concurrent engineering & reverse engineering. **[8]**

OR

Q10) a) Explain Deming's approach towards quality and world class manufacturing. **[8]**

b) Describe concept of six sigma. **[8]**

Q11) Write short note on Any Three : **[18]**

a) Failure Mode and Effective Analysis (FMEA).

b) Design of Experiments. (DOE)

c) ISO

d) Pokayoke

e) QS and CMM standards

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Total No. of Questions : 8]

SEAT No. :

P2022

[Total No. of Pages : 2

[4858]-123

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

BEHAVIOURAL SCIENCE

(2008 Pattern) (Elective - I) (Self Study)

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

Instructions to the candidates:

1) ***Answer 3 questions from Section I and 3 questions from Section II.***
2) ***Figures to the right indicate full marks.***

SECTION - I

Q1) a) Explain with diagram line organisation and staff organization. **[6]**

b) Explain with sketch, advantage and limitation of project structure & Matrix structure. **[10]**

Q2) What are the different forms of business organisation? Explain the formation and function of Joint Stock Company. Also describe it's merits and demerits. **[16]**

Q3) a) Explain the following theories of motivation. **[10]**

i) Maslow's hierarchy of needs.

ii) Herberg's two factory theory.

b) Explain Environment in the Urban & Rural Laws. **[6]**

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

a) Stimulus Response.

b) Planning and design.

c) Functions of Finance Management.

d) Statutory Control.

P.T.O.

SECTION - II

Q5) a) Explain the characteristics of Grapline theory. **[8]**

b) Explain Group dynamics. **[8]**

Q6) a) What is transitional analysis? Where it is used. **[8]**

b) What is Leadership behaviour? Explain two types of leaders. **[8]**

Q7) a) Explain Management Grid. **[8]**

b) Explain the Quality awards models and role of Self Assessment. **[8]**

Q8) Write a short on (Any three) : **[18]**

a) Written communication.

b) Oral and Nonverbal communication.

c) Different types of Interview.

d) Group dynamics.

Total No. of Questions : 12]

SEAT No. :

P2023

[Total No. of Pages : 3

[4858]-124

T.E. (Mech. S/W)

WELDING TECHNOLOGY

(2008 Pattern)

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

Instructions to the candidates:

1) ***Answer any 3 questions from each section.***
2) ***Answer 3 questions from Section I and 3 questions from Section II.***
3) ***Answers to the two sections should be written in separate books.***
4) ***Neat diagrams must be drawn wherever necessary.***
5) ***Figures to the right indicate full marks.***
6) ***Your answers will be valued as a whole.***
7) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
8) ***Assume suitable data, if necessary.***

SECTION - I

Unit - I

Q1) a) Differentiate between Leftword and Rightword welding techniques. **[8]**

b) Explain what is manifold system in gas welding? What are the advantages of using manifolds? **[8]**

OR

Q2) a) Explain definition, principle of operation and applications of air acetylene welding. **[8]**

b) Explain different advantages, disadvantages and applications of gas welding. **[8]**

Unit - II

Q3) a) Explain Flux shielded metal Arc Welding Process in detail. **[8]**

b) Explain with figure principle of submerged Arc Welding Processes. Explain its advantages and applications. **[8]**

OR

P.T.O.

Q4) a) Explain Non consumable and Consumable electrodes used in welding processes. **[8]**

b) Explain how right electrodes are selected for particular operation? What core is to be taken for electrodes? **[8]**

Unit - III

Q5) a) Define Resistance Welding Processes. Explain fundamentals of Electric Resistance Welding Processes. **[9]**

b) What are the different variables commonly considered in Resistance Welding? Explain advantages and disadvantages of Resistance Welding. **[9]**

OR

Q6) a) Explain in brief different Spot Welding Machines with figures. **[9]**

b) Explain Projection Welding Processes with its advantages, disadvantages & applications. **[9]**

SECTION - II

Unit - IV

Q7) a) Explain in brief Cold (Pressure) Welding Process. What are the different metals welded by cold welding processes. **[8]**

b) Explain different parameters of diffusion welding. **[8]**

OR

Q8) a) Differentiate between Inertia Welding and Friction Welding. **[8]**

b) Explain in brief Thermit Welding Process. **[8]**

Unit - V

Q9) a) Explain principle of operation of Brazing. What are advantages, limitations & applications of brazing? **[8]**

b) Explain furnace brazing in detail. **[8]**

OR

Q10) a) Explain induction brazing in brief. **[8]**

b) Compare soldering, brazing and welding processes. **[8]**

Unit - VI

Q11) a) Enumerate different welding defects and explain different causes of following defects. **[9]**

i) Cracks.
ii) Distortion.
iii) Porosity & blow holes.
iv) Overlapping.

b) What is 'Weld Quality'? What are the factors considered for Weld Quality. **[9]**

OR

Q12) a) Explain the concept "Quality Conflicts" in welding. **[9]**

b) Explain main components of costs of Welding Processes. What are the different factors involved in welding costs. **[9]**

Total No. of Questions : 12]

SEAT No. :

P1376

[Total No. of Pages : 7

[4858] - 125

T.E. (Mechanical S/W)

THEORY OF MACHINES AND MACHINE DESIGN - II

(2008 Pattern) (Semester - II)

Time : 4 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.***

SECTION - I

Q1) a) Explain what is meant by Type synthesis, and Number synthesis? **[4]**

b) It is required to set out the profile of a cam to give the following motion to the reciprocating follower with a flat mushroom contact face : **[12]**

i) Follower to have a stroke of 20 mm during 120° of cam rotation;
ii) Follower to dwell for 30° of cam rotation;
iii) Follower to return to its initial position during 120° of cam rotation ; and
iv) Follower to dwell for remaining 90° of cam rotation.

The minimum radius of the cam is 25 mm. The out stroke of the follower is performed with simple harmonic motion and the return stroke with equal uniform acceleration and retardation.

OR

P.T.O.

Q2) a) Derive relation for displacement, velocity and acceleration of follower which has uniform acceleration and retardation motion during rise. **[6]**

b) Synthesize a four-bar mechanism to generate a function $y = \sin x$ for $0 \leq x \leq 90°$. The range of the output crank may be chosen as 60° while that of input crank be 120°. Assume three precision points which are to be obtained from Chebyshev spacing. Assume fixed link to be 50 mm long and $\theta_1 = 105°$ and $\phi_1 = 66°$. **[10]**

Q3) a) State and prove the law of gearing. Show that involute profile satisfies the conditions for correctgearing. **[6]**

b) A pair of involute spur gears with 16° pressure angle and pitch of module 6mm is in mesh. The number of teeth on pinion is 16 and its rotational speed is 240 r.p.m. When the gear ratio is 1.75, find in order that the interference is just avoided : **[10]**

i) the addenda on pinion and gear wheel;

ii) The length of path of contact; and

iii) The maximum velocity of sliding of teeth on either side of the pitch point.

OR

Q4) a) Two helical gears are to be used to transmit 200 KW with a velocity ratio of 3:1 in between parallel shafts. The teeth are of involute shape with a normal pressure angle of 20°, normal module of 12.5 mm and standard addendum of one module, and pinion has 20 teeth and rotates at 650 rpm. If the helix angle is 30°, determine : **[6]**

i) the center distance

ii) the axial thrust on the gear,

iii) the transverse pressure angle,

iv) normal tooth load.

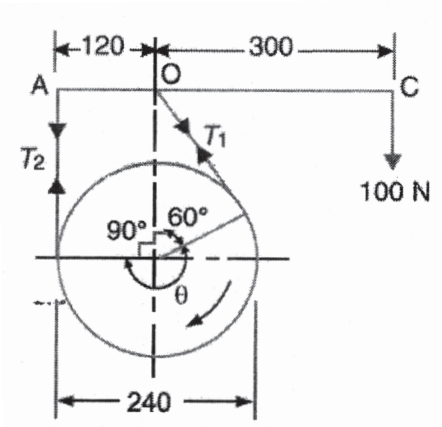
b) In a reverted epicyclic geartrain, the arm A carries two gears B and C and acompound gear D - E. The gear B meshes with gear E and the gear C meshes with gear D. The number of teethon gears B, C and D are 75, 30 and 90 respectively. Find the speed and direction of gear C when gear B is fixed and the arm A makes 100 r.p.m. clockwise. **[10]**

Q5) a) The simple band brake, as shown in Fig. 2, is applied to a shaft carrying a flywheel of mass 400 kg. The radius of gyration of the flywheel is 450 mm and runs at 300 r.p.m. If the coefficient of friction is 0.2 and the brake drum diameter is 240 mm, find : **[8]**

i) The torque applied due to a hand load of 100 N,

ii) The number of turns of the wheel before it is brought torest, and

iii) The time required to bring it to rest, from the moment of the application of the brake.



All dimensions in mm.
Figure 1

b) The turbine rotor of a ship has a mass of 3500 kg. It has a radius of gyration of 0.45 m and a speed of 3000 r.p.m. clockwise when looking from stern. Determine the gyroscopic couple and its effect upon the ship: 1. When the ship is steering to the left on a curve of 100 m radius at a speed of 36 km/h.^{2}. When the ship is pitching in a simple harmonic motion, the bow falling with its maximum velocity. The period of pitching is 40 seconds and the total angular displacement between the two extreme positions of pitching is 12 degrees. **[10]**

OR

Q6) a) Explain belt transmission dynamometer with neat sketch. **[6]**

Explain the following terms with neat sketch; **[4]**

i) Precession in Gyroscope,

ii) Reactive Gyroscopic couple,

iii) Axis of spin,

iv) Axis of couple.

b) A band and block brake, having 14 blocks each of which subtends an angle of 15° at the centre, is applied to a drum of 1m effective diameter. The drum and flywheel mountedon 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, find :

[8]

i) maximum braking torque,

ii) angular retardation of the drum, and

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

The coefficient of friction between blocks and drum may be taken as 0.25.

SECTION - II

Q7) A helical pinion having 14 teeth to be made of alloy steel 40Ni2CrlMo28 (S_{ut} = 800 N/mm^2) is to mesh with a gear to be made of plain carbon steel 55C8 (S_{ut} = 720 N/mm^2). The gear pair is required to-transmit 20 kW power from an electric motor running at 800 rpm to a machine running at 250 rpm. The application factor and load concentration factor are 1.3 and 1.1 respectively. The required factor of safety is 2.0. The face width is 10 times the normal module and tooth system is 20° full depth involute.

[18]

Design the gear pair by using velocity factor and Buckingham's equation for dynamic load. Also suggest the case hardness for gear pair.

Use the following data:

Velocity factor, $Cv = 5.6 / (5.6 + V^{1/2})$

Deformation factor, C = 11000 e N/mm

For Grade 7, $e = 11.0 + 0.9 (m_n + 0.25d^{½})$

Select the module under first choice.

OR

Q8) a) What are different modes of worm gear tooth failure? State their causes and remedies. **[4]**

b) The following data is given for a worm gear pair : **[14]**

i) Pitch circle diameter of worm = 55 mm

ii) Pitch circle diameter of worm gear = 200 mm

iii) Axial pitch of worm = 18.85 mm

iv) Pressure angle in axial plane of worm = 20.14º

v) Lead of worm = 18.85 mm

vi) Effective width of worm gear teeth = 36 mm

vii) Worm speed = 3000 rpm

viii) Permissible bending strength for worm gear = 90 N/mm^2

ix) Worm gear wear factor = 830 kN/m^2

x) Coefficient of friction between worm and worm gear teeth = 0.025

xi) Overall heat transfer coefficient without fan = 16 W/m^{20} C

xii) Overall heat transfer coefficient with fan = $15.2 + 8.25 \times 10^{-3} n_w$, $W/m^{20}C$

xiii) Effective area of housing = $9 \times 10^{-5} \times (a)^{1.88}$, m^2

xiv) Frictional losses in bearings = 4.5%of total input power

Where n_w = worm speed, rpm

a = centre distance, mm

Determine :

A) The dimensions of worm and worm gear

B) The input power rating on the basis of strength; and

C) The temperature rise of lubricating oil with fan.

D) Is Fan necessary? Comment

Q9) a) Justify the statement that, the uniform pressure theory predicts a higher frictional torque carrying capacity as compared to uniform wear theory. **[4]**

b) A multi-plate clutch is used to transmit 12 kW power at 1440 rpm. The inner and outer diameters of contacting surfaces are 70 mm and 100 mm respectively. The coefficient of friction and the permissible intensity of pressure for the lining are 0.12 and 0.38 N/mm^2 respectively. Determine : **[12]**

i) the number of pressure plates and friction plates.

ii) the axial force required to transmit the power.

iii) the actual average pressure; and

iv) the actual maximum pressure intensity after wear.

OR

Q10) a) What is preloading of rolling contact bearings? Why it is necessary? State methods to achieve it. **[4]**

b) A transmission shaft is supported by two deep groove ball bearings at two ends. The center distance between the bearings is 160 mm. A load of 300 N acts vertically downwards at 60 mm distance from the left hand bearing where as a load of 550 N acts horizontally at 50 mm distance from the right hand bearing. **[12]**

Shaft speed is 3000 rpm and expected life of bearing is 7000 hrs with a reliability of 95%. It is intended to use same bearing at both ends of the shaft. Calculate dynamic load rating of the bearing so that it can be selected from manufacturer's catalogue.

Q11) a) What is Goodman's criterion of failure? Develop an equation for the same. **[4]**

b) A transmission shaft supports a pulley midway between the two bearings. The bending moment at the mid point varies from 150 N-m to 450 N-m. The torque on the shaft varies from 85 N-m to 150 N-m.

The frequency of variation of bending moment and torque are equal to the shaft speed. The shaft rotates at 1440 rpm. The shaft is made of plain carbon steel with ultimate tensile strength of 600 N/mm^2 and yield strength of 450 N/mm^2. The corrected endurance limit of the shaft is 200 N/mm^2. If the factor of safety is 2.5, determine the diameter of the shaft. **[12]**

OR

Q12) a) Compare the Soderberg, Goodman and Gerber Approach for fatigue analysis. **[4]**

b) A solid circular shaft 25 mm diameter is subjected to torsional shear stress, which varies from 0 to 28 MPa and at the same time is subjected to an axial stress that varies from – 25 MPa to + 45 MPa. The frequency of variation of these stresses is equal to the shaft speed. The shaft is made of steel with S_{ut} = 560 MPa and S_{yt} = 450 MPa and corrected endurance strength of the shaft is 200 MPa. Determine the factor of safety. **[12]**

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Total No. of Questions : 12]

SEAT No. :

P1377

[Total No. of Pages : 3

[4858] - 128

T.E. (Mechanical S/W)

TRIBOLOGY

(2008 Pattern)

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 is allowed.***
6) ***Assume suitable data, if necessary.***

SECTION - I

UNIT - I

Q1) a) Explain need of tribology in design and manufacturing industry? **[8]**

b) What are the objectives of lubrication? Explain thin film lubrication. **[8]**

OR

Q2) a) Write in detail about viscosity standards? **[8]**

b) Explain Sliding contact bearings with its classification? **[8]**

UNIT - II

Q3) a) Define friction? Write various types of friction measurement? **[8]**

b) Explain in detail theory of friction? **[8]**

OR

Q4) a) Define wear? Explain its various measurements? **[8]**

b) What is wear between solid and liquids. **[8]**

P.T.O.

UNIT - III

Q5) a) Explain in detail derivation for infinitely long journal bearing. **[10]**

b) Define Somerfield number. What is the bearing modulus? **[8]**

OR

Q6) a) Following data refers to a 360°(full) hydrodynamic bearing; Journal diameter d = 75 mm, bearing length l = 75mm, radial clearance C = 0.05 mm, minimum film thickness h_o = 0.02 mm, Journal speed N = 420 rpm, radial load W = 3500 N, Cp for oil = 1.75 kJ/ kg°C, ρ of oil = 0.9 gm/cc. **[10]**

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.

b) What is a hydrodynamic bearing? Define viscosity and viscosity index. **[8]**

SECTION - II

UNIT - IV

Q7) a) Write note on viscous flow through rectangular slot. **[8]**

b) Explain in detail load carrying capacity and flow requirement of hydrostatic step bearing. **[8]**

OR

Q8) a) Write in detail optimum design of steps bearing. **[8]**

b) The following data is given for hydrostatic step bearing of vertical turbo generator. Thrust load = 450kN, shaft diameter = 400mm, recess diameter = 250mm, shaft speed = 750rpm, viscosity of lubricant = 30cp. Draw neat sketch showing effect of film thickness. Calculate a) optimum film thickness for minimum power loss. **[8]**

UNIT - V

Q9) a) With neat sketch explain the mechanism of oil film development in hydrodynamic journal bearings. **[8]**

b) Explain in detail ring oil lubrication in drawing and extrusion? **[8]**

OR

Q10) a) What is concept bearing material? **[8]**

b) A plate of 50 mm length and infinite width is separated from the plane by an oil film 30 microns thickness and having viscosity of 0.08 N-s/m^2. If the normal load per unit width of 45 kN/m is applied on the plate, determine : **[8]**

i) The time required to reduce the film thickness to 4.5 microns; and

ii) The maximum pressure.

UNIT - VI

Q11) a) Write short notes on : **[10]**

i) Centre of pressure

ii) Throttling bush seals.

b) What is hydrostatic thrust bearing? Explain in detail equation of pressure. **[8]**

OR

Q12) a) The Rayleigh step bearing has following details : **[10]**

- Length of the bearing = 800 mm
- Width of the bearing = 150 mm
- Load on the bearing = 450 kN
- Sum of surface roughness on contacting surfaces = 9 microns
- Minimum oil film thickness = 40 × 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) Write note on mechanical seals and shields. **[8]**

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Total No. of Questions : 12]

SEAT No. :

P1378

[Total No. of Pages : 5

[4858] - 131

T.E. (Automobile)

Machine Design

(2008 Pattern) (Semester - I)

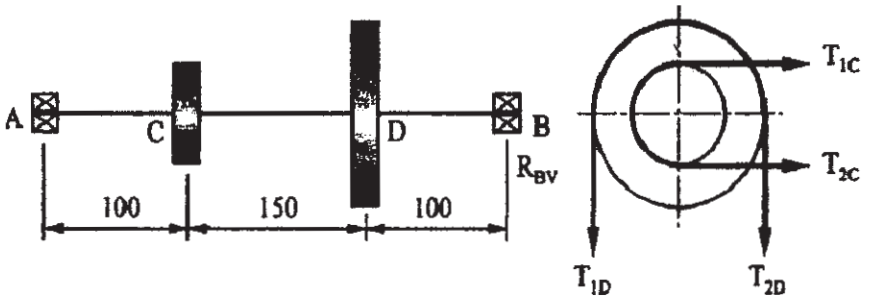
Time : 3 Hours] *[Max. Marks : 100*

Instructions to the candidates:

1) ***Answer any 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 logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
6) ***Assume suitable data, if necessary.***

SECTION - I

Q1) The layout of a shaft is as shown in fig. 1. Pulley D (diameter 480 mm) drives the shaft, while pulley C (diameter 150 mm) transmits power to a compressor. The belt tensions for pulley C are 1500 N and 600 N. The ratio of belt tensions for pulley D is 3.5. Find the shaft diameter as per A.S.M.E. code. Yield strength and ultimate tensile strength for shaft material are 380 MPa and 720 MPa respectively. Assume Kb = 1.75 and Kt = 1.25. If the solid shaft is replaced by a hollow shaft with outside diameter 30 mm, find inside diameter of the shaft. Compare the weights of the solid and hollow shaft. **[18]**



P.T.O.

OR

Q2) a) Design a C.I. flange coupling for a mild steel shaft transmitting 90 kW at 250 rpm. The allowable shear stress for shaft material is 40 MPa. The allowable shear stress and crushing stress for key and bolt material are 45 MPa and 85 MPa respectively. The permissible shear stress for C.I. is 14 MPa. The key is having square cross-section with (width) = (thickness) = [(diameter of shaft)/4]. The numbers of bolts are 6. The bolts are fitted in reamed and ground holes and are fingure tight. **[12]**

b) Compare the weights of equal length of hollow shaft and solid shaft to transmit a given torque for the same maximum shear stress. The material for both shafts is same and inside diameter is 2/3 of outside diameter for hollow shaft. **[6]**

Q3) a) A power screw of a screw press is required to transmit a maximum load of 100 kN at 60 RPM. The coefficient of friction for screw threads is 0.12. The torque required for collar friction and journal bearing is about 10% of the torque required to drive the load considering the screw friction. The maximum permissible compressive stress for screw is 100 MPa, while the screw has single start square threads. Determine: **[10]**

i) The screw dimensions.

ii) The screw efficiency; and

iii) The motor power required to drive the screw.

Design data for square threads

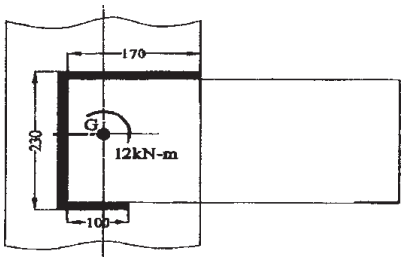
Nominal diameter (mm)	36	40	44	48	50	52
Pitch (mm)	6	7	7	8	8	8

b) What are different types of screw threads used for power screws ? Give advantages and limitations of each type. **[6]**

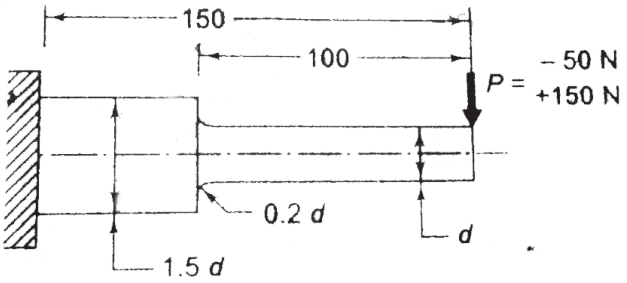
OR

Q4) a) Give welding symbol system standardized by the American Welding Society (AWS). **[8]**

b) A welded connection as shown in Fig. is subjected to a torsional moment of 12 kN-m about the centre of gravity of welds. If the permissible shear stress in weld deposit is 35 N/mm^2, calculate the throat and leg dimensions of weld. **[8]**



Q5) A cantilever beam made of cold drawn steel 40 C8 (S_{ut} = 600 N/mm^2 and S_{yt} = 380 N/mm^2) is as shown in fig. The force 'P' acting at the free end varies from – 50 N to + 150 N. The expected reliability is 90% and the factor of safety is 2. The notch sensitivity factor at the fillet is 0.9. Determine the diameter'd' of the beam at the fillet cross – section using Gerber curve as failure criterion. **[16]**



Q6) a) Define the term stress concentration. State the cause of stress concentration. Also suggest the methods to reduce it? **[8]**

b) Explain Soderberg and Goodman equations in brief. **[8]**

SECTION - II

Q7) Design a helical compression spring for a pressure relief valve using following data : **[18]**

Operating pressure = 14.5 bar

Valve lift 7 mm at 18% pressure rise

Diameter of valve 37 mm

Limiting mean coil diameter 36 mm

Permissible value of shear stress for spring material 465 MPa

Modulus of rigidity 83 GPa

Standard spring wire diameters are ..., 6, 6.5, 7, 7.5, 8, 8.5,...

Clash clearance is 15% of maximum deflection of spring

End style for the spring is squared and ground

Find pitch of the spring p using equation for free length LF as LF = pn + 2d.

Where n is number of active turns and d is spring wire diameter.

OR

Q8) a) For a helical torsion spring find stresses and angular deflection using following data : **[6]**

Diameter of coil	105 mm
Diameter of wire	15 mm
Modulus of elasticity	2.1 x 105 N/mm^2
Number of active turns	6
Load	40.36 kN-mm.

b) It is required to design a helical compression spring with plain ends, for carrying a maximum pure static force of 1000 N. The allowable shear stress and modulus of rigidity for spring material are 400 N/mm^2 and 85 N/mm^2 respectively. The spring rate is 48 N/mm. If spring index is 5, determine : **[12]**

i) Wire diameter; ii) Total number of coils;

iii) Free length; and iv) Pitch.

Draw neat sketch of spring and give necessary dimension.

Q9) The following data is given for a 360° hydrodynamic bearing: **[16]**

Radial load = 3.2kN

Journal speed = 1490 rpm

Journal diameter = 50 mm

Bearing length = 50 mm

Radial clearance = 0.05mm

Viscosity of lubricant = 25 cP

Assuming that the total heat generated in the bearing is carried by the total oil flow in the bearing, Calculate :

i) Coefficient of friction

ii) Power lost in friction

iii) Minimum oil film thickness

iv) Flow requirement in liters /min

v) Temperature rise

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

OR

Q10) a) A power of 30 kw at 250 rpm is transmitted from a shaft of dia 35 mm by using kennedy key of 10 × 10 mm cross section. If Syt = Syc = 375 MPa and F. S = 3. Find required length of key. **[10]**

b) Explain the hydrodynamic theory of lubrication. **[6]**

Q11) a) Determine the minimum number of teeth required on a pinion in order to avoid interference which is to go gear with, i. A wheel to give gear ratio 3 to 1 and 2. An equal wheel. ii. The pressure angle is 20° and a standard addendum of 1 module for the wheel may be assumed. **[10]**

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

OR

Q12) a) A drive on machine tool is to be made by two helical gears wheels, the helical of which are of the same hand and has normal pitch of 12.5 mm, the wheel are of equal diam. And the center distance between the axes of the shaft is approximately 134 mm. the angle between the shaft is 80° and speed ratio 1.25. Determine : **[12]**

i) Helical angle of each wheel

ii) Number of teeth on each wheel

iii) Efficiency of the drive if friction angle is 6° and

iv) Maximum efficiency.

b) Explain Herringbone helical gears. **[4]**

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Total No. of Questions : 12]

SEAT No. :

P1379

[Total No. of Pages : 3

[4858] - 132

T.E. (Automobile)

AUTOMOTIVE ENGINE DESIGN

(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 logarithmic tables, slide rule, electronic pocket calculator is allowed.***
6) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) What is the relation between stroke length and engine rpm? Describe effect of clearance volume on efficiency. **[6]**

b) Compare Otto, Diesel & dual cycle on the basis of Compression ratio, peak pressure, heat addition, heat rejection and net work done. **[10]**

OR

Q2) a) Derive an expression on efficiency of Diesel cycle. **[6]**

b) An engine working on Otto cycle has the following conditions:- **[10]** Pressure at the beginning of compression is 1 bar and pressure at the end of compression is 11 bar. Calculate compression ratio and air standard efficiency of the engine. Assume $\gamma = 1.4$.

Q3) a) Write design considerations for combustion chamber with explanation. **[6]**

b) Compare water cooling system with air cooling system. **[6]**

c) Describe the term engine balancing. **[6]**

P.T.O.

OR

Q4) Write a note on

a) Selection of firing order. **[6]**

b) Selection of Stroke and bore. **[6]**

c) Selection of No of cylinder. **[6]**

Q5) a) What is the importance of heat calculations in IC Engine? Explain heat balance sheet in detail? **[8]**

b) Explain how will you select the lubricating oil for an IC engine? **[8]**

OR

Q6) a) Write note on water pump used in IC engine. **[8]**

b) What is the function of radiator? How will you design a radiator? **[8]**

SECTION - II

Q7) a) What is buckling of connecting rod? **[4]**

b) What are the functions of cylinder head and cylinder liner? **[4]**

c) The following data is given for piston of a four stroke diesel engine. **[8]**

Cylinder bore 250 mm, material of piston ring = gray cast iron, allowable tensile stress = 100 n/mm^2, allowable radial pressure on cylinder wall = 0.03MPa, Thickness piston head = 42 mm, no of piston rings = 4

Calculate :

i) Radial width of piston ring.

ii) Axial thickness of piston ring.

iii) Gap between free ends of piston ring before assembly.

iv) Gap between free ends of piston ring after assembly.

v) Width of top land.

vi) Width of ring grooves

vii) Thickness of piston barrel and

viii) Thickness of piston barrel at open end.

OR

Q8) a) Elaborate why I section is used for connecting rod? **[6]**

b) Write the design procedure for center crankshaft at top dead center position? **[10]**

Q9) What are the contents of engine emission? How will you measure HC and CO emission of IC engine? What are the remedies to reduce the HC and CO emission? **[16]**

OR

Q10) a) Write a note on cylinder power balance. **[8]**

b) Write a note on mechanical fuel pump testing? **[8]**

Q11) Write note on (any 3) :

a) Variable valve timing. **[6]**

b) Variable compression ratio engine **[6]**

c) Wankel engine. **[6]**

d) Advanced turbulent flow technology. **[6]**

OR

Q12) a) What is homogenous charge compression ignition engine (HCCI)? **[9]**

b) Give application, advantages and disadvantages of four valve engines and dual fuel engine? **[9]**

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Total No. of Questions : 10]

SEAT No. :

P1380

[Total No. of Pages : 2

[4858] - 136

T.E. (Automobile Engineering)

Vehicle Body Engineering

(2008 Pattern) (Semester - II)

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

Instructions to the candidates:

1) ***Figures carry full marks.***
2) ***Assume suitable data.***
3) ***Write both sections on seperate answer book.***

SECTION - I

Q1) a) How to minimize vehicle drag? **[8]**

b) Write a short note on scale model testing. **[8]**

OR

Q2) a) Enlist parameters affect vehical lift & how to control lift? **[8]**

b) Write in brief about orientation of forces & moments for running vehicles. **[8]**

Q3) Write in brief about any four terms **[4 × 4 = 16]**

a) Limousine Car

b) Drivers visibility

c) Bonnet

d) Space in car

e) Safety of passenger

f) Front & rear wheel driven cars

Q4) a) Write a note on split level & articulated bus. **[6]**

b) Make a layout of city bus having capacity of 40 persons, with front engine rear wheel drive. **[12]**

OR

P.T.O.

Q5) a) Write a note on mini bus & double dekker bus. **[6]**

b) Make a layout of luxury coach having capacity of 32 persons, with rear engine rear wheel drive. **[12]**

SECTION - II

Q6) a) Explain driver seat design in relation to controls. **[9]**

b) Explain with neat diagrams different types of commercial vehicle bodies. **[9]**

OR

Q7) a) Design driver cubin for commercial vehicle. **[9]**

b) According to location of Engine, classify commercial vehicle and explain in short. **[9]**

Q8) Explain (Any four) : **[4 × 4 = 16]**

a) Shear panel method.

b) Design of chassis frame.

c) Integral bus body construction.

d) Symmetric vertical load on car.

e) Axial loads on vehicle during bump.

f) Idealized structure.

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

i) Anthropometry ii) Safety belt

b) Explain with diagram types of seats used in automobiles. **[8]**

OR

Q10) a) Explain construction & working of airbug. **[8]**

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

i) Importance of bumper in automobile.

ii) Energy absorbing systems.

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Total No. of Questions : 12]

SEAT No. :

P1950

[Total No. of Pages : 4

[4858] - 141
T.E. (E & TC)
CONTROL SYSTEM
(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) *Black figures to the right indicate full marks.*

SECTION - I

Q1) a) What is open loop and closed loop control system? Explain with the real time example. **[8]**

b) Reduce the following block diagram and obtain the Transfer function of Fig. 1. **[8]**

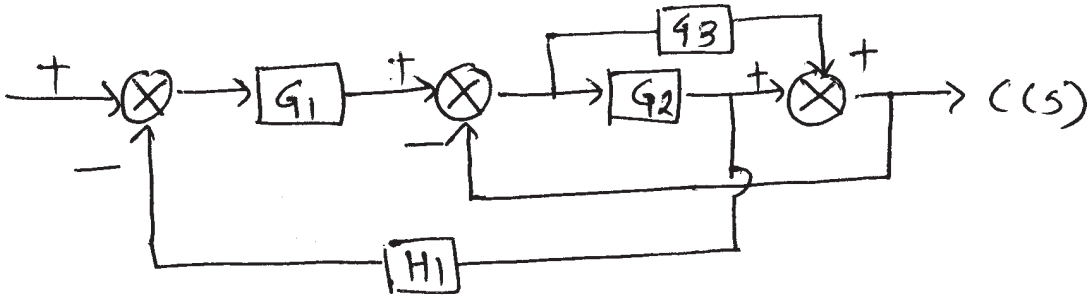


Fig. 1

OR

Q2) a) Compare between the Block Diagram algebra and Mason's Gain formula (8 pts.) **[8]**

P.T.O.

b) Using Mason's gain formula find the gain of the following system shown in Fig. 2. **[8]**

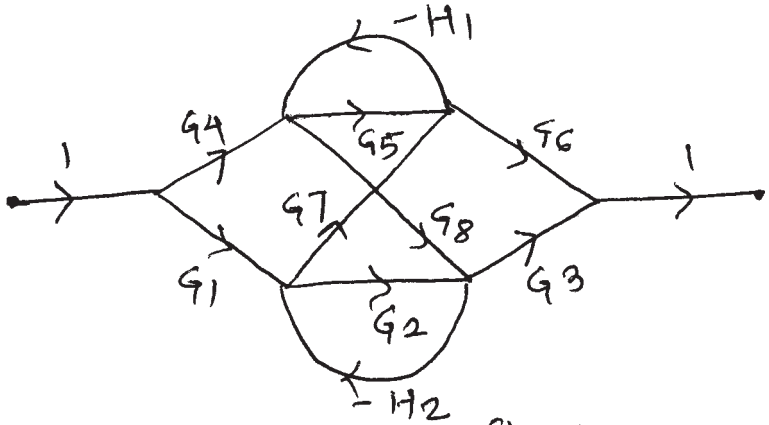


Fig. 2.

Q3) a) A unity Feedback system has the following transfer function :

$$G(s) = \frac{1000(s+8)}{(s+7)(s+9)}$$

Evaluate system type, K_p, K_v, K_a. Also find the steady state errors for the standard step, ramp and parabolic inputs. **[8]**

b) The characteristic equation of Feedback control system is $F(s) = s^4 + 2s^3 + s^2 + 4s + 2 = 0$ using Routh's criteria, determine the stability. **[8]**

OR

Q4) a) Sketch the root locus for unity Feedback system with open loop transfer Function.

$$G(s) = \frac{k}{s(s^2+8s+32)}$$ **[8]**

b) Write a short note on Time domain specifications and obtain the expression for any two of them. **[8]**

Q5) a) The open loop transfer function of unity Feedback system in given by

$$G(s) = \frac{k(s+20)}{(s+1)(s+2)(s+10)}$$

Construct bode plot for k = 10. Determine G.M., P.M., WgC, WpC. Comment on the stability of the system. **[12]**

b) State and explain any three frequency domain specifications. **[6]**

OR

Q6) a) Explain how to obtain PM & GM from bode plot. **[6]**

b) The open loop transfer function of a unity Feedback system is given by

$$G(s) = \frac{2(1-s)}{(s+2)(s+3)}$$

Draw the Nyquist plot and hence find out whether the system is stable or Not. **[12]**

SECTION - II

Q7) a) What is state transition matrix? State the properties of state transition matrix. **[8]**

b) Consider a system having state model

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} -2 & -3 \\ 4 & 2 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 3 \\ 5 \end{bmatrix} u$$

$$Y(t) = \begin{bmatrix} 1 & 1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$$

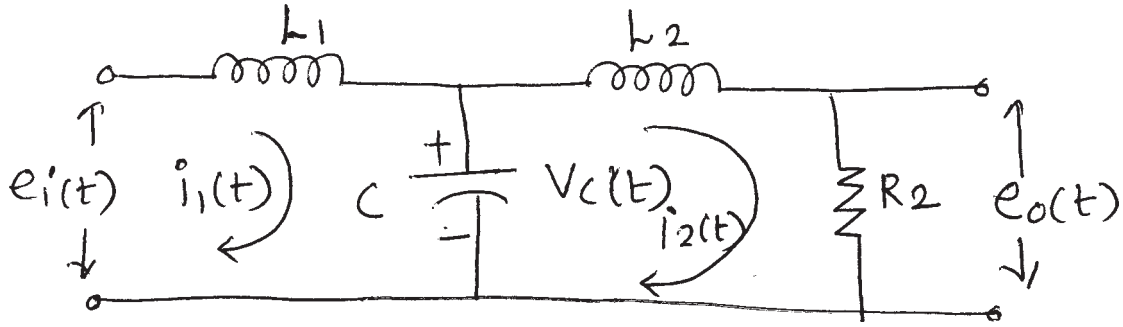
Obtain its transfer function. **[8]**

OR

Q8) a) Obtain state transition matrix for the system?

$$\begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \begin{bmatrix} -3 & 1 \\ 0 & -1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$$ **[8]**

b) Obtain the state model of the given electrical network in a standard form. **[8]**



Q9) a) Draw and explain the architecture of PLC. **[8]**

b) Explain P, PI and PD mode of PID controllers with their limitations. **[8]**

OR

Q10) a) Draw the ladder diagram for an elevator system and explain it. **[8]**

b) Write a note on PID controller. **[8]**

Q11) a) Explain what is SCADA system. Draw the block diagram of a typical SCADA system and explain it. **[10]**

b) Explain Missile launching and guidance system. **[8]**

OR

Q12) a) Write short note on : **[10]**

i) Gain scheduling.

ii) Self tuning regulator.

b) Draw and explain the block diagram of a Roboust Control System. **[8]**

Total No. of Questions : 12]

SEAT No. :

P1381

[Total No. of Pages : 4

[4858] - 142

T.E. (E & TC) (Semester - I)

DIGITAL COMMUNICATION

(2008 Pattern)

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 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) With the help of detail diagram explain function of each block of digital communication system. **[8]**

b) A voice signal (300 to3300 Hz) is digitized such that the quantization distortion <= ± 0.1% of peak to peak signal voltage Assume a sampling rate of 8000 samples/s and a multilevel PAM waveform with 32 levels. Find the theoretical minimum system bandwidth that voids ISI. **[8]**

OR

Q2) a) Compare PCM, DPCM, Delta modulation & Adaptive Delta modulation on the basis of Sampling Frequency, Bit rate & bandwidth requirement. **[8]**

b) In the Compact Disc (CD) digital audio system, an analog signal is digitized so that the ratio of the Peak Signal power to Peak Quantization power is at least 96dB. Sampling Rate is 44.1 kilosamples/s. **[8]**

i) How many quantization levels of analog signal are needed for $(S/N_q)_{peak}$ = 96dB?

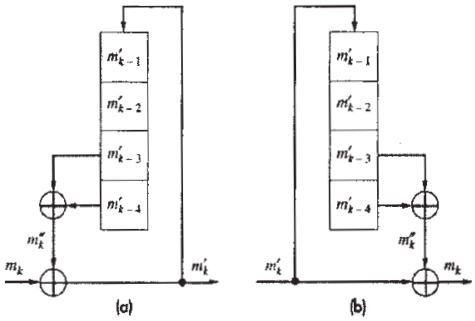
ii) How many bits per sample are needed for the number of levels found in part (a)?

iii) What is the data rate in bits/s?

P.T.O.

Q3) a) Explain need of Line coding. State its properties. Draw and give mathematical expression of Power Spectral density for unipolar NRZ, Polar RZ, AMI, and Manchester. **[10]**

b) A scrambler is shown in figure. Design the corresponding descrambler. If a sequence mk = 10110000000001 is applied to the input of this scrambler, determine the output sequence mk. Verify that if this mk' is applied to the input of the scrambler, the output sequence mk. **[8]**



OR

Q4) a) What is digital Hierarchy used in digital Communication system? Explain anyone with a neat sketch. **[6]**

b) Explain Inter Symbol interference (ISI) with help of block diagram of a binary base band transmission system. Also explain Nyquist solution used for curing ISI. **[8]**

c) Explain the use of Eye Diagram to measure ISI. **[4]**

Q5) a) Show that a narrowband random process X(t) can be completely represented in terms of its in phase and Quadrature components. **[8]**

b) Two random processes $z(t)$ and $y(t)$ are given by **[8]**

$z(t) = A \cos(\omega_c t + \phi)$

$y(t) = A \sin(\omega_c t + \phi)$

Where A and ω_c are constants and ϕ is a uniform random variable over $(0, 2\pi)$. Find the auto correlation and cross correlation of $z(t)$ and $y(t)$.

OR

Q6) a) Explain Ergodic process. If $X(t) = A \cos(2 \pi f c t + Ø)$ is random process with Ø as a random variable uniformly distributed over $(0, 2\pi)$. Prove that $X(t)$ is ergodic in mean. **[8]**

b) What is a Wide Sense Stationary Process? When A WSS R.P. X(t) is applied to input of LTI system with impulse response $h(t) = 3 e^{-2t} u(t)$, Find the mean value of system if E[X(t)] = 2 and its autocorrelation. **[8]**

SECTION - II

Q7) a) Draw and explain the block diagram of QPSK Transmitter & Receiver. Compare the Euclidean Distance'd' of QPSK & Offset QPSK with the help of Signal Space representation. **[10]**

b) 16 QASK has a lower error rate than 16 MPSK, but a higher error rate than QPSK. Prove the statement. **[8]**

OR

Q8) a) Compare the Euclidean Distance 'd' & Bandwidth of M-ary PSK, M-ary FSK with $M = 2^n$ for n = 3, 4, 5 and comment on the same. **[10]**

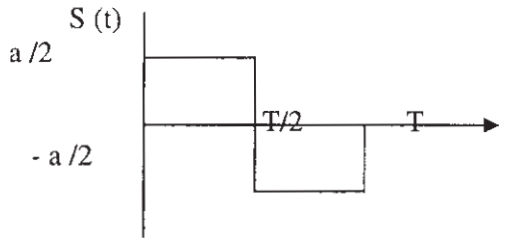
b) The following bit streams are to be transmitted using DPSK scheme. **[8]**

i) 1011100011

ii) 0101000111

Determine and sketch the encoded sequence and transmitted phase sequence.

Q9) a) Consider the signal S (t) shown in fig. **[8]**



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

b) Derive the expression for the probability of error of a BPSK system. **[8]**

OR

Q10) a) What is Correlater? Compare its performance with Matched filter mathematically and relevant diagrams. **[8]**

b) A BPSK signal is received at the input of a coherent receiver with amplitude 100mv and frequency 1MHz. The signal is corrupted with White noise of PSD 10^{-9} W/Hz. If the data rate is 10^{-4} bits/sec, find **[8]**

i) Probability of Error

ii) Error Probability if the local oscillator has a phase shift of $\pi/6$

iii) Error Probability if there is 10% mistiming in bit synchronization while sampling.

iv) find Pe when both (ii) and (iii) occur.

erfc(1.50) = 0.03389, erfc(1.5811) = 0.0254, erfc(1.3692) = 0.0528, erfc(1.2648) = 0.0736, erfc(1.0953) = 0.1214, erfc(1.6511) = 0.0196

Q11) a) Draw the block diagram of Satellite communication and Write a short note on radio link budget analysis. **[8]**

b) In a DSSS-BPSK system, the feedback shift register used to generate the PN sequence of length 15. The system is required to have an average probability of symbol error as 10^{-5}. **[8]**

Calculate

i) Processing gain ii) Antijam Margin.

Given :

X	erfc(X)
3.01	0.00002074
3.02	0.00001947
3.03	0.00001827
3.04	0.00001714

OR

Q12) a) Represent variation of the frequency of an fast hop spread spectrum system with binary FSK, having following parameters **[8]**

Number of bits per MFSK symbol K = 2.

Number of MFSK tones $M = 2^k = 4$

Length of PN segment per hop k = 3

Total number of frequency hops $2^k = 8$

for the binary message of 01111110001001111010

Generate the PN Sequence for the message to be transmitted . The period of the PN sequence is $2^4 - 1 = 15$ with initial shift register content of 1100.

b) What is multi-user communication? Describe different multiple access techniques on the basis of channel sharing and applications. **[8]**

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Total No. of Questions : 12]

SEAT No. :

P1382

[Total No. of Pages : 4

[4858] - 143

T.E. (Electronics & Telecommunication)

Network Synthesis & Filter 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) ***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) Given : $Z(s) = \dfrac{s^2 + As}{s^3 + 3s + 2}$ **[8]**

i) What are restrictions on 'A' for Z(s) to be a PRF?

ii) Find 'A' for Re Z(jω) to have second order zero at ω = 0.

b) Define the stability, causality and realizability terms. **[3]**

c) What is positive real function? Give necessary and sufficient conditions for a function to be a Positive real function. **[5]**

OR

Q2) a) Explain the significance and effect of poles & zeroes on the system function in network synthesis. **[5]**

b) Define a Hurwitz Polynomial. State properties of it. **[3]**

c) Test whether following polynomials are Hurwitz : **[8]**

i) $s^7 + 2s^6 + 2s^5 + s^4 + 4s^3 + 8s^2 + 8s + 4$

ii) $s^7 + 3s^5 + 2s^3 + s$

P.T.O.

Q3) a) State the properties of LC driving point impedance function. Obtain the Foster-I form of the network with impedance function : **[8]**

$$Z(s) = \frac{(s^2+1)(s^2+9)}{s(s^2+4)}$$

b) Find Cauer - I and Cauer - II forms of the function : **[8]**

$$F(s) = \frac{4(s^2+1)(s^2+9)}{s(s^2+4)}$$

OR

Q4) a) Find the Foster-I and Foster-II forms of the following transfer function : **[8]**

$$Z(s) = \frac{(s+1)(s+3)}{s(s+2)}$$

b) An impedance function is given as : **[8]**

$$Z(s) = \frac{s(s+2)(s+5)}{(s+1)(s+4)}$$

Find the R-L representation of Cauer I and Cauer II forms.

Q5) a) Explain the concept of zeros of transmission (ZOT) with example. State its properties. **[6]**

b) Synthesize $Z_{21}(s) = \frac{2}{s^3+3s^2+4s+2}$ into LC ladder network with 1Ω termination. **[6]**

c) What do you mean by a constant resistance network? Derive the open circuit parameters of a bridge circuit. **[6]**

OR

Q6) a) Find the condition for a lattice network when terminated in 'R', to be a constant resistance network. **[6]**

b) Synthesize Z_a and Z_b for a bridge T- network terminated in 1Ω if its transfer function is given as : $\frac{V_2}{V_1} = \frac{s^2+3s+2}{s^3+4s^2+5s+2}$. **[6]**

c) Synthesize $Z_{21}(s) = \dfrac{s^3}{s^3 + 3s^2 + 4s + 2}$ into LC ladder network with 1Ω termination. **[6]**

SECTION - II

Q7) a) Explain the necessity of approximation techniques in filter design. Explain in detail the Butterworth approximations and state its properties. **[6]**

b) Determine the transfer function for a normalized third order Butterworth LPF. Also determine the cut-off frequency. **[6]**

c) Derive the expression for the order 'n' of a typical low pass Butterworth filter. **[6]**

The specification of a low pass Butterworth filter are;

Passband = 0.2Mrad/sec

Passband loss ≤ 2 dB

Stopband loss ≤ 60 dB at 6 Mrad/sec.

Find the minimum order of the filter.

OR

Q8) a) Explain in detail the Chebyshev approximation technique for filter design and state its properties. **[6]**

b) The specifications of a chebyshev filter are : **[6]**

Passband ripple = 0.5 dB

Passband = 0 to 2.5 MHz

Stop band attenuation = 40 dB

Stopband frequency = 5 MHz

i) Determine the order 'n' of the filter
ii) Draw its pole location in s-plane

c) Explain the need and concept of magnitude and frequency scaling as used in filter designing. **[6]**

Q9) a) Explain the various Active filter design approaches. **[8]**

b) Synthesize a second order LPF to have a pole frequency of 2 KHz and a pole Q of 10, using Sallen and key circuit and design 3 i.e. Saraga design. **[8]**

OR

Q10) a) Explain the different biquad feedback topologies used in active filter designing and list the important observations. **[8]**

b) Synthesize the following high pass filter function using RC - CR transformation on Sallen and Key low pass filter. **[8]**

$$H_{hpf}(S) = k\left(\frac{s^2}{s^2 + s + 25}\right)$$

Q11) a) Explain the concept of gain sensitivity. Also explain the various factors affecting the gain sensitivity. **[8]**

b) What is multielement deviation? Define variability and derive the expression for per unit change in parameter 'P' due to simultaneous variations in all elements. **[8]**

OR

Q12) a) Find the transfer function (V_o/V_{in}) for a series RLC circuit. Compute the sensitivities of k, ω_p, and Q_p to the elements. **[8]**

b) Explain the effect of following OPAMP characteristics on the performance of active filters : **[8]**

i) Offset voltage and currents.

ii) Slew rate.

iii) Dynamic range.

iv) CMRR.

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Total No. of Questions : 12]

SEAT No. :

P1383

[Total No. of Pages : 4

[4858] - 144

T.E. (E &TC) (Semester - I)

Digital Signal Processing

(2008 Pattern)

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

Instructions to the candidates:

1) ***Attempt three questions from section-I, Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and three questions from section II, 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 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) With the help of neat block diagram explain the basic elements of DSP. **[4]**

b) State the sampling theorem. Explain the frequency domain representation of sampling process with reconstruction of the original signal. **[6]**

c) Find the impulse response and unit step response of the system described by the difference equation **[8]**

$$y(n) = 0.6\ y(n-1) - 0.08\ y\ (n-2) + x(n).$$

OR

Q2) a) Obtain direct form I and II realization of a system described by, **[8]**

i) $y(n) - 3/4\ y(n-1) + 1/8\ y(n-2) = x(n) + 1/2\ x(n-1)$.

b) Find the convolution of two finite duration sequences **[6]**

$h(n) = a^n\ u(n)$ for all n i) $a \neq b$

$= b^n\ u(n)$ for all n ii) $a = b$

c) Comment on the stability in an LT I DT System. **[4]**

P.T.O.

Q3) a) State and prove the relationship between DFT and DTFT. **[4]**

b) Compute DTFT of the Sequence, $x(n) = A$ for $0 \leq n \leq L - 1$ **[6]**

$= 0$ otherwise

c) Compute the DFT of the sequence, $x(n) = [1\ 1\ 0\ 0]$ and IDFT of [1010]. **[6]**

OR

Q4) a) State and prove any four properties of DFT. **[6]**

b) Compute the DITFFT of the following Sequence. **[8]**

$x(n) = [1\ 2\ 3\ 4\ 432\ 1]$

c) Comment on Bit reversal. **[2]**

Q5) a) State and prove any 4 properties of Z transform. **[6]**

b) Find the Z transform and draw Region of Convergence. **[6]**

i) $x(n) = 3u(n) + 4u\ (-n - 1)$ ii) $x(n) = n.\ u(n)$ $|z| > 1$

c) Determine the Z transform and draw ROC of the following finite duration sequence **[4]**

i) $\{\ 1\ 2\ 3\ 4\}$ ii) $\{\ 3\ 2\ 1\ 4\}$

$\uparrow$ $\uparrow$

OR

Q6) a) State and prove the relationship between Z- transform and DFT. **[4]**

b) Compute IZT **[6]**

$$X(Z) = \frac{1}{(1 + Z^{-1})\ (1 - Z^{-1})^2}$$

c) Find the magnitude response and phase response of a system described by the difference equation. **[6]**

$y(n) - 1/6\ x(n) + 1/3\ x(n - 1) + 1/6\ x(n - 2)$.

SECTION - II

Q7) a) Determine the coefficients of a linear phase FIR filter using frequency sampling method of length N = 15 which has a symmetric unit sample response and a frequency response that satisfies the conditions. **[10]**

$$H\left(\frac{2\pi k}{15}\right) = 1 \quad ; \; for \;\; k = 0,\; 1,\; 2,\; 3$$

$$= 0.4 \; ; for \; k = 4$$

$$= 0 \quad ; for \; k = 5,\; 6,\; 7$$

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) Design a complete Butterworth digital IIR filter using bilinear transformation by taking T = 0.1 second, to specify the following specifications (Use bilinear transformation) **[10]**

$$0.6 \le |\, H(e^{jw}) \,| \le 1.0 \quad ; \text{for } 0 \le w \le 0.35\pi$$

$$|\, H(e^{jw}) \,| \le 0.1 \quad ; \text{for } 0.7 \le w \le \pi$$

b) Derive the impulse invariant transformation to transform an analog system to digital system. Explain the mapping of s – plane to z-plane in impulse invariant transformation. What is the relationship between analog and digital frequency in impulse invariant transformation. **[8]**

Q9) a) Explain the sampling rate conversion by a rational factor I/D and show the spectrum. **[8]**

b) Explain how the Multirate sampling helps in acquiring high quality data. **[8]**

OR

Q10) a) Write a detailed note on polyphase decomposition of filters. **[8]**

b) Explain application of DAC in compact disc Hi-Fi systems. **[8]**

Q11) a) Explain the desirable architectural features for selecting a digital signal processor. **[8]**

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

i) Pipelining

ii) MAC Unit

OR

Q12) a) Explain five important salient features of TMS 320C6713 digital signal processor and draw its functional block diagram. **[8]**

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

i) Harvard Architecture.

ii) Barrel Shifter.

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Total No. of Questions : 12]

SEAT No. :

P1384

[Total No. of Pages : 3

[4858] - 145

T.E. (E & TC)

Microcontroller And Applications

(2008 Pattern)

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 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.***

SECTION - I

Q1) a) Explain criteria for choosing a microcontroller. **[6]**

b) Explain RAM organisation of 8051 microcontroller. **[6]**

c) Explain the important features of 8051 microcontroller in detail. **[4]**

OR

Q2) a) With the help of block diagram of 8051 microcontroller explain function of each block. **[8]**

b) Explain the PSW Structure of 8051 microcontroller. **[4]**

c) Compare CISC and RISC Processors. **[4]**

Q3) a) Explain timer/counter modes of 8051 with SFRs. **[8]**

b) Explain Serial communication modes of 8051 with SFRs. **[8]**

OR

Q4) a) Explain the interrupt structure of 8051 in detail. **[8]**

b) Explain different addressing modes of 8051. Illustrate with an example. **[8]**

P.T.O.

Q5) a) Explain functions of following pins of 8051 in detail : **[10]**

i) TO

ii) PSEN'

iii) ALE

iv) RXD

v) INTO'

b) Explain the following software development tools (any two) : **[8]**

i) Assembler

ii) Simulator

iii) Emulator.

OR

Q6) a) Write assembly language program for addition of 5 eight bit numbers stored at locations 30 H onwards store result at 40 H and 41 H. **[6]**

b) Write an ALP of 8051 to find a two's complement of number with suitable example. **[6]**

c) Write program in assembly language for finding largest number from an array of 5 eight bit nos. stored at 3000H and store the result at 3020H. **[6]**

SECTION - II

Q7) a) Write ALP to generate following waveform using 8 bit DAC, also draw interface diagram. **[8]**

i) Triangular wave

ii) Square wave

b) Explain the following buses in detail : **[8]**

i) RS-232

ii) RS-485

OR

Q8) a) Interface the analog to digital converter 0808/0809 with microcontroller 8051. **[8]**

b) Draw an interfacing diagram for LCD with 8051 and write an ALP to display "PUNE" on 16 × 2 LCD at first line and "UNIVERSITY" on second line. **[8]**

Q9) a) Draw functional block diagram of PlC microcontroller and explain it. **[8]**

b) Explain in detail program memory and data memory of PlC microcontroller. **[8]**

OR

Q10) a) List the important features of PlC microcontroller and explain it. **[8]**

b) Explain in detail flag register structure of PlC microcontroller. **[8]**

Q11) a) Design micro controller based DAS. **[10]**

b) Design a test board of 8051 and explain its memory interface. **[8]**

OR

Q12) a) Design a digital weighing machine to display the weight in Kgs. The range of Weight is from 0 to 100 Kg. **[10]**

b) Design a system to measure Frequency of unknown signal. Display that frequency on seven segment display. **[8]**

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Total No. of Questions : 12]

SEAT No. :

P1385

[Total No. of Pages : 4

[4858] - 146

T.E. (E & TC)

SIGNAL CODING AND ESTIMATION THEORY

(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 indicate full marks.***
5) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) A voice signal in a PCM system is quantized in 16 levels with following probabilities P1 – P4 = 0.1, P5 – P8 = 0.05, P9 – P12 = 0.075, P13 – P16 = 0.025. Calculate Entropy, Joint entropy and information rate if *fm* = 3KHz. **[8]**

b) What is discrete memoryless channel? Draw the binary symmetric channel and find out the channel capacity of binary symmetric channel. **[8]**

OR

Q2) a) Consider a DMS with source alphabets. **[10]**

X = {S0, S1, S2}

P = {¼, ¼, ½}

i) Find out H(X)

ii) Find out the different symbol and their probability if source is extended to second order.

iii) Also calculate the entropy of extended source.

b) Explain Differential Entropy and Mutual Information for continuous Ensembles. **[6]**

P.T.O.

Q3) a) Explain Shannon third theorem (Information Capacity Theorem or Shannon Hartley theorem) and prove that when $B \rightarrow \infty$ then Channel capacity = S/No log2e = 1.44 S/No. **[10]**

b) Write in short about implications of information capacity theorem. **[6]**

OR

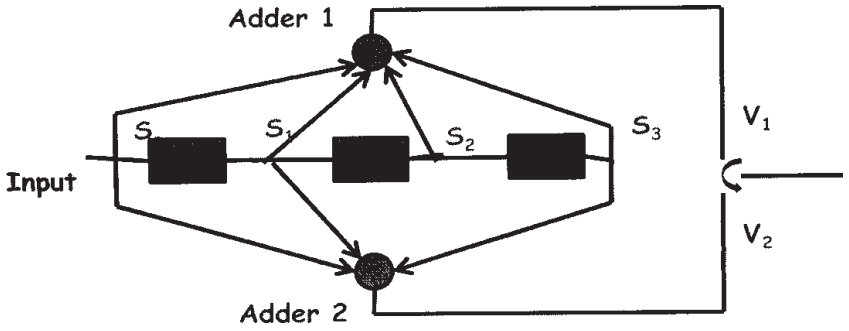
Q4) a) Find a generator polynomial g(x) for a systematic (7, 4) cyclic codes and find the code vectors for the following data vectors 1010, 1111, 0001 and 1000 Find a generator polynomial g(x) for a systematic (7, 4) cyclic codes and find the code vectors for the following data vectors 1010, 1111, 0001 and 1000. **[10]**

b) Explain the following term : **[6]**

i) JPEG

ii) Fire code.

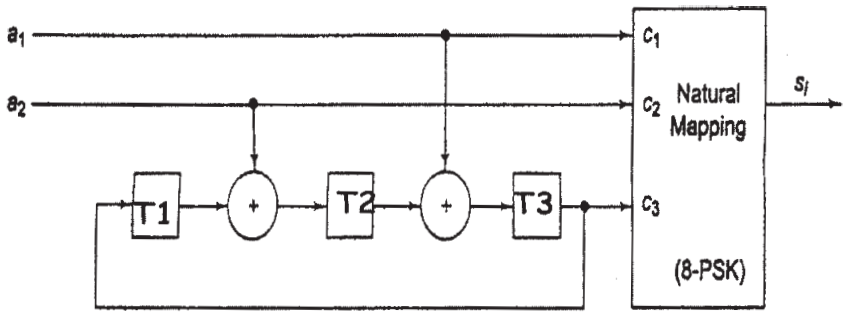
Q5) a) For the convolutional encoder shown above encode the sequence 10111 with Time Domain approach. **[10]**



b) Write a short note on Turbo codes **[8]**

OR

Q6) a) Find the Asymptotic Coding Gain for the above TCM Encoder. **[9]**



b) Compared state, tree and Trellis representation of convolution codes with example. **[9]**

SECTION - II

Q7) a) Find the generator polynomial for BCH code over GF(8) using the primitive polynomial $p(z) = z^3 + z^2 + 1$ over GF(2) codeword. The code should correct t = 1, 2, ... errors. **[10]**

b) Define the terms related to BCH Codes Primitive Polynomial, Minimal Polynomial and Generator Polynomial. **[8]**

OR

Q8) a) Define (15, 11) RS code and Find out the generator polynomial equation g(x). If message m(x) = x + 1; find out the RS code after RS coding. **[10]**

b) Write note on Cryptography. **[8]**

Q9) a) Let Y1 and Y2 be two statistically independent Gaussian random variables, such that E[Y1] = m, E[Y2] = 3m, and var [Y2] = 1; m is unknown. Obtain the ML estimate of m. **[10]**

b) What is Cramer Rao Bound inequality and what are its limitations discuss in detail. **[6]**

OR

Q10) a) In the received signal under hypothesis H_1 and H_0 was **[10]**

H_1 : $Yk = m + N_k$, $k = 1, 2, ... K$

H_0 : $Yk = N_k$, $k = 1, 2, ... K$

i) Assuming the constant m is unknown. Obtain the Maximum Likelihood estimation of the mean.

ii) Suppose now mean 'm' is known but the variance is unknown. Obtain the MLE.

b) What are the criteria for the good Estimator, calculate the unbiased Estimation of DC level With 'A' as unknown in presence of WGN. **[6]**

Q11) a) In a digital communication system, consider a source whose output under hypothesis H_1 is a constant voltage of value m, while its output under H_0 is zero. The received signal is corrupted by N, an additive white Gaussian noise of zero mean, and variance σ^2. **[8]**

i) Set up the likelihood ratio test and determine the decision regions.

ii) Calculate the probability of false alarm and probability of detection.

b) Explain the concept of MINIMAX detector in detail. **[8]**

OR

Q12) a) A ternary communication system Transmits one of three amplitude signals { 1,2,3) with equal probabilities, **[10]**

The independent received signal samples under each hypothesis are

$H_1 : Y_k = 1 + N \quad k = 1, 2, \ldots K,$

$H_2 : Y_k = 2 + N \quad k = 1, 2, \ldots K,$

$H_3 : Y_k = 3 + N \quad k = 1, 2, \ldots K,$

The additive noise N is Gaussian With zero mean and variance σ^2, The costs are Cii = 0, and Cij–1, determine the decision regions

b) Write short note on Neyman-Pearson detector. **[6]**

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Total No. of Questions : 12]

SEAT No. :

P1386

[Total No. of Pages : 3

[4858] - 147

T.E. (E & TC) (Semester - II)

System Programming and Operating System

(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) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Define Language Processor Also explain various language processing tools. **[8]**

b) Enlist different types of errors that are handled by PASS I and PASS II of a two pass assembler **[4]**

c) Explain LEX & YACC. **[4]**

OR

Q2) a) Explain different phases of language processing. **[4]**

b) Explain top down parsing in detail. What type of grammar is required by this parser. **[6]**

c) Describe the different phases of compiler in detail. **[6]**

Q3) a) What are different language processing activities & explain in detail. **[6]**

b) Draw a neat flowchart for macro-processor to handle nested macro definitions. **[5]**

c) Compare compilers and Interpreters. **[5]**

OR

P.T.O.

Q4) a) What are the advantages and disadvantages of single pass compilers. **[8]**

b) Explain the terms. **[8]**

i) Macro definition.

ii) Macro call

iii) Macro Expansion

iv) Nested Macro calls

Q5) a) Write a note on MS-DOS linker. **[8]**

b) Explain the five different types of editor with their applications? **[10]**

OR

Q6) a) What is a Linker? In case of a Direct Linking Loader, what is the information required to be passed by a translator to the loader. **[8]**

b) Explain the design of an absolute loader. **[10]**

SECTION - II

Q7) a) What is Process? Explain various states of process with state diagram for five state process model. **[8]**

b) What is Operating System? Explain any three types of Operating system. **[8]**

OR

Q8) a) What is scheduling? What are different types of scheduling? Explain any one in detail. **[8]**

b) What is deadlock? Explain Bankers algorithm for dead lock avoidance with suitable example. **[8]**

Q9) a) Explain Paging with Address Translation Mechanism. **[8]**

b) Given the memory partitions of size 100k, 500k, 200k, 300k, 600k (in order). How would each of First Fit, Best Fit, Worst Fit algorithms place the process of 212k, 417k, 112k and 426k? Which algorithm makes most efficient of memory. **[8]**

OR

Q10) a) List various page replacement algorithms. Explain any one with example. **[8]**

b) Explain Virtual Memory management with suitable diagram. **[8]**

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

a) File Operations.

b) Graphical User Interface.

c) Network Terminal.

OR

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

a) Directory Structure.

b) Secondary Storage Management.

c) Clock Software.

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Total No. of Questions : 12]

SEAT No. :

P1387

[Total No. of Pages : 3

[4858] - 148

T.E. (E & TC)

Computer Organization 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 books.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***
5) ***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.***

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 (22) × (–5) using Booth's multiplication algorithm. **[12]**

OR

Q2) a) With the help of flow chart explain floating point multiplication operation. **[8]**

b) Describe different IEEE standards for representing floating point numbers. Represent the following in single precision format : **[10]**

i) (100.125)

ii) (–64)

iii) (15)

P.T.O.

Q3) a) Draw and explain organization of single bus CPU with control signals. **[8]**

b) Explain with respect to micro programmed control unit : **[8]**

i) Micro-instruction sequencing

ii) Micro-instruction encoding

OR

Q4) a) Write control sequence for unconditional branch instruction. **[8]**

b) Using input output gating for the registers in single bus organization explain operation of **[8]**

i) Fetching a word from memory.

ii) Storing a word in memory.

Q5) a) Explain synchronous DRAM with the help of block and timing diagram. **[8]**

b) What is the different method of handling multiple I/O devices by CPU? **[8]**

OR

Q6) a) What is cache memory? Why it is needed in computers? **[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 = 1000H, DS = 3000H, Displacement = 0400H, BX = 2000H, DI = 4000H. **[6]**

i) Register relative addressing mode

ii) Based indexed addressing mode

iii) Direct addressing mode.

OR

Q8) a) With neat diagram explain the architecture of 8086 processor. **[6]**

b) Explain the minimum and maximum modes of operation in 8086 and pins associated with it. **[6]**

c) Explain the following assembler directives : **[6]**

i) EQU

ii) DUP

iii) PTR

Q9) a) Explain the real mode of 80386. **[6]**

b) State different types of descriptors and explain in detail segment descriptor. **[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 80386. **[6]**

i) TSS

ii) TR

iii) Task Descriptor (TSS Descriptor)

Q11) a) Explain pipelining mechanism of RISC processor. **[6]**

b) Explain role of Barrel shifter in ARM core data flow model. **[6]**

c) Explain properties of RISC architecture. **[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 according to Flynn's classification. **[8]**

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Total No. of Questions : 12]

SEAT No. :

P1388

[Total No. of Pages : 3

[4858] - 149

T.E. (E & TC)

INDUSTRIAL MANAGEMENT

(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) ***Solve three questions from each section as indicated.***
3) ***Figures to the right side indicate full marks.***

SECTION - I

Q1) a) How do you correlate the terms 'Organization, Management and Administration? **[8]**

b) Explain various functions of Management. **[8]**

OR

Q2) a) Explain different forms of ownerships. **[8]**

b) Discuss Fayol's 14 management principles. **[8]**

Q3) a) Prepare the Environmental Threat and Opportunity Profile of a Telecom Industry. **[8]**

b) Explain in details' Goalpost View of Quality'? **[8]**

OR

Q4) a) Explain Porter's Five forces model of competition. **[8]**

b) Sketch the GE Nine Cell Matrix and explain the three different zones. **[8]**

P.T.O.

Q5) a) Explain the basic philosophy of Total Quality Management (TQM). What are the Limitations of this technique? **[8]**

b) What do you understand by Quality of Design, Conformance and Performance? **[10]**

OR

Q6) a) Discuss the importance of ISO 14001: 2004 Standards in detail with suitable examples on application of this standard. **[10]**

b) Explain the terms : **[8]**

i) Poka Yoke ii) Kaizen

SECTION – II

Q7) a) Draw the standard graph of Break Even Analysis and define the following terms : **[10]**

i) Break even point ii) Contribution per unit

iii) Margin of Safety iv) Marginal Cost

b) Write a short note on Fixed Capital and Working Capital. **[8]**

OR

Q8) a) Explain PERT in Project Managment with the help of an example. **[10]**

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

i) C PM

ii) Project crashing and resource leveling

Q9) a) What do you understand by "Supply Chain Management (SCM)"? Explain the various stages in SCM. **[8]**

b) Write a note on 3PL and 4PL logistics. **[8]**

OR

Q10) a) Compare the HML, FSN and VED analysis. **[8]**

b) Define Inventory Management. Explain various costs associated with Inventory. **[8]**

Q11) a) Compare in detail MIS & DSS on following two grounds. **[8]**

i) Decision support

ii) Form of information

b) What is ERP? State basic features of ERP? **[8]**

OR

Q12) a) Write a note on types of e-commerce? **[8]**

b) What is feedback in management and economics? and explain feedback structure in Detail. **[8]**

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Total No. of Questions : 12]

SEAT No. :

P1389

[Total No. of Pages : 4

[4858] - 150

T.E. (E & TC)

Wave Theory and Antennas

(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 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 nonmagnetic medium $\overline{E} = 10\sin(4\pi \times 10^7 t - 0.9x)\,\hat{a}_z$ V/m. Find **[8]**

i) $\in_r$, η

ii) The time average power carried by the wave.

iii) The total power crossing 100 cm^2 of plane 3x + y = 10.

b) What is loss tangent? Explain how different media are classified based on loss tangent. **[8]**

OR

Q2) a) What is Poynting vector? Give its significance. Derive the expression for the instantaneous and average Poynting vectors and interpret each term. **[8]**

b) i) A parallel polarized wave propagates from air to dielectric at Brewster angle of 75°. Find $\in_r$. **[4]**

ii) A plane wave travelling in air is normally incident on a block of paraffin with $\in_r$ = 2.2. Find the reflection and transmission coefficient. **[4]**

P.T.O.

Q3) a) Write short notes on : **[8]**

i) Duct propagation

ii) Multi-hop propagation.

b) A television transmitting antenna mounted at a height of 120m radiates 15 kw of power equally in all directions in azimuth at the frequency of 50 MHz. Calculate : **[8]**

i) Maximum line of sight range

ii) Field strength at receiving antenna mounted at a height of 16m at a distance of 12km.

iii) The distance at which the field strength reduces to 1mw/m.

OR

Q4) a) What are ionospheric abnormalities and how they affect wave propagation? **[8]**

b) Describe ground wave propagation What is angle of tilt? How does it affect field strength at a distance from the transmitter. **[8]**

Q5) a) For a lossless horn antenna with directivity of 20 dB, and operating frequency of 10 GHz calculate, **[8]**

i) The maximum effective aperture.

ii) The maximum power received when incident power density is 2 milliwatts/m^2.

b) Explain the following antenna parameters with the help of illustrative diagrams and mathematical expressions and their significance. **[10]**

i) Field Radiation pattern

ii) Power Radiation pattern

iii) Radiation Intensity

iv) Effective Aperture

v) Directivity

OR

Q6) a) Explain the term effective length of antenna. Calculate the effective length of $\lambda/2$ antenna. Given $R_r = 73\Omega$, $A_e(max) = 0.13\ \lambda^2$ and $\eta = 120\ \pi$. **[8]**

b) i) The radiation intensity of a unidirectional antenna is $U = U_m \cos\theta$ where $0 \leq \theta \leq \pi/2$, $0 \leq \emptyset \leq 2\pi$. Find directivity.

ii) Explain the terms – Radiation power density and Directive gain related to antenna.

[10]

SECTION - II

Q7) a) With respect to the Hertzian dipole, find the following: **[10]**

i) Current distribution.

ii) Vector magnetic potential

iii) Far field components of electric and magnetic field

iv) Radiation resistance

v) Directivity.

b) Derive relation between the radiation resistance of the small dipole as compared to that of the infinitesimal dipole. **[8]**

OR

Q8) a) Design broadside Doiph Tschebhyscheff array of 8 elements with half wave spacing and with major to minor lobe ratio 26dB.Find excitation coefficients. **[10]**

b) Sketch the radiation pattern of a Broadside linear array of 6 elements with uniform amplitude and half wave spacing. Find side lobes, Null directions, HPBW, FNBW. **[8]**

Q9) a) Explain with neat sketches the different feeding methods for Dipole antenna. **[8]**

b) List the different antennas used at low frequencies. Explain any one antenna in detail. **[8]**

OR

Q10) a) Explain with proper structural details, features and applications Beverage antenna. **[8]**

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

i) Rhombic Antenna

ii) Whip Antenna

Q.11) Write short notes on : **[16]**

a) Biconical Antenna

b) Slot antenna

c) Turnstile Antenna

d) Lens Antenna

OR

Q12) a) Explain electromagnetic horn antennas. Explain various types and practical applications of horn antenna. **[8]**

b) Explain Yagi Uda antenna with its construction, principle of operation. Directivity, Bandwidth. **[8]**

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Total No. of Questions : 12]

SEAT No. :

P1390

[Total No. of Pages : 4

[4858] - 151

T.E. (Electronics)

FEEDBACK CONTROL SYSTEM

(2008 Pattern) (Semester - I)

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

Instructions to the candidates:

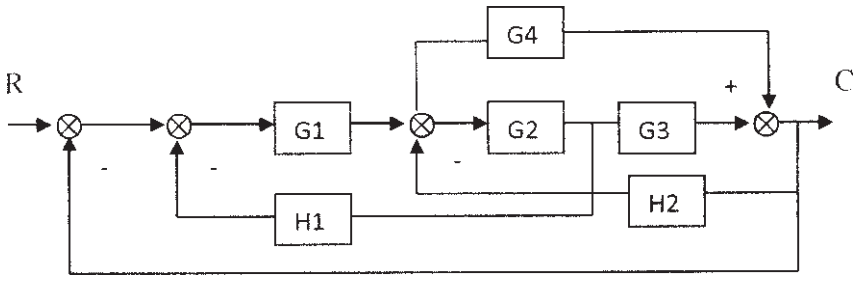
1) ***Answers to the two sections should be written in separate books.***
2) ***Answer any three questions from each section.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to be right side indicate full marks.***
5) ***Assume suitable data, if necessary.***
6) ***Use of logarithmic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

SECTION - I

Q1) a) Indentify the following system as open loop or closed loop and justify. **[8]**

i) Home heating system. ii) Traffic light controller.

b) Determine transfer function C(S)/R(S) for given diagram. **[8]**

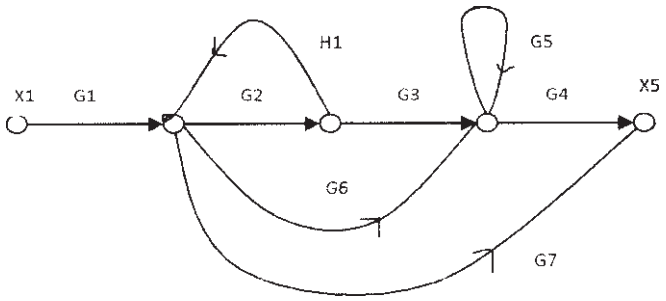


OR

Q2) a) Comparing between Armature controlled and field controlled DC servomotors. **[8]**

P.T.O.

b) Determine the ratio of X5/X1. Use Mason's gain formula for signal flow graph. **[8]**



Q3) a) Find Kp, Kv, Ka and steady state error for a system with open loop transfer function. **[8]**

$$G(s)H(s)=\frac{10(s+3)(s+4)}{s(s+1)(s+2)(s+5)}$$

Where input is

$$r(t) = 3 + t + t^2$$

b) For unity feedback system, (Using Routh's Criteria) **[8]**

$$G(s)=\frac{k}{s(1+0.4s)(1+0.25s)}$$

Find

i) Range of values of K

ii) Marginal value of K

iii) Frequency of sustain oscillation

iv) Comment of stability

OR

Q4) Draw the root locus of the following system and find stability. **[16]**

$$G(s)=\frac{k(s+5)}{(s^2+5s+6)}$$

Q5) a) Derive the expression for the bandwidth of a standard second order system in frequency domain. **[8]**

b) A unity feedback control system has **[10]**

$$G(s)=\frac{80}{s(s+2)(s+20)}$$

Draw the bode plot and determine G.M, P.M., ω_{gc}, ω_{pc} and comment on stability.

OR

Q6) a) The open loop transfer function of a certain control system is **[10]**

$$G(s)H(s)=\frac{10(1+T_1 s)}{s^2(1+T_2 s)}$$

Sketch the nyquist plot for

i) $T_1 > T_2$

ii) $T_2 > T_1$

iii) $T_1 = T_2$

b) Classify compensation techniques and explain any one in detailed. **[8]**

SECTION - II

Q7) a) Evaluate the observability of the system with kalman's test. **[10]**

$$A=\begin{bmatrix}0 & 1 & 0\\ 0 & 0 & 1\\ 0 & -2 & -3\end{bmatrix}\quad B=\begin{bmatrix}0\\0\\1\end{bmatrix}\text{ and }C=\begin{bmatrix}3 & 4 & 1\end{bmatrix}$$

b) Find state transition matrix for : **[8]**

$$A=\begin{bmatrix}1 & -2\\ 3 & -4\end{bmatrix}$$

OR

Q8) a) Obtain state space model using with transfer function. **[6]**

$$\frac{Y(s)}{U(s)} = \frac{1}{(s^2 + 5s + 6)}$$

b) Define the terms for second order system : **[12]**

i) State ii) State variables

iii) State space iv) State vector

v) State trajectory vi) State model

Q9) a) Explain Piezoelectric Pressure Transducer. **[8]**

b) State PID control mode and state characteristics. **[8]**

OR

Q10) a) Explain PLC operating modes. **[8]**

b) Draw the ladder diagram for number of tank filing machine. **[8]**

Q11) a) Write note on : **[8]**

i) Fuzzy operation

ii) Fuzzy set and membership function

b) Explain fuzzification and defuzzification method. **[8]**

OR

Q12) a) Explain various types of neural network used in control system. **[8]**

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

Artificial neural network.

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Total No. of Questions : 12]

SEAT No. :

P1391

[Total No. of Pages : 3

[4858] - 152

T.E. (Electronics)

DATA COMMUNICATION

(2008 Pattern)

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 and Q.7 or Q.8, Q.9 or Q.10 and 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) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) State properties of CDF. **[4]**

b) Show that if a wide sense stationary process x(t) is passed through LTI filter with impulse response h(t) then its output has constant mean square value. **[8]**

c) Define autocorrelation. State and explain any three properties. **[4]**

OR

Q2) a) What are the conditions for a random process to be wide sense stationary? Explain Ergodicity. **[4]**

b) Compare binomial, poisons, Gaussian and reighlay probability models with respect to their PDF. **[8]**

c) Show that impulse response of matched filter is time reversed and delayed version of input signal. **[4]**

P.T.O.

Q3) a) Draw line code formats for 11001001 **[8]**

i) RZ unipolar ii) NRZ polar

iii) AMI iv) RZ polar

Also sketch power spectral density

b) Explain closed loop synchronization. **[8]**

OR

Q4) a) Explain ISI and also how eye pattern is used to interpret ISI. **[8]**

b) Sketch PSD for polar NRZ and bipolar NRZ. Comment on its BW and synchronisation capabilities. **[8]**

Q5) a) Explain with respect to convolutional codes: **[8]**

i) Code rate and Constraint length

ii) Steady state transitions

iii) Trellis diagram

b) For LBC prove that : **[10]**

i) Syndrome depends only on error pattern.

ii) All error patterns that differ by code word have same syndrome.

OR

Q6) a) Determine the encoded message for following 8 bit data using CRC, $P(x) = x^4 + x^3 + x^0$. **[10]**

i) 11001100 ii) 01011111

b) A rate 1/3 convolutional encoder has generating vectors g1 = (100) g2 = (101). **[8]**

i) Sketch encoder configuration.

ii) Draw code tree, state diagram and trellis diagram.

iii) If input message is 10110 determine output sequence.

SECTION - II

Q7) a) Consider a telegraph source having 2 symbols dot and dash. The dot duration is 0.2 sec and dash is 3 times of dot. The probability of dot's occurring is twice that of dash and time between symbols is 0.2 sec. Calculate information rate of source **[8]**

b) Explain mutual information. Prove that - **[8]**

i) $I(X, Y) = I(Y, X)$

ii) $I(X, Y) = H(X) + X(Y) - H(X, Y)$

OR

Q8) a) State and prove shannon's theorem on channel capacity. **[8]**

b) A voice grade telephone channel has bandwidth 3400 HZ. If SNR on channel is 30dB determine capacity of channel. If above channel is to be used to transmit 4.8kbps of data determine minimum SNR required on channel. **[8]**

Q9) a) Explain transmission and reception of DPSK with proper diagram and waveforms. **[8]**

b) Derive expression of error probability of BPSK. Compare it with error probability of BFSK. **[10]**

OR

Q10) a) Explain QPSK system with its mathematical expressions, spectral diagrams and signal space representations. **[10]**

b) Draw and explain signal space representation for orthogonal and non-orthogonal BFSK signal. **[8]**

Q11) a) For a 4 stage shift register with feedback combination of (4, 1) demonstrate the balance property and run property of PN sequence. Also calculate and plot the autocorrelation of PN sequence. **[8]**

b) Explain FHSS transmitter and receiver with neat block diagram. **[8]**

OR

Q12) a) State different applications of spread spectrum systems. **[8]**

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

i) ALOHA ii) CSMA

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Total No. of Questions : 12]

SEAT No. :

P1392

[Total No. of Pages : 4

[4858] - 153

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

Network Synthesis and Filter Design

(2008 Pattern)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) Define the term causality and realizability. State and explain the condition for stability of a network. **[5]**

b) What is the significance of positive real function? Give necessary and sufficient conditions for a function to be positive real function. **[5]**

c) Test whether the given polynomials are Hurwitz. **[8]**

i) $G_1(s) = s^4 + s^3 + 4s^2 + 2s + 3$

ii) $G_2(s) = S^5 + S^3 + S$

OR

Q2) a) Explain the following : **[8]**

i) Removal of pole at S = ∞ from the given driving point impedance function.

ii) Removal of pole at S = O from the given driving point impedance function.

b) Synthesize a positive real function $z(s) = \frac{6s^3 + 3s^2 + 3s + 1}{6s^3 + 3s}$ by removing min [Re Z(jw)]. **[5]**

P.T.O.

c) Determine whether the following functions are positive real or not.

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

Q3) a) From the pole - zero plots shown in below figures 1(a), (b) & (c), identify the plot indicating RL impedance. Draw and explain reactance curve for RL network. **[6]**

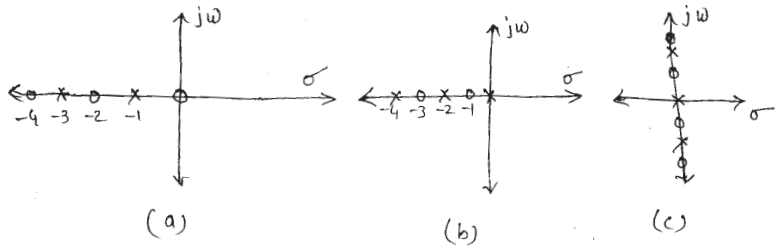


Figure 1. (a), (b), (c)

b) State the properties of LC driving point immitance function. **[4]**

c) Synthesize the following impedance function using cauer I form. **[6]**

$$Z(s) = \frac{s^5 + 10s^3 + 12s}{s^4 + 4s^2 + 3}$$

OR

Q4) a) Write the properties of R-C driving point impedance function. Also draw and explain reactance curve for RC network. **[8]**

b) Realize the given network impedance function using Foster I and Cauer I form. $Z(s) = \frac{(s+1)(s+4)}{s(s+2)}$ **[8]**

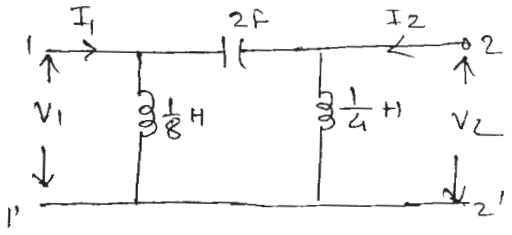
Q5) a) Synthesize the open circuit voltage ratio function $\frac{V_2}{V_1} = \frac{K}{(s+2)(s+4)}$ using RC ladder network. **[8]**

b) Realize the following function : **[8]**

i) $Z_{21}(s) = \frac{2}{s^3 + 3s^2 + 4s + 2}$

OR

Q6) a) What is residue condition? Verify the residue condition for the following network for y parameter **[6]**



b) Realize the following function **[6]**

$$\frac{V_2}{V_1} = \frac{s^2+1}{s^2+2s+1}$$

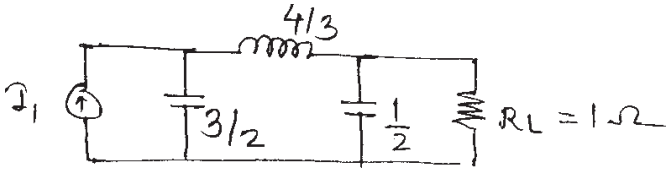
c) Define minimum and non-minimum phase function. **[4]**

SECTION - II

Q7) a) Compare Butterworth and chebyshev approximation. **[6]**

b) Determine the order of low pass butterworth filter that is to provide 40dB attnuation at a frequency which is twice of cut off frequency. **[6]**

c) Normalize third order Low pass filter is shown in fig. Design the corresponding high pass filter with its cut off frequency Wc = 10^6 rad/sec and the impedance level of 500 Ω.



OR

Q8) a) Write a short note on frequency transformation and frequency and impedance scaling. **[12]**

b) Obtain the system function H(s) that exhibit the chebyshev characteristics with not more than 1dB ripple in passband and attenuation of 20 dB at w = 2 rad/sec. **[6]**

Q9) a) Design a second order butterworth low pass filter with upper cut off frequency 1 kHz. **[6]**

b) Write a short notes on **[10]**

i) RC - CR Transformation

ii) Coefficient matching techniques for obtaining element values.

OR

Q10) a) Explain the positive feedback topology used in active filter design. Derive the eq^{n} for its transfer function. **[8]**

b) Synthesize the following high pass filter using RC - CR transformation on Sallen and key low pass filter $H_{HP}(S)=\frac{K S^2}{S^2+S+25}$. **[8]**

Q11) a) Define sensitivity in general. Give some of its importance properties. **[4]**

b) Explain the effect of slew rate and dynamic range of op-amp on active filter performance. **[4]**

c) Prove the following sensitivity relationship. **[8]**

i) $S_{\sqrt{x}}^{P} = 2\ S_x^P$

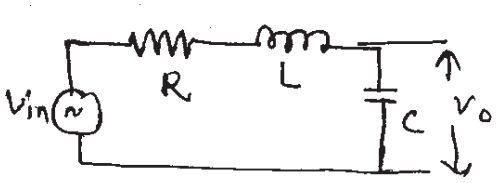
ii) $S_x^{\sqrt{P}} = \frac{1}{2}\ S_x^P$

iii) $S_x^{y+a} = \frac{y}{y+a}\ S_x^y$

iv) $S_x^{P_1/P_2} = S_x^{P_1} - S_x^{P_2}$

OR

Q12) a) Find the voltage transfer function for the following passive series RLC circuit as shown in fig. below also compute the sensitivity of wp, QP and gian 'k' to the network element R, L and C. **[8]**



b) Explain the effect of the following OP-amp characteristics on the active filter. **[8]**

i) Input offset voltage

ii) Input Bias current

iii) CMRR

iv) Slew rate

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Total No. of Questions : 12]

SEAT No. :

P1393

[Total No. of Pages : 3

[4858] - 154

T.E. (Electronics Engineering)

Microcontrollers

(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 architectures of 8051 microcontroller. **[10]**

b) Compare Harvard and Von Neumann Architecture. **[6]**

OR

Q2) a) Explain architecture of 8 bit microprocessor. **[10]**

b) Compare microprocessor and microcontroller. **[6]**

Q3) a) Draw & explain the Internal RAM organization of 8051 microcontroller. **[8]**

b) What is addressing mode? What are types of addressing mode? explain any three addressing modes of 8051 microcontroller. **[8]**

OR

P.T.O.

Q4) a) Draw and Explain the PSW Register of 8051 microcontroller. **[6]**

b) Explain the following instructions. **[10]**

i) SUBB A, Rn

ii) MOVX @ Ri, A

iii) CJNE A, direct, rel

iv) XCH A, Direct

v) ANL A, Rn

Q5) a) Assume that ROM Space starting at 200H Contain "PUNE", write an ALP of 8051 to transfer the byte in to RAM location starting at 50 H. **[8]**

b) Draw an interfacing diagram of 16 × 2 LCD with 8051 microcontroller. Write an Assembly language program to displaying " UNIVERSITY". **[10]**

OR

Q6) a) Draw and Explain ADC 0804 chip **[9]**

b) Draw an interfacing diagram of 4 × 4 keypad to 8051 microcontroller and explain the help of flowchart how the scanning the key is performed by microcontroller **[9]**

SECTION – II

Q7) a) Explain 12C communication protocol with timing diagram. **[9]**

b) Write a program for 8051 to transfer "SPPU" serially at 9600 baud rate,continuously. Also explain SCON register. **[9]**

OR

Q8) a) Explain RS232 standard. Why MAX 232 is required in serial communication. **[9]**

b) Explain the SPI Protocol in detail. **[9]**

Q9) a) Explain the architecture of ATMEGA 32. **[10]**

b) Draw an interfacing diagram of LED with PORTB of PIC 18FXXX and write an embedded C program for flashing of LED. **[6]**

OR

Q10) a) Explain architecture of PIC 18FXX with suitable block diagram. **[10]**

b) Draw and explain the working register (W) of PIC 18FXX with suitable example. **[6]**

Q11) Draw the block diagram of the Data acquisition system and explain in brief the following : **[16]**

a) selection of sensor.

b) Design of signal conditioning

c) Selection of ADC

d) Selection of Microcontroller

OR

Q12) a) Explain the typical characteristic of following: **[10]**

i) Thermocouple ii) RTDS
iii) Thermistor iv) IC Temperature

b) Explain the working principle of stepper motor. **[6]**

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Total No. of Questions : 12]

SEAT No. :

P1394

[Total No. of Pages : 3

[4858] - 155

T.E. (Electronics)

POWER ELECTRONICS

(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 the right side indicate full marks.***
5) ***Use of calculator is allowed.***
6) ***Assume suitable data if necessary.***

SECTION - I

Q1) a) Explain the operation of 3Øfully controlled bridge converter with R-L load. Describe in detail the following modes of operation with associated waveforms. **[12]**

i) Rectifier mode

ii) Inverter mode

b) For 3Øfully controlled bridge converter with R-L load derive an equation for r.m.s output voltage. **[6]**

OR

Q2) a) What is dual converter? Explain in detail the operation of dual converter with Circulating current. List the advantage and disadvantage of the same. **[12]**

b) What is triggering? Give types of triggering? Explain microprocessor/ microcontroller based triggering. **[6]**

P.T.O.

Q3) a) What is DC to DC converter? Explain with circuit diagram & waveforms working of chopper? Why it is preferred over phase controlled converters. **[10]**

b) A D.C. chopper circuit connected to a 100V D.C. source supplies an inductive load having 40mH in series with a resistance of 5Ω. A freewheeling diode is places across the load. The load current varies between the limits of 10A and 12A. Determine **[6]**

i) Average value of load current.

ii) Maximum value of load current.

iii) The time ratio of the chopper.

OR

Q4) a) Explain working of SLR half bridge DC to DC converter along with waveforms. **[8]**

b) What is SMPS? Explain in brief. **[8]**

Q5) a) What is resonant converter? Explain the need of resonant converter. Give its Classification. **[8]**

b) Define cycloconverter. Explain basic principle of operation of cycloconverter with neat equivalent circuit diagram .State its advantages & disadvantages. **[8]**

OR

Q6) Write short notes on any three : **[16]**

a) 4 Quadrant chopper.

b) 2-quadrant type C chopper.

c) Inverse Cosine Method.

d) Matrix converter

SECTION - II

Q7) a) What are inverters? Explain with circuit diagram & waveforms, working 3Φvoltage source inverter operating in 120º mode with R-load. **[10]**

b) Explain the sinusoidal pulse width modulation tech used in inverter. **[8]**

OR

Q8) a) What is the need of cooling in industries? Suggest the remedies for reducing heating & power Dissipation in the Semi- conductordevices. **[10]**

b) What do you mean by Snubbers circuit? Give design of snubber circuit. **[8]**

Q9) a) Explain HF induction heating. **[8]**

b) What is the difference between soldering &welding? Explain at least one type of welding techniques. **[8]**

OR

Q10) a) What is HVDC? Explain advantage of HVDC over HVAC. **[10]**

b) What is CT/PT? Explain. **[6]**

Q11) a) What is importance of power factor? Explain the EAC method for PF improvement. **[10]**

b) Explain sequence control of series converters. **[6]**

OR

Q12) a) What is necessity of power quality? Explain with different types of power linedisturbances. **[8]**

b) What is energy audit? Explain the required procedure for energy audit. **[8]**

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Total No. of Questions : 12] SEAT No. :

P3507 [Total No. of Pages : 2

[4858]-156
T.E. (Electronics) (Semester - II)
DRIVES AND CONTROL (DAC)
(2008 Pattern)

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) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Explain with a neat circuit diagram and relevant waveforms the working of 3¢ dual converter. **[8]**

b) Explain working of 1-Φ full converter for continuous and discontinuous current mode of seriesd.c. motor drive. **[10]**

OR

Q2) a) Explain the motor performance parameter. **[8]**

b) The speed of a separately excited motors is controlled by 1ϕ Semi converter. The field current is also controlled a semiconverter is set to maximum possible value. The ac supply vtg. to the armature & field converter is 1Φ 230 50 Hz, Ra = 0.25Ω, kv = 0.7032 v/a-rad/s, T_L = 50 N-m at 1000 rpm. The armature & field current are continuous & ripple free. Determine **[10]**

i) the field current I_F
ii) Delay angle α_a
iii) I/p PF of armature ckt. converter

Q3) a) Explain open loop control of dc drives with transfer function. **[8]**

b) Explain briefly the braking methods of d.c. motors. **[8]**

OR

Q4) a) What is PLL? Explain in Brief. **[8]**

b) Compare the PF improvement techniques SAC, EAC, PWM. **[8]**

Q5) a) Which are the speed control methods of induction motor? Explain briefly one of the methods. **[8]**

b) Explain briefly the braking methods of induction motor. **[8]**

P.T.O.

OR

Q6) a) Explain the various protections for induction motor. **[8]**

b) Explain the construction and operation of 3¢ induction motor. Derive the expression for slip. **[8]**

SECTION - II

Q7) a) Explain the Cylindrical rotor motor with vector diagram. **[8]**

b) Draw and explain the operation of 3¢ brushless d.c. motor drive. **[10]**

OR

Q8) a) Compare Variable reluctance motor and Salient pole Synchronous motor. **[10]**

b) Difference between half step and full step control of stepper motor. **[8]**

Q9) a) Explain the switched reluctance motor and close loop control of synchronous motor. **[8]**

b) Describe construction and principle of working : **[8]**

i) Variable reluctance and

ii) Permanent magnet type stepper motors.

OR

Q10)a) List the drive requirements for stepper motor drive. Draw the circuit diagram and explain the working of Chopper drive (unipolar) for stepper motor. **[8]**

b) With the help of a neat circuit diagram and relevant waveforms, explain the operation of bipolar voltage chopper drive for PM and hybrid stepper motors. **[8]**

Q11)a) Explain Neural network based PWM controller. **[8]**

b) Explain Fussy logic based wind generation system. **[8]**

OR

Q12)Write short note on : **[16]**

a) Traction motor driver

b) PI control tuning of a drive

c) Chopper fed DC drives.

Total No. of Questions : 12]

SEAT No. :

P1395

[Total No. of Pages : 3

[4858] - 157

T.E. (Electronics)

Sensors & Interfaces

(2008 Pattern) (Semester - II)

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

Instructions to the candidates:

1) ***Answer any three questions from each section.***
2) ***Answers to the two sections should be written in separate books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***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 pH measurement with neat diagram. **[8]**

b) Explain selection criterion for choosing a transducer. **[8]**

OR

Q2) a) Explain incremental and absolute rotary encoders for angular velocity measurement. **[8]**

b) Explain principle of flow measurement. Describe pitot tube used for flow measurement. **[8]**

Q3) a) A sensor outputs a range of 10 to 200 mv as a variable varies over its range. Develop a signal conditioning circuit using 3 OP-AMP instrumentation amplifier so that it becomes 0 to 5V. **[8]**

b) Explain with neat diagram I/P converter and P/I converter. **[8]**

P.T.O.

OR

Q4) a) Explain any one technique for level and humidity measurement. **[8]**

b) Write a short note on SMART transmitter. **[8]**

Q5) a) What are the different types of ADCs? Explain any one of them. Write a note on specifications of ADC. **[9]**

b) Describe working of R-ZR ladder type DAC. How it is advantageous over weighted register DAC. **[9]**

OR

Q6) a) Describe the working of a typical flash A/D converter for n bit operation. **[9]**

b) Enlist different types of DAC and give specifications of DAC. **[9]**

SECTION - II

Q7) a) Explain HART communication protocol along with its modes of operation. **[8]**

b) Write short note on foundation field bus. **[8]**

OR

Q8) a) Explain with block diagram computer based data logger. **[8]**

b) Explain with neat diagram IEEE 488 bus interface for test & measurement instruments. **[8]**

Q9) a) Explain following types of valves with neat diagram. **[8]**

i) Spool valve

ii) Poppet valve

b) Explain with neat diagram pressure control valves. **[8]**

OR

Q10) a) Explain lift system to move the load up and down using pneumatic actuators. **[8]**

b) Explain principle of operation of D.C. motor. State various types of D.C. motor. **[8]**

Q11) a) Draw and explain architecture of PLC. Compare PLC with a personal computer. State important specifications of PLC. **[10]**

b) Develop a ladder diagram for a circuit that can be used to start a motor and then after delay of 100 sec start a pump. when the motor is switched off there should be a delay of 10 sec. before the pump is switched off. **[8]**

OR

Q12) a) With suitable assumptions draw the block diagram of a bottle filling plant and develop a PLC ladder diagram for the automatic operation of bottle filling plant. **[10]**

b) Explain current source and current sink configuration of input & output channel. **[8]**

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Total No. of Questions : 12]

SEAT No. :

P1396

[Total No. of Pages : 3

[4858] - 158

T.E. (Electronics)

Microcomputer Based System

(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 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) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Draw flag structure of 8086 processor & explain operation of each flag. **[8]**

b) Explain the function of following pins. **[10]**

i) ALE

ii) $MN/\overline{MX}$

iii) READY

iv) HOLD

v) $M/\overline{IO}$

OR

Q2) a) Draw & explain architecture of 8086. **[10]**

b) List different addressing modes of 8086 & explain any three. **[8]**

P.T.O.

Q3) a) Explain the following instructions. **[8]**

i) JMP ii) CLC

iii) ROL iv) MOVSB

b) Write an ALP to find sum of numbers in an array of 15 bytes. Draw flow chart. **[8]**

OR

Q4) a) Draw the interrupt vector table and explain the concept of interrupt vector for 8086 processor. **[8]**

b) List string manipulating instructions and explain any three. **[8]**

Q5) a) Draw & explain register set of 80386 & explain a typical function of each of the register in brief. **[8]**

b) Draw and explain paging operation in 80386 using page directory & page table. **[8]**

OR

Q6) a) Draw & explain the structure of 80386 descriptor. **[8]**

b) What are the modes of operation of 80386? Explain any two modes of operation. **[8]**

SECTION - II

Q7) a) Explain with block diagram IBM PC system based mother board. **[8]**

b) Write short note on : (any two) **[8]**

i) BIOS

ii) Serial port

iii) PS/2

OR

Q8) a) Enlist and describe the different data type in USB. **[8]**

b) Give the specifications of PCI Bus & compare it with EISA Bus. **[8]**

Q9) a) Explain with suitable diagram dataflow model of ARMY. **[8]**

b) State and explain various operating modes of ARMY. **[8]**

OR

Q10) a) List and explain register structure of ARM core. **[8]**

b) Explain the following instructions of ARMY. **[8]**

i) B ii) LDR

iii) MLA iv) AND

Q11) Design 8086/AMRY based two channel data acquisition system to measure parameters like pressure & temperature. Pressure range is 0 to 5 bar & temperature range is 0 to 100 ºC. Display these parameters on LCD. **[18]**

- Explain important design steps
- Selection criteria of component
- Design suitable signal conditioning circuitary
- Draw complete interfacing diagram.
- Draw necessary flow chart.

OR

Q12) a) Draw the block diagram of Data Acquisition system & explain in brief various steps involved in designing data acquisition system. **[10]**

- Selection of sensor
- Design of signal conditioning circuit
- Selection of ADC
- Selection of processor

b) Design 8086/ARMY based path follower using DC motor. **[8]**

- Draw appropriate interfacing circuitary.
- Explain the important design steps.

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Total No. of Questions : 12]

SEAT No. :

P1397

[Total No. of Pages : 3

[4858] - 159

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

Industrial Management

(2008 Pattern)

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) Define an "Organization". What are its common 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) Explain different forms of ownerships. **[8]**

b) Discuss Fayol's 14 management principles. **[8]**

Q3) a) Prepare the Environmental Threat and Opportunity Profile of a Telecom Industry. **[8]**

b) Explain Porter's Five Forces Model of competition in an Industry. **[8]**

OR

P.T.O.

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 Limitations of this technique? **[10]**

b) Explain the 5s Quality Management Standards. **[8]**

OR

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 'Kaizen'. 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) With the help of an example, explain the critical Path Method (CPM) in project management. **[8]**

b) Distinguish between Fixed Capital and Working Capital. Discuss various sources of this capital. **[8]**

Q9) a) Discuss the competencies and responsibilities of HR professional in an organization. **[8]**

b) What would be your mix of selection methods for the selection of middle level managers and why? **[8]**

OR

Q10) a) Why Talent Acquisition is always on top priority in the role of HR? **[8]**

b) What are the functions involved in HRM? **[8]**

Q11) a) What is Information System ? Differentiate between Information System and MIS. **[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 B2B in detail. **[8]**

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Total No. of Questions : 12]

SEAT No. :

P1398

[Total No. of Pages : 4

[4858] - 160

T.E. (Electronics)

Discrete Time Signal Processing

(2008 Pattern) (Semester - II)

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

Instructions to the candidates:

1) ***Answer any three question 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) An analog signal is given by **[6]**

$x(t) = 3 \cos 100 \pi t + 2\sin 300 \pi t - 4 \cos 100 \pi t$

i) What is the Nyquist rate for this signal?

ii) Write the equation of sampled signal.

iii) If the signal is sampled at a rate of 200 sam/sec. What is the discrete time signal obtained after sampling?

b) What are the advantages of discrete time signal processing over analog signal processing? **[6]**

c) Explain Direct form II structures for realization of LTI discrete time systems. **[6]**

OR

Q2) a) Discrete time systems $h_1(n)$ & $h_2(n)$ are connected in cascade. **[6]**

$$h_1(n) = \left\{ \frac{1}{2} \quad \frac{1}{4} \quad \frac{1}{2} \right\} \qquad h_2(n) = \delta(n-2)$$

Determine the response of the overall system to the input

$x(n) = \delta(n + 2) + 3\delta(n - 1) - 4\delta(n - 3)$

P.T.O.

b) A difference equation of discrete time system is given below : **[6]**

$$y(n)-\frac{2}{5}y(n-1)+\frac{3}{7}y(n-2)=2x(n)+\frac{2}{3}x(n-1)$$

Draw direct form I & direct form II structures.

c) Determine the impulse response of the systems described by the difference equation. **[6]**

$y(n) = 0.6y(n-1) - 0.08y(n-2) + x(n)$

Q3) a) Compute the 4 - point DFT of the following sequence $x(n)=\{1 \quad 1 \quad 1 \quad 1\}$. **[4]**

b) Compute the circular convolution of the following sequences. **[4]**

$$x_1(n)=\{4 \quad 3 \quad 2 \quad 1\} \quad x_2(n)=\{1 \quad 2 \quad 1 \quad 2\}$$

c) Explain the following properties of DFT. **[8]**

i) Linearity

ii) Time shifting

iii) Circular convolution

OR

Q4) a) Compute the 8-point DFT of the following sequence using DIT FFT algorithm. **[10]**

$$x(n)=\{1 \quad 2 \quad 2 \quad 1 \quad 1 \quad 2 \quad 1 \quad 1\}$$

b) Find IDFT of the following sequence. **[6]**

$$x(k)=\{7 \quad -2-j \quad 1 \quad -2+j\}$$

Q5) a) State and explain the condition of causality and stability of the discrete time system. **[6]**

b) Compute the z-transform of **[10]**

i) $x_r(n)=\left(\frac{1}{2}\right)^n u(n)+(3)^n\ u(-n-1)$

ii) $x_r(n)=a^{|n|}$

iii) $x(n)=n(a)^n\ u(n)$

OR

Q6) a) Compute the z-transform of **[4]**

$$x(z) = \frac{1}{1 - 1.5z^{-1} + 0.5z^{-2}}$$

for i) ROC : $|z| > 1$ ii) ROC : $|z| < 0.5$

b) Determine the impulse response of the system. **[6]**

$$H(z) = \frac{1 - z^{-1}}{1 - 0.2z^{-1} - 0.15z^{-2}}$$

c) Sketch the following sequences. **[6]**

compute z - transforms

plot pole zero plots for following sequences

i) $x(n) = (1)^n\ u(n)$ ii) $x(n) = (-1)^n\ u(n)$

SECTION - II

Q7) a) Convert the analog filter with system function **[5]**

$$H_a(s) = \frac{s + 0.1}{(s + 0.1)^2 + 9}$$

into digital IIR filter by means of Bilinear transformation. The digital filter should have resonant frequency of $w_r = \pi/4$.

b) Explain frequency warping in Bilinear transformation. What are the advantages of Bilinear transformation over Impulse Invariance transformation? **[5]**

c) Design a single pole low pass digital filter with a 3-dB bandwith of 0.2 π using bilinear transformation applied to the analog filter. **[8]**

$$H(s) = \frac{\Omega c}{s + \Omega c}$$

where Ωc is 3-dB bandwidth of analog filter. Also compute the magnitude at w = 0 & w = 0.2π.

OR

Q8) a) Design a low pass filter using frequency sampling method. **[12]**

Passband : 0-5 kHz

Sampling rate : 18 kHz

length of filter : 9

b) Explain the different characteristics of window function. **[6]**

Q9) a) Explain the sampling rate conversion by a non-integer factor. **[8]**

b) Explain the polyphase filter structure used for interpolation. **[8]**

OR

Q10) a) Explain the process of decimation. **[8]**

b) Explain the application of multirate signal processing in compact Hi-fi system. **[8]**

Q11) a) Explain in brief various architectures of digital signal processors. **[8]**

b) Explain the necessity of **[8]**

i) MAC unit

ii) Barrel shifter

iii) Pipelining

for a digital signal processor.

OR

Q12) a) Describe the desirable features of a digital signal processor. **[8]**

b) What is the difference between fixed point and floating point representations? Why is floating point representation preferred? **[8]**

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Total No. of Questions : 12]

SEAT No. :

P1399

[Total No. of Pages : 3

[4858] - 161

T.E. (Electrical Engineering) (Semester - I)

MICROCONTROLLER AND ITS APPLICATIONS

(2008 Pattern)

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

Instructions to the candidates:

1) ***Answer any three questions from section - I and any 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) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Explain special function registers in 8051. **[9]**

b) Explain the role of program counter and stack pointer registers necessary in 8051 programming. Also discuss instructions due to which stack pointer effect on program counter. **[9]**

OR

Q2) a) Explain internal RAM structure in detail with neat sketch. **[9]**

b) Explain all ports. Why P0 and P2 are unavailable in case of I/O operation when external memory is interfaced? **[9]**

Q3) a) Describe program status word of 8051 and give the status of flag register after execution of the following instructions. **[8]**

```
MOV A, #67H
ANL A, # F0H
INC A
ADD A, # 08H
```

P.T.O.

b) Explain instruction format used. Also explain addressing modes with one example. **[8]**

OR

Q4) a) Explain following instructions: **[8]**

i) MOVX A, @ DPTR

ii) MOVX 07H, @R0

iii) XCHD a, @Ri

iv) MOVC A, @A+PC

b) Store DPTR in external ram locations 1234h (DPL) and 2458h (DPH). **[8]**

Q5) a) Explain TFx bit in TCON register. Also explain Functional block diagram of Timer 0 in mode 3. **[8]**

b) Explain vectored interrupts in 8051 with neat sketch. **[8]**

OR

Q6) a) Explain in detail function of each bit of IE and IP **[8]**

b) The setting of TH1, in timer mode 1, to generate a boud rate of 2400 if the serial port is in mode 1 and 11.059 MHz crystal is in use. Find the setting of both values in SMOD. **[8]**

SECTION - II

Q7) a) Explain simulator, assembler and Emulators for 8051 microcontroller. Also explain microcontroller development tool **[9]**

b) Explain External 8255 interfacing with microcontroller 8051. **[9]**

OR

Q8) a) 16K × 8 two data memory are to be interfaced with 8051. Draw an interfacing diagram and memory mapping. Also Explain EA and PSEN pin status. **[9]**

b) Explain RS232 with pin diagram. Also give function of each Pin. **[9]**

Q9) a) Write assembly language program to rotate stepper motor in clockwise direction. Also give proper switching sequence. (diagram and delay program not expected) **[8]**

b) Draw and explain interfacing diagram of ADC with 8051. **[8]**

OR

Q10) a) Write an assembly language program to generate square wave using DAC and 8051 interfacing. (only program required) **[8]**

b) What are various sensors/transducer used for pressure measurement. Draw interfacing diagram for pressure measurement using 8051. (only sketch required) **[8]**

Q11) a) Explain level measurement using 8051. **[8]**

b) Explain interfacing of 4 × 4 matrix keyboard with 8051. **[8]**

OR

Q12) a) Draw and explain 8051 based speed control of DC motor. **[8]**

b) Explain 16 × 2 LCD and it's interfacing with 8051. **[8]**

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Total No. of Questions : 12]

SEAT No. :

P1400

[Total No. of Pages : 3

[4858] - 162

T.E. (Electrical)

ELECTRICAL MACHINES - II

(2008 Pattern)

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 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 emf method for finding out voltage regulation of alternator. **[8]**

b) Compare salient pole & non salient pole synchronous machines. **[4]**

c) A 3 phase 16 poles 50 Hz star connected alternator has 144 slots with 4 conductors per slot. The flux per pole is 5 mwb. The coil falls short by 30º. Calculate the phase value of induced emf. **[6]**

OR

Q2) a) A 10 kVA 440V 50Hz 3 phase star connected alternator has the open circuit characteristics as given below. **[10]**

If (Amp)	1.5	3	5	8	11	15
Voc (line) volts	150	300	440	550	600	635

with zero p.f at full load, the excitation required is 14 Amp to produce 500v of terminal voltage. On short circuit, 4 Amp excitation is required at full load current. Determine voltage regulation at full load 0.8 pf lagging. Neglect Ra.

b) Explain the effect of armature reaction on synchronous machine at **[8]**

i) Unity pf ii) zero pf lag iii) zero p.f. lead

P.T.O.

Q3) a) A 3phase alternator has direct axis synchronous reactance of 0.85 pu and quaderature axis synchronous reactance of 0.55 pu. Determine the local angle, the no-load p.u. voltage, and p.u voltage regulation for the alternator when operation on full load at 0.8 pf lag. **[8]**

b) Explain the necessity of parallel operation of 3 phase alternators. What are the necessary conditions for parallel operation of 3 phase alternators. **[8]**

OR

Q4) a) What is short circuit Ratio? Elaborate its significance. **[4]**

b) With usual notations derive expression for synchroning current & synchroning power when two alternators are operations in parallel to each other. **[8]**

c) Explain operation of synchronous motor at constant excitation & variable load condition. **[4]**

Q5) a) With neat diagram explain the construction & working of 3 phase synchronous Induction motor. **[8]**

b) Write a short note on 3phase Induction generator. **[8]**

OR

Q6) a) Explain v/f method of speed control of 3 phase Induction motor. Why v/f ratio is to be kept constant? **[8]**

b) Compare 3 phase induction motor with 3 phase synchronous motor (min 8 points). **[8]**

SECTION - II

Q7) a) What are the problems is d.c. series motor operated on a.c. supply? What are the corrective actions to be taken? **[8]**

b) Explain the conductively & inductively compensated a.c. series motor. **[8]**

OR

Q8) a) With neat diagram explain working of universal motor. State its applications. **[8]**

b) Explain the procedure to plot circle diagram of A.c. series motor. **[8]**

Q9) a) Explain construction & working of permanent magnet D.C. motor. State its applications. **[8]**

b) Explain the effects of slot harmonics on the performance of machine. Also give remedical measures for it. **[8]**

OR

Q10) a) Explain the construction & working of Brushless d.c. motor. State its applications. **[8]**

b) Write a note on 'Linear Induction Motor'. **[8]**

Q11) a) Explain the construction & working of capacitor state Induction motor with neat diagram. State applications of this motor. **[10]**

b) Is single phase Induction motor is self starting? Why? Explain double revolving field theory. **[8]**

OR

Q12) a) A 220 V, single phase Induction motor give following test results. **[8]**

No load test	220V	4.6 A	125W
blocked Rotar test	120V	9.6 A	460 W

The stator winding resistance is 1.5Ω. During the blocked rotar test, starting winding is open. Determine the equivalent circuit parameters. Also find case, frictional & windage losses.

b) With suitable diagram explain - No load test & blocked rotar test on single phase induction motor. Draw equivalent circuits for these test. **[10]**

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Total No. of Questions : 12]

SEAT No. :

P1401

[Total No. of Pages : 3

[4858] - 163

T.E. (Electrical)

POWER ELECTRONICS

(2008 Pattern)

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

Instructions to the candidates:

1) ***Answer any three questions from section-I and any three questions from section-II.***
2) ***Figures to the right indicate full marks.***

SECTION - I

Q1) a) Explain in detail VI chara. of SCR showing latching & holding currents & Breakover voltages. **[6]**

b) Explain importance of following ratings of SCR **[10]**

i) Holding & latching current

ii) P/V rating

iii) dv/dt & di/dt rating

iv) Maxi Temp.

OR

Q2) a) Draw gate chara. of SCR. Explain how value of gate voltage & gate current can be selected for proper turn on of SCR. **[8]**

b) Explain R & RC triggering circuit of SCR with neat circuit diagram & waveforms. **[8]**

Q3) a) Describe working of single ph. two pulse SCR controlled midpoint converter with RL load through waveforms of source voltage, load voltage, load current and voltage across SCR. **[10]**

b) Explain operation of single ph. fully controlled bridge converter with inductive load with anociated waveforms. **[6]**

P.T.O.

OR

Q4) a) Describe concept of overlap angle. Derive expression for voltage drop due to overlap in three phase full bridge converter. **[8]**

b) Explain working of three phase full converter feeding highly inductive load with firing angle of 60° and obtain expression for phase & line voltage. **[8]**

Q5) a) Explain single phase ac regulator feeding resistive load. Derive expression for rms voltage across load. Draw output voltage waveform. **[9]**

b) Describe operation of transformer tap changer sequence control of ac voltage regulator with suitable diagram & waveforms. **[9]**

OR

Q6) a) Draw neat diagram and explain how TRIAC can be used in 4 quadrant operations. **[9]**

b) What is snubber? What are types? Explain procedure of design of snubber elements. **[9]**

SECTION - II

Q7) a) Draw and explain operation and characteristics of GTO in comparison with SCR. What is turn off gain? **[8]**

b) With help of neat structural diagram and suitable waveforms, explain operation of MOSFET. **[8]**

OR

Q8) a) Discuss the switching chara. of IGBT with help of neat diagram and waveforms. **[8]**

b) Compare MOSFET with IGBT based on characteristics and applications. **[8]**

Q9) a) Draw schematic of step down chopper and derive expression for output voltage interms of Duty cycle. **[8]**

b) What are control parameters of chopper? Explain TRC & CLC control strategies used for chopper. **[8]**

OR

Q10) a) Draw neat circuit of class E chopper and explain its working using waveforms for diff. modes of operation. **[8]**

b) A stepdown dc chopper connected to 100V dc source supplies an inductive load having resi. of 5 Ω in series with 40 mH inductance. A free wheeling diode is placed across the load. When operated with 60% duty, and 500 Hz frequency, find output voltage, load current mini. & maxi. value and % Ripple in current. **[8]**

Q11) a) With help of neat dia. and associated waveforms explain operation of 1 ph full bridge Mosfet controlled voltage source inverter with **[9]**

i) Resistive load

ii) Inductive load

b) With neat dia. & waveforms explain operation of three phase bridge inverter feeding star connected resistive load in 180° mode of conduction. Derive & Draw phase & line voltages. **[9]**

OR

Q12) a) With neat dia. & waveforms, explain operation of single phase sinusoidal PWM voltage source inverter with inductive load. Show output voltage & current. **[9]**

b) Why voltage control is needed inverter circuits? What are the methods? Explain in brief. **[9]**

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Total No. of Questions : 12]

SEAT No. :

P1402

[Total No. of Pages : 3

[4858] - 164

T.E. (Electrical)

ELECTRICAL INSTALLATION, MAINTENANCE & TESTING

(2008 Pattern)

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) ***Neat diagrams must be drawn wherever necessary.***

3) ***Figures to the right indicate full marks.***

4) ***Assume suitable data if necessary.***

SECTION - I

UNIT - I

Q1) a) Draw and explain circuit diagram of 3 phase 4 wire distribution system and explain its importance. **[4]**

b) What is secondary distribution system? Explain in detail loop type distribution systems. **[8]**

c) Enlist various factors to be considered for design of secondary distribution system. **[4]**

OR

Q2) a) State and explain Kelvin's law for calculation of economic cross section of conductor. State its limitations. **[8]**

b) A 3 phase 4 wire distributor supplies a balanced voltage of 400/230V to a load consisting of 80A at p.f. 0.8 lagging, 70A at p.f. 0.9 lagging and 50A at unity p.f. for R,Y and B phase respectively. Calculate the voltage drop in neutral conductor and hence calculate voltage at supply end of 'R' phase considering load voltage as reference. The resistance of each phase and neutral is 0.2 ohms. **[8]**

P.T.O.

UNIT - II

Q3) a) Define earth resistance. What do you mean by pipe and plate earthing. **[6]**

b) What is soil resistivity? Explain different factors affecting soil resistivity. **[6]**

c) Explain technical specifications of following: **[6]**

i) Transformer

ii) Circuit Breaker

iii) Lightning Arrestor

OR

Q4) a) Classify different types of substations. Define **[8]**

i) step potential and

ii) touch potential related to substation with necessary circuit diagram.

b) Draw a single line diagram of 132/33kV substation having two 132kV incoming lines and four 33kV out going lines. Also show all the essential equipment in the layout with their ratings. **[10]**

UNIT - III

Q5) a) Explain in detail breakdown maintenance and condition based maintenance. **[8]**

b) Explain preventive maintenance of induction motor in detail. **[8]**

OR

Q6) a) State and explain different factors affecting life of insulation of equipment. **[8]**

b) Define and explain importance of dielectric absorption and dielectric discharge ratio in condition monitoring of an equipment. **[8]**

SECTION - II

UNIT - IV

Q7) a) Explain contamination process in transformer oil. **[8]**

b) Discuss in detail various failure modes of transformer. **[8]**

OR

Q8) a) Write a note on Dissolved Gas Analysis. **[8]**

b) With a neat block diagram explain filtration process of transformer oil. **[8]**

UNIT - V

Q9) a) Discuss in detail different failure modes of induction motor. **[8]**

b) Describe the various failure modes of power cables. Also explain in detail any two tests conducted on power cables. **[10]**

OR

Q10) a) List out various condition monitoring tools for induction motor & explain any two of them. **[8]**

b) List out various fault location methods for power cable? Explain any two in detail. **[10]**

UNIT - VI

Q11) a) Explain construction, working & troubleshooting of ceiling fan with circuit diagram. **[8]**

b) Explain construction, working & troubleshooting of refrigerator with circuit diagram. **[8]**

OR

Q12) a) Explain construction, working & troubleshooting of water pump with circuit diagram. **[8]**

b) Explain construction, working & troubleshooting of mixer with circuit diagram. **[8]**

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Total No. of Questions : 12] **SEAT No. :**

P3118 **[Total No. of Pages : 2**

[4858] - 165
T.E. (Electrical Engg.) (Semester - I)
ENGINEERING ECONOMICS & MANAGEMENT
(2008 Pattern) (Theory)

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

Instructions to the candidates:

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

SECTION - I

UNIT - I

Q1) a) Define Business Organisation. Explain Private public partnership & Joint stock company. **[8]**

b) Explain BOT & BOLT types of ownership. **[8]**

OR

Q2) What is forecasting? Explain various methods of demand Forecasting. **[16]**

UNIT - II

Q3) a) Define management. Differentiate between Administration & Management. **[8]**

b) Explain the contribution of Henry Feyol in the field of management. **[8]**

OR

Q4) Write short notes.

a) Lean manufacturing **[4]**

b) Kanban **[4]**

c) ABC Analysis **[4]**

d) TQM **[4]**

UNIT - III

Q5) a) Define marketing. What is the defference between marketing & selling. **[9]**

b) Define market research. Explain its scope & importance. **[9]**

P.T.O.

OR

Q6) Write short notes **:**

a) Break Even Analysis **[6]**

b) Capital **[6]**

c) Merger **[6]**

SECTION - II

UNIT - IV

Q7) a) Define motivation. Explain Herzberz theory. **[8]**

b) Explain Maslow Hierarchy of needs theory. **[8]**

OR

Q8) a) Define Leadership. Explain its different Attributes. **[8]**

b) Explain the concept of "Entrepreneurship" in detail. **[8]**

UNIT - V

Q9) a) Define Industrial Relations. Explain its scope & objectives. **[8]**

b) Define Training. Explain various Types of Training. **[8]**

OR

Q10)Write short notes :

a) Attitude **[4]**

b) Business Ethics **[4]**

c) Stress management **[4]**

d) Principles of Learning. **[4]**

UNIT - VI

Q11)a) Explain the term Disaster management in detail. **[9]**

b) Explain the use of GIS & GPS for Disaster management. **[9]**

OR

Q12)Prepare a detailed Disaster management plan for "Terrorist Attack". **[18]**

Total No. of Questions : 12]

SEAT No. :

P1403

[Total No. of Pages : 3

[4858] - 166

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

Energy Audit and Management

(2008 Pattern)

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) Give important features of Energy Conservation Bill 2001. **[8]**

b) What are the adverse impacts of uncontrolled use of energy? What can be long term feasible solutions? **[8]**

OR

Q2) a) Give Indian Codes for Green Building. **[8]**

b) Discuss latest reforms in Indian Energy Sector. **[8]**

Q3) a) What is Supply Side Management? Explain few measures taken for improvement in energy sector. **[9]**

b) Explain implementation of DSM for commercial establishment, agricultural consumers and for residential consumers. **[9]**

OR

P.T.O.

Q4) a) Explain need of energy management. Also explain objectives and principles of successful energy management. **[9]**

b) Explain with suitable example various wave shaping tools used in DSM for management of system. **[9]**

Q5) a) Explain steps in detailed energy audit. Also state importance of executive summary. **[8]**

b) Explain least square method used in carrying out data analysis in energy audit. **[8]**

OR

Q6) a) Compare preliminary audit and detailed energy audit. **[8]**

b) Explain cumulative sum method for carrying out energy analysis. **[8]**

SECTION - II

Q7) a) Find out internal rate of return for following investment **[10]**

Capital cost Rs. 20000/- Annual saving for fives are Rs. 4000, Rs. 4000, Rs. 5000, Rs. 5000 and Rs 7500 respectively.

b) Explain following **[8]**

i) Time value of money

ii) Apparent energy tariff

OR

Q8) a) Calculate net present values for investment of Rs. 50000 with cash flows generated for five years are Rs. 15000, Rs. 15000, Rs. 15000, Rs. 20000 and Rs. 20000. Take discounting factor as 10%. **[9]**

b) i) Advantages and disadvantages of pay back period. **[5]**

ii) Benefit to cost ratio and sensitivity analysis. **[4]**

Q9) a) Enlist various energy conservation techniques for air conditioning systems. **[8]**

b) Explain different waste heat recovery systems for energy improvements. **[8]**

OR

Q10) a) Explain energy conservation methods in pumping systems. What is effect of NPSH on performance of pump. **[8]**

b) Explain energy saving options in boilers and furnaces. **[8]**

Q11) a) Explain energy audit case study of steel mill. **[8]**

b) Explain energy audit energy saving options of T& D sector. **[8]**

OR

Q12) a) Give the details of energy audit carried out in IT industry. **[8]**

b) Share executive summary of energy audit carried out in paper and pulp industry. **[8]**

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Total No. of Questions : 12]

SEAT No. :

P1404

[Total No. of Pages : 4

[4858] - 167

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

Power System - II

(2008 Pattern)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) Derive the power flow equation using generalized constants for transmission line. **[8]**

b) A three phase 132 kV overhead line delivers 50 MVA at 132 kV and powerfactor 0.8 lagging at its receiving end . The constants of line are A = 0.98, α = 3º and B = 110, β = 75º ohm per phase. Find **[8]**

i) Sending end voltage and power angle

ii) Sending end active and reactive power

iii) Line losses and vars absorbed by the line.

Capacity of static compensation equipment at the receiving end if the sending end voltage to 140 kV for the same load condition.

OR

Q2) a) What is line compensation? Why it is necessary? Compare static capacitor & synchronous compensator. **[8]**

b) What is surge impedance loading? Explain different methods used to improve surge impedance loading. **[8]**

P.T.O.

Q3) a) Explain following terms in brief : **[8]**

i) Disruptive Critical voltage.

ii) Visual critical voltage.

b) Explain the phenomenon of corona and state various methods to reduce it. **[8]**

OR

Q4) a) Find the disruptive critical voltage and visual critical voltage for local and general corona for a three phase line consisting of 21 mm diameter conductors spaced in 6 m delta configuration. Take temperature 25ºC, pressure 73 cm of mercury, surface factor 0.84, irregularity factor for local visual corona 0.72 and for general (decided) visual corona 0.82. **[8]**

b) What is corona loss? Why it is different in different weather conditions? How can it be estimated? **[8]**

Q5) a) What is per unit system? Explain the advantages and applications of per unit system. **[8]**

b) Explain in detail the subtransient, transient and steady states at the three phase short circuit fault condition on an unloaded alternator and explain how will you find subtransient, transient and steady state currents? **[10]**

OR

Q6) a) What do you mean by DC offset current? What is the effect of instant of short circuit on the waveform of short circuit current of R-L circuit. **[10]**

b) Two three phase 11 kV generators of capacities 8 MVA and 4 MVA and subtransient reactance of 8% is connected to a feeder of series impedance $(0.12 + j0.48)\Omega$/ph/km. The transformer is rated at 3 MVA, 6.6kV/33kV and has a reactance of 5%. **[8]**

Determine the fault current supplied by the generator operating under no load with a voltage of 6.9 kV when a three phase symmetrical fault occurs at a point 15 km along the feeder.

SECTION - II

Q7) a) A voltages of 3-phase supply connected to load of l0ohm resistance per phase in star are $200\angle 0^{o}$, $100\angle 255.5^{o}$ and $200\angle 151^{o}$ volts. Find : **[10]**

i) Symmetrical components of phase voltages and line currents.

ii) Line currents and total power consumed.

b) Show that fault current $I_f = \frac{3E}{Z1+Z2+Z0}$ when L-G fault occurs at the terminals of solidly grounded star connected alternator. **[8]**

OR

Q8) a) Derive the expression for fault current of an alternator, with sequence diagram in following types of faults. **[12]**

i) Line to line fault

ii) Double line to ground fault.

b) Draw the equivalent circuit for zero sequence reactance of three phase transformer, for different combinations of connections. **[6]**

Q9) a) Explain the bus incidence matrix method of formation of Y_{bus} matrix. **[8]**

b) Explain Newton Raphson method of load flow analysis along with flowchart. **[8]**

OR

Q10) a) Give classification of various types of buses in power system for load flow studies. What is the significance of reference bus? **[8]**

b) Derive static load flow equation for 'n' bus system. **[8]**

Q11) a) Explain Different types of HVDC transmission system. Give the name of HVDC transmission line in Maharashtra with its type and specification. **[8]**

b) With the help of suitable diagram, explain different component of HVDC transmission system along with their function. **[8]**

OR

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

a) Advantages and problems of HVDC system.

b) Constant current control.

c) Constant ignition control.

d) Constant extinction control.

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Total No. of Questions : 12]

SEAT No. :

P1405

[Total No. of Pages : 3

[4858] - 168

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

DESIGN OF ELECTRICAL MACHINES

(2008 Pattern)

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

Instructions to the candidates:

1) ***Answer 3 questions from Section I and 3 questions from Section II.***
2) ***Answers to the two sections should be written in separate books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***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) Write note on magnetic leakage and state effects of magnetic leakage. **[8]**

b) Explain : **[8]**

i) Phenomenon of Rotating Hysterisis.

ii) Pulsation Loss.

OR

Q2) a) Explain Carter's fringe curve and gap distribution factor in detail. **[8]**

b) Explain principal components of leakage flux for poly-phase machines. **[8]**

Q3) a) Draw heating curve and cooling curve and explain the following : **[8]**

i) Heating time constant.

ii) Cooling time constant.

iii) Final steady temperature rise.

iv) Hot spot temperature.

b) Enlist specifications of transformer as per IS 2026. **[8]**

OR

P.T.O.

Q4) a) Derive output equation of single phase core type transformer. **[8]**

b) Determine the main dimensions of 500 KVA, 6600/400 V, 3 phase, 50 Hz core type oil immersed self-cooled distribution transformer. Voltage per turn is 20V, area factor for stepped core is 0.56, window space factor = 0.3, current density is 3A/mm^2, B_m = 1.2Wb/m^2, width of largest stamping = 0.85d, D = 1.85a. Assume $A_y = A_i$ **[8]**

Q5) a) Derive the formula for axial forces developed in transformers. **[8]**

b) Determine the main dimension of core and yoke for a 200 KVA, 50Hz, 1 phase, core type transformer. A cruciform core is used with distance between adjacent limbs is 1.5 times the width of core laminations. Assume voltage per turn = 14V, B_m = 1.2T, K_w = 0.30, current density = 2.5A/mm^2, K_s = 0.9, $A_i = 0.56d^2$. Width of largest stamping is 0.85d. **[10]**

OR

Q6) a) Discuss mechanical forces in transformer and explain how they are taken into consideration while fabricating and how the mechanical bracing is provided? **[8]**

b) A 500KVA11000/400delta/star transformer has following details : HV turns = 1660, length of mean turn = 93cm, length of coil = 52cm, short circuit current = 20 x rated current. Find radial force in tonnes on HV winding under short circuit conditions. **[10]**

SECTION - II

Q7) a) Define, (i) specific magnetic loading and (ii) specific electric loading. Explain the effect of the same on the size and the permance of induction motor if the values of specific magnetic loading and specific electrical loading are selected above the normal valves during the design of induction motor. **[10]**

b) Find the main dimensions of a 15kW, 3-phase, 400 V, 50 Hz, 2810 rpm SCIM having an efficiency of 0.88 and a full load power factor of 0.9

Assume -

Specific magnetic loading = 0.5 wb/m^2, specific electric loading = 25,000 A/m., The rotor peripheral speed 20 m/sec at synchronous speed. **[8]**

OR

Q8) a) Derive the equation for KVA input for 3-phase induction motor. **[8]**

b) Draw the winding diagram for three-phase, 24 slots, 4-pole, double layer type induction motor. **[10]**

Q9) a) Explain the harmonic synchronous torques produced in three-phase induction motor. due to harmonic field. **[6]**

b) Explain the effect of length of air-gap affect the overload capacity of induction motor. **[4]**

c) Explain the methods used to reduce harmonic torques in three - phase induction motor. **[6]**

OR

Q10) a) Explain the procedure for the design of rotor bars and slots. in squirrel cage induction motor. **[8]**

b) A 11 kW, 3-phase, 6-pole, 50 Hz, 220V, star connected induction motor has 54 slots, each containing 9 conductors, Calculate the value of bar and endring currents. The number of rotor bars is 64. The machine has efficiency of 0.86 and power factor of 0.85. The rotor mmt may be assumed as 85% of stator mmf. Also find the bar and the end-ring size if the current density is $5A/mm^2$. **[8]**

Q11) a) Explain the effect of dispersion coefficient on maximum power factor in pulyphase induction motor. **[8]**

b) Explain the factors on which the no-load current in 3-phase induction. **[8]**

OR

Q12) a) Explain the effect of dispersion coefficient on the power factor on an induction motor. **[8]**

b) Derive the equation for magnetising current per phase in three-phase induction motor. **[8]**

Total No. of Questions : 12]

SEAT No. :

P1406

[Total No. of Pages : 4

[4858] - 169
T.E. (Electrical) (Semester - II)
CONTROL SYSTEM - I
(2008 Pattern)

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

Instructions to the candidates:

1) ***Answer any three 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 wherever necessary.***
4) ***Assume suitable data, if necessary.***
5) ***Use of logarithmic tables slide rule, electronic pocket calculator is allowed.***
6) ***Figures to the right indicate full marks.***

SECTION - I

Q1) a) Describe various sub functional blocks and signals of a feedback control system. Give examples. **[8]**

b) Derive $G(s) = \frac{V2(s)}{V1(s)}$ of the network as shown in fig 1b. **[8]**

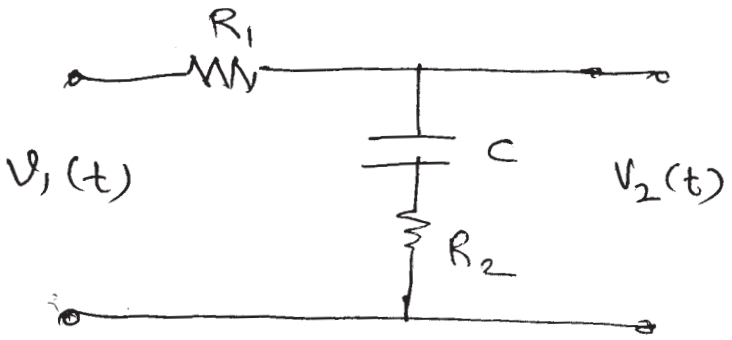


Fig 1b

OR

P.T.O.

Q2) a) For the signal flow graph as shown in fig.2a find $\frac{C(s)}{R(s)}$ using Mason's gain formula. **[8]**

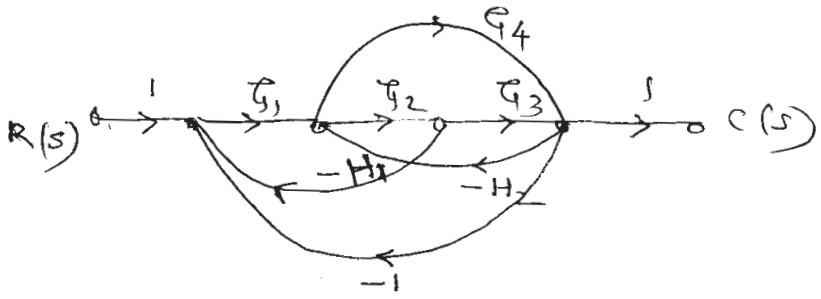


fig 2a

b) Write the equilibrium equations for the mechanical system as shown in fig 2b and derive the electrical equivalent circuit using Force-Voltage analogy. **[8]**

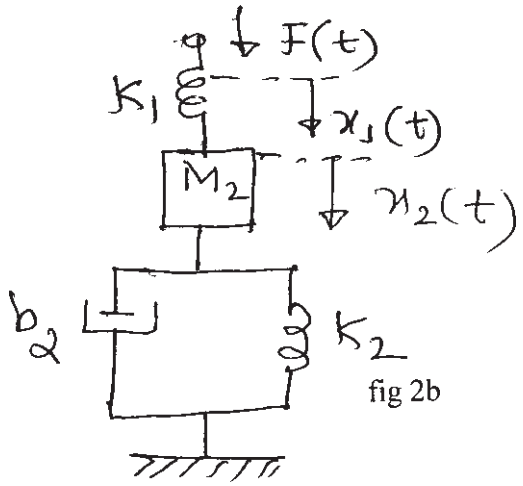


fig 2b

Q3) a) State and explain standard time signals. Write their Laplace transforms. **[5]**

b) Discuss on steady state response. **[3]**

c) Find steady state error of the following systems for inputs: unit step, unit ramp and unit acceleration. **[8]**

i) $G(s) = \frac{10}{s(0.1s+1)\ (0.5s+1)}$

ii) $G(s) = \frac{1000(s+1)}{(s+10)(s+50)}$

OR

Q4) a) Sketch the time response curve of a under damped system with unit step input. State and explain time domain specifications. **[8]**

b) Given a system $G(s) = \frac{25}{(S^2+6S+25)}$ find its rise time, peak time and peak overshoot. **[8]**

Q5) a) State Routh-Hurwitz criterion. Explain its limitations to determine the closed loop stability of a control system. **[8]**

b) Find **K** marginal and '**q**' of marginal system G(s) H(s), if oscillating frequency is 4 rad/sec. **[10]**

$$G(s)\,H(s) = \frac{4}{(S^2+qS+2K)}$$

OR

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

i) asymptotes

ii) breakaway points

iii) angle of departure used in Root locus sketch.

b) Sketch the root locus for a system with loop transfer function $G(s) = \frac{K}{(S^2+S+1)}$ Also discuss on stability of the system. **[10]**

SECTION - II

Q7) a) Explain in detail frequency response specifications **[8]**

b) Construct BODE plot for unity feedback control system whose open loop TF is given by : $G(S) = \frac{0.25(1+0.5s)}{s(1+2s)\,(1+4s)}$. **[10]**

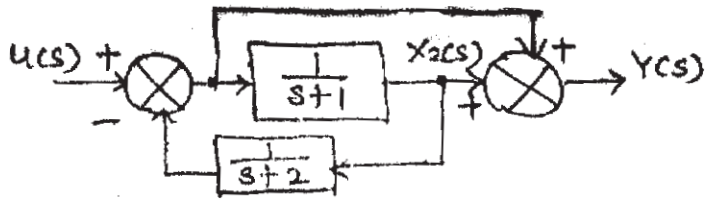
OR

Q8) a) Explain Nyquist stability criteria. What is principal of Argument? **[8]**

b) Sketch a polar plot for $G(s) = \frac{10}{s(s+1)(s+5)}$. **[10]**

Q9) a) State advantages and dis-advantages of state space analysis. **[8]**

b) Construct state model for following system : **[8]**



OR

Q10) a) What are controllable and abservable canonical form? Explain with suitable example. **[8]**

b) Consider SISO system given by, $\dot{x} = Ax + Bu;\ where, y = Cx + Du.$

$$A = \begin{bmatrix} 0 & 1 & 0 \\ 0 & -3 & -3 \\ 1 & 0 & -1 \end{bmatrix}; B = \begin{bmatrix} 0 \\ 3 \\ 0 \end{bmatrix}; C = \begin{bmatrix} 1 & 0 & 0 \end{bmatrix}; D = [0]$$

Determine Transfer function G(s). **[8]**

Q11) a) Draw circuit diagram, Bode plot and explain working of Lead compensator in detail. **[8]**

b) Explain characteristics and TF of PID controller. Mention any one example for application of PID controller. **[8]**

OR

Q12) a) Explain modelling and T.F. of :

i) Potentiometer

ii) Synchros **[8]**

b) Explain modelling of T.F. of DC and AC servomotor. **[8]**

Total No. of Questions : 12]

SEAT No. :

P1407

[Total No. of Pages : 3

[4858] - 170

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

UTILIZATION OF ELECTRICAL ENERGY

(2008 Pattern)

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) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***

SECTION - I

Q1) a) Draw equivalent circuit of arc furnace. Derive the expression for power factor at maximum power. **[9]**

b) State the detail classification of electric heating. Describe each type in brief. **[9]**

OR

Q2) a) A single phase 2.5kW, 240 volt resistance oven uses nichrome wire as resistance heating element. The wire temperature is to be 1500ºC and that of charge is to be 450ºC. Calculate the length and diameter of wire. The resistivity of nichrome wire is 42.5 $\mu\Omega$ cm. Assume radiating efficiency as 1 and emissivity as 0.9. **[9]**

b) With suitable diagram explain ultrasonic welding. State its applications. **[9]**

Q3) a) With suitable diagram explain electroplating on non conducting materials. **[8]**

b) With suitable diagram explain reverse-forward operation of 3 phase induction motor using suitable control devices. **[8]**

P.T.O.

OR

Q4) a) Explain construction and working of pressure switch, thermostat. **[8]**

b) With suitable diagram explain electric circuit used in water cooler. **[8]**

Q5) a) Define following terms in case of illumination. **[8]**

i) Space to height ratio

ii) Depreciation factor

iii) Coefficient of utilization

iv) Solid angle

b) With suitable diagram explain construction and working of mercury vapour lamp. State its applications. **[8]**

OR

Q6) a) Give comparison between - Incamdescent lamp and gas discharge lamps. (minimum 4 points). **[8]**

b) A drawing hall of 30m × 13m is to be illuminated using 80 watt flourocent tubes. The luminuous efficiency of flourocent tube is 40 lumens/watt. The ceiling height is 5 meters. The required illumination is 120 lux. The coefficient of utilization is 0.5 and depreciation factor is 1.4. Find total number of flourocent tubes required and show their disposition in the plan. **[8]**

SECTION - II

Q7) a) Describe any two systems of track electrification. **[8]**

b) What is overhead catenary system? With suitable diagram explain construction of compound catenary system. **[8]**

OR

Q8) a) Compare steam engine drive and electric drive (minimum 8 points). **[8]**

b) With suitable diagram explain - side contact type and bottom contact type third rail system of current collection. **[8]**

Q9) a) With usual notations derive the expression for energy output from driving axle. **[8]**

b) A schedule speed of 45 kmph is required between two stops 1.5 km apart. Find the maximum speed over the run if the stop is of 20 second duration. The value of acceleration is 2.4 kmph ps and retardation is 3.2 kmph ps Assume trapezoidal speed time curve. **[8]**

OR

Q10) a) Draw trapezoidal speed-time curve and derive the expression for maximum speed in terms of total time of run, acceleration, retardation, maximum and average speed. **[8]**

b) Compare - urban, suburban, mainline traction service and draw speed-time curve for these type of services. **[8]**

Q11) a) With speed torque characteristics of DC series motor & DC shunt motor explain how DC series motor is best suited for parallel running. **[6]**

b) Explain any one electric circuit used for detecting track occupancy of train. **[6]**

c) Describe how AC series motor is suitable for traction work. **[6]**

OR

Q12) a) Explain regenerative braking in case of DC series motor. Describe clearly the modifications made in the circuit. **[6]**

b) State the importance of route relay inter lock. How it is achieved? **[6]**

c) With suitable diagram explain series-parallel control of two DC series motors. **[6]**

Total No. of Questions : 12]

SEAT No. :

P1408

[Total No. of Pages : 2

[4858]-171

T.E. (Instrumentation & Control)

INSTRUMENTATION FOR CHEMICAL ANALYSIS

(2008 Pattern) (Semester - I)

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 books.***
3) ***Neat diagram 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) Give detail classification of Instrumental Method of Chemical Analysis. **[8]**

b) Explain the experimental set up of Potentiometry with neat sketch. **[8]**

OR

Q2) a) Explain Conductometry with neat sketch. **[8]**

b) Explain Voltametry with neat sketch. **[8]**

Q3) a) Draw electromagnetic spectrum show one source and one detector in each region. **[8]**

b) What is spectrophotometer? Explain UV-visible Spectrophotometer with neat sketch. **[10]**

OR

Q4) a) List various types of nebuliser,Explain ultrasonic nebuliser with neat sketch. **[10]**

b) Explain Hollow cathode lamp with neat sketch. **[8]**

P.T.O.

Q5) a) Explain Interferogram used in FTIR with neat sketch. **[8]**

b) Explain flame photometer with neat sketch. **[8]**

OR

Q6) a) List Various IR detector. Explain any one type of IR Detector with neat sketch. **[8]**

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

i) DCP

ii) Discharge type of Atomiser

SECTION - II

Q7) a) Explain with neat sketch double beam flouriometer. **[8]**

b) Explain with neat sketch Spectroflouriometer. **[8]**

OR

Q8) a) Explain with neat sketch O2 analyser. **[8]**

b) Explain NMR Spectrometer with neat sketch. **[8]**

Q9) a) Enlist different types of mass spectrometer. Explain working principles of time of flight mass spectrometer. **[10]**

b) Define retention time & retention volume in GC. Explain with neat sketch electron capture detector with neat sketch. **[8]**

OR

Q10) a) List & Explain various Factor affecting separation in Gas Chromatography. **[10]**

b) Explain any one type of detector used in Gas Chromatography. **[8]**

Q11) a) State & Prove Braggs Law of X-ray Diffraction. **[8]**

b) What is ESCA? Explain in brief Auger emission spectroscopy. **[8]**

OR

Q12) a) Explain with a neat sketch Geiger-Muller Counter. **[8]**

b) Explain Abbes' Refract meter with neat sketch. **[8]**

Total No. of Questions : 12]

SEAT No. :

P1951

[Total No. of Pages : 3

[4858] - 172

T.E. (Instrumentation & Control) (Semester - I)

EMBEDDED SYSTEM DESIGN

(2008 Pattern)

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) ***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) Explain the function of pins $\overline{PSEN}$ and ALE of 8051 microcontroller with suitable example. **[8]**

b) Draw and explain the TMOD register of 8051 microcontroller. **[8]**

Q3) a) Explain different addressing mode of 8051 microcontroller with suitable example. **[10]**

b) Write an assembly language program for 8051 microcontroller to generate square wave of frequency 3 KHz on pin P1.4. Use oscillator freq. = 11.0592 MHz. **[8]**

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. **[8]**

i) MOVX A,@DPTR

ii) ANL A,@R0

iii) DA A

iv) SUBB A,R0

v) CJNE A,#50H,AGN

Q5) a) With a neat sketch explain the interfacing of ADC0808 with 8051 microcontroller. **[8]**

b) Interface 16 × 2 LCD to 8051 and write an assembly language program to display "INSTRUMENTATION" on first line of LCD. **[8]**

OR

Q6) a) Write a short note on RS-232 standard. **[8]**

b) Draw the interfacing diagram of Stepper motor with 8051 microcontroller. Also explain the function of ULN in Short. **[8]**

SECTION - II

Q7) a) Explain the function of Watchdog timer of AT Mega8535 microcontroller. **[8]**

b) Draw & explain the Status Register SREG of AT Mega8535. **[8]**

OR

Q8) a) Explain the stack operation in AVR microcontrollers. **[8]**

b) Explain Architectural features of AT Mega8535. **[8]**

Q9) a) Explain the Addressing mode of 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 different clock sources which can be used with AVR microcontroller. **[8]**

b) Explain the following instruction of AVR microcontroller. **[10]**

i) LDI r16,$53

ii) SUBI r15,10

iii) NEG r30

iv) ROL r30

v) SWAP r10

Q11) a) With a neat schematic, explain the interfacing of stepper motor to AVR microcontroller. **[8]**

b) With a neat diagram, explain the interfacing of 16 × 2 LCD display with 8 data lines to the AVR microcontroller. **[8]**

OR

Q12) 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]**

Total No. of Questions : 12]

SEAT No. :

P1409

[Total No. of Pages : 3

[4858] - 173

T.E. (Instrumentation & Control)

CONTROL SYSTEM COMPONENTS

(2008 Pattern)

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

Instructions to the candidates:

1) ***Students have to answer 3 questions from each section.***
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 Q10, Q.11 or Q12.***
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 with the help of neat figure construction and working of Electromechanical Relay. State the advantages and limitations. **[8]**

b) Explain in brief the application of following types of switches **[8]**

i) Temperature switch

ii) Limit switch

OR

Q2) a) Write the differences between a contactor and a relay. **[8]**

b) Explain with the help of neat sketch construction and working of Level switch. Also give its application. **[8]**

Q3) a) Explain the advantages, layout, controls, power distribution in a typical motor control centre. **[8]**

b) List different protection circuits for a motor. Draw and explain any one. **[8]**

OR

Q4) a) What is meant by braking of motor? Draw electrical wiring diagram for any one type of braking. **[8]**

b) Explain the construction & working of thermal overload relay. **[8]**

P.T.O.

Q5) a) Explain with the help of neat block diagram pneumatic supply. **[8]**

b) Draw pneumatic circuit for implementing Automatic reciprocation of double acting cylinder. **[10]**

OR

Q6) a) List different types of special pneumatic cylinders. Give application of each type. **[10]**

b) Give application of Non return flow control valve with the help of a pneumatic circuit. **[8]**

SECTION - II

Q7) a) Draw the symbols and explain the function of the following hydraulic components. **[8]**

i) Relief valve

ii) Filter

iii) Pump

iv) 4/3 Direction control valve

b) Explain meter in and meter out hydraulic circuits with the help of standard symbols. **[10]**

OR

Q8) a) Name general standard specifications used in the selection of hydraulic oil. **[8]**

b) Using standard symbols, draw hydraulic circuit for sequential operation of two cylinders. **[10]**

Q9) a) Explain with a neat sketch the construction and working of high selector. State its application. **[8]**

b) What are different controls on the face plate of a typical alarm annunciator. **[8]**

OR

Q10) a) Compare semi-enclosed type fuse with HRC fuses. **[8]**

b) State the uses of seals. Explain any one type. **[8]**

Q11) a) Explain various methods to make an instrument safe in hazardous area. Explain the concept of any one method. **[8]**

b) State the precautions to be taken for sanitary pipe fittings. **[8]**

OR

Q12) a) Explain the following tube fittings. **[8]**

i) Union

ii) Tee

iii) Elbow

iv) Plug

b) Define hazardous area / location and give its classification. **[8]**

Total No. of Questions : 12]

SEAT No. :

P1410

[Total No. of Pages : 2

[4858] - 174

T.E. (Instrumentation and Control)

ELECTRONIC INSTRUMENTATION

(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 practical Q-meter. **[10]**

b) Explain significance of Automatic Test Equipment (ATE) with its advantages & limitations. **[6]**

OR

Q2) a) Draw and explain the block diagram of DMM. **[8]**

b) Explain auto-zeroing and auto-ranging in digital instruments. **[8]**

Q3) a) What is sine wave synthesis? Explain sampled sine wave synthesis. **[10]**

b) Explain typical pulse characteristics. **[8]**

OR

Q4) a) With the help of neat block diagram/circuit diagram, explain working of Ramp generator. **[8]**

b) Explain different types of pulse jitters. **[8]**

c) Give two differences between function generator and frequency synthesizer. **[2]**

P.T.O.

Q5) a) Explain ALT and CHOP modes in dual trace CRO. **[8]**

b) Explain with neat circuit diagram 10:1 probe. **[8]**

OR

Q6) a) Explain with neat block sampling oscilloscope. **[8]**

b) How response time of a relay can be measured using DSO? **[8]**

SECTION - II

Q7) a) Explain dual slope ADC. **[8]**

b) Explain R – 2R type of DAC. **[8]**

c) Determine the conversion time required for 10 bit SAR type if clock frequency is 100 kHz. **[2]**

OR

Q8) a) Explain counter type of ADC. **[8]**

b) Write short notes on – sample and hold circuit and analog multiplexer. **[10]**

Q9) a) Explain time interval and frequency ratio modes of universal counter. **[8]**

b) A digital frequency meter has a time base derived from 1 MHz clock generator divided by decade counters. Determine the measured frequency when a 1.512 KHz sine wave is applied and time base uses- **[8]**

i) six decade counters

ii) four decade counters

OR

Q10) a) Explain digital capacitance meter with neat block or circuit diagram. **[8]**

b) What are the different measurement errors in universal counter? **[8]**

Q11) a) Write a note on harmonic distortion meter. **[8]**

b) Explain spectrum analyzer with swept super heterodyne technique. **[8]**

OR

Q12) Write shrot notes on : **[16]**

a) Virtual instrumentation

b) Data logger

✪✡✪✡

Total No. of Questions : 12] SEAT No. :

P3119 [Total No. of Pages : 2

[4858] - 175
T.E. (Instrumentation & Control) (Semester - I)
INDUSTRIAL MANAGEMENT
(2008 Pattern)

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

Instructions to the candidates:

1) ***Any three questions from each section.***
2) ***The answer to the two sections should be written in separate books.***
3) ***Neat diagrams must be drawn whenever necessary.***
4) ***Black figures to right indicate full marks.***
5) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Enlist various functions of management. Explain strategic planning and types of business strategy. **[10]**

b) Critically evaluates the importance of SWOT analysis, is it developing a sustainable business strategy. **[8]**

OR

Q2) a) What is a BCG matrix? Explain Parters 5 forces of competition management techniques for developing strategy **[10]**

b) Explain briefly the Mind Mapping and Cause & Effect diagram. **[8]**

Q3) a) Explain with importance Quality Circle. **[6]**

b) Briefly explains the salient features of ISO 9001 standard. **[10]**

OR

Q4) Write notes on **[16]**

a) Industry Institute interaction

b) The effect of GAT/WTO agreement

Q5) a) What is ABC analysis? How it wallets the inventory to reduce cost? **[10]**

b) What is outsourcing? Give its advantages and disadvantages **[6]**

OR

Q6) a) Explain the Raw materials storage & handling? **[10]**

b) Explain Store keeping and Material handling. **[6]**

SECTION - II

Q7) a) Explain the Man power planning. **[8]**

b) What is Motivation? Explain Maslow's theory. **[10]**

OR

Q8) a) State & explain various methods of training how it influences productivity. **[12]**

b) Explain the Leadership Skill? **[6]**

Q9) Differentiate between CPM and PERT **[16]**

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) ISO 14000

b) Global Warming

OR

Q12)State and explain the concept of disaster management. Explain in detail its causes effect & mitigation mechanism **[16]**

Total No. of Questions : 12]

SEAT No. :

P1411

[Total No. of Pages : 4

[4858] - 176

T.E. (Instrumentation & Control)

DIGITAL SIGNAL PROCESSING FUNDAMENTALS

(2008 Pattern)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) Explain the classification of discrete-time signals in detail with examples. **[9]**

b) Determine the cross-correlation of following sequences using graphical method: **[9]**

$x_1(n) = \{2, 1, 3, 5\}$, $x_2(n) = \{3, 2, 6, 4\}$

OR

Q2) a) Determine the resultant impulse response $h(n) = h_1(n) * h_2(n)$ if $h_1(n) = (0.25)^n\ u(n)$, $h_2(n) = (0.5)^n\ u(n)$. **[8]**

b) Determine the zero-input response of the discrete-time systems described by following difference equations : **[10]**

i) $y(n) = \frac{3}{4} y(n-1) - \frac{1}{8} y(n-2) + x(n)$

ii) $y(n) = 0.6\, y(n-1) - 0.08\, y(n-2) + x(n)$

P.T.O.

Q3) a) Explain the basic structures of FIR systems. **[8]**

b) Sketch the direct form I and direct form II structures for following: **[8]**

i) $y(n) = 5y(n-1) - 8y(n-2) + 3x(n) - 4x(n-1) + 2x(n-2)$

ii) $y(n) = ay(n-1) - by(n-2) + cx(n) + dx(n-1)$

OR

Q4) a) Determine and plot the magnitude and phase response of the discrete time system described by, $y(n) - 1.5y(n-1) + 2y(n-2) = 3x(n)$.

Use $\omega = 0, \pm\frac{\pi}{4}, \pm\frac{\pi}{2}, \pm\pi.$ **[8]**

b) The discrete time system is described by : **[8]**

$y(n) = 3.5y(n-1) - 4y(n-2) + 2.4x(n) - 4.4x(n-1) + x(n-2)$

i) Determine the system function.

ii) Sketch pole-zero plot.

iii) Comment on stability.

Q5) a) Explain any four properties of DTFT. **[8]**

b) Compute circular convolution of $x_1(n) = \{2,1,3,1\}$ and $x_2(n) = \{1,2,5,4\}$. **[8]**

OR

Q6) a) Explain any four properties of DFT. **[8]**

b) Determine 8-point DFT of $x(n) = \{2,1,2,1\}$. **[8]**

SECTION - II

Q7) a) Explain the radix-2 decimation-in-frequency (DIF) FFT algorithm for $N = 8$. **[9]**

b) Determine 8-point DFT of $x(n) = \{2, 2, 0, 0, 1, 2, 3, 4\}$ using radix-2 decimation-in-time (DIT) FFT algorithm. **[9]**

OR

Q8) a) Determine 8-point DFT of $x(n) = \{1, 1, 0, 0, 2, 2, 3, 3\}$ using radix-2 decimation-in-frequency (DIF) FFT algorithm. **[9]**

b) Explain the radix-2 decimation-in-frequency (DIF) FFT algorithm for $N = 8$. **[9]**

Q9) Design a FIR linear-phase, digital filter approximating the ideal frequency response

$$H_d(\omega) = \begin{cases} 1 \text{ for } |\omega| \le \frac{\pi}{4} \\ 0 \quad \text{for} \frac{\pi}{4} < |\omega| \le \pi \end{cases}$$

a) Determine the desired impulse response $h_d(n)$ for $M = 7$. **[8]**

b) Determine the FIR filter coefficients using Bartlett window. **[4]**

c) Repeat part (b) using Hamming window. **[4]**

OR

Q10) Design a FIR linear-phase, digital filter approximating the desired frequency response

$$H_d(\omega) = \begin{cases} e^{-j5\omega} \quad \text{for} \quad |\omega| \le \frac{\pi}{6} \\ 0 \quad \text{for} \quad \frac{\pi}{6} < |\omega| \le \pi \end{cases}$$

a) Determine the desired impulse response $h_d(n)$ for $M = 7$. **[8]**

b) Determine the FIR filter coefficients using Hanning window. **[4]**

c) Repeat part (b) using Blackman window. **[4]**

Q11) A digital low-pass filter is required to meet the following specifications :

$\delta_p = 0.9, \omega_p = 0.4\pi$ rad/sec

$\delta_s = 0.2, \omega_s = 0.6\pi$ rad/sec

This filter is to be designed by performing a bilinear transformation on Butterworth analog design with $T = 1$ sec.

a) Determine the order and cut-off frequency of analog filter. **[6]**

b) Determine the analog poles of the filter. **[5]**

c) Convert the analog system function into a digital filter system function. **[5]**

OR

Q12) Explain following with respect to IIR filter design :

a) Approximation of derivatives. **[6]**

b) Impulse invariance method. **[6]**

c) Compare Butterwoth filters and Chebyshev filters. **[4]**

Total No. of Questions : 12]

SEAT No. :

P1412

[Total No. of Pages : 2

[4858] - 177

T.E. (Instrumentation and Control)

INSTRUMENTATION SYSTEM DESIGN

(2008 Pattern) (Semester - II)

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

Instructions to the candidates:

1) ***Solve 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 whenever 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 are the different approaches adopted for product design? **[8]**

b) Explain the role of prototyping and testing in the product design. **[8]**

OR

Q2) a) Explain NEEMA Standard. **[8]**

b) Explain different tests carried out on an enclosure. **[8]**

Q3) a) Write short note on Shielding and grounding. **[8]**

b) How ESD protection is achieved in the equipment design? **[8]**

OR

Q4) a) Explain contact and thermal noise in detail. **[8]**

b) What is arching? What are the ways to avoid it? **[8]**

P.T.O.

Q5) a) In the oven Pt-100 is used to control the temperature in the range of 0-100 ºC. The Output is to be converted in to 0-5V. Select the proper IC for signal conditioning. Draw the circuit diagram. Design the circuit. **[9]**

b) With the help of neat diagram explain the method of zero and span adjustment of XTR-110. **[9]**

OR

Q6) a) Explain how set point controller is designed with AD595? **[9]**

b) How does an HCNR 201 helps to isolate analog voltage signal? **[9]**

SECTION - II

Q7) a) It is desired to driva a 5V, 100Ω relay with MCT-2E using 3V battery. The CTR of MCT- 2E is 6. Draw and explain interfacing diagram. **[9]**

b) Explain how ICM7217 can be used as a frequency counter? **[9]**

OR

Q8) a) Design thermometer using ICL7107 temperature range of 0-100 ºC full scale. **[9]**

b) It is desired to drive the stepper motor using 89C51 microcontroller and ULN2803 driver. Draw and explain suitable interfacing diagram. **[9]**

Q9) a) Explain general considerations of layout check. **[8]**

b) Explain the thumb rules to place the components on the PCB. **[8]**

OR

Q10) a) Explain mass soldering in detail. **[8]**

b) Explain the designing rules for digital circuit PCB. **[8]**

Q11) a) Explain "Bath Tub Curve" with neat diagram. **[8]**

b) Explain the causes of reliability. **[8]**

OR

Q12) a) Explain the term availability and traceability. **[8]**

b) Write short note on virtual instrumentation. **[8]**

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Total No. of Questions : 12] **SEAT No. :**

P3120 **[Total No. of Pages : 2**

[4858] - 178

T.E. Instrumentation & Control (Semester - II)

POWER PLANT INSTRUMENTATION

(2008 Pattern)

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) ***Assume suitable data, if necessary.***

SECTION - I

Q1) A) What is difference between Distillation and Extraction? **[8]**

B) Explain extraction unit operation with neat sketch? **[8]**

OR

Q2) A) What are the different types of dryers? **[8]**
Explain spray dryer in details

B) Explain reciprocating compressor with neat sketch? **[8]**

Q3) A) Explain working of evaporator with neat sketch? **[8]**

B) What is LMTD? Derive equation for LMTD for any heat exchanger **[8]**

OR

Q4) A) Explain in detail Conduction, Convection modes of heat transfer **[8]**

B) Explain the main components of water treatment plant. **[8]**

Q5) A) Explain with neat sketch the components of wind power plant **[9]**

B) Explain the block diagram of solar power plant **[9]**

OR

Q6) A) Explain with neat diagram radiation detector in power plant **[9]**

B) What is smoke detector? Explain working of smoke detector **[9]**

SECTION - II

Q7) A) Explain the shutdown procedure for boiler **[8]**

B) Explain with neat sketch CFBC boiler **[8]**

OR

Q8) A) Explain 3-element drum level control for boiler operation **[8]**

B) Explain the working of carbon dioxide analyzer used for boiler **[8]**

Q9) A) Enlist different types of sensors and their function used in turbine **[8]**

B) Explain with neat sketch cooling system used for turbine **[8]**

OR

Q10) A) Explain flue gas oxygen analyzer in power plant with neat diagram **[8]**

B) Explain the importance of pH measurement in power plant **[8]**

Q11) A) Explain working of tidal power plant **[9]**

B) Explain the instrumentation used for diesel power generator **[9]**

OR

Q12) A) Explain importance of instrumentation for wind power plant **[9]**

B) Explain working of nuclear reactor in with neat sketch **[9]**

Total No. of Questions : 12] **SEAT No. :**

P3536 **[Total No. of Pages : 4**

[4858]-179
T.E. (Instru & Control) (Semester - II)
CONTROL SYSTEM DESIGN
(2008 Pattern)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Answer 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, electronic pocket calculator and steam table is allowed.***
6) ***Your answer will be valued as a whole.***
7) ***Assume suitable data if necessary.***

SECTION - I

Q1) a) For a system having open loop transfer function **[12]**

$G(s)=\frac{6}{s(s+3)}$ and the feedback is unity.

i) Draw the block diagram.

ii) Design a suitable compensator for having $\zeta = 0.7$ and undamped natural frequency $\omega = 4$ rad/sec

b) Draw suitable lead network and derive transfer function for same. **[6]**

OR

Q2) a) Compare lead and Lag compensator. **[8]**

b) For a system having open loop transfer function $G(s)=\frac{K}{s(s+4)(s+1)}$ and the feedback is unity. **[10]**

Design a suitable compensator so that zeta = 0.4 settilling time is 10sec and K_v = 5 sec^{-1}.

P.T.O.

Q3) Design a Lead-Lag compensator for open loop transfer function

$$G(s)=\frac{K}{s(s+3)(s+2)}$$

The static velocity error constant be 10 sec^{-1}, P.M. should be more 10°, G.M. = 10db more than uncompensated system. **[16]**

OR

Q4) A unity feedback control system has an open loop transfer function of $G(s)=\frac{1}{s(s+1)}$ Design a suitable compensating network such that K_v= 10 and PM < 50°. Draw the bode plot of compensated and uncompensated system. **[16]**

Q5) The transfer function of unity feedback system is given below : **[16]**

$$G(s)=\frac{K}{s(s+4)(s+5)}$$

Find the parameters for P, PI and PID using Ziegler-Nicholas method.

OR

Q6) a) The following transfer function is obtained from step response of the system $G(s)=\frac{3e^{10s}}{(15s+1)}$

Find the parameters for P,PI and PID using Cohen-Coon method. **[10]**

b) Explain the tuning of PID controller by using Ziegler-Nichols close loop tuning method. **[6]**

SECTION - II

Q7) a) Design a PD Controller so that a unity feedback system with open loop transfer function. **[8]**

$$G(s)=\frac{25}{s(s+2)(s+4)}$$

Will have damping ratio of 0.9 and natural frequency of oscillation is 2rad/sec

b) Design a PI Controller so that a unity feedback system with open loop transfer function. **[8]**

$$G(s)=\frac{10}{(s+2)(s+1)}$$

Will have damping ratio of 0.7 and natural frequency of oscillation is 3 rad/sec.

OR

Q8) a) Design a PID Controller so that a unity feedback system with open loop tranfer function. **[10]**

$$G(s)=\frac{25}{(s+3)(s+4)(s+1)}$$

Will have P.M. 60° at 4rad/sec and steady state error for unit ramp should be 10%

b) Design a Controller so that a system tranfer function $G(s)=\frac{1}{(s+2)}$ and the desired performance of the compensated system is $G(s)=\frac{1}{(s+4)}$ **[6]**

Q9) a) The state space representation of a system is given by : **[10]**

$$\begin{bmatrix}\dot{x}1\\ \dot{x}2\end{bmatrix}=\begin{bmatrix}0 & 1\\ -6 & -5\end{bmatrix}\begin{bmatrix}x1\\ x2\end{bmatrix}+\begin{bmatrix}0\\ 3\end{bmatrix}u;\begin{bmatrix}x1(0)\\ x2(0)\end{bmatrix}=\begin{bmatrix}1\\ 1\end{bmatrix}$$

Compute the state transition matrix and obtain state response

b) Determine whether following system is controllable and observable or not **[8]**

$$\begin{bmatrix}\dot{x}1\\ \dot{x}2\end{bmatrix}=\begin{bmatrix}0 & 1\\ -4 & -8\end{bmatrix}\begin{bmatrix}x1\\ x2\end{bmatrix}+\begin{bmatrix}0\\ 2\end{bmatrix}u;$$

$$y=\begin{bmatrix}0 & 4\end{bmatrix}\begin{bmatrix}x1\\ x2\end{bmatrix}$$

OR

Q10)a) Give derivation for the necessary and sufficiency condition for complete state observability. **[10]**

b) Explain the Lyapunov Stability criteria in detail. **[8]**

Q11)Design full order state observer that the system **[16]**

$$\begin{bmatrix}\dot{x}1\\ \dot{x}2\\ \dot{x}3\end{bmatrix}=\begin{bmatrix}0 & 1 & 0\\ 0 & 0 & 1\\ -6 & -11 & -6\end{bmatrix}\begin{bmatrix}x1\\ x2\\ x3\end{bmatrix}+\begin{bmatrix}0\\ 0\\ 1\end{bmatrix}u$$

$$y=\begin{bmatrix}1 & 0 & 0\end{bmatrix}\begin{bmatrix}x1\\ x2\\ x3\end{bmatrix}$$

Assume that the desired eigen values of the observer are -2 + j 2.5, –2 –j 2.5, –6

OR

Q12) Obtain the state feedback gain matrix for the system show : **[16]**

$$\begin{bmatrix} \dot{x}1 \\ \dot{x}2 \\ \dot{x}3 \end{bmatrix} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -6 & -11 & -6 \end{bmatrix} \begin{bmatrix} x1 \\ x2 \\ x3 \end{bmatrix} + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} u$$

The location of desired poles are –2, –4, –5.

Total No. of Questions : 12]

SEAT No. :

P1413

[Total No. of Pages : 3

[4858] - 180

T.E. (Instrumentation Engineering)

PROCESS LOOP COMPONENTS

(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) Draw Temperature control loop using standard symbols and explain its components in brief. **[8]**

b) Resistances in a bridge circuit are $R_1=R_2=R_3= 150\Omega$. $R_4= 121\Omega$. If the supply voltage is 10 V. Find the offset voltage. Also design a signal conditioning circuit to get output 1 to 5V. **[10]**

OR

Q2) a) Draw P & ID symbols for the following components & also explain the use of each components. **[10]**

i) Air to open Control Valve

ii) High Alarm signal

iii) Low Alarm signal

iv) Flow Indicator and Controller

v) Temperature Transmitter

b) What are various desired features of the transmitters (min 4 features)? Also Compare two and three wire transmitters (min 4 comparison points). **[8]**

P.T.O.

Q3) a) Explain the following terms related to various control actions. **[8]**

i) Rate action

ii) Dead zone

iii) Integral time

iv) Proportional band

b) Draw front panel of digital PID controller. Give the advantages of PID controller. **[8]**

OR

Q4) a) Draw block diagram of Digital controller. Give the advantages of digital controller over analog controller. **[8]**

b) Explain ON-OFF control action in detail. Give its suitable application. **[8]**

Q5) a) Explain tuning of controller? List various methods of controller tuning. Explain quarter decay method in detail. **[8]**

b) What is reset windup? How to overcome reset windup. **[8]**

OR

Q6) a) Write & explain the equations for position & velocity algorithm for digital controller. **[8]**

b) Explain close loop method for tuning of controller. **[8]**

SECTION - II

Q7) a) Explain with following w.r.t. PLC. **[10]**

i) Ladder diagram

ii) I/p module

iii) Scan time

iv) Rung

v) Watch dog timer.

b) Explain block diagram of PLC. Give one example of Aanlog Input and Digital Output (min 2 each). **[8]**

OR

Q8) a) Develop physical ladder diagram for a motor with following: NO start P.B., NC stop P.B., thermal over load limit switch opens on high temperature, green light when running and red light for thermal overload. Assume suitable data if required. **[8]**

b) Compare Relay logic and PLC logic (min 6 comparison points). **[6]**

c) Explain Physical ladder diagram and programmable ladder diagram. **[4]**

Q9) a) What do you mean by "Installed characteristics of control valve"? Why they are different than inherent characteristics. **[8]**

b) List various types of Control valve. Draw and explain any one type in detail. **[8]**

OR

Q10) a) Explain w.r.t control valve. **[8]**

i) Valve coefficient (Cv)

ii) Rangeability

iii) Plug

iv) Travel indicator

b) Draw and explain fail safe action - {Air to Open (ATO) and Air to Closed (ATC) valve applications}. **[8]**

Q11) a) Draw and explain cavitation and flashing. List techniques to reduce it. **[8]**

b) Explain different selection criteria for control valve. **[8]**

OR

Q12) a) Explain in detail Control valve sizing. Write equations. **[8]**

b) Explain various Control valve characteristics. **[8]**

Total No. of Questions : 12]

SEAT No. :

P1414

[Total No. of Pages : 3

[4858] - 181

T.E. (Computer)

DATABASE MANAGEMENT SYSTEMS

(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) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Explain how problem statement is converted to ER diagram and ER diagram converted into Tables. **[4]**

b) Draw overall structure of Database management system and explain it. **[10]**

c) Explain advantages of DBMS over normal file system. **[4]**

OR

Q2) a) What is Extended ER diagram? Explain with Example. **[4]**

b) Explain different data models Hierarchical, Network and Object Relational Model. **[6]**

c) Explain the concept of primary key, candidate key, super key and Foreign Key with suitable examples. **[8]**

Q3) a) Explain any four Basic Operations in Relational Algebra with suitable example. **[8]**

b) Write note on Database Modification using SQL Insert, Update and Delete Queries. **[8]**

OR

P.T.O.

Q4) a) Explain with example Creating, Dropping and Updating Views. **[6]**

b) Write a short note on dynamic and embedded SQL. **[8]**

c) Explain Aggregate Functions. **[2]**

Q5) a) Write short note on canonical cover. **[4]**

b) Explain Partial dependency and Transitive Dependency. **[8]**

c) Explain Fist Normal Form (1NF) with example. **[4]**

OR

Q6) a) What are different anomalies, that lead us to redesign of database (Normalization)? **[4]**

b) What are desirable features of Decomposition? **[6]**

c) Explain how to convert un-normalized table in database to 2NF. **[6]**

SECTION - II

Q7) a) Compare B Tree and B+ Tree. Write short note on B Tree as an indexing technique. **[8]**

b) Write the Transformation Rules for Relational Expressions. **[8]**

OR

Q8) a) Explain static Hashing and Dynamic Hashing with suitable examples. **[8]**

b) Write note on Query Optimization. **[8]**

Q9) a) Write short note on : **[12]**

i) The two phase locking protocol and rigorous two phase locking protocol.

ii) Multi-Version Concurrency Control.

b) Explain Properties of transaction in detail. **[4]**

OR

Q10) a) Explain Shadow Paging with diagram. **[6]**

b) What are checkpoints? Explain Deferred and Immediate Checkpoints. **[8]**

c) Explain Cascaded Aborts. **[2]**

Q11) a) Explain 2-Tier and 3-Tier Architecture of databases. **[6]**

b) What is distributed database system? Specify advantages and disadvantages of distributed database system. **[6]**

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

i) Need of OODBMS.

ii) Association Rule Mining.

OR

Q12) a) Write short note on : **[6]**

i) Centralized and client server database architecture

ii) Pointer Swizzling techniques.

b) Draw and explain components of Data warehouse. **[8]**

c) Explain.data mining process. **[4]**

Total No. of Questions : 12]

SEAT No. :

P1415

[Total No. of Pages : 3

[4858] - 182

T.E. (Computer Engineering)

DATA COMMUNICATIONS

(2008 Pattern)

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

Instructions to the candidates :-

1) ***In Section I, attempt Q. No. 1 or Q. No. 2, Q. No. 3 or Q. No. 4, Q. No. 5 or Q. No. 6.***
2) ***In Section II, attempt Q. No. 7 or Q. No. 8, Q. No. 9 or Q. No. 10, Q. No. 11 or Q. No. 12.***
3) ***Answers to the two Sections must be written in separate answer books.***
4) ***Neat diagram must be drawn whenever necessary.***
5) ***Figures to the right indicate full marks.***
6) ***Assume suitable data, if necessary.***

SECTION - I

Q1) 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]**

OR

Q2) a) Explain SNR, channel bandwidth and rate of Communication The power of a signal is 10mW and the power of noise is 1mW. What are the values of SNR, SNRdB? **[8]**

b) Explain the different frequency Components present in 1kHz since and 1kHz Square waveform? **[4]**

c) Explain simplified Communication System and mention various parts of Communication System **[6]**

P.T.O.

Q3) a) Explain in detail what is delta modulation. Draw diagram for delta modulator and demodulator. What are its advantages over PCM? **[8]**

b) Explain with diagram operation of DPCM transmitter. **[8]**

OR

Q4) a) Explain Pulse code modulation technique. **[8]**

b) Represent Binary 01001110 in NRZ-L, NRZ-I, RZ, manchester and differential Manchester, AMI. **[8]**

Q5) a) What is the significance of Quantization in A/D Conversion. What is Uniform Quantization? What is the drawback associated with it and how to overcome this drawback. **[10]**

b) A Signal m(t) of Band width B = 4 kHz is transmitted using a binary Companded PCM with $\mu = 100$. Compare the case of L = 64 with the case of L = 256 from the point of view of transmission bandwidth and the Output SNR. **[6]**

OR

Q6) a) Draw and explain Schematic diagram of T1 carrier System. What is the Data rate Supported? **[6]**

b) List and explain all types of ARQ System. **[10]**

SECTION - II

Q7) Write short notes on (any three) : **[18]**

a) Bluetooth

b) Frame Relay

c) Ethernet

d) PSTN

OR

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

i) wireless LAN

ii) Virtual LAN

b) Explain the layers in OSI-ISO reference model what is the difference between TCP/IP model and OSI model. **[10]**

Q9) a) Explain the switching techniques used in computer data communication. **[8]**

b) Explain wireless transmission media is detail. **[8]**

OR

Q10) a) Define digital hierarchy used by telephone companies. List and explain different levels of hierarchy. **[8]**

b) Explain Network Hardware Components viz connectors, repeaters, hubs, NICS, Bridges and switches. **[8]**

Q11) a) Explain different data link layer design issues. **[8]**

b) Explain stop and wait protocol. **[8]**

OR

Q12) a) Write note on : **[8]**

i) ALOHA

ii) CSMA

b) Explain sliding window protocol. **[8]**

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Total No. of Questions : 12]

SEAT No. :

P1416

[Total No. of Pages : 3

[4858] - 183

T.E. (Computer Engineering)

MICROPROCESSORS AND MICROCONTROLLERS

(Semester - I) (2008 Pattern)

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

Instructions to the candidates :-

1) ***In Section I, attempt Q. No. 1 or Q. No. 2, Q. No. 3 or Q. No. 4, Q. No. 5 or Q. No. 6.***
2) ***In Section II, attempt Q. No. 7 or Q. No. 8, Q. No. 9 or Q. No. 10, Q. No. 11 or Q. No. 12.***
3) ***Answers to the two Sections must be written in separate answer books.***
4) ***Neat diagram must be drawn whenever necessary.***
5) ***Figures to the right indicate full marks.***
6) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Compare 80386, 80486 and the Pentium based on architecture. **[6]**

b) What is branch prediction in the Pentium? Explain with diagram. **[4]**

c) Explain following pins of the Pentium. **[6]**

i) ADS#

ii) D/C#

iii) RESET

OR

Q2) a) Is the Pentium RISC or CISC or both? Justify your answer. **[4]**

b) Describe cache organization of the Pentium. **[4]**

c) Explain Floating Point Unit of the Pentium? **[8]**

P.T.O.

Q3) a) What do you mean by bus cycle? Draw and explain non-pipelined read bus cycle of the Pentium. **[8]**

b) Explain flag register of the Pentium in detail. **[8]**

OR

Q4) a) What is bit manipulation instruction? Explain any two bit manipulation instruction. **[6]**

b) Explain addressing modes of the Pentium with suitable examples. **[8]**

c) Describe any one instruction. **[2]**

i) BTC

ii) PUSH

Q5) a) Describe logical to linear address translation mechanism in the Pentium. Draw the required data structures. **[8]**

b) Describe PDE and PTE formats. **[6]**

c) Draw & explain the structure of a call gate. **[4]**

OR

Q6) a) Name protected mode registers of the Pentium. **[4]**

b) What are the selectors in the Pentium? Explain their use in segmentation. **[6]**

c) Draw and explain the use of control registers in the Pentium. **[8]**

SECTION - II

Q7) a) How I/O devices are handled by the Pentium processor? **[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 Pentium. **[6]**

Q9) a) Explain the features of 8051 microcontroller. **[6]**

b) Draw and explain Program Status Word of 8051 microcontroller. **[6]**

c) Explain the function of following pins. **[4]**

i) T1

ii) T0

OR

Q10) a) Describe different timer modes of 8051 microcontroller. **[8]**

b) Explain following 8051 instructions. **[8]**

i) POP ii) ANL

iii) MUL AB iv) LCALL

Q11) a) Write features of 8096 microcontroller. **[4]**

b) Explain addressing modes of 8051 microcontroller. Explain with suitable example. **[8]**

c) Explain SCON register of 8051 microcontroller. **[4]**

OR

Q12) a) What are the different sources of interrupts in 8051? Explain interrupt handling mechanism in 8051. **[8]**

b) Explain IE register of 8051 microcontroller. **[4]**

c) Explain PCON register of 8051 microcontroller. **[4]**

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Total No. of Questions : 12]

SEAT No. :

P1417

[Total No. of Pages : 3

[4858] - 184

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

DIGITAL SIGNAL PROCESSING

(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) ***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) Determine the values of power and energy of the following signals. Find whether the signals are power, energy or neither energy nor power signals. **[15]**

i) $x(n) = (1/3)^n u(n)$

ii) $x(n) = \sin(\pi/4\ n)$

iii) $x(n) = e^{2n} u(n)$

b) What is Nyquist rate? Draw block diagram of ADC. **[3]**

OR

Q2) a) What is discrete time system? Explain any three classification of discrete time system with example. **[13]**

b) Define impulse response of a discrete time system. Show that $h(n) = 0$ for $n < 0$. **[5]**

P.T.O.

Q3) a) Compute circular convolution of the following sequence : **[8]**

$x_1(n) = \{1, 1, 2, 1\}$ and $x_2(n) = \{1, 2, 3, 4\}$

b) Obtain DTFT, magnitude and phase for $x(n) = u(n) - u(n - 4)$ **[8]**

OR

Q4) a) What is zero padding? What are its uses? **[4]**

b) State and prove periodicity property of DFT. **[8]**

c) Find the sequence x(n) if its Fourier transform $X(e^{jw}) = 1$. **[4]**

Q5) a) State and prove convolution property of Z- transform. Compute the convolution x(n) of the signals $x_1(n) = \{1, -2, 1\}$ and $x_2(n) = \{1, 1, 1, 1, 1, 1\}$ **[10]**

b) What is mean by radix-2 FFT? Draw the 4-point radix-2 DIT FFT butterfly structure for DFT. **[6]**

OR

Q6) a) State and prove linearity property of Z- transform. Determine the ZT and ROC of the signal $x(n) = [3(2^n) - 4(3^n)]\ u(n)$. **[10]**

b) Calculate DFT of the sequence $x(n) = \cos(\pi n/2)$ where N = 4 using DIFFFT algorithm. **[6]**

SECTION - II

Q7) a) An impulse response of discrete time system is u(n). What will be output of the system if the input is :

i) $\delta(n)$ and ii) u(n)? Whether this system is stable? **[8]**

b) .A system has unit sample response h(n) given by
$h(n) = -1/4\ \delta(n+1) + 1/2\ \delta(n) - 1/4\ \delta(n-1)$ **[8]**

i) Is the system BIBO stable?

ii) Is the filter causal?

iii) Compute the frequency response and plot it

OR

Q8) a) LTI system is described by $h(n) = (0.9)^n u(n)$. Calculate and plot magnitude response of the system. **[8]**

b) State and prove time advance property of unilateral Z transform. **[8]**

Q9) a) State the characteristics of ideal filter. What are the advantages and disadvantages of digital filter over analog filter. **[10]**

b) $H_a(S)$ is given as, $Ha(s) = \frac{1}{(s+1)}$ and T_s = 1 sec. Find H(z) using bilinear transformation method and also write the difference equation of digital filter. **[8]**

OR

Q10) a) Determine the unit sample response of the ideal low pass filter. Why it is not realizable? **[8]**

b) The system function of the analog filter is given as $\text{Ha(s)} = \frac{(s+0.1)}{(s+0.1)^2+16}$ Obtain the system function of the digital filter using bilinear transformation which is resonant at $W_r = \pi/2$. **[10]**

Q11) a) Write a note on applications of DSP in speech processing. **[8]**

b) Compare DSP processor and general purpose processors. **[8]**

OR

Q12) a) What is the use of DAG1 and DAG2 in ADSP 2IXX family? With example explain the use of various memory pointer registers of DAG1 and DAG2. **[8]**

b) Obtain the system function H(z) and difference equation for h(n) = {1, –2, –2, 3 }. Draw a direct form FIR filter structure. **[8]**

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Total No. of Questions : 12]

SEAT No. :

P1418

[Total No. of Pages : 4

[4858] - 185

T.E. (Computer Engg.)

THEORY OF COMPUTATION

(2008 Pattern) (Semester - I)

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

Instructions to the candidates :

1) ***Answer 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 the following terms. **[6]**

i) Kleen Closure

ii) Finite Autimata

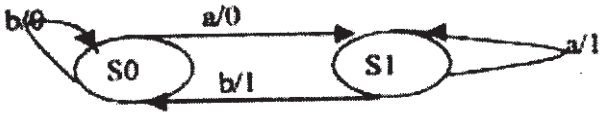
iii) Transition Diagram

b) Design DFA for a language of string 0 & 1 that **[6]**

i) Ending with 11

ii) Either begin or end with 01

c) Convert the following Mealy Machine to Moore Machine. Show the output for input string 'abba' through Moore machine. **[4]**



OR

P.T.O.

Q2) a) Convert DFA to NFA. **[8]**

	0	1
p	{p,q}	{p}
q	{r}	{r}
r	{s}	φ
s*	{s}	{s}

b) Design a Moore Machine that gives an output of 1 if the input string ends in 'bab'. Convert the same Moore Machine to Mealy Machine. **[8]**

Q3) a) Show ((a+bb)*aa)* and ε+(a+bb)*aa are equivalent. **[4]**

b) Prove that(1+00*1)+(1+00*1)(0+10*1)*(0+10*1)=0*1(0+10*1)* **[4]**

c) Convert following Regular Expression to DFA (Regular Expression to NFA with ε moves and direct method to convert NFA with ε to DFA) **[8]**

R.E.=01[(10*+111)*+0]*1

OR

Q4) a) Show for regular expression (rs+r)*r=r(sr+r)* **[4]**

b) Draw DFA of following Regular Expression. **[6]**

i) (11+00)*

ii) (111+100)*0

c) Using pumping lemma show that the language L={$a^m b^n$ |m>n} is not regular. **[6]**

Q5) a) For the grammar given below. **[6]**

E→E+T|T

T→T*F|F

F→(E) | a|b

Give derivation of (a+b)* a+b using sentential form and parse tree

b) Give context free grammar for following. **[6]**

i) (011+1)*(01)*

ii) $0^i 1^{i+k} 0^k$ where i, k > = 0

c) Simplify the following grammar **[6]**

S→ASB | ε

A→aAS | a

B→SbS | A |bb

OR

Q6) a) Construct the right linear grammar corresponding to the regular expression. **[6]**

R=(0+1)1*(1+(01)*)

b) Discuss the following applications of CFG. **[6]**

i) Parser

ii) Markup Languages

c) Convert the grammar given below to its equivalent CNF. **[6]**

$S \rightarrow PQP$

$P \rightarrow 0P \mid \varepsilon$

$Q \rightarrow 1Q \mid \varepsilon$

SECTION - II

Q7) a) Construct a PDA equivalent to the following. **[8]**

CFG G.

$S \rightarrow OBB$

$B \rightarrow OS \mid 1S \mid 0$

Test whether $.010^4$ is in N(A).

b) Define acceptance by PDA. **[4]**

i) By final state

ii) By empty stack

c) Construct pushdown automata $L = \{W \subset W^R \mid W \in (a + b)^*\}$ and W^R is reverse string of W. **[6]**

OR

Q8) a) Consider the PDA with following moves. Construct a CFG equivalent to PDA. **[8]**

$M = (\{q_0, q_1\}, \{a, b\}, \{P, Z_0\}, \delta, q_0, Z_0, \phi)$ and δ is given as :

$\delta(q_0, a, Z_0) = (q_0, PZ_0)$

$\delta(q_0, a, P) = (q_0, PP)$

$\delta(q_0, b, P) = (q_1, \varepsilon)$

$\delta(q_1, b, P) = (q_1, \varepsilon)$

$\delta(q_1, \varepsilon, P) = (q_1, \varepsilon)$

$\delta(q_1, \varepsilon, Z_0) = (q_1, \varepsilon)$

b) Compare deterministic PDA with non-deterministic PDA. **[4]**

c) Obtain a PDA to accept the language $L = \{a^n b^n \mid n \geq a\}$ by final state. **[6]**

Q9) a) Give the formal definition of post machine compare FA, PDA, PM and TM. **[8]**

b) Design a turing machine M to recognize the language $\{a^n b^n c^n \mid n \geq 1\}$ **[8]**

OR

Q10) a) Write short notes on : **[8]**

i) Universal Turing Machine.

ii) Composite Turing Machine.

iii) Iterated Turing Machine.

iv) Multitape Turing Machine.

b) Design a turing machine for finding.2's complement of a binary number. **[4]**

c) Construct a post machine for the language $L = \{0^n 1^n \mid n \geq 0\}$ **[4]**

Q11) a) Describe in detail Chomsky Hierarchy with example. **[8]**

b) Show that if L_1 & L_2 are recursively enumerable languages over Σ then $L_1 \cup L_2$ and $L_1 \cap L_2$ are also recursively enumerable. **[8]**

OR

Q12) a) Define the following terms : **[8]**

i) Post correspondence problem

ii) Un-decidability

iii) Context sensitive language

iv) Recursive & Recursively Enumerable language

b) What is Halting problem? Prove that halting problem is undecidable. **[8]**

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Total No. of Questions : 12]

SEAT No. :

P1419

[Total No. of Pages : 4

[4858] - 186

T.E. (Computer Engg.) (Semester - II)

PRINCIPLES OF PROGRAMMING LANGUAGES

(2008 Pattern)

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 side indicate full marks.***

SECTION - I

Q1) a) What do you mean by programming paradigms? State key features of following **[10]**

i) Functional programming

ii) Logic programming

iii) Parallel programming

iv) Concurrent programming

b) What is the scope, visibility and lifetime of a following variables. **[8]**

i) static variable ii) extern variable

OR

Q2) a) Explain difference between recursive call and ordinary call of a program. How recursive subprogram call acts as an important sequence control structure in programming? **[8]**

b) Differentiate between structured and nonstructured data type. **[4]**

c) What do you mean by storage management? Explain static and dynamic storage management. **[6]**

P.T.O.

Q3) a) What are the features of procedural programming? How procedures and modularity makes procedural programming as a better choice for programs. **[8]**

b) With suitable example, demonstrate how nested procedures and functions acts as a efficient program design construct. **[8]**

OR

Q4) a) Explain desirable and undesirable characteristics of procedural programming. **[8]**

b) What are parameter passing techniques used in PASCAL? Explain with example. **[8]**

Q5 a) What are advantages and disadvantages of inheritance in Java. **[4]**

b) What is difference between pointer and references with reference to object oriented programming. **[6]**

c) With suitable examples, demonstrate the role of various predefined exception classes in Java. **[6]**

OR

Q6) a) Explain following kinds of variables supported by Java. **[8]**

i) Instance variable ii) Static variable

iii) Local variable iv) Parameter variable

b) What do you mean by package/List and explain in brief standard Java packages. **[4]**

c) Explain the use of JDBC in database programming. **[4]**

SECTION - II

Q7) a) Explain .Net framework architecture and function of CLR? **[10]**

b) Explain types of access specifiers with example. **[8]**

OR

Q8) a) What is a polymorphism and types of polymorphism. **[8]**

b) Describe the structure of c# program. **[5]**

c) What is a metadata? Mention uses in .NET. **[5]**

Q9) a) Write a following statement in PROLOG. **[8]**

i) If Fido is yellow Lab, then Fido is a Dog.

ii) If it is Tuesday and it is February, then there is school.

iii) If Rajiv is a male and Rajiv is your parent, then Rajiv is your Father.

iv) If X is your parent, then X is your mother or X is your father.

b) State and explain key features of Logical Programming specification. **[8]**

OR

Q10) a) Consider following PROLOG Database of Vehicles/Instrument and their fuels. **[8]**

Fuel_Drives(Prtrol, 2 wheeler)

Fuel_Drives(CNG , 4 wheeler)

Fuel_Drives(Prtrol,4 wheeler)

Fuel_Drives(CNG, Truck)

Fuel_Drives(LPG, Stove)

Fuel_Drives(Diesel,4 wheeler)

Fuel_Drives(Kerosene, Batti)

Fuel_Drives(Diesel, Engine)

Fuel_Drives(LPG, Batti)

Identify result in following cases.

i) Gole: Fuel_Drives (petrol, X) and Fuel_Drives(Diesel, X)

ii) Gole: Fuel_Drives (LPG, X) and Fuel_Drives(Y, X)

iii) Specify goal to identify all fuels of 4 wheelers

iv) Specify goal to identify all vahicles driven by LPG and CNG.

b) Explain following Preliminary notation used by PROLOG with suitable examples. **[8]**

i) Facts

ii) Existential Query

iii) Clauses

iv) Deductions

Q11) a) Write a short note on Binding in LISP. **[6]**

b) Explain numeric predicate function in LISP. **[4]**

c) Write LISP program to skip last n element from a given list. **[6]**

OR

Q12) a) Write a LISP program to display the result of a given arithmetic operation on two numbers. **[4]**

b) Explain Shallow binding and Deep binding with respect to LISP. **[4]**

c) Explain the following expression evaluation techniques with proper examples. **[8]**

i) Short circuit evaluation

ii) Outermost evaluation

iii) Selective evaluation

iv) Innermost evaluation

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Total No. of Questions : 12]

SEAT No. :

P1420

[Total No. of Pages : 3

[4858] - 187

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

COMPUTER NETWORKS

(2008 Pattern)

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 side indicate full marks.***
5) ***Assume Suitable data if necessary.***

SECTION - I

Q1) a) Compare circuit switching and packet switching Techniques of network core. Explain in brief the functionality of DHCP server. **[8]**

b) What is DNS? Explain with suitable example how query resolving process is done. **[8]**

OR

Q2) a) Compare file transfer using FTP and HTTP methods. **[8]**

b) What is difference between persistent and non persistent HTTP? Explain HTTP message format. **[8]**

Q3) a) Explain Significance of following flags in TCP header. SYN, RST, FIN, PSH. **[8]**

b) Explain flow control in TCP. **[8]**

OR

Q4) a) Draw and explain TCP segment structure. **[8]**

b) Why UDP does not provide reliable data transfer? Justity. compare UDP with TCP. **[8]**

P.T.O.

Q5 a) Explain working of RSVP in detail. **[8]**

b) What is QoS? Explain QoS parameters. **[6]**

c) Discuss in brief integrated services. **[4]**

OR

Q6) a) What is traffic shaping? How is it used for congestion control? **[8]**

b) Discuss in brief Differentiated services. **[4]**

c) How TCP estimates RTT and Timeout. **[6]**

SECTION - II

Q7) a) What are the components of Router? What is difference between routing and forwarding? **[8]**

b) Explain network layer Design issues? **[8]**

OR

Q8) a) Compare and contrast IPV4 and IPV6 header fields. Do they share any field in common? **[8]**

b) Which protocol is used to obtain IP address by giving physical address? Explain 255.255.255.255 is which type of IP address. **[8]**

Q9) a) Write a short note on Hierarchical Routing. **[4]**

b) Explain Routing policy of BGP? Compare Broadcast and multicast routing. **[6]**

c) How Distance vector Routing Algorithm works? **[8]**

OR

Q10) a) Describe in brief ICMP messages. **[6]**

b) Explain MACA and MACW protocols. **[6]**

c) What is PPP? Explain with state transition diagram? **[6]**

Q11) a) Explain HDLC frame format. **[8]**

b) Write short note on ATM. **[8]**

OR

Q12) a) Explain the working of MPLS. **[8]**

b) Explain the functionalities of Hubs & switches. How switches and routers are different? Explain. **[8]**

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Total No. of Questions : 12]

SEAT No. :

P1421

[Total No. of Pages : 3

[4858] - 188

T.E. (Computer Engg.) (Semester - II)

SYSTEM PROGRAMMING & OPERATING SYSTEMS

(2008 Pattern)

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 side indicate full marks.***
5) ***Assume Suitable data if necessary.***

SECTION - I

Q1) a) What are different databases that are used for design of PASS-1 of a two pass Assembler. Give the format for each one of these databases. **[10]**

b) What is the use of conditional expansion of macro? Which pseudo OPs are used to support conditional expansion? Give example. **[8]**

OR

Q2) a) Draw a flow chart for pass - I of two pass assembler design. **[8]**

b) What is forward reference? How it is handled in a single pass assembler. **[4]**

c) What is the use of the stack in micro processor. **[6]**

Q3) a) Explain overlay structure. What is dynamic binding? **[8]**

b) Explain in brief absolute loader scheme. What are advantages and disadvantages of this scheme. **[8]**

OR

P.T.O.

Q4) a) Comment on statement "Direct linking loader is a general relocatable loader". **[6]**

b) What is loader? What are its basic functions? **[5]**

c) Explain the term static linking and dynamic linking. **[5]**

Q5 a) What are different scheduling algorithms? Explain with examples. **[8]**

b) What is process. Explain state transition diagram. **[8]**

OR

Q6) a) Explain the content of Process Control Block (PCB). **[8]**

b) Explain following system calls. **[8]**

i) PS ii) Fork

iii) Join iv) Exec

SECTION - II

Q7) a) What is mutual Exclusion? What are requirements to support mutual Exclusion? **[6]**

b) Explain hardware approach for mutual Exclusion with its advantages & disadvantages. **[6]**

c) What is deadlock prevention? Explain in detail approaches for deadlock prevention. **[6]**

OR

Q8) a) Write a solution to reader writer problem using semaphore with reader have priority. **[10]**

b) Explain types of message passing system used in interprocess communication. **[8]**

Q9) a) Write proper examples explain memory allocation strategies first fit, best fit and worst fit. Also explain their advantages and disadvantages. **[8]**

b) What is segmentation? Explain the process of address translation in segmentation. **[8]**

OR

Q10) a) What is TLB? Explain the paging system with the use of TLB? What are the advantages of TLB. **[8]**

b) What is fragmentation? Explain the types of fragmentation. How it can be handled. **[8]**

Q11) a) What is RAID? Explain RAID levels with their advantages and disadvantages. **[8]**

b) With respect to file system explain free space management. What are the technique for free space management. Explain in details. **[8]**

OR

Q12) a) Explain different allocation methods used in file system implementation. **[8]**

b) What information is present in directories? Explain the structure of directory in details. **[8]**

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Total No. of Questions : 12]

SEAT No. :

P1422

[Total No. of Pages : 3

[4858] - 189

T.E. (Computer Engg.) (Semester - II)

FINANCE & MANAGEMENT INFORMATION SYSTEMS

(2008 Pattern) (Theory)

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) ***Assume Suitable data if necessary.***

SECTION - I

Unit-I

Q1) a) What is human resource management & explain functions of HRM? **[8]**

b) Explain HR management and selection. What strategies are followed in appraisal? **[8]**

OR

Q2) a) List down the functions of management and explain any two. **[8]**

b) Explain International Management and Multinational Corporation with a suitable example. **[8]**

Unit-II

Q3) a) Define Financial Management. Explain its goals and principles. **[8]**

b) Explain Corporate Security with share and debentures. **[8]**

OR

P.T.O.

Q4) a) Explain Merges, Acquisition and Takeover with suitable example. **[8]**

b) Elaborate the scope of financial management in a business organization. **[8]**

Unit - III

Q5) a) What is decision making? Explain model of decision making in detail. **[8]**

b) Explain in brief, 'what - if analysis'& sensitivity analysis in decision making process: **[10]**

OR

Q6) a) Explain management information system? Explain the different role of an MIS. **[8]**

b) Explain Following: **[10]**

i) Business process Reengineering

ii) Decision support system

SECTION - II

Unit - IV

Q7) a) Describe the essential process for the successful operation & management of ecommerce. **[8]**

b) Explain in details, Enterprise content Management. **[8]**

OR

Q8) a) Explain e-business and e-commerce in detail. **[8]**

b) How modern business technologies are used in security and business? **[8]**

Unit - V

Q9) a) Describe Enterprise management system? Explain its components. **[8]**

b) Explain global management with the help of Outsourcing and Off-shoring. **[8]**

OR

Q10) a) Explain global management of information technology? **[8]**

b) Explain cultural, political & geo-economic challenges involved in global IT management. **[8]**

Unit - VI

Q11) a) Explain cyber-crimes as per IT Act with suitable example? **[9]**

b) Explain Information Technology Act 2000, in detail. **[9]**

OR

Q12) a) Explain intellectual property Rights in detail. **[9]**

b) Explain the importance of IT Act to stop the cyber-crime in e-business? **[9]**

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Total No. of Questions : 12]

SEAT No. :

P1423

[Total No. of Pages : 3

[4858] - 190

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

SOFTWARE ENGINEERING

(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) ***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) What is a process model? Explain the general process framework activities of the Software Process. **[6]**

b) Explain the prototyping model with its advantages and disadvantages. **[6]**

c) State the myths and realities of a practitioner? **[6]**

OR

Q2) a) Explain the spiral model as an evolutionary process model. **[6]**

b) Explain the characteristics of software that differ from hardware. **[6]**

c) What are the advantages of an agile process? Explain with a process model. **[6]**

Q3) a) Explain the flow oriented modeling in requirement analysis. **[8]**

b) How to build the behavior model with a state diagram? Explain with an example. **[8]**

P.T.O.

OR

Q4) a) Identify the actors, usecases and give the Use case diagram for "Online taxi booking system" with three functionalities. **[8]**

b) State the tasks of Requirements Engineering. Explain any one requirement elicitation method. **[8]**

Q5) a) Explain Layered and Call and return architectural styles. **[8]**

b) Explain Abstraction and Functional independence in software design. **[8]**

OR

Q6) a) Explain any two user interface design issues. **[8]**

b) Explain the design elements of interface and data design. **[8]**

SECTION - II

Q7) a) Give the importance of software testing. Explain the unit testing strategy. **[6]**

b) Explain any two white box testing methods. **[6]**

c) Explain the debugging process. **[6]**

OR

Q8) a) Explain any two system testing methods. **[6]**

b) What is loop testing and how test cases are derived in loop testing. **[6]**

c) How validation testing methods test the conformity with requirements? **[6]**

Q9) a) Compare and explain the size oriented and function oriented metrics. **[8]**

b) Explain the LOC based estimation method. **[8]**

OR

Q10) a) Explain the COCOMO II model for estimation. **[8]**

b) Explain the role of people in project management. **[8]**

Q11) a) Explain the following in brief. **[8]**

i) Risk Identification

ii) Change management

b) Explain the quality factors of software. **[8]**

OR

Q12) a) Explain the scheduling of project with task network. **[8]**

b) Explain in brief the layers of Software Configuration Management process. **[8]**

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Total No. of Questions : 12]

SEAT No. :

P3605

[Total No. of Pages : 4

[4858] - 191

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

CHEMICAL ENGINEERING MATHEMATICS

(2008 Pattern)

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

Instructions to the candidates:

1) ***Assume suitable data, if necessary.***
2) ***Neat figures to the right indicate full marks.***
3) ***Attempt Section - I and Section - II on two separate answer books.***
4) ***Use of scientific calculator is allowed.***

SECTION - I

Q1) a) Use Bisection method to determine the root of $x^3 - 1.8x^2 - 10x + 17 = 0$ that lies between the interval (1,2) at the end of 5^{th} iteration **[6]**

b) Obtain the smallest positive root of following equation by using Newton Raphson formula

$$x^3 - 5x + 3 = 0$$ **[6]**

c) Use Secant method to determine the root of following equation. Determine the root correct upto 3 decimal places

$$f(x) = \cos(x) - xe^x$$ **[6]**

OR

Q2) a) Derive Newtons Raphson formula

b) Obtain the roots of following equation using Mullers method

$$f(x) = x^3 - 13x - 12$$ **[6]**

With guess of x_0,x_1 and x_2 as 4.5, 5.5 and 5 respectively

Note that the roots of this equation are –3,–1 and 4 **[6]**

c) Use secant method to determine the square root of 25 correct upto 3 decimal places **[6]**

P.T.O.

Q3) a) Solve following system of equations using LU decomposition method

$7x + 2y - 5z = -18$

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

$2x - y - 9z = -26$ **[8]**

b) Solve the following system of equations using Gauss Seidal method

$10x - 2y - z - t = 3$

$-2x + 10y - z - t = 15$

$-x - y + 10z - 2t = 27$

$-x - y - 2z + 10t = -9$ **[8]**

OR

Q4) a) Solve the following system of equations using Cholesky method

$10x + y = 1$

$x + 9y + z = 3$

$y + 9z - t = 0$

$-z + 16t = 0$ **[8]**

b) Use gauss elimination method with partial pivoting to solve following system of equations

$10x - y + 2z = 4$

$-x + 10y - z = 3$

$2x + 3y + 20z = 7$ **[8]**

Q5) a) Explain the procedure of polynomial regression. **[5]**

b) For the following data calculate forward differences and obtain the forward polynomial. Interpolate the polynomial at $x = 0.25$ **[5]**

x	0.1	0.2	0.3	0.4	0.5
F(x)	1.4	1.56	1.76	2.0	2.28

c) From the given data find the value of Y **[6]**

X	45	46	50	55	60	65
Y	2.8710	Y	2.4040	2.0830	1.8620	1.7120

OR

Q6) a) Using stirling formula of interpolation calculate y at x = 0.644. The given data is shown below **[8]**

X	0.61	0.62	0.63	0.64	0.65	0.66	0.67
$Y = e^x$	1.840431	1.858928	1.877610	1.896481	1.915541	1.934792	1.954237

b) For the following data find root 1.1 using Langrages interpolation. Determine the accuracy of interpolation. **[8]**

X	1	1.2	1.3	1.4
Y	1	1.095	1.140	1.183

Q7) a) Derive equation of Eulers method **[6]**

b) Use Eulers method to solve $y' = x - y$ given that $x_0 = 0$, $y_0 = 1$ at $x = 1.0$ taking h = 0.2 **[10]**

OR

Q8) a) Using fourth order Runge Kutta method to integrate following equation to determine y at $x = 1$ Given $F(x,y) = -2x^3 + 12x^2 - 20x + 8.5$. At $x = 0$, $y = 1$. **[8]**

b) Enlist various numerical method used for solving differential equations and explain advantages and disadvantages of each in detail. **[8]**

Q9) Use implicit method to solve for temperature distribution of a long thin rod with length of 10 cm and the following values K' = 0.49 Cal/(s.cm.0C), $\Delta X = 2$ cm and $\Delta t = 0.1$ sec. At t = 0, the temperature of The rod is zero and boundary conditions are fixed for all times at T(0) = 100°C and T(10) = 50 deg C. Note that the rod is of aluminium with C = 0.2174 cal/ g. deg C and $\rho = 2.7$ gms/cm^3, K = 0.835 cm^2/sec and $\lambda = 0.020875$. Find the temperature distribution in a long thin rod using explicit method. **[16]**

OR

Q10) Explain Cranck Nicolson method and its advantages and disadvantages in detail **[16]**

Q11) a) Explain numerical methods for optimizing a function of one variable. **[9]**

b) Explain scanning and bracketing procedures for optimization of unconditional functions of one dimensional search. **[9]**

OR

Q12) a) Use quadratic interpolation to approximate the maximum of

$$f(x) = 2x - 1.75x^2 + 1.1x^3 - 0.25x^4$$

with initial guesses of $x_0 = 1.75$, $x_1 = 2$ and $x_2 = 2.25$. **[9]**

b) What is optimization ? Explain with suitable Chemical engineering examples. Also mention its Chemical Engineering applications. **[5]**

c) Differentiate between constrained and unconstrained optimization. **[4]**

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Total No. of Questions : 12]

SEAT No. :

P1424

[Total No. of Pages : 4

[4858] - 192

TE Chemical Engineering (Semester - I)

CHEMICAL ENGINEERING THERMODYNAMICS - II

(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) ***Answer Q1 or2, Q3or Q4, Q5 or Q6 from section I and Q7 or Q8, Q9 or Q10, 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) What is activity and activity coefficient? **[6]**

b) Derive an expression for the fugacity coefficient of a gas obeying the equation of state $P(V - b) = RT$ and estimate the fugacity of the gas at 100 bar and 298 K when $b = 3.707 \times 10^{-5}$ m^3/mol. **[5]**

c) What is the effect of temperature and pressure on chemical potential? **[5]**

OR

Q2) a) What is an ideal solution? Derive equations for G^{1d}, S^{1d}, V^{1d} and H^{1d}. **[8]**

b) Calculate the fugacity of nitrogen at 800 bar and 273 K from the following data: **[8]**

P,bar	50	100	200	400	800	1000
PV/RT	0.9846	0.9914	1.0365	1.2557	1.7959	2.0641

P.T.O.

Q3) a) What is the importance of models for estimating excess Gibbs Free Energy? Give any two of them. **[9]**

b) Give the various forms of Gibbs Duhem equation. **[9]**

OR

Q4) a) What are partial molar properties? How are they determined? **[8]**

b) The enthalpy change of mixing for a binary mixture at 298K and I bar is given by $\Delta H = x_1 x_2 (40x_1 + 20x_2)$ J / mol, x_1 and x_2 are mol fractions of the two components. The enthalpies of the pure liquids at the same temperature and pressure are 400 and 600 J/mol for components 1 and 2 respectively. Determine the numerical values of the partial molar enthalpies at infinite dilution $\bar{H}_1^{\infty}$ and $\bar{H}_2^{\infty}$ at 298K and 1 bar. **[10]**

Q5) a) Give the statement for Duhem's theorem and give it's significance. **[4]**

b) The vapor pressures of acetone (1) and acetonitrile (2) are calculated by the Antonie equations : in $P_1^s = 14.5463 - \frac{2940.46}{T - 35.93}$ and in $P_2^s = 14.2724 - \frac{2945.47}{T - 49.15}$ Where T is in K and P is in kPa. Assuming the mixture to be ideal calculate. **[8]**

i) x_1 and y_1 at 327 K and 65 kPa;

ii) P and y_1 at 327 K and $x_1 = 0.4$;

iii) P and x_1 at 327 K and $y_1 = 0.4$

c) What are low boiling and high boiling azeotropes? **[4]**

OR

Q6) a) Construct the P – x, y diagram for the cyclohexane (1) – benzene (2) system at 313 K given that at 313 K the vapour pressures are $P_1^s = 24.62 kpa$ and $P_2^s = 24.41 kpa$. The liquid phase activity coefficients are given by In $\gamma_1 = 0.458 x_2^2$ and In $\gamma_2 = 0.458 x_1^2$. **[12]**

b) Explain the T-x,y diagram in detail. **[4]**

SECTION - II

Q7) a) Explain the criterion for equilibrium and stability in phase equilibrium. **[8]**

b) The activity coefficient for component 1 in a binary mixture is given by the expression in $\gamma_1 = ax_2^2 + bx_2^3 + cx_2^4$ where a, b and c are concentration independent constants. Derive an equation for in γ_2 in terms of x_1. **[8]**

OR

8Q) a) Describe any two methods for finding thermodynamics consistency. **[8]**

b) Explain solid-liquid equilibrium. **[8]**

Q9) a) What is reaction coordinate? Derive an equation correlating reaction coordinate and mole fractions in a reacting mixture. **[8]**

b) For a system in which the following reaction occurs $CH_4 + H_2O \rightarrow CO + 3H_2$ assume there are 2 mol CH_4, 1 mol H_2O, 1 mol CO and 4 mol H_2 present initially. Determine the expressions for the mole fractions of each component as a function of reaction coordinate. **[6]**

c) Explain how the Gibbs criterion for equilibrium applies to reacting systems. **[4]**

OR

Q10) a) Derive the relation between Gibbs free energy change and reaction equilibrium constant. **[6]**

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. **[6]**

c) Derive an expression giving the effect of temperature on reaction equilibrium constant. **[6]**

Q11) a) Derive an expression giving the relation between equilibrium constant and for composition for gas phase reactions and state the effect of excess reactants. **[8]**

b) One mole of steam undergoes the water gas shift reaction at 1100 K and 1 bar. $CO(g) + H_2O(g) \rightarrow CO_2(g) + H_2(g)$. The equilibrium constant for the reaction K = 1. Assuming ideal behaviour calculate the fractional dissociation of steam when CO is supplied in 100% excess of theoretical requirement. **[8]**

OR

Q12) a) Derive an expression relating mole fractions of components to reaction coordinate for a multiple reaction system. **[8]**

b) The water gas shift reaction is carried out at 1100K and 1 bar with 1 mol of CO and 1 mol of water initially. The value of K = 1. Assuming the gas behaves ideally calculate the fractional decomposition of steam. The reaction:

$C0(g) + H_2O(g) \rightarrow CO_2(g) + H_2(g)$. Calculate the fractional decomposition at 10 bar and when 2 moles on N_2 are present in the reacting mixture, all other conditions remaining same as above. Comment on the effect of increasing pressure and presence of inerts.**[8]**

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Total No. of Questions : 12]

SEAT No. :

P1952

[Total No. of Pages : 2

[4858] - 193

T.E. (Chemical)

CHEMICAL PROCESS TECHNOLOGY

(2008 Pattern)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) Explain various reactions for Solvay Process. **[6]**

b) Discuss recovery of Mg Salts from sea water. **[10]**

OR

Q2) a) Explain manufacture of aluminium by electrolytic process. **[8]**

b) Describe production of Soda ash. **[8]**

Q3) a) Describe production of urea with engineering problems. **[8]**

b) Discuss in detail the problems associated with Phosphorus industry. **[8]**

OR

Q4) a) Explain DCDA process for mfg of Sulphuric acid. **[8]**

b) Explain mfg of Nitric acid. **[8]**

Q5) a) Explain production of Ethyl alcohol by Fermentation. **[10]**

b) Describe process of manufacturing paper-pulp. **[8]**

OR

P.T.O.

Q6) Write short notes on : **[18]**

a) Triple Superphosphate.

b) Kraft Pulp process.

c) Prilling process of Ammonium Nitrate.

SECTION - II

Q7) a) Explain destructive distillation of coal. **[8]**

b) Explain with diagram hydrogenation of oils. **[8]**

OR

Q8) a) Discuss the production of Penicillin. **[8]**

b) Describe production of soap & natural glycerine. **[8]**

Q9) a) Discuss the construction of fuel cell. **[8]**

b) Enlist various refining operations and explain catalytic cracking in short. **[8]**

OR

Q10) a) Explain alkylation process in petroleum industry. **[6]**

b) Describe mfg of water gas by regeneration & continuous process. **[10]**

Q11) a) What are aromatic compounds? Discuss mfg. of phenol by any one compound. **[10]**

b) Describe in brief process of manufacture of isopropyl alcohol by indirect hydration of propylene. **[8]**

OR

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

a) Water gas.

b) Producer gas.

c) Catalytic reforming in petroleum industry.

Total No. of Questions : 12]

SEAT No. :

P3606

[Total No. of Pages : 2

[4858] - 194

T.E. (Chemical)

INDUSTRIAL ORGANIZATION AND MANAGEMENT

(2008 Pattern) (Semester - I)

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 from Section - I and Q.7 or Q.8 Q.9 or Q.1O and Q.11 or Q.12 from Section - II.***
2) ***Answer to the two section should be written in separate answer book.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right side indicate full marks.***

SECTION - I

Q1) a) Explain the contribution of Henry Fayol to the development of scientific management. **[8]**

b) Briefly explain the definition and functions of management. **[8]**

OR

Q2) Distinguish between Partnership and Joint Stock Company. Explain in detail the formation and function of Joint Stock Company. **[16]**

Q3) Define merit rating. Explain any two methods of merit rating. **[16]**

OR

Q4) State and explain the concept of man power planning. Enlist various techniques and objectives of man power planning. **[16]**

Q5) a) What is Economic Order Quantity? How it is derived ? Explain the assumptions and objectives of EOQ? **[9]**

b) What is ABC analysis? Explain its importance and objectives. **[9]**

OR

P.T.O.

Q6) a) State and explain various functions of stores management. **[9]**

b) Explain in detail Bin card and Storage ledger. How it helps to inventory management? **[9]**

SECTION - II

Q7) What is Market Research ? Explain various methods of market research . How it helps an enterprise to position its business in a competitive business environment? Explain. **[16]**

OR

Q8) a) State and explain the objectives and importance of advertising and sales promotion. **[8]**

b) Distinguish between penetration pricing and skimming pricing. Under what conditions these pricing methods are adopted ? **[8]**

Q9) a) What is quality ? What are its Features? Explain the concept of total quality management. **[8]**

b) Distinguish between product patent and process patent. How patent right is different from copyright? **[8]**

OR

Q10)a) State and explain the functions of Export Promotion Council. How it facilitates International Trade? **[8]**

b) What is anti-dumpling duties? How it is Levied ? Explain the impact of anti-dumpling in International Business. **[8]**

Q11)a) Define Method Study. Explain its procedures and objectives. **[9]**

b) Explain in detail : **[9]**

i) Flow process chart.

ii) Therblige.

OR

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

a) Contract Act,

b) MRTP act and

c) FERA and FEMA

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Total No. of Questions : 12]

SEAT No. :

P1425

[Total No. of Pages : 4

[4858] - 195

TE (Chemical) (Semester - I)

MASS TRANSFER - I

(2008 Pattern)

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) What is mass transfer? Define molecular diffusion and Fick's law of diffusion. **[4]**

b) Oxygen (A) is disusing through carbon monoxide (B) under steady state conditions with the carbon monoxide non-diffusing. The total pressure is $1 \times 10^5 N/m^2$ and the temperature 0°C. The partial pressure of oxygen at two planes 2.0 mm apart is respectively 13000 and 6500 N/m^2. The diffusivity for the mixture is $1.87 \times 10^{-5} m^2/s$. Calculate the amount of oxygen diffused in one hour in kg. mol. through each sq. meter of the two planes. **[12]**

OR

Q2) a) A tube 1cm in inside diameter that is 20 cm long is filled with carbon dioxide (A) & hydrogen (B) at 2 atm total pressure at 0°C. The diffusion coefficient under these conditions is 0.275 cm^2/sec. If the partial pressure of carbon dioxide is 1.5 atm. At one end & 0.5 atm. at the other end. Find the rate of diffusion for steady state diffusion of carbon dioxide through stagnant hydrogen? **[10]**

b) Derive an expression to calculate the flux of diffusion of gas A through non-diffusing stagnant gas. **[6]**

P.T.O.

Q3) a) Ammonia is absorbed by water in wetted wall colunm using Operating temperature of 20°C and 1 atm pressure. The overall Coefficient is 2.72×10^2 kmol/m^2 atm. At one point in the column the Gas contained 10 mol% ammonia and the liquid phase concentration Was 6.42×10^{-2} kmol ammonia per m3 of solution. Temperature is 20°C and 1 atm pressure. 85% of the resistance to mass transfer lies In a gas phase. If henry's law constant is 9.35×10^{-3} atm m^3/kmol, Calculate the individual film coefficient and the interfacial composition. **[8]**

b) Derive relation between overall and individual mass transfer resistance. **[8]**

OR

Q4) a) Explain Higbie's Penetration and Danckwert' s surface renewal theories of interphase mass transfer. Discuss limitations of these theories. **[8]**

b) Ammonia is absorbed by water in a wetted wall column operating at 20°C and 1 atm. pressure. The overall gas coefficient is 1 kmol/m^3. atm. At one point in the column the gas contains 10 mole% NH_3 and the liquid phase contains 0.155 mole NH_3/m^3 of solution. 96% of total resistance is in the gas phase. Assume Henry's law constant at 293°K = 4.247×10^{-3} atm/mol/m^3. Determine individual film coefficients and the molar flux. **[8]**

Q5) a) What is minimum liquid to gas ratio for the absorber? How it is determined and explain its significance during the design of absorption column. **[8]**

b) An ammonia air mixture containing 2% by volume ammonia is to be scrubbed with water at 20°C in a tower packed with 1.27 cm Raschig rings. The water and gas rates are 1170kg/hr m^2 each, based on empty tower cross section. Estimate the height of the tower required if 98% of the ammonia in the entering gas is to be absorbed. The tower operates at 1 atm pressure. The equilibrium relationship is given by the following equation: **[10]**

y_e 0.746x

y_e = Mole fraction of ammonia in air

x = Mole fraction of ammonia in solution with water

The height of transfer unit may be taken as equal to 2 metre

OR

Q6) a) Derive an expression for height of packed bed absorption column in terms of NTU & HTU. **[8]**

b) Explain the selection criteria for solvent in absorption. **[6]**

c) Explain absorption factor and stripping factor **[4]**

SECTION - II

Q7) a) Explain wet bulb temperature and derive $(t_G - t_w) = \frac{\lambda_w (Y'w - Y)}{h_G / k_y}$ **[10]**

b) Moist air at 310K has a wet Bulb Temperature of 300K. If the latent heat of vaporization of water at 300 K is 2440kJ/kg. The total pressure is 105 kN/m^2 and vapour pressure of water at 300K is 3.6 kN/m^2 and 6.33 kN/m^2 at 310K. **[6]**

Find

i) The humidity of air

ii) % Relative humidity

OR

Q8) a) Write short notes on any two : **[10]**

i) Adiabatic Saturation Curve

ii) Vapour - liquid equilibrium in humidification operation

iii) Principle and working of Water Cooling tower

b) For air-water vapor mixture having DBT of 65°C, Calculate the wet bulb temperature using the formula for wet bulb depression. **[6]**

Data:

Y' = 0.0247 kg H_2O/ kg of dry air

Y'_w = 0.0365 kg H_2O/ kg of dry air

λ_w = 2419.3 kJ/kg

Psychrometric ratio = 950 J/kg. K

Q9) a) Comparison between spray and bubble column absorber. **[6]**

b) Explain different types of tray efficiencies. **[4]**

c) What are various equipments used for gas-liquid contact. Explain sparged vessel & mechanically agitated vessels with neat diagram. **[8]**

OR

Q10) a) Explain in brief the following terms in connection with packed tower absorber **[6]**

i) Channeling

ii) Loading

iii) Flooding

b) Explain the different types packing used in separation towers? Give classification. **[4]**

c) Explain venturi scrubber and wetted wall column for gas-liquid contact. **[8]**

Q11) a) A porous solid is dried in a batch dryer under constant drying conditions. 6 hours are required to reduce the moisture content from 30 to 10 %. The critical moisture content is found to be 16% an equilibrium moisture content is 2 %. All moist content on dry basis. Assume the rate of drying in falling period curve is linear. How long will it take to dry the solid from 35 to 6 %. **[8]**

b) Describe the rate of drying Curve with neat sketch. **[8]**

OR

Q12) a) Explain the selection criteria for dryers to dry various materials. **[6]**

b) Classify different types of dryers and explain the principle, construction and working of fluidized bed dryer with neat sketch. **[10]**

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Total No. of Questions : 12]

SEAT No. :

P2024

[Total No. of Pages : 3

[4858] - 196

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

TRANSPORT PHENOMENA

(2008 Pattern)

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) Explain shear diagram for Newtonian and time independent non-newtonian fluids. **[10]**

b) What is Lennard-Jones potential. **[6]**

OR

Q2) Derive the expression for volumetric flow rate 'Q' for Ellis fluid. **[16]**

Q3) a) Consider a liquid-liquid ejector. Use macroscopic balances and derive expression for pressure rise and friction loss. **[10]**

b) What pressure gradient is required to cause N, N - diethylamine to flow in a horizontal smooth tube of inside diameter 3cm at a rate of 1.1lit/s. Density of diethylomine is 935 kg/m^3 and viscosity is 1.95 Cp. Assume friction factor f = 0.0063. **[6]**

OR

Q4) a) Derive Newtons second law of motion. **[10]**

b) Derive dimensionless form of equation of change. **[6]**

P.T.O.

Q5) a) Explain procedure used to solve heat transfer problems. **[6]**

b) An electric current of 200 Amp is passed through stainless steel vessel having radius r = 1.26mm and length L =91cm. The wire has a resistance of 0.126Ω. The outer surface temperature Tw is held at 422.1K. The average thermal conductivity K = 22.5 W/mk. Calculate the centreline temperature. **[6]**

c) Explain thermal conductivity of gases at low density. **[6]**

OR

Q6) a) Explain heat transfer coefficients for forced convection in tubes. **[10]**

b) A copper wire has a radius of 2mm and a length of 5m. for what voltage drop would the temperature rise at the wire axis be 10°C, if the surface temperature of the wire is 20°C, lorenz no for copper = 2.23×10^{-8} (Vol^2/K^2). **[8]**

SECTION - II

Q7) a) Derive the expression for heat flux of the composite cylinder of radii r_1 and r_2 respectively. **[8]**

b) Explain heat transfer coefficient for forced convection around submerged object. **[8]**

OR

Q8) a) A standard schedule 40, two inch steel pipe (ID 2.067 in). carrying steam is lagged with 2 in. of 85% magnesia covered in turn with 2 in. of cork. Estimate the heat loss per hour per foot of pipe, if the inner surface of cork is at 250°F and the outer surface of the cork is at 90°F. The thermal conductivities of the substances concerned are **[8]**

Material	Conductivity
Steel	26.1 Btu hr^{-1} ft^{-1} F^{-1}
85% Magnesia	0.4 Btu hr^{-1} ft^{-1} F^{-1}
Cork	0.03 Btu hr^{-1} ft^{-1} F^{-1}

b) Discuss heat transfer coefficient for forced convection through packed beds. **[8]**

Q9) a) Calculate the mass flux of benzene through a layer of air 10 mm thickness at 25°C and 200 KN/m^2 (total pressure), partial pressure of benzene is 6×10^3 N/m^2 at the left of the layer and 1 KN/m^2 at the side. The mass diffusivity at this temperature pressure is 4.4×10^{-6} m^2/s. **[8]**

b) Discuss theory of ordinary diffusion in gases at low density. **[8]**

OR

Q10)For a diffusion through stagnant gas film show that.

$$N_{A2}/2 = 21 = \frac{CD_{AB}}{(Z_2 - Z_1)(X_B)\ln}(x_{A1} - x_{A2})$$ If the rate of mass transfer is related to a characteristic concentration driving force $x_{A1} - x_{A2}$ **[16]**

Q11)a) Write analogies among mass heat and momentum transfer. **[6]**

b) What is physical significance of flux ratio. **[6]**

c) Explain diffusion in laminar falling film. **[6]**

OR

Q12)a) Discuss transfer coefficients at high mass transfer rates for penitration theory. **[6]**

b) Write note on macroscopic and microscopic balance. **[6]**

c) Explain correlations of binary mass transfer coefficients in one phase at low mass transfer rates. **[6]**

Total No. of Questions : 12]

SEAT No. :

P3541

[Total No. of Pages : 4

[4858] - 197

T.E. (Chemical)

CHEMICAL REACTION ENGINEERING

(2008 Pattern)

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

Instructions to the candidates:

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

SECTION - I

Q1) 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°C and 30°C calculate the activation energy. **[4]**

d) Differentiate between molecularity and order of reaction. **[4]**

OR

Q2) a) Explain rate of reaction and give various ways of expressing the reaction rate. **[6]**

b) A certain reaction has a rate given by
$-r_A = 0.005\ CA^2$, mol/cm^3. min.
If the concentration is expressed in mol/lit and time in hours, what would be the value and unit of rate constat? **[6]**

c) Explain the kinetic model for non-elementary reaction. **[4]**

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) Explain in detail Integral method of analysis. **[6]**

P.T.O.

OR

Q4) a) Show that, $C_A = C_{A0}(1 - X_A)$. **[4]**

b) 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.

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. **[12]**

Q5) a) A homogeneous gas reaction $A \rightarrow 3R$ has reported rate at 215°C

$-r_A = 10^{-2} C_A^{1/2}$ [mol/lit.sec.].

Find the space time needed for 80% conversion of 50% A and 50% inerts feed to a Plug flow reactor operating at 215°C and 5 atm ($C_{A0} = 0.0625$ mol/lit.) **[12]**

b) Derive performance equation of Plug Flow Reactor. **[6]**

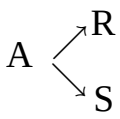
OR

Q6) a) Derive performance equation of Batch Reactor. **[12]**

b) Deduce the performance equation for recycle reactor. **[6]**

SECTION - II

Q7) a) Liquid phase reactant A decomposes as per following scheme.



With rates $r_R = K_1 C_A^2$; $K_1 = 0.4 m^3$/mol.min.

$r_S = K_1 C_A K_2 = 2$ min^{-1}.

Feed contains A with $C_{A0} = 40$ mol/m^3 enters the reactor decomposes and mixture of A, R and S leaves the reactor. Find operating conditions (X_A, C_R, ξ) which maximizes C_R in mixed flow reactor. **[10]**

b) Explain in detail. **[6]**

i) Instantaneous yield (Ψ)

ii) Overall yield (φ)

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, $C_{A0} = 2$.

Find the maximum expected C_S for isothermal operations.

a) In a mixed reactor.

b) In a plug flow reactor.

[16]

Q9) Determine the equilibrium conversion for the following elementary reaction between 0°C to 100°C at 298K.

$A \rightleftarrows R$, $\Delta G^0 = -14130$ J/mol, $\Delta H^0 = -75300$J/mol, $C_{PA} = C_{PR}$ = 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? **[16]**

OR

$A \rightleftarrows R$ $r_R = 1$

$A \rightarrow S$ $r_S = 2C_A$

$r_T = r_R + r_S = 1 + 2C_A$

Q10) Calculate the heat or reaction at 600°C of the reaction. **[16]**

.

Heat capacities of the reacting species may be expressed as

$C_P = \alpha + \beta T + \gamma T^2 + \delta T^3$.

Component	α	$\beta \times 10^2$	$\gamma \times 10^5$	$\delta \times 10^9$
A	– 0.24	8.65	– 5.12	12.05
B	– 1.30	8.40	– 5.55	14.25
C	6.45	0.104	– 0.008	0

The heat of reaction at the standard state (25°C) of the reaction is 27.23 k cal/g mol.

Q11) 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.

OR

Q12) A sample of tracer was injected into a vessel and effluent concentration was measured as function of time. Construct C and E and determine the fraction of material leaving the vessel that has spent 33 and 6 min and fraction of material that has spent 7.75 and 8.2 min in the vessel. **[18]**

t (min)	0	1	2	3	4	5	6	7	8	9	10	12	14	16
C(g/m^3)	0	1	5	8	10	8	6	4	3	2.2	1.5	0.6	0	0

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Total No. of Questions : 12]

SEAT No. :

P1426

[Total No. of Pages : 4

[4858] - 198

TE (Chemical) (Semester - II)

CHEMICAL ENGINEERING DESIGN - 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) ***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) What is proportioning of vessels? Derive volume relationship for optimum proportions of vessels with elliptical dished heads. **[10]**

b) Write a note on plastics as materials of construction for chemical plants. **[6]**

OR

Q2) a) Explain the pressure and radiography testing of equipments. **[9]**

b) Discus the various factors to be considered for selection of material for handing corrosive fluids. **[7]**

Q3) a) Explain the design of pressure vessel subjected to external pressure. **[6]**

b) A pressure vessel is to be designed for an internal pressure of 0.3 N/mm. 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 toque due to offset piping is 500 N-m find the stresses due to combined loading. Also suggest suitable head. **[10]**

OR

P.T.O.

Q4) a) Explain reinforcement of nozzles and the area for area method of compensation. **[10]**

b) Write a note on Gasket classification and selection. **[6]**

Q5) a) A vessel is to be designed to withstand internal pressure of 150 MN/m^2. An internal diameter of 300 mm is specified and 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. **[10]**

b) Explain the stresses in cone roof. **[8]**

OR

Q6) a) A tank is to store 26000 kg of liquid having density of 980 kg/m^3. Due to space limitations the maximum tank diameter can be 2.4 m. Calculate the height of the tank if liquid is filled upto roof to shell junction. No corrosion allowance is necessary. Welded joint efficiency is 85%. The permissible stress for the material is 1020 kg/cm^2. Also calculate various course thicknesses. **[10]**

b) With neat sketch explain the stresses developed in the wall of a high pressure vessel. **[8]**

SECTION - II

Q7) a) A tall vertical vessel 1.5 m in diameter and 13 m in height is to be provided with the skirt support. Weight of the vessel with all its attachments is 80000 kg. Diameter of the skirt is equal to the diameter of vessel is 100 kg/m^2. Seismic coefficient = 0.08. Permissible tensile of skirt material is 960 kg/cm^2. Yield stress = 2400 kg/cm^2. Estimate the thickness of skirt support. **[10]**

b) Discuss the various parameters to be considered for selection of a particular type of support. **[8]**

OR

Q8) a) Design a saddle support for a horizontal vessel using following data. **[10]**

Material - Low carbon steel, Vessel dia. = 1230mm, Length of shell = 8000mm, Shell thickness = 10mm, Working pressure = $0.5N/mm^2$, Head thickness =12mm, Torispherical Head - Crown Radius =1230mm, Knuckle radius = 75mm, Total head depth = 257mm, Corrosion allowance =1.5mm, Permissible stress = $95N/mm^2$, Weight of the Vessel and contents = 119430N, Distance of saddle centre line from shell end = 320mm, Included angle = 120°.

b) With neat sketches explain the lug support and leg support for the vertical vessels. **[8]**

Q9) a) Liquid bottoms from a distillation column are to be cooled form 80 °c to 40 °C at the rate of 20,000 kg/hr cooling water is available at 30 °C and can be heated up to 35 °C. **[16]**

Data

Property	Organic liquid	Water
Heat capasity J/kg°K	1400	4180
Thermal conductivity	0.096	0.62
Viscosity, N-s/m	0.40×10^{-3}	0.67×10^{-3}
Density kg/m^2	780	1000

Tubes having ID = 16 mm, OD = 19 mm and effective length 3.0 m are available. Tubes are to be arranged on 25 mm 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 °K can be used. Metal wall resistance can be neglected. Fouling resistance on inside of the tubes is 0.0002 m^2k/W and outside of tube is 0.0004 m^2k/W.

OR

Q10) a) 1800 kg/hr of an organic liquid is to be cooled form 101°C to 60°C by water available at 16°C. The maximum intake temperature to which cooling tower operates is 42°C. Water is circulated through the annulus of a concentric tubes heat exchangers. I.D. of inner tube = 12.5mm, O.D. of inner tube 14.5 mm, I.D of outer tube = 22 mm **[10]**

The properties of liquids at mean temperatures are:

	Density(kg/m^3)	viscosity(N-s/m^2)	Cp (J/Kg.K)	K(W/mK)
Org. liq	1080	3.2×10^{-3}	2650	0.261
Water	995	0.853×10^{-3}	4180	0.614

Neglect fouling and tube wall resistance. Design the heat exchanger.

b) Write a note on significance of temperature correction factor in the design of a heat exchanger. **[6]**

Q11) a) 3 kg/sec of aqueous solution containing 12% solute is to be concentrated to 40% by weight. The feed solution at 21°C enters the first effect of a forward feed arrangement of triple effect evaporators. Steam is available at 4 kg/cm^2 with temperature 143°C. Vacuum in the last effect is 0.2 kg/cm^2 corresponding to a boiling temperature 60°C. Overall heat transfer coefficient for three effects: U_1 = 1800 w/m^{2}k, U_2 = 1000 w/m^{2}k, U_3 = 600 w/m^{2}k. **[16]**

Cp for liquor = 3700 J/kg k - assumed to be constant, λ of steam = 2441 kJ/kg, λ of vapour = 2357 kJ/kg.

Find :

i) Minimum area required for each effect.

ii) Steam Economy

iii) Condenser water requirement (when cooling water inlet temp. = 20°C and outlet temp. = 40 °C)

If the evaporator system is used with backward feed arrangement, find the % change in the above answers.

OR

Q12) a) Explain principal types of reboilers used in industries. **[6]**

b) Draw a neat of forward feeding and mixed feeding system used for multiple effect evaporators. **[5]**

c) Explain the pressure drop calculations for the condensers. **[5]**

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Total No. of Questions : 12] **SEAT No. :**

P3121 **[Total No. of Pages : 2**

[4858] - 199
T.E. (Chemical)
PROCESS INSTRUMENTATION AND CONTROL
(2008 Pattern)

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 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 in detail. **[8]**

b) Explain scope of process instrumentation. **[8]**

OR

Q2) a) Give the classification of instruments **[8]**

b) Explain the difference between accuracy and precision 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]**

P.T.O.

OR

Q6) a) Explain classification of level measuring instruments **[9]**

b) Explain with diagram,construction and working sight or gauge glass method. **[9]**

SECTION - II

Q7) Describe with diagram the following techniques of composition analysis **[16]**

a) Mass spectroscopy

b) Ultraviolet absorption spectroscopy

OR

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

a) HPLC

b) Liquid chromatography

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 differences between first order and second order system **[8]**

b) State the differences between 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 if the controller PB is:

i) 55%

ii) 20%

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 HE. **[9]**

Total No. of Questions : 12] SEAT No. :

P4424 [Total No. of Pages : 3

[4858]-2
T.E. (E & TC) (Electronics)
DIGITAL DESIGN AND COMPUTER ORGANIZATION
(2003 Pattern)

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

Instructions to the candidates:

1) ***Answer any 3 questions from each section - I and 3 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) ***Neat diagrams must be drawn wherever necessary.***
5) ***Use of logarithmic tables, slide rule, Mollier charts, electronics pocket calculator is allowed.***
6) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Design sequence detector to detect following sequence 110. **[8]**

i) Draw state diagram

ii) Draw ckt diagram.

b) What are the static and dynamic hazards? Explain how static hazards are eliminated. **[8]**

OR

Q2) a) State advantage and disadvantage of a FSM. Explain difference between Mealy and Moore Machine. Compare combinational and sequential circuit. **[8]**

b) Explain following terms : **[8]**

i) Asynchronous sequential circuit.

ii) Universal logic gates

Q3) a) Write VHDL code for asynchronous reset D Flip flop **[8]**

b) Write VHDL code for 2 bit up down counter. **[8]**

OR

P.T.O.

Q4) a) Write VHDL programming for 2 bit comparator. **[8]**

b) Explain following statements used in VHDL with suitable example. **[8]**

i) Wait ii) Std_logic

iii) Entity iv) Architecture

Q5) a) Explain bit pair recoding of multiplier with one example. **[10]**

b) Multiply the following numbers using booth algorithm **[8]**

Multiplicand 10011 (–13)

Multiplier 01011 (11)

OR

Q6) a) Explain IEEE excess-127 floating point single precision format and convert the following decimal number in the above format. **[8]**

i) – 48 ii) 31.865

b) Explain carry look ahead addition with example **[10]**

SECTION - II

Q7) a) Explain Multiple bus organization **[8]**

b) Write control sequence for execution of the instruction. MOV R2, [R1] using single bus Organization. **[8]**

c) Explain fatching a word from memory. **[2]**

OR

Q8) a) Explain the following : **[8]**

i) Horizontal Microinstruction

ii) Conditional code

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

i) Direct addressing

ii) Indexed addressing

c) Explain indirect addressing mode with suitable 1 example **[2]**

Q9) a) Explain memory mapped I/O and isolated I/O. **[8]**

b) Explain interrupt service routine and subroutine in detail. **[8]**

OR

Q10)a) Explain the interrupts in handling multiple devices modes in following : **[8]**

i) Interrupt Hardware

ii) Interrupt nesting

b) Explain keyboard interface circuit in detail. **[8]**

Q11)a) Explain with neat diagram and timing diagram the synchronous DRAM. **[8]**

b) Explain organization of a 2M × 32 memory module using 512K×8 static memory Chip. **[8]**

OR

Q12)a) Explain Internal organization of a 2M × 8 dynamic memory chip. **[8]**

b) Explain functioning of CD-ROM and DVD. **[8]**

Total No. of Questions : 12]

SEAT No. :

P1427

[Total No. of Pages : 5

[4858] - 200

TE (CHEMICAL)

MASS TRANSFER - II

(2008 Pattern) (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) Explain in brief extractive distillation and azeotropic distillation. **[8]**

b) In A feed of 50-mole% n-heptane and 50- mole% n-octane is fed into a pipe still through a pressure reducing valve and then into a flash disengaging chamber. The vapor and liquid leaving the chamber are assumed to be in equilibrium. If the fraction of feed converted to Vapour is 0.5, find the compositions of top and bottom products the equilibrium data is as follows. **[8]**

X-1.00	0.69	0.40	0.192	0.045	0.00
Y-1.00	0.932	0.78	0.538	0.1775	0.00

OR

Q2) a) A liquid mixture containing 40 wt% benzene and 6Owt% toluene is subjected to flash distillation at pressure 101.325 Kpa. If the fraction of feed vaporized is 0.50, calculate the equilibrium composition of vapour and liquid. **[8]**

X:- 0.05	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
Y:- 0.13	0.21	0.375	0.5	0.6	0.7	0.77	0.83	0.9	0.95	1.0

b) Define distillation? derive Rayleigh equation for differential distillation. **[8]**

P.T.O.

Q3) 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 **[10]**

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

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) What is reflux ratio? Derive Fenske equation for number of theoretical plates at total reflux. **[6]**

OR

Q4) a) Give significance and applications of q-line. **[6]**

b) A continuous column is to be designed to separate a binary mixture containing 50 mole% n-heptane with a distillate containing 98 mole% n-heptane and bottom containing 98mole% n-octane. The feed is at boiling point and tower operates to one atmosphere. Using equilibrium data given below, calculate **[10]**

i) minimum reflux ratio,

ii) minimum number of theoretical plates,

iii) if a reflux ratio of greater than the minimum reflux by 50 percent is used, how many number of theoretical plates will be required?

X-	0.10	0.30	0.50	0.70	0.90	1.00
Y-	0.195	0.585	0.690	0.840	0.950	1.00

Q5) a) A solution of nicotine in water containing 1 % nicotine is to be extracted with kerosene at 293°K (20°C) Water and Kerosene are essentially insoluble. The equilibrium data is **[10]**

X= 0	0.001011	0.00246	0.00502	0.00751	0.00998	0.0102
Y= 0	0.000807	0.001961	0.00456	0.00686	0.00913	0.00935

Where

Y = kg nicotine / Kg kerosene

X = kg nicotine / kg water

i) Determine the percentage extraction of nicotine if 100 kg of a feed solution is extracted with 150 kg of solvent (Kerosene)

ii) Repeat for three theoretical extractions using 50 kg solvent each time.

b) Give uses and discuss representation of triangular diagram. **[4]**

c) What are the criteria for solvent selection for liquid extraction? **[4]**

Q6) a) 1000 kg of pyridine —water solution containing 50% pyridine is to be extracted with equal amount of pure chlorobenzene. The raffinate from the first extraction is to be extracted with a weight of solvent equal to raffinate weight and so on (S2=Rl, S3=R2). **[16]**

i) what is the exit concentration and percentage recovery of pyridine after three stages.

ii) if all the solvent is used in single stage what is the percentage recovery and exit concentration? The equilibrium data and tie line data is as given below

Chlorobenzene Layer (C.B.)			Water Layer		
Pyridine	C.B.	Water	Pyridine	C.B.	Water
0.0	99.95	0.05	0	0.08	99.92
11.05	88.28	0.67	5.02	0.16	94.82
18.95	79.90	1.15	11.05	0.24	88.71
24.10	74.28	1.62	18.90	0.38	80.72
28.60	69.15	2.25	25.50	0.58	73.92
31.55	65.58	2.87	36.10	1.85	62.05
35.05	61.00	3.95	44.95	4.18	50.81
40.60	53.00	6.40	53.20	8.50	37.90
49.00	37.8	13.2	49.00	37.8	13.20

b) Define selectivity and distribution coefficient. **[2]**

SECTION - II

Q7) a) Give detail procedure for finding the number of stages in multistage countercurrent leaching. **[8]**

b) Derive an expression for finding the number of stages under the condition of constant underflow. **[8]**

OR

Q8) a) Oil is to be extracted from meal by means of benzene using continuous countercurrent extraction unit. The unit is expected to treat 1000 kg of meal per hour. The untreated meal conations 365 kg of oil and 30 kg of benzene. The solvent used contains 14 kg of oil and 590 kg of benzene. The exhausted solids are to contain 55 kg of unextracted oil. Experimental data on the extraction of oil from meal are as **[14]**

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	.0571	0.595	0.620

Find the number of ideal stages required.

b) Give factors affecting the rate of leaching. **[2]**

Q9) a) Give detail material balance and its application to Freundlich adsorption isotherm for multistage crosscurrent adsorption. **[8]**

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

i) Break through curve,

ii) Adsorption isotherm

OR

Q10) a) In a laboratory setup, toluene vapors in air are passed over a bed of activated carbon. In first experiment, the bed depth at 50 cm, while in the second experiment, it is 100 cm. The breakthrough curve was determined at 55 of inlet concentration. In the first experiment, the breakthrough occurred at 65 minutes while in the second test, it occurred at 140 minutes. Determine the length of unused bed. **[8]**

b) State equilibrium in ion exchange and explain ion-exchange process. **[8]**

Q11) a) A saturated solution of $MgSO_4$ at 353°K is cooled to 303°K in a crystallizer. During cooling 4% of the water is lost by evaporation. Estimate the quantity of original saturated solution to be fed to the crystallizer per 1000kg of $MgSO_4$ $7H_2O$ crystals. Data: solubility of $MgSO_4$ at 353°K = 64.2kg/100kg, water solubility of $MgSO_4$ at 303°K = 40.8 kg/100kg water. At wt Mg = 24, S = 32, H = 1, O = 16. **[10]**

b) Explain Miers theory of super saturation. **[8]**

OR

Q12) a) Explain reverse osmosis for water purification. **[10]**

b) Give flux equation for a pressure driven process. **[4]**

c) What are different membrane modules? **[4]**

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Total No. of Questions : 12]

SEAT No. :

P1428

[Total No. of Pages : 3

[4858] - 201

T.E. (IT)

DBMS

Database Management Systems

(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) ***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 SQLwith example. **[8]**

OR

Q4) a) Explain Natural Join & division operation in relational algebra with example. **[8]**

b) Explain Stored Procedures & Triggers. **[8]**

P.T.O.

Q5) a) What is Normalization? Explain 1NF & 2 NF 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 3 NF. **[8]**

SECTION - II

Q7) a) Define Hashing. Explain the difference between static & Dynamic Hashing. **[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) What 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]**

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Total No. of Questions : 12] **SEAT No. :**

P1429 **[Total No. of Pages : 3**

[4858] - 202

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

SOFTWARE ENGINEERING

(2008 Pattern)

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

Instructions to the candidates :-

1) ***From section I answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and answer Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.***
2) ***Answers to the two sections should be written in separate answer books.***
3) ***Neat Diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***

SECTION - I

Q1) a) What are the characteristics of software? Explain in detail following software myths. **[10]**

i) Practioner's myths

ii) Management myths

b) Explain in detail Spiral model with its merits/demerits. **[8]**

OR

Q2) a) Define software engineering. What are the software characteristics? What are the various categories of software? **[10]**

b) Explain in detail extreme programming. **[8]**

Q3) a) Explain in detail requirement engineering task. **[8]**

b) What are the rules of thumb Explain in detail following UML diagrams stating purpose and applicability. **[8]**

i) Use-case diagram

ii) State diagram

OR

P.T.O.

Q4) a) Draw level 0, level 1, and level 2 data flow diagram for library book returning system for a student. System also maintains book information. **[8]**

b) Explain domain analysis. Discuss in short : Data objects, cardinality and modality in data models. **[8]**

Q5) a) Explain in Detail following Design concepts : **[12]**

i) Information Hiding 3. Function Independence

ii) Modularity

b) Explain Layered architecture style in brief. **[4]**

OR

Q6) a) Explain the Golden rules used for user interface design. **[12]**

b) Explain Web application interface design principles and guidelines. **[4]**

SECTION - II

Q7) a) Explain the Debugging Process with the help of a diagram. **[6]**

b) Explain the following system testing strategies in brief. **[6]**

i) Stress Testing

ii) Security Testing

c) Define Cyclomatic Complexity? What are the 3 ways to calculate it? **[4]**

OR

Q8) a) Explain the following Integration Testing Strategies: **[8]**

i) Top-down integration

ii) Bottom-up integration

b) What is black box testing? What are the ways to perform black box testing? **[8]**

Q9) a) What are the ways in which software estimation can be classified? Elaborate **[6]**

b) Explain the term people and process of management Spectrum. **[6]**

c) State the direct measures of the Software process and product. Also state the indirect measures of product? **[4]**

OR

Q10) a) Explain decision tree to support make-buy decision with an example. **[8]**

b) What do you mean by DRE? What is the ideal value for DRE? What is the significance of DRE in maintaining Software Quality? **[4]**

c) Describe the Lorenz and Kidd approach of estimation for Object-Oriented Projects. **[4]**

Q11) a) What is risk mitigation, risk monitoring, risk management? Explain in brief. **[10]**

b) What are the types of risks? Explain in brief. **[8]**

OR

Q12) a) What is the objective of SCM? What are SCM features? **[6]**

b) What are the software quality factors? Explain any four. **[12]**

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Total No. of Questions : 12]

SEAT No. :

P1430

[Total No. of Pages : 3

[4858] - 203

T.E. (Information Technology)

COMPUTER NETWORK TECHNOLOGY

(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) ***From section Ianswer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and answer Q.7 or Q.8, Q.9 or Q.1O, Q.11 or Q.12***
3) ***Neat Diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***

SECTION - I

Q1) a) Differentiate among circuit switching, packet switching and message switching. Give at least one example. **[10]**

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

i) Hierarchical routing Algorithm.

ii) Link State routing Algorithm.

OR

Q2) a) Explain the difference between interdomain and intradomain routing protocols with example. **[9]**

b) What do you mean by congestion? Explain any two congestion control algorithms in virtual circuit subnets. **[9]**

Q3) a) Differentiate between BOOTP and DHCP. **[8]**

b) Compare between IPv4 and IPv6. **[8]**

OR

P.T.O.

Q4) a) What is NAT? Explain its operation with an example. **[8]**

b) Consider any class - B network with default subnet mask. Design the subnet in such a way that each has 126 nodes. Write the range of IP addresses for all subnets. **[8]**

Q5) a) Explain how TCP provide flow control mechanism. **[8]**

b) What is silly window syndrome? How to overcome it? **[8]**

OR

Q6) a) What is a Socket? Explain various socket primitives used in client-server interaction. **[8]**

b) What do you mean by flow control in transport layer? What are the different methods to achieve it? **[8]**

SECTION - II

Q7) a) What is cookie? Where and how it is used. **[4]**

b) Differentiate between FTP and TFTP. **[6]**

c) What is the purpose of SMI and MIB in relation to SNMP? **[6]**

OR

Q8) a) List the five areas of network management and explain the necessity of each. **[8]**

b) Explain working of DNS in detail. **[8]**

Q9) a) Explain the RTSP protocol. Why this protocol is needed? **[8]**

b) Differentiate between SIP and H.323 protocol. **[8]**

OR

Q10) a) What is meant by interactivity for streaming stored audio/video? **[8]**

b) Explain Round Robin and Weighted Fair Queuing algorithm for scheduling. **[8]**

Q11) a) Discuss various layers used in ATM architecture. **[9]**

b) Explain Bluetooth architecture with diagram. **[9]**

OR

Q12) Write a short note on : **[18]**

a) Limitations of Bluetooth

b) ATM Switch

c) X.25

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Total No. of Questions : 6] **SEAT No. :**

P3122 **[Total No. of Pages : 3**

[4858] - 204
T.E. (Information Technology) (Semester - I)
OPERATING SYSTEM
(2008 Pattern)

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

SECTION - I

Q1) A) What is the purpose of system call and how do the system calls relate to operating system? **[8]**

B) How operating system is as resource manager ? State and explain the basic functions of operating system? **[8]**

OR

A) Discuss various architectures of operating system.

B) Write a shell script for sorting a given list of numbers using bubble sort.

Q2) A) Draw the Process Control Bock and explain it. **[8]**

B) What is a thread? Define User Level Thread (ULT) and Kernel Level Thread (KLT).

How is ULT mapped to KLT? **[8]**

OR

A) Consider the following processes **[12]**

Processes	BT	Priority
P1	10	3
P2	1	1
P3	2	3
P4	1	4
P5	5	2

The processes arrived in order P1 to P5 all at 0

i) Draw Gantt chart to show the execution using FCFS, SJF, non-preemptive priority (smaller priority implies higher priority).

ii) Calculate average TAT and WT.

B) Explain multilevel feedback queue scheduling. **[4]**

P.T.O.

Q3) A) List the requirements of mutual exclusion. **[6]**

B) Write a semaphore solution for readers-writers problem. **[6]**

C) Apply the deadlock Detection algorithm for following example and show the results. **[6]**

Available [2 10 0]

Request	Allocation
2001	0010
1010	2001
2100	0120

OR

A) What is the difference among deadlock avoidance, detection and prevention? **[8]**

B) Write a semaphore solution for dining philosophers problem. **[6]**

C) Explain monitors in brief. **[4]**

SECTION - II

Q4) A) Draw graph of degree of multiprogramming verses CPU utilization. Explain the nature of graph. **[6]**

B) Explain with the help of a neat diagram how TLB can be used to improve Effective Access time? **[10]**

OR

A) What are the common techniques for structuring the page table? Explain at least three of the techniques. **[10]**

B) For the following reference string. **[6]**

5, 6, 7, 8, 5, 6, 9, 5, 6, 7, 8, 9

Count the number of page faults that occur with 3 frames and 4 frames using FIFO page replacement method. Discuss the result.

Q5) A) A disk drive has 500 cylinders, numbered 0 to 499. The drive is currently serving a request at cylinder 255 and the previous request was at cylinder 143. The queue of pending requests in FIFO order is: **[9]**

84, 147,91, 177,286,341,78,488.38, 130

Starting from current head position, what is the total distance that the disk arm moves to satisfy all pending requests for each of the following disk scheduling algorithms?

i) FCFS

ii) LOOK

iii) C-LOOK

B) Explain various allocation methods for storage of files on disk. **[9]**

OR

A) Write Short note on **[9]**

i) Directory Structure

ii) File Sharing.

B) Describe free space management techniques with suitable example. **[9]**

Q6) A) Discuss the security in UNIX. **[8]**

B) What is the difference between a threat and an attack? Explain with example. **[8]**

OR

A) Explain techniques and security policies to improve the resistance to threats. **[8]**

B) Explain how the access matrix can be implemented effectively? **[8]**

Total No. of Questions : 12]

SEAT No. :

P1431

[Total No. of Pages : 3

[4858] - 205

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

THEORY OF COMPUTATION

(2008 Pattern)

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 the SECTION - I.***
2) ***Solve Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12 from the SECTION - II.***
3) ***Answers to the two sections should be written in separate answer books.***
4) ***Neat diagrams must be drawn wherever necessary.***
5) ***Assume suitable data if necessary.***

SECTION - I

Q1) a) Design FA/FSM that read strings made up of I = {a, b} and accept only those strings which starts with "a" and ends with "bb" **[8]**

b) Define and explain : **[8]**

i) Language
ii) Cartesian Product
iii) Regular Expression
iv) Kleene Closure

c) What is regular expression and explain with example. **[2]**

Q2) a) Design a Finite State Machine to accept set of strings containing substring "101" over input {0,1}. **[8]**

b) Give RE for following language over = {0, 1}. **[8]**

i) Language of all strings that begin with "11" and end with "01"
ii) Language of all strings in which occurrence of "a" is always tripled
iii) Language of all strings containing substring 00.
iv) Language of all strings not containing substring 00.

c) Show that (a*b*) = (a+b)* **[2]**

P.T.O.

Q3) a) Design a Mealy machine to compute 2's complement of a given binary number. **[8]**

b) Construct DFA for regular expression abb (a+b)* **[8]**

Q4) a) Convert the following NFA into equivalent DFA **[8]**

NFA = ({p, q, r, s}, {0, 1}, δ, p, {s})

	0	1
p	p,q	p
q	r	r
r	s	-
s	s	s

b) Construct NFA for the following regular expression. **[8]**

i) $a^*b(bb)^+$

ii) (a+b)*bab(a+b)*

Q5) a) Show that the following grammar is ambiguous **[6]**

S ->aSbS S ->bSaS S-> ε

b) Convert the following grammar to Chomsky Normal Form (CNF) **[6]**

G = ({S}, {a, b}, P, S)

S->ABA, A->aA, A-> ε, B->bB, B-> ε

c) Obtain a grammar to generate the language L = $\{a^{2n}\ b^n | n>0\}$ **[4]**

Q6) a) Explain Chomsky Hierarchy. **[6]**

b) Consider the following grammar **[6]**

S->aB, S->bA,

A->a,A->aS,A->bAA.

b-> b,B->bS,B->aBB

Derive the string aaabbb using

i) Leftmost derivation

ii) Rightmost derivation.

c) Construct CFG for language of even length palindrome of strings of a's and b's. **[4]**

SECTION - II

Q7) a) Show that CFLs are closed under Union, Concatenation and Kleene closure. **[6]**

b) Explain closure properties of regular languages. **[6]**

c) Let G = ({A0, A1},{a, b}, P, A0)
Where P = {A0->aAl, Al->bAl, Al->a, Al->bA0}
Convert given grammar to equivalent Left linear grammar **[6]**

Q8) a) State and prove Pumping lemma theorem for Context-Free Language. **[6]**

b) Let G = ({A, A}, {a, b}, P, A)
where P = {A->aB, B->bB | a | bA}
Construct a FA equivalent to G. **[6]**

c) Construct a regular grammar G generating the regular set represented by P = b* a(a+b)* **[6]**

Q9) a) Compare PDA with FSM and Construct PDA for S ->S + S, S->S * S, S->8 **[8]**

b) Define post machines and explain its elements. **[4]**

c) Define acceptance by PDA **[4]**
i) By final state
ii) By empty stack.

Q10) a) Show that post machine for l = $\{a^n b^n c^n\}$ and compare PDA with PM **[8]**

b) Obtain a PDA to accept the language
L = $\{a^n b^n | n > 1\}$ by a final state **[8]**

Q11) a) Write short notes on : **[8]**
i) Limitation of Turing Machine
ii) Halting Problem of Turing Machine

b) Design a Turing machine to compute 1's complement of a given binary number. **[8]**

Q12) a) Write a short note on universal Turing machine. **[8]**

b) Design a Turing machine for concatenation of two strings over input a, b. **[8]**

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Total No. of Questions : 12]

SEAT No. :

P1432

[Total No. of Pages : 3

[4858] - 206

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 Q10, 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) For the following assembly code generate Literal table, Symbol Table, Pool Table, Intermediate Code, Assume size of instruction is equal to one byte. **[12]**

```
          START 200
          MOVER AREG, = '5'
          MOVEM AREG,A
LOOP :    MOVER AREG, A
          MOVER CREG, B
          ADD AREG, ='2'
          LTORG
NEXT1:    SUB AREG, = '1'
          ORIGIN LOOP+6
          ADD BREG, A
     A    DS   2
     B    DC   3
NEXT2     EQU   LOOP
          END
```

b) Describe the following System software **[6]**

i) Compiler
ii) Assembler
iii) Interpreter

P.T.O.

OR

Q2) a) Write an algorithm for Pass-II of two pass Assembler and explain with suitable example. **[12]**

b) Explain Back patching with respect to Assembler. **[6]**

Q3) a) Describe an algorithm for Pass-I of two pass Macro Processor also show the contents of different tables created during Pass-I for suitable example. **[8]**

b) Explain following Macro facilities with example. **[8]**

i) Expansion time loops

ii) Change of flow during Macro expansion.

OR

Q4) a) Write an algorithm for Pass-II of two pass Macro Processor with suitable example also show different tables used during Pass-II. **[10]**

b) Describe conditional macro calls with suitable example. **[6]**

Q5) a) List and explain the working of various phases of compiler for the statement. **[8]**

X = Y + Z * 10 (where X,Y,Z are float type).

b) Explain Shift Reduce Parser with example also enlist what are the major problems with Shift Reduce Parser. **[8]**

OR

Q6) a) Enlist various tables used and created by Lexical Analyzer? Show the contents of tables with suitable example. **[10]**

b) Describe Top down parser with example. **[6]**

SECTION - II

Q7) a) Explain Machine Independent code optimization technique by taking appropriate example. **[12]**

b) Explain the importance of intermediate code generation in compiler. **[4]**

OR

Q8) a) For the statement given below, generate intermediate code in the format. **[8]**

i) Quadruple

ii) Triple

iii) Postfix

iv) Parse Tree

A = (-C + D) / (-P * (-Q + R))

b) Describe and explain the issues in code generation. **[8]**

Q9) a) Explain BSS loading scheme with the help of an example. Also discuss how four basic functions of loader are performed in BSS loading scheme. **[10]**

b) Describe ESD and RLD cards with the help of suitable example. **[8]**

OR

Q10) a) Explain the following : **[6]**

i) Overlay Structure ii) Linkage editor.

b) What is loader? Enlist basic functions of a loader? **[6]**

c) Compare : **[6]**

i) Dynamic loading Vs Dynamic linking

Q11) a) Describe various types of editors? Explain with the help of the block diagram of Typical Editor structure. **[12]**

b) Differentiate between Line and Screen editor. **[4]**

OR

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

a) Debug Monitor.

b) LEX and YACC.

c) Programming Environment.

d) User Interfaces

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Total No. of Questions : 12]

SEAT No. :

P1433

[Total No. of Pages : 3

[4858] - 207

T.E. (Information Technology)

PROGRAMMING PARADIGMS

(2008 Pattern)

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

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

SECTION - I

Q1) a) Why there is a need to study programming languages explain in detail. **[8]**

b) Explain different aspects of cost of programming Languages. **[8]**

OR

Q2) a) Explain in detail procedural and functional programming paradigms? **[8]**

b) Define the term "Binding". With suitable example in particular language Explain which bindings are done at **[8]**

i) Language implementation time

ii) Translation time

iii) Execution time

Q3) a) What is mean by activation record and explain in detail with an example. **[8]**

b) Explain in detail **[8]**

i) Static scope rule

ii) Dynamic scope rule

OR

P.T.O.

Q4) a) Explain following terms with suitable examples. **[8]**

i) Exception and Exception Handler

ii) Build in exception

b) State and explain referencing environment with suitable example. **[8]**

Q5) a) i) Explain life cycle of applet with proper example. **[4]**

ii) Differentiate Applet and Application. **[4]**

iii) Differentiate AWT and SWING. **[4]**

b) Explain concept of inheritance with respect to C++ and JAVA. **[6]**

OR

Q6) a) Why java doesn't support for multiple inheritances? Explain how interfaces plays role for it with suitable example. **[9]**

b) What do you mean by multithreading? Explain the life cycle of threading? How it is achieved in JAVA. **[9]**

SECTION - II

Q7) a) Explain approaches for garbage collection in LISP. **[8]**

b) What are declarative programming paradigms? Explain how they are different from imperative programming paradigms. **[10]**

OR

Q8) a) i) Enlist Application of Logic programming. **[5]**

ii) What are cuts in Prolog? How it is used in program. **[4]**

b) Define following terms with respect to declarative and functional programming. **[9]**

i) Facts, Rules and Queries

ii) Lambda Calculus

iii) Reduction

Q9) a) Explain the Flynn's classification of computer architectures. **[8]**

b) Explain different synchronization mechanisms of parallel programming language. **[8]**

OR

Q10) a) Explain message passing and shared address space. **[8]**

b) Draw data flow diagram for computation for $X = B^2 - 4 * A * C$ and control flow methods. **[8]**

Q11) a) Write short notes on : **[8]**

i) Links in HTML.

ii) Design principles of Database programming.

b) Explain Design principles of Network System. **[8]**

OR

Q12) a) Write short notes on : **[8]**

i) Windows Programming.

ii) Components of URL.

b) Explain design principles of Parallel programming **[8]**

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Total No. of Questions : 12] **SEAT No. :**

P3123 **[Total No. of Pages : 3**

[4858] - 208
T.E. (INFORMATION TECHNOLOGY)
Human Computer Interaction and Usability
(2008 Pattern)

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.1O, Q.11 or Q.12***
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) What is ergonomics? Explain its significance in interface design. **[8]**

b) Compare STM and LTM of human with respect to capacity, access time and forgetting. **[8]**

OR

Q2) a) Discuss general principles and goals of user interface design. **[8]**

b) Explain Inductive reasoning and Abductive reasoning with examples. **[8]**

Q3) a) List different interaction styles. Explain command line interface and menus interface with advantages and disadvantages. **[10]**

b) Express your opinion - "A design should be User-Centric". **[8]**

OR

Q4) a) What are the different life cycle models in HCI? Explain any one lifecycle model in detail. **[10]**

b) Describe briefly four different interactions styles used to accommodate the dialog between user and computer. Specify advantages and disadvantages of each interaction style. **[8]**

Q5) a) Explain scenarios and expert reviews **[8]**

b) Evaluate Microsoft Power Point interface using the "Eight golden rules of interface design". **[8]**

P.T.O.

OR

Q6) a) Why is context important in selecting and applying guidelines and principles for interface design? Illustrate your answer with examples. **[8]**

b) With respect to Human Diversity how to accommodate users with disabilities and elderly users. **[8]**

SECTION - II

Q7) a) What is DECIDE? List and explain unique phases of DECIDE framework. **[10]**

b) Explain any two evaluation paradigms for UI design **[8]**

OR

Q8) a) Discuss the characteristics, guidelines and principles of good web page design. **[10]**

b) What usability standards are necessary in designing home page for e-governance websites? **[8]**

Q9) a) Explain GOMS model by taking appropriate task. Also discuss the issue of closure in terms of your GOMS description. **[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) Explain status event analysis with example **[8]**

b) Hierarchical Task Analysis (HTA) is used to describe the interactions between a user and a software system. Draw and explain HTA to online bus reservation system. **[8]**

Q11)a) Consider following two shared application. **[8]**

-Shared PCs and shared window systems

-Shared editors.

What are the main issues that need to be addressed in the design of these applications?

b) Discuss Augmented reality use for Aircraft. **[8]**

OR

Q12) Write short notes on Any Three of the following : **[16]**

a) Information and data visualization

b) Augmented reality

c) Any three devices for virtual reality

d) Ubiquitous computing

Total No. of Questions : 12]

SEAT No. :

P1434

[Total No. of Pages : 2

[4858] - 209

T.E. (I.T.)

MANAGEMENT INFORMATION SYSTEM

(2008 Pattern)

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 answers books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to right indicate full marks.***
5) ***Assume suitable data, if necessary.***
6) ***Point wise answers are expected to get full marks.***

SECTION - I

Q1) a) What is scope of Information System and Management Information System? **[9]**

b) What are the factors managers must consider during change in technology? **[9]**

OR

Q2) a) How MIS is helpful for different managerial levels? **[9]**

b) What are the different strategies used by a company to develop business? **[9]**

Q3) a) Explain the various decision making tools used by an organization. **[8]**

b) What are the limitations of GDSS? **[8]**

OR

Q4) a) What is expert system? When we can say that expert system is successful? **[8]**

b) How GIS helps decision making process? **[8]**

P.T.O.

Q5) a) Why m-commerce is being popular now a days? **[8]**

b) What is E-governance of India? **[8]**

OR

Q6) a) What are the different trends in CRM? **[8]**

b) What are the trends in SCM? **[8]**

SECTION - II

Q7) a) How MIS helps to a manufacturing industry? Explain in detail. **[9]**

b) Explain material management with respect to MIS. **[9]**

OR

Q8) a) Is it efficient to use MIS for hotel management? Explain. **[9]**

b) Explain the architecture of Cross Functional Enterprise System. **[9]**

Q9) a) What is role of MIS in EMS? **[8]**

b) Explain ERP architecture with different modules. **[8]**

OR

Q10) a) Explain different BPO services. **[8]**

b) Explain medical transcription as an application of ITES. **[8]**

Q11) a) What are the reasons and modes of Cyber Crime? **[8]**

b) What are the statutory provisions for cyber crime? **[8]**

OR

Q12) a) What are the different system controls exercised in an Information System? **[8]**

b) Explain global management of Information Technology. **[8]**

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Total No. of Questions : 12]

SEAT No. :

P1435

[Total No. of Pages : 3

[4858] - 210

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

DESIGN AND ANALYSIS OF ALGORITHMS

(2008 Pattern)

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) Explain O, θ and Ω notations. Give examples. **[8]**

b) Explain any two proof techniques with suitable examples. **[8]**

OR

Q2) a) What is the framework for analysis of algorithms? Discuss all the components. **[8]**

b) Explain amortized analysis. **[8]**

Q3) Use of divide and conquer technique for multiplication of large integers, reduces time complexity of algorithms. Two n-digit numbers require 3 multiplications of n/2 numbers. Thus M(n) = 3 M(n/2) for n> 1 and M(1) = 1. Solve this recurrence and find the time complexity for this recurrence. **[16]**

OR

Q4) a) Construct Huffman tree using greedy strategy. **[8]**

character	A	B	C	D	-
probability	0.35	0.1	0.2	0.2	0.15

b) Explain closest pair problem. How can it be solved using divide and conquer strategy. **[8]**

P.T.O.

Q5) a) What is Dynamic programming? Is this the optimization technique? Give reasons. What are its drawbacks? **[9]**

b) Compare dynamic programming and divide and conquer. What are the advantages and disadvantages of both techniques. **[9]**

OR

Q6) a) Explain knapsack problem. State its recurrence relation. What is the strategy of solving knapsack problem using Dynamic Programming paradigm? **[9]**

b) Compare matrix generation for Warshall's algorithm and Floyd's algorithm with suitable examples. **[9]**

SECTION - II

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

Live nodes, expanding nodes, bounding function and solution space.

b) Consider S={5,10,12,13,l5,18} and sum of subsets=30. Find different subsets. **[8]**

OR

Q8) a) Explain 4-queens problem using backtracking. State the constraints for placement of queens on 4x4 chessboard. **[8]**

b) Write GraphColoring algorithm. State time complexity. **[8]**

Q9) a) Explain the terms : **[9]**

Branch and Bound, LC, LIFO and Bounding function.How are LIFO and LC techniques different?

b) Explain dynamic reduction for TSP. **[9]**

OR

Q10) a) Explain FIFO Branch and bound with suitable example. **[9]**

b) Explain the terms: state space, live node, static trees and dynamic trees. **[9]**

Q11) a) Write non-deterministic algorithm for sorting elements of an array. Write its complexity. **[8]**

b) What is a halting problem? Is this NP-Complete or NP-Hard? **[8]**

OR

Q12) a) Write non-deterministic algorithm for searching an element of an array. Write its complexity. **[8]**

b) Explain Cook's theorem. **[8]**

Total No. of Questions : 6]

SEAT No. :

P3607

[Total No. of Pages : 3

[4858] - 211

T.E. (Printing)

OFFSET MACHINES - I

(2008 Pattern) (Semester - I)

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 books.***

SECTION - I

Q1) a) Explain cylinder undercut and bearers drawing neat diagram of cylinder body. **[8]**

b) Explain with help of neat diagram perfecting type design of offset machine. **[8]**

OR

Explain the following : **[16]**

a) Circumferential speed of the printing cylinders.

b) Cylinder Packing material and requirements.

c) Cylinder Configuration.

d) Pitch circle diameter.

Q2) a) Explain the steps involved in violet CTP platemaking procedure. **[8]**

b) Explain in detail the effects of exposure and development on image reproduction on P.S. platemaking. **[8]**

OR

a) Explain factors considered for preparing a layout while taking for print. **[8]**

b) What is the importance of silver halide in platemaking. Compare CTP and CTCP. **[8]**

P.T.O.

Q3) a) Explain central drum inking unit. **[9]**

b) Explain why rollers in inking unit have different materials. Explain. **[5]**

c) Explain roller pressure setting by stripe method. **[4]**

OR

a) Compare EB and UV inks used for sheet fed offset. **[9]**

b) How does ink dry in offset by chemical process. **[9]**

SECTION - II

Q4) Explain : **[18]**

a) Ceramic coated and chrome plated rollers for dampening

b) Explain relation of ph, conductivity and concentration of F.S.

OR

a) Explain inker feed dampening system. **[5]**

b) What is the role of IPA in dampening solution? **[4]**

c) What is hot weather scumming and constant operating temperature for dampening systems. **[9]**

Q5) State working of following : **[16]**

a) Blowers and suctionin feeder unit.

b) No sheet and double detectors.

OR

a) Why is swing gripper more preferred in offset presses. Explain working. **[8]**

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

i) Side lay pull type.

ii) Front lays from above.

Q6) a) State the make-ready arrangement for a 2 colour job on a single- colour machine. **[8]**

b) State method for preparing new blanket. **[8]**

OR

Write short notes on : **[16]**

a) Color control bar.

b) Grey balance.

c) Star target.

d) Register marks.

❖ ❖ ❖ ❖

Total No. of Questions : 12]

SEAT No. :

P2015

[Total No. of Pages : 2

[4858] - 212

T.E. (Printing Engg.)

PRINTING NETWORK TECHNOLOGY AND OPTO ELECTRONICS

(2008 Pattern)

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 Q1O.***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data, if necessary.***
4) ***Neat diagrams must be drawn wherever necessary.***
5) ***Use of Calculator is allowed.***

SECTION - I

Q1) a) Draw and explain block diagram of communication system. Explain necessity of modulation. **[10]**

b) State "Sampling Theorem". Explain pulse amplitude modulation (PAM). **[8]**

OR

Q2) Write short notes on (Any three) : **[18]**

a) Quantization

b) Multiplexing technique

c) Pulse coded modulation

d) Frequency modulation

Q3) a) Explain data encryption and decryption. **[8]**

b) Explain the losses in fiber optic cable with suitable diagrams. **[8]**

OR

Q4) a) Draw and explain block diagram of basic fiber optic communication system. **[8]**

b) Explain different losses in fiber optic communication. **[8]**

P.T.O.

Q5) a) Explain application of RFID in field of printing. **[8]**

b) Explain different types of RFID. **[8]**

OR

Q6) a) Explain Wi-Fi technology. **[10]**

b) Explain any one application of optoelectronics in printing. **[6]**

SECTION - II

Q7) a) Explain different types operating system (OS). **[10]**

b) Explain any four UNIX commands. **[8]**

OR

Q8) Write short notes on (Any three) : **[18]**

a) MAC operating system.

b) Design issues of operating system.

c) Windows NT.

d) Directory structure of UNIX.

Q9) a) Explain following protocols (Any two) : **[16]**

i) POP3

ii) FTP

iii) SMTP

OR

Q10)a) Explain TCP/IP reference model. **[8]**

b) Explain different types of local area network (LAN). **[8]**

Q11)a) Explain what is ISDN. **[8]**

b) Explain Bridges and routers. **[8]**

OR

Q12)a) Explain modems and hubs. **[8]**

b) Explain VPN and VSAT. **[8]**

Total No. of Questions : 6] **SEAT No. :**

P3124 **[Total No. of Pages : 2**

[4858] - 213
T.E. (Printing)
COLOR MANAGEMENT AND STANDARDIZATION
(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 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 the visible spectrum of Electromagnetic spectrum.

b) Explain two color and three color trapping.

c) Draw the spectral graph of Cyan, Yellow and Magenta by considering ink impurities.

Q2) Solve any two **[16]**

a) Explain the Human vision deficiencies

b) Explain the term color temperature and Spectral power distribution of CIE Standard Illuminant.

c) Explain Human vision theory.

Q3) Answer any two **[16]**

a) Explain Color system based on uniform perception with their two advantages and two disadvantages.

b) Calculate chromaticity co-ordinates for A and C Illuminants

c) Explain Human matching experiment.

SECTION - II

Q4) Answer any one **[16]**

a) Explain visual color measurement.

b) Explain the color difference equation.

Q5) Explain any two **[16]**

a) Explain the need of color management in Printing Industry.

b) How to apply input, output and display profile from Photoshop software.

c) Explain the test charts used for various press devices.

Q6) Explain any two **[18]**

a) Device dependent and Device Independent workflow

b) Calculate L, a, b, C and h for given sample

Sample 1 : X = 60, Y = 75, Z = 20 and

c) Explain the term calibration, Explain Proofer calibration for any substrate with the help of starproof software.

Total No. of Questions : 6]

SEAT No. : ____

P3608

[Total No. of Pages : 3

[4858] - 214

T.E. (Printing Engineering)

DESIGN OF PRINTING MACHINE COMPONENTS

(2008 Pattern)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***

SECTION - I

Q1) a) Explain step by step procedure for design of shaft on basis of ASME code. **[8]**

b) State and explain the significance of service factor and overload factor. **[8]**

OR

a) Explain the BIS system of designation of steel.

b) The layout of an intermediate shaft of a gear box supporting two spur gears B and C. The shaft is mounted on two bearings A and D. The pitch circle diameters of gear B and C are 900 and 600 resp. the material of shaft is steel FeE 580 (Sut = 770 N/mm^2 and Syt = 580 N/mm^2). The factors Kb and Kt of ASME code are 1:5 and 2 resp. determine the shaft diameter using ASME code. Assume that the gears are keyed to shaft.

Q2) a) Design a flange coupling which is used to connect two shaft of steel, transmitting 35 kw power at 360 rpm. The shaft and keys are made up of plain carbon steel 30C8 for which Syt = Syc = 400N/mm^2. The sleeve is made up of grey cast iron FG 200 Sut = 200N/mm^2.
FOS for a shaft is 4 and FOS for sleeve is 6. **[8]**

b) Explain step by step procedure for cotter joint. **[8]**

OR

P.T.O.

a) Draw a neat sketch of Knuckle joint and also explain design of Knuckle joint.

b) Explain the term of FOS and factor to be consider while selecting FOS.

Q3) a) What is the importance of limits, fits in machine elements? What are different types of tolerances? Show how to give such a tolerance of machine elements. **[8]**

b) State the procedure of designing a shaft as per Rigidity approach. **[10]**

OR

a) Explain basic procedure of machine design.

b) Explain important factor of selecting coupling.

SECTION - II

Q4) a) Prove that maximum efficiency of square threaded screw can be given by

$$\eta_{max} = 1 - \sin\theta/1 + \sin\theta$$ **[8]**

b) What are the different types of stresses induced in power screw? **[8]**

OR

a) Explain protected type rigid flange coupling.

b) Difference between welded joint and bolted joint.

Q5) a) Explain construction and applications of recirculating ball screw. **[8]**

b) Explain advantages and limitations of welded joint. **[8]**

OR

a) Explain the basic types of screw fastening.

b) Explain advantages and limitations of bolted joint.

Q6) a) It is required to design a helical compression spring subjected to 1250 N. The deflection of the spring corresponding to the max force should be approximately 30mm. The spring index can be 6, C = 6. The spring is made of cold drawn steel wire, the ultimate tensile strength and modulus of rigidity of the spring material are 1090 and 81370 N/mm^2. The permissible shear stress for the spring wire should be taken as 50 % of the ultimate tensile strength. Design the strength and calculate is wire diameter,

i) Wire diameter, ii) Mean coil diameter,

iii) No.of active coils, iv) Total no.of coils,

v) Free length of the Spring, vi) Pitch of spring coil.

b) Derive the relation for deflection of helical torsion spring.

[18]

OR

Write a short note on (any three) :

a) Types of springs.

b) Spring nomenclature.

c) Load-deflection derivation.

d) Types of spring.

❖ ❖ ❖ ❖

Total No. of Questions : 6]

SEAT No. :

P2025

[Total No. of Pages : 3

[4858] - 215

T.E. (Printing)

MANAGEMENT INFORMATION SYSTEM AND COST ESTIMATION

(2008 Pattern)

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

Instructions to the candidates:

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

SECTION - I

Q1) List down the various types of business organizations and explain any two types in detail with suitable examples. **[16]**

OR

Explain the difference between the elements of Competitive Environment for the Manufacturing industry and Service industry with suitable examples.

Q2) Explain the role of MIS in the process of deciding the strategy for the printing industry with suitable examples. **[16]**

OR

Draw the workflow of CIP3 and CIP4 technology.

Q3) Explain the structure of Decision Support System with suitable examples.**[18]**

OR

Explain the structure of Group Decision Support System with suitable examples.

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 labour: 15600

Direct expenses: 6420

Factory overheads are charged at 75% on labour 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) Labour cost

e) Overhead cost

f) Fixed cost

g) Variable cost

Q6) a) Estimate the cloth roll of 60 cms 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" x 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. **[18]**

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Total No. of Questions : 6] SEAT No. :

P3125 [Total No. of Pages : 3

[4858] - 216
T.E. (Printing) (Semester - II)
OFFSET MACHINES - II
(2008 Pattern)

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 books.***

SECTION - I

Q1) Explain the following related to roll to web processing. **[16]**

a) Reel width and reel diameter.

b) Roll core handling.

c) Festoon rollers.

d) Dancer roller function.

OR

Explain the following :

a) State different reel stands and their utility for newspaper and magazine printing. **[8]**

b) Explain the use of the following : **[8]**

i) Metering unit

ii) V and W pattern

Q2) a) What is the ink setting mechanism for heatset inks. How do these ink dry. **[8]**

b) Compare brush feed dampening systems to turbo dampening system used in newspaper industry. **[8]**

P.T.O.

OR

Explain why **[16]**

a) Packing required under plate and blanket.

b) Compressible blankets are better than incompressible blankets.

c) IPA is used in Fountain solutions.

d) Tower press is used in newspaper presses.

Q3) Describe combination type of dryer. Why different substrates require different dryer temperature. **[18]**

OR

a) Explain chopper folding mechanism and its use in commercial printing. Assume necessary sizes. **[10]**

b) Write significance of : **[8]**

i) Tucker blades and jaws

ii) Ribbon folder

SECTION - II

Q4) State factors affecting tension in printing unit. **[18]**

OR

Explain various tension zones in the web press. **[18]**

Q5) What is the use of antistatic devices in web offset. Why pre-heaters are required on web presses. **[16]**

OR

Explain **[16]**

a) Ink agitators

b) Web break sensors

c) Web steering devices

d) Pyrometers

Q6) Explain following troubles : **[16]**

a) Web sagging

b) Blistering in dryer

c) Tone value increase

d) Ink chalking

OR

Explain following problems occurring due to following defects : **[16]**

a) Slitter defect

b) Soft end and baggy end

c) Crushed core

d) Water damage

Total No. of Questions : 6]

SEAT No. :

P1988

[Total No. of Pages : 2

[4858]-217

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

STATISTICAL PROCESS CONTROL

(2008 Pattern) (Theory)

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

Instructions to the candidates:

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

SECTION - I

Q1) Explain the role of Histogram tool used in SPC with reference to the printing industry. **[16]**

OR

Explain the application of process mapping / flowcharting in solving the process problems with the help of suitable examples. **[16]**

Q2) Explain the various run chart patterns and its correlation with the process Problems with suitable examples. **[16]**

OR

Differentiate between Primary and Secondary type of Data. Give suitable examples of both, and also explain the importance of Primary and Secondary data in solving process problems. **[16]**

Q3) Explain the term sampling plan. And explain in detail the single and double sampling plan used in quality control. **[18]**

OR

Explain the Measures of Distribution and its application in Statistical Process Control with suitable examples. **[18]**

P.T.O.

SECTION - II

Q4) Differentiate between X bar R and X bar S chart in detail with suitable examples. **[16]**

OR

Differentiate between 'P' and 'np' chart in detail with suitable examples. **[16]**

Q5) Explain various techniques of process improvements with suitable examples. **[16]**

OR

Explain the method of implementing the SPC in an existing printing press with suitable examples. **[16]**

Q6) Explain Six Sigma concept with diagram in detail. **[18]**

OR

Explain the term DOE with suitable example and its application in process improvement. **[18]**

Total No. of Questions : 6] **SEAT No. :**

P3126 **[Total No. of Pages : 2**

[4858] - 218
T.E. (Printing) (Semester - II)
DIGITAL WORKFLOW AND IMAGE SETTING
(2008 Pattern)

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

Instructions to the candidates :

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***

SECTION - I

Q1) Explain the different modules of the PDF workflow. **[16]**

OR

What is workflow? Compare between conventional and digital workflow. **[16]**

Q2) Explain in details JDF workflow with its features. **[16]**

OR

What is file format? Which are the most common file formats used while a job is designed and being processed? **[16]**

Q3) Which are the different checks performed under Pre-flight checking? **[18]**

OR

Explain with neat diagram the External drum imagesetter principal. **[18]**

SECTION - II

Q4) Which are the steps followed while the image gets processed digitally? Explain each in details. **[16]**

OR

What is the significance of proofing? Which are the most common technologies used in industry today for proofing? Why these technologies are perferred over others? **[16]**

P.T.O.

Q5) What is job ticket? How is it useful for the smooth workflow of the job? **[16]**

OR

What are the techniques of compression? Explain in details any two commonly used techniques. **[16]**

Q6) Draw neat diagram of laser printer and explain its technology. **[18]**

OR

What are the options used while riping of the job; explain in details. **[18]**

Total No. of Questions : 6] SEAT No. :

P3514 [Total No. of Pages : 2

[4858] - 219
T.E. (Printing)
TECHNOLOGY OF FLEXOGRAPHY
(2008 Pattern)

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

Instructions to the candidates :

1) ***Answers to two sections should be written separately.***
2) ***Draw neat diagram wherever necessary.***

SECTION - I

Q1) Explain the benefits of photopolymer plate over rubber plate. **[18]**

OR

Explain in detail the properties of rubber plate. **[18]**

Q2) Explain the stages of Flexographic reproduction. **[16]**

OR

Calculate % shortening and new negative length for 2.84 mm plate thickness having printed length of 50 cm. **[16]**

Q3) Explain in detail photopolymer plate-making. **[16]**

OR

Explain standardization test for Back Exposure. **[16]**

SECTION - II

Q4) Explain the making of 1.7 mm flexo plate. **[16]**

OR

Explain in detail the impact of wash-out on plate reproduction. **[16]**

P.T.O.

Q5) Explain in detail CI Flexo process. **[18]**

OR

Describe in detail inline flexo press. **[18]**

Q6) Explain in detail role of Anilox cell structures in Flexography. **[16]**

OR

Explain in detail the role of doctor blade in ink transfer. **[16]**

Total No. of Questions : 12]

SEAT No. :

P1436

[Total No. of Pages : 4

[4858] - 220

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

THEORY OF PRINTING MACHINE & MACHINE DESIGN

(2008 Pattern)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Draw neat diagrams wherever necessary.***
3) ***Assume suitable data, if necessary.***
4) ***Figures to the right indicate full marks.***

SECTION - I

UNIT - I

Q1) a) State and derive the law of gearing. **[8]**

b) Explain force analysis in helical gears with neat sketch. **[8]**

OR

Q2) a) Define arc of contact and deduce the expression. **[8]**

b) Two 20º involute spur gears mesh externally and give a velocity ratio of 3. Module is 3 mm and the addendum is equal to 1.1 module. If the pinion rotates at 120 rpm, determine :

i) The minimum number of teeth on each wheel to avoid interference

ii) The number of pairs of teeth in contact **[8]**

UNIT - 2

Q3) In the epicyclic train shown in Fig. 3, the shaft with the arm is an output shaft. If the shaft on whom gears A and H are rigidly mounted rotates at 1400 rev/mm CCW, determine the speed of the output shaft. **[16]**

ELEMENT	A	C	D	G	E	F	H
TEETH	40	30	10	40	40	50	70

P.T.O.

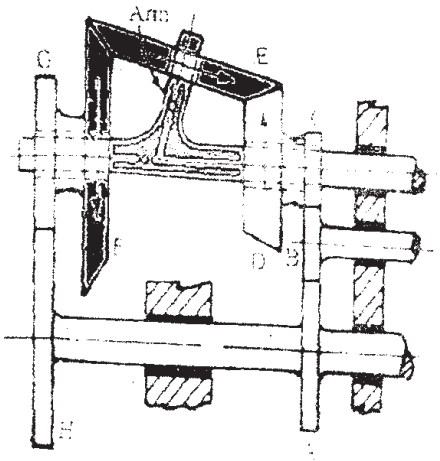


Fig. 3 Epi cyclic Gear Train

OR

Q4) In the epicyclic train shown in Fig. 4, the fixed internal gear B has 92 teeth. The wheels C and D have 25 and 15 teeth respectively. The wheel E has 52 teeth. The arm makes 260 rev/min and transmits 0.4 kw. **[16]**
Calculate :

a) speed of E
b) the resisting torque on E and
c) the holding torque on B

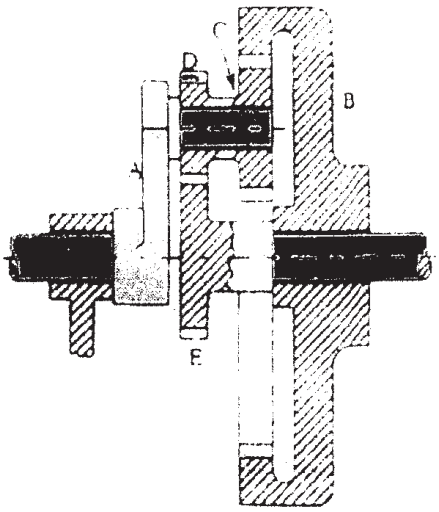


Fig. 4 Epi cyclic Gear Train

UNIT - 3

Q5) a) Explain different followers with neat sketch. **[8]**
b) Explain different types of follower motions drawing displacement diagrams. **[10]**

OR

Q6) a) Give detail classification of cams with neat sketches. **[8]**

b) The following data relate to a cam profile with follower moving with uniform acceleration and retardation during ascent and descent.
Min radius of cam: 25 mm
Roller dia: 7.5 mm
Lift: 28 mm
Offset of follower axis: 12 mm right
Angle of ascent: 60º
Angle of descent: 90º
First dwell: 45º
Speed of cam: 200 rpm.
Draw cam profile and find max velocity, Max acceleration during both strokes. **[10]**

SECTION - II
UNIT - 4

Q7) a) What are the causes of stress concentration? Explain the methods to reduce stress concentration. **[8]**

b) Explain S-N curve with neat sketch. **[8]**

OR

Q8) a) The work cycle of mechanical component subjected to completely reversed bending stress consists of the following three elements:
± 350 N/mm^2 for 85% of time
± 400 N/mm^2 for 12% of time
± 500 N/mm^2 for 3 % of time
Material for the component is 50C4. (S_{ut} = 660 N/mm^2) and the corrected endurance limit of the component is 280 N/mm^2. Determine life of component. **[10]**

b) Explain Size factor, Surface Finish factor and notch Sensitivity Factor. **[6]**

UNIT - 5

Q9) a) Write a short note on gear lubrication. **[8]**

b) Derive the expression for beam strength of spur gear. **[8]**

OR

Q10) a) Explain different modes of gear tooth failure. **[4]**

b) A 20° full-depth involute spur gear pair is to transmit 7.5 kw power from an electric motor running at 1440 rpm to the machine running at 320 rpm. The number of teeth on the pinion is just sufficient to avoid the interference. The pinion is to be made of plain carbon steel 55C8 (S_{ut} = 720 mpa) and gear is to be made of same material. The face

width of the gears is 12 times the module. The load distribution factor and application factor are 1.3 and 1.5 respectively. The factor of safety required is 1.5. The gears are to be machined to meet the specifications of grade 7. Design the gear pair using the velocity factor Kv = $\frac{5.6}{5.6+\sqrt{v}}$

e=11.0+0.9[m+0.25$\sqrt{d}$], Y=0.484-2.87/Z, K=0.16(BHN/100)^2, Q=2Z_g/Z_g+Z_p,

c=11500e. Also specify the surface hardness gear pair.

F_d=(21V(bc+Ftmax))/(21v+$\sqrt{}$(bc+Ftmax)) **[12]**

UNIT - 6

Q11) a) Explain Selection of rolling contact bearings from manufacturer's catalogue. **[8]**

b) Derive Steinbeck's equation with neat sketch. **[10]**

OR

Q12) a) Write a short note on Lubrication & mounting of bearings. **[8]**

b) A shaft transmitting 50 kw at 125 rpm from gear G_1 to gear G_2 and mounted on bearings B_1 and B_2 is shown in Fig. 12 b). The forces are

P_{t1} = 15915 N, P_{r1} = 5793 N

P_{t2} = 9549 N, P_{r2} = 3476 N

The diameter of the shaft at bearings is 75 mm. The load factor is 1.4 and the expected life for 90% of the bearings is 10000 hrs. Select suitable ball bearings.

6015: C=39.7 KN;6215=66.3 KN;6315=112 KN;6415=153 KN

Refer Fig. 12b. **[10]**

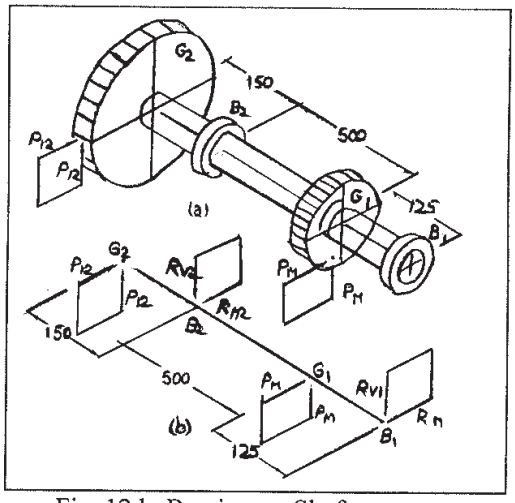


Fig. 12 b. Bearing on Shaft

Total No. of Questions : 12]

SEAT No. :

P2016

[Total No. of Pages : 6

[4858] - 221

T.E. (Petrochemical Engg.) (Semester - I)

NUMERICAL AND STATISTICAL METHODS

(2008 Pattern)

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 ro 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 indicate full marks.***
4) ***Use of logarithmic books, electronic pocket calculator is allowed.***
5) ***Assume suitable data if necessary.***

SECTION - I

Q1) a) Find all basic solutions to the system of equations : **[6]**

$$2x_1 + x_2 - x_3 = 2$$

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

b) Use simplex method to solve the following linear programming problem: **[10]**

Maximize $z = x_1 + 4x_2 + 5x_3$

Subject to the constraints :

$$3x_1 + 3x_3 \le 22$$

$$x_1 + 2x_2 + 3x_3 \le 14$$

$$3x_1 + 2x_2 \le 14$$

$$x_1, x_2, x_3 \ge 0$$

OR

Q2) a) Obtain the dual of the following : **[6]**

Maximize $z = x_1 - x_2 + 3x_3$

Subject to constraints : $x_1 + x_2 + x_3 \le 10$

$$2x_1 - x_3 \le 2$$

$$2x_1 - 2x_2 + 3x_3 \le 6$$

$$x_1, x_2, x_3 \ge 0$$

P.T.O.

b) Apply the principle of duality to solve : **[10]**

$$\text{Minimize} \quad z = 2x_1 + 2x_2$$

$$\text{subject to} \quad 2x_1 + 4x_2 \geq 1$$

$$x_1 + 2x_2 \geq 1$$

$$2x_1 + x_2 \geq 1$$

$$x_1, x_2 \geq 0$$

Q3) a) The firm XYZ corporation Ltd. manufactures a single product in three plants I, II and III. The three plants have produced 60, 35, 40 units respectively during a month. the firm had made a commitment to sell 22 units to customer A, 45 units to B, 20 units to C, 18 units to D and 30 units to E. Find the minimum possible transportation cost of shifting the manufactured product to the five customers. The net per unit cost of transporting from the three plants to five customers is given below: **[10]**

		Customer				
		A	B	C	D	E
Plant	I	4	1	3	4	4
	II	2	3	2	2	3
	III	3	5	2	4	4

b) Solve the following assignment problem for minimum assignment time. The time required by each machine for performing the jobs is given below : **[6]**

		Job				
		1	2	3	4	5
Machine	A	8	4	2	6	1
	B	0	9	5	5	4
	C	3	8	9	2	6
	D	4	3	1	0	3
	E	9	5	8	9	5

OR

Q4) a) Solve the following transportation problem for minimum cost. Use Vogel's Approximation method for initial basic feasible solution. **[10]**

		to				
		D_1	D_2	D_3	D_4	Availability
From	O_1	5	3	6	2	19
	O_2	4	7	9	1	37
	O_3	3	4	7	5	34
Demand		16	18	31	25	

b) The head of the department has five jobs A, B, C, D, E and five sub-ordinates V, W, X, Y, Z. The number of hours each man would take to perform each job is as follows : **[6]**

	V	W	X	Y	Z
A	3	5	10	15	8
B	4	7	15	18	8
C	8	12	20	20	12
D	5	5	8	10	6
E	10	10	15	25	10

How should the jobs be allocated to minimize the total time?

Q5) a) Find the coefficient of correlation for the following data : **[7]**

x	:	10	14	18	22	26	30
y	:	18	12	24	6	30	36

b) In a certain factory manufacturing brass pins, there is a small chance $\frac{1}{500}$ for any pin to be defective. The pins are supplied in a packet of 10. Use poisson distribution to calculate the approximate number of packets containing two defective pins in a consignment of 10,000 packets. **[5]**

c) The mean and variance of Binomial Distribution are 6 and 2 respectively. Find probability $p(r \geq 1)$. **[6]**

OR

Q6) a) For the following data, find the lines of regression. **[7]**

x :	10	14	19	26	30	34	39
y :	12	16	18	26	29	35	38

Estimate x for y = 29.5.

b) One hundred samples were drawn from a production process each after 5 hours. The number of defectives in these samples were noted. A poisson distribution by estimating the parameter m was fitted to the data. The results obtained are as follows : **[5]**

Number of defectives	Number of samples (observed)	Expected Number of samples
0	63	60.65
1	28	30.33
2 and above	9	9.02

Test the goodness of fit of poisson distribution in above situation.

Given $\chi^2_{1:0.05} = 3.841$

c) A sample of 100 dry battery cells tested to find the length of life shows the average life of a cell is 12 hours with standard deviation 3 hours. Assuming the data to be normally distributed, what percentage of battery cells are expected to have life between 10 and 14 hours. **[6]**

Give : z = 0.67, area = 0.2487

SECTION - II

Q7) a) With usual notations establish the following : **[9]**

i) $\mu\delta = \frac{\Delta}{2} + \frac{\Delta E^{-1}}{2}$

ii) $\frac{1}{2}\delta^2 + \delta\sqrt{1+\delta^2/4} = \Delta$

iii) $\Delta^2 = (1+\Delta)\delta^2$

b) Calculate $\int_{0.5}^{0.7} e^{-x} x^{\frac{1}{2}} dx$, taking 5 ordinates by simpson's $\frac{1}{3}$ rule. **[8]**

OR

Q8) a) Find $\frac{dy}{dx}$ given **[8]**

x	0	1	2	3	4
y (x)	1	1	15	40	85

Hence find $\frac{dy}{dx}$ at x = 0.5.

b) Use simpson's $\frac{1}{3}$ rule, to find $\int_0^{0.6} e^{-x^2} dx$ by taking seven ordinates. **[9]**

Q9) a) Using Newton-Raphson method, find a root of the function $f(x) = e^x - 3x^2$, taking the starting value of x as $x_o = 1$. **[8]**

b) Solve the system of equations by Gauss-Seidel method. **[9]**

$$27x_1 + 6x_2 - x_3 = 85$$
$$6x_1 + 15x_2 + 2x_3 = 72$$
$$x_1 + x_2 + 54x_3 = 110$$

OR

Q10)a) Use Gauss elimination method to solve the system of equations. **[9]**

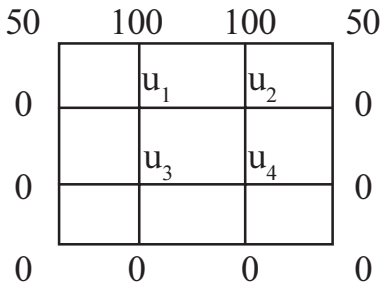
$$2x_1 + 3x_2 + 5x_3 = 23$$
$$3x_1 + 4x_2 + x_3 = 14$$
$$6x_1 + 7x_2 + 2x_3 = 26$$

b) By the method of least squares, find the straight line that best fits the following data : **[8]**

x	1	2	3	4	5
y	14	27	40	55	68

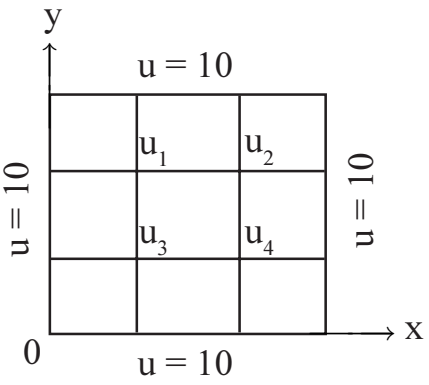
Q11)a) Given $\frac{dy}{dx} = x^2 - y, y(0) = 1, \text{find } y(0.1), y(0.2)$ using Runge - Kutta method of 4th order. **[8]**

b) Solve $\frac{\partial^2 y}{\partial x^2} + \frac{\partial^2 y}{\partial y^2} = 0$ for the following square meshes with boundary conditions as given below : **[8]**



OR

Q12)a) Solve the poisson equation $\frac{\partial^2 u}{\partial x^2}+\frac{\partial^2 u}{\partial y^2}=-x^2y^2$. over the square region bounded by the lines x = 0, y = 3, x = 3, y = 0, given that u = 10 throughout the boundaries taking h = k = 1. **[8]**



b) Solve $\frac{dy}{dx}=1+yx, y(0)=2,$ Find y (0.1) y (0.2) and y (0.3) by Euler's method. **[8]**

Total No. of Questions : 12]

SEAT No. :

P1989

[Total No. of Pages : 3

[4858]-222

T.E. (Petrochemical Engineering) (Semester- I)

APPLIED HYDROCARBON THERMODYNAMICS

(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) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q5. or Q.6, Q.7 or Q.8, Q.9 or Q.10, 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 third law of thermodynamics. Give its significance. **[8]**

b) Formulate the first law of thermodynamics for non-flow systems. **[8]**

OR

Q2) a) A refrigerator operates in surroundings of 300 K. Determine the minimum amount of work required to freeze 1 kg of water at 273 K by this refrigerator. Also find the heat given up to the surroundings. The latent heat of fusion of ice at 273 K is 334.11 kJ/kg. **[8]**

b) Explain the concept of entropy. **[8]**

Q3) a) Write a note on the virial equation. Explain the significance of the virial coefficients. **[8]**

b) Explain the terms: saturation temperature, saturation pressure, reduced temperature, critical temperature. **[8]**

OR

Q4) a) A cylinder of 0.01 m^3 volume is filled with 0.727 kg of n-octane at 427.85 K. Assuming that n-octane obeys the van der Waals equation of state, calculate the pressure of the gas in the cylinder. The van der Waals constants are 3.789 Pa$(m^3/mol)^2$ and 2.37×10^{-4} m^3/mol respectively. **[8]**

P.T.O.

b) Calculate the specific volume of steam at 500°C and 300 bar using **[8]**

i) the ideal gas law

ii) generalized compressibility charts Given: critical constants for water are T_c = 647.30 K and P_c = 221.20 bar. (*Use the chart in the appendix of this paper on the last page*)

Q5) a) Write a note on the Clausius-Clayperon equation. Derive the same. **[9]**

b) Differentiate between reference properties, energy properties and derived properties. **[9]**

OR

Q6) a) What are the Maxwell relations? Give the importance of these relations. **[8]**

b) Describe any two methods used to find the fugacity of a pure gas. **[8]**

SECTION - II

Q7) a) How do you estimate the dew point temperature and bubble point temperature for a multicomponent system? **[9]**

b) With proper phase diagrams, distinguish between minimum and maximum bioling azeotropes. **[9]**

OR

Q8) a) Construct a T-x-y diagram and the equilibrium diagram from the following data for n-heptane and n-octane **[18]**

T,K	371.4	378	383	388	393	398.6
P_A, kPa	101.3	125.3	140	160	179.9	205.3
P_B, kPa	44.4	55.6	64.5	74.8	86.6	101.3

Q9) a) Give the methods of determining partial molar properties. Describe any one in detail. **[8]**

b) Discuss the Gibbs Duhem equation and its various forms. What are the major fields of application of the Gibbs-Duhem equation? **[8]**

OR

Q10) a) Water (1) – Hydrazine (2) system forms an azeotrope containing 58.5% (mol) hydrazine at 393 K and 101.3 kPa. Calcuate the equilibrium vapour composition for a solution containing 20% (mol) hydrazine. The relative volatility of water with respect to hydrazine is 1.6 and may be assumed to be constant over the temperature range involved. The vapour pressure of hydrazine at 393 K is 124.76 kPa. **[16]**

Q11) a) One mole steam undergoes water gas shift reaction at a temperature of 1100 K and a pressure of 1 bar **[16]**

$$CO\ (g) + H_2O\ (g) \rightarrow CO_2(g) + H_2(g)$$

The equilibrium constant for the reaction is K = 1. Assuming ideal gas behavior, calculate the fractional dissociation of steam in the following cases:

i) CO supplied is 100% excess of the stoichiometric requirement.

ii) CO supplied is only 50% of the theoretical requirement.

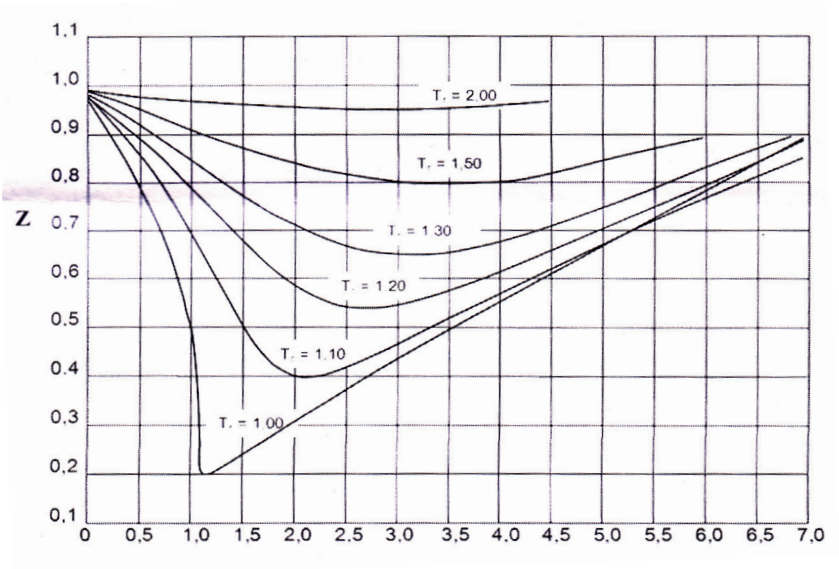
OR

Q12) a) Discuss the phase rule for reacting systems. **[8]**

b) Write a note on the van't Hoff equation. **[8]**

Appendix

Generalized Compressibility Chart



Total No. of Questions : 8]

SEAT No. :

P3609

[Total No. of Pages : 4

[4858] - 223
T.E. (Petrochemical)
MASS TRANSFER - I
(2008 Pattern) (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, wherever necessary.***
5) ***Use of steam tables and electronic calculator is allowed.***

SECTION - I

Q1) Answer the following questions in brief : **[16]**

a) Describe in brief gas diffusivity measurement.

b) Write a note on convective mass transfer.

c) Compare Fick's first and second laws of diffusion.

Q2) In absorption of component A from flue gas into an aqueous solvent, at a particular point in the column, the partial pressure of A on gas side is P_{AG} = 0.05 atm and concentration of A on liquid side is C_{AL}= 0.04 mol/m^3. The Henry's constant for A in the solvent is 90 atm. cm^3 / mol. The overall gas side mass transfer coefficient is given as 5×10^{-6} gmol / cm^2.sec. atm. It is also given that 40% of the total resistance to mass transfer lies in the liquid film. **[18]**

Determine

a) The thermodynamically preferred direction of mass transfer.

b) Molar flux of A in the preferred direction.

P.T.O.

Q3) In a gaseous catalytic dimerization reaction of A, A is diffusing across a film at catalyst surface where it reacts instantaneously and irreversibly. Reaction rate at the catalyst surface is solely decided by mass transfer of A to the surface. Calculate local reaction rate in Kmol A per hr per m^2 surface area of the catalyst. **[16]**

DATA : Gas side contains 90% A and the rest inerts. Pressure and temperature : 300 KPa and 180 C respectively. Assume film thickness to be 1×10^{-4} m and diffusivity of A through the film to be 1×10^{-9} m^2/s.

Q4) a) Discuss a method for solving liquid-liquid extraction problems involving cascaded stages of cross-flow contact between two phases.

b) Define volumetric mass transfer coefficient and state how it is measured.

[16]

SECTION - II

Q5) A stream of air with a bulk velocity of 10 m/sec at 100 kPa pressure and 340 K is flowing on the top surface of a thin flat sheet of solid naphthalene of length 0.2 m and width of 0.05 m. Calculate the rate of loss of naphthalene from the surface **[16]**

Data: -

Kinematic viscosity of air = 1.8×10^{-5} m^2/s

Mass diffusivity of naphthalene vapour in air = 5.5×10^{-6} m^2/ sec

Vapor pressure of naphthalene at 340 K = 0.19 mm Hg

Q6) A batch of solids is to be dried from 45% on wet basis to the moisture content that is 20% higher than the equilibrium moisture. The initial weight of the wet solids is 100 Kg and the drying surface is reported to be 0.4 m^2 per 50 kg of dry weight. The critical moisture content is 20% wet basis and constant drying rate is 0.45 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 in Kg/m^2.hr. Calculate the batch time required for given drying duty.

Q7) Report the following by using humidity chart for air-water system with reference to the air having dry bulb temperature of 55 C and wet bulb temperature of 20 C. **[18]**

i) Relative saturation.

ii) Dew point temperature.

iii) Heat to be added per kg of dry air under 1 bar pressure so as to decrease the relative saturation by 20%.

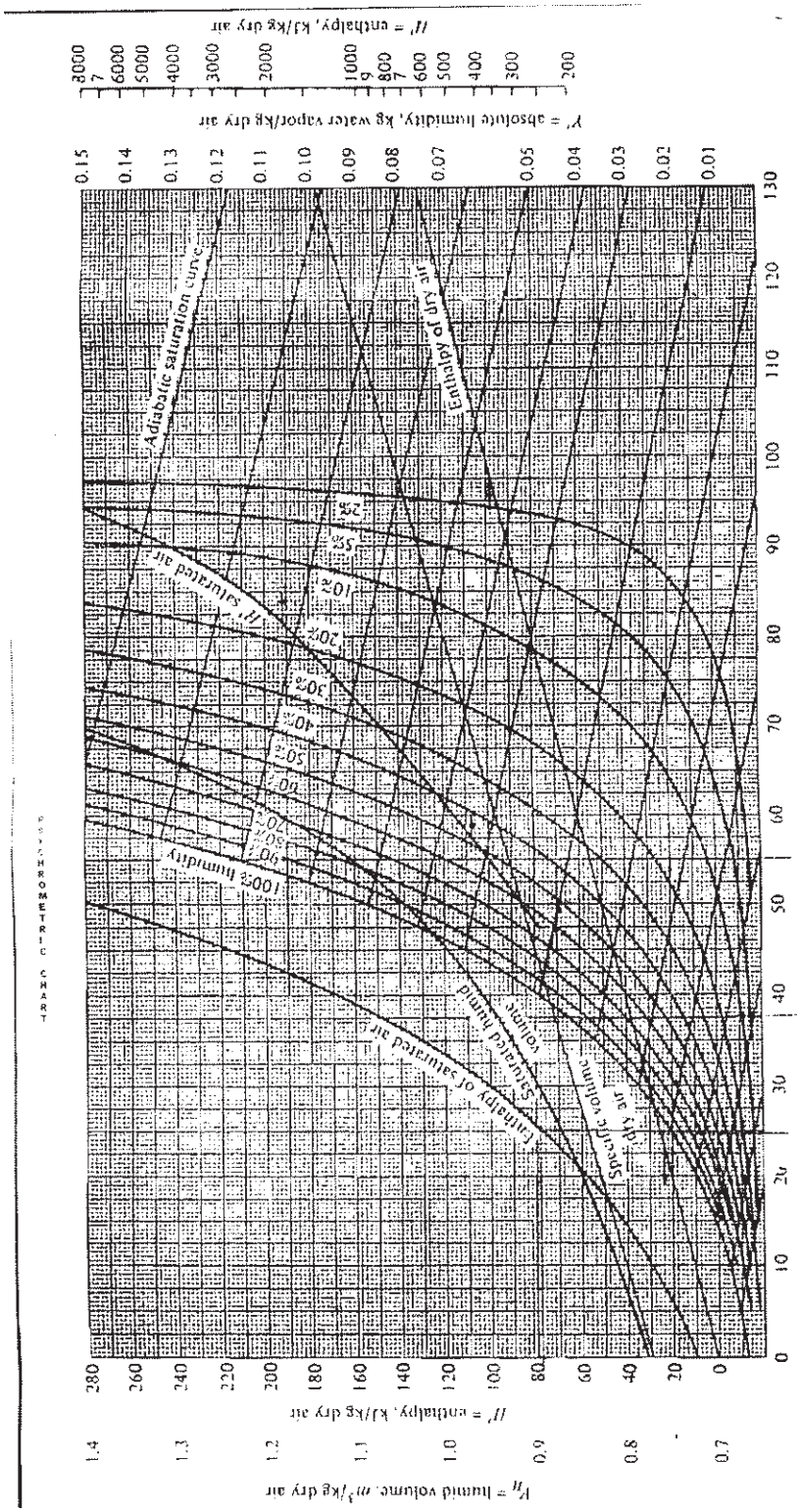
Q8) Write notes : **[16]**

a) Types of Cooling tower.

b) Rotary dryer.

c) Spray Column.

d) Venturi Scrubber.


PSYCHROMETRIC CHART
H' = enthalpy, kJ/kg dry air
Y' = absolute humidity, kg water vapor/kg dry air
H' = enthalpy, kJ/kg dry air
V_H = humid volume, m^3/kg dry air
Adiabatic saturation curve
Enthalpy of dry air
Saturated air
100% humidity
Enthalpy of saturated air
Saturated humid volume
Specific volume of dry air

Total No. of Questions : 8]

SEAT No. :

P3610

[Total No. of Pages : 2

[4858] - 224

T.E. (Petrochemical)

PETROCHEMICAL PROCESSES - I

(2008 Pattern)

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) Discuss in the uses and potential growth of the following important petrochemicals at global and national level : **[16]**

a) LLDPE b) LAB

c) PVA d) PVC.

Q2) Discuss the main engineering challenges involved in the process of aromatic nitration. **[16]**

Q3) Discuss pertinent properties, consumption pattern, method of production and engineering problems therein for **[16]**

a) Phenol

b) Ethylene Oxide

Q4) a) Discuss reactive distillation. **[18]**

b) Explain engineering challenges involved in alkylation of benzene.

P.T.O.

SECTION - II

Q5) a) Discuss how chemicals can be produced from biomass.

b) Describe in brief lactic acid production from whey.

[16]

Q6) a) Explain in detail suspension polymerization.

b) Discuss in detail how molecular weight distribution can affect the properties of polymers.

[16]

Q7) a) Explain in brief manufacture of carbon nanotubes (CNT).

b) Write a note on possible applications of CNT in chemical process industry.

[18]

Q8) Write notes : **[16]**

a) Bioreactor

b) Catalyst in Polymer Synthesis

c) Polystyrene outlets

d) Ethylene Glycol process

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Total No. of Questions : 6] SEAT No. :

P3127 [Total No. of Pages : 2

[4858] - 225
T.E. (Petrochemical Engineering)
INSTRUMENTATION AND INSTRUMENTAL ANALYSIS
(2008 Pattern) (Semester - I)

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

Instructions to the candidates :

1) ***Attempt Q1 or 2, Q3 or 4, Q 5 or 6, Q7 or 8, Q9 or 10, Q11 or 12.***
2) ***Figures to the right indicate full marks.***
3) ***Use of electronic calculators, steam table is allowed.***
4) ***Draw neat sketch wherever necessary.***

SECTION - I

Q1) a) Explain the types of measurement uncertainties in detail. **[8]**

b) Define : Accuracy, Precision, Repeatability, Reproducibility, Hysterisis, Drift, Fidelity, Dead zone. **[8]**

OR

a) Give the classification of the measuring instruments. **[8]**

b) Explain hierarchy of standards and calibration. **[8]**

Q2) a) Explain the principle, construction and working of a radiation pyrometer. **[8]**

b) Explain pressure measurement using different types of manometers. **[8]**

OR

a) Explain the various types of level indicators using magnetic properties. **[8]**

b) Write a note on electromagnetic flow meter. **[8]**

Q3) 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]**

P.T.O.

OR

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) Describe the various sampling techniques. **[8]**

b) Write a note on HPLC. **[8]**

OR

a) Classify analysis instruments. **[8]**

b) Write a note on NMR spectroscopy. **[8]**

Q5) 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

a) Discuss CO analyzer. **[8]**

b) Write a note on the mass spectrometer. **[8]**

Q6) 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

a) Explain composition analysis using refrective index method. **[6]**

b) Describe in brief pH measurement. **[6]**

c) Discuss the various methods of density measurement. **[6]**

Total No. of Questions : 12]

SEAT No. :

P1437

[Total No. of Pages : 2

[4858] - 226

T.E. (Petrochemical)

PETROCHEMICAL PROCESSES - II

(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 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) Discuss the various non-conventional sources of energy. **[8]**

b) State the low boiling components of a refinery and discuss their applications. **[8]**

OR

Q2) a) Draw a neat labeled diagram of the refinery flow diagram. **[8]**

b) Define: Cetane Number, Aniline Point, API Gravity, Smoke Point. **[8]**

Q3) a) Explain the need for desalting of crude oil. What are factors affecting the desalting process? **[8]**

b) Discuss the various methods of dewaxing of lube oil base stock. Hence elaborate the process of DILCHILL dewaxing. **[8]**

OR

Q4) a) Discuss the types of reflux employed in atmospheric distillation. **[8]**

b) Discuss the various factors affecting the alkylation process. **[8]**

Q5) a) Discuss the various process variables affecting the FCC operation. **[9]**

b) Explain the process of delayed coking. **[9]**

OR

P.T.O.

Q6) a) What is the need for sulphur recovery in the refinery? Discuss the once through Claus process for the sulphur recovery from refinery gases. **[9]**

b) What are the desirable properties of bitumen? How will you enhance these properties? Explain. **[9]**

SECTION - II

Q7) a) What are the various aromatic conversion processes? Explain any one. **[9]**

b) What is catalytic reforming? Explain the reactions that take place in catalytic reforming. **[9]**

OR

Q8) a) Give the various processes for recovery of hydrogen in refinery? Explain any one. **[9]**

b) How is steam cracking used in the production of olefins? **[9]**

Q9) a) Describe in brief the various characteristics of polymers. **[8]**

b) Give the various process technologies for the manufacture of polyethylene. **[8]**

OR

Q10) a) Discuss the manufacture of polyvinyl chloride by emulsion polymerization and suspension polymerization. **[8]**

b) Describe the method of manufacture of phenol formaldehyde resin. **[8]**

Q11) a) Describe the AMCO process for the manufacture of Terepthalic Acid. **[8]**

b) Discuss the various process steps in the manufacture of Nylon 66. **[8]**

OR

Q12) a) Give the manufacturing process for polyester from dimethyl terepthalate (DMT). **[8]**

b) Discuss the various routes for the manufacture of adipic acid. **[8]**

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Total No. of Questions : 8] SEAT No. :

P3509 [Total No. of Pages : 3

[4858]-227
T.E. (Petrochemical)
MASS TRANSFER - II
(2008 Pattern) (Semester - II)

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 answerbooks.***
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 benzene and toluene. The column is supposed to recover bottom and top products at 99% purity each. For 100 Kmol/hr of 30% vaporized feed having 40 mol% benzene, **[18]**

a) Calculate distillate and bottoms stream rates,

b) Assuming relative volatility of benzene as 3.5 with respect to toluene, calculate minimum reflux ratio.

c) Calculate the number of theoretical stages required and the optimum feed location.

d) Calculate the vapor and liquid flow rates in the column in Kg/hr.

Q2) With reference to flash distillation, answer the following : **[16]**

a) Where it is used in refinery processes?

b) A feed to flash vessel consists of equimolar saturated liquid mixture of A and B at the flow rate of 1500 Kmol/hr. Temperature and pressure of the flash chamber are such that the feed gets 40% vaporized. Assuming relative volatility of A as 1.36 with respect to B, calculate the vapor and liquid product flow rates and their compositions.

P.T.O.

Q3) With reference to steam distillation, answer the following : **[16]**

a) Discuss the basic governing equation for calculating temperature.

b) At the operating steam distillation temperature, vapor pressures of water and a heavy organic (MW 195) are 710 mm Hg and 50 mm Hg respectively. What will be the composition of the distillate in wt%?

Q4) Write precise notes : **[16]**

a) Theoretical stage

b) Azeotropic behaviour

c) Operating reflux ratio

SECTION - II

Q5) Calculate the number of ideal trays required for the absorber designed for removing organic vapors from a gas. Feed gas flow rate is 20.0 m^3/s at NTP and contains 3% by volume organic vapors. Expected recovery is 90% Solvent (MW 150) fed counter-currently is pure and is fed at the rate of 1.5 times the minimum. Henry's law statement is given as : $y = 0.175x$, where y is gas side mol fraction of the organic and x is solvent side mol fraction at equilibrium. **[18]**

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 : $y = 0.92\ x$ where y is kg nicotine/kg kerosene and x is kg nicotine/kg water at equilibrium, Water and kerosene are not miscible with each other. The scheme of extraction is to contact 200 kg of the aqueous solution containing 1 wt% nicotine with 90 kg pure kerosene in a single equilibrium contact. Calculate % recovery of nicotine from the feed solution. Assume kerosene and water are immiscible with each other. **[16]**

Q7) With reference to adsorption as a unit operation write the following notes : **[16]**

a) Law of equilibrium

b) Choice of adsorbent

c) Temperature Swing Adsorption

Q8) Component X in water is to be recovered using pure Y as solvent. Distribution law for X in water and Y at equilibrium is given by : $y = 0.9\ x$ where y is kg X/kg Y and x is kg X/kg water. Water and Y are not miscibel with each other. Compare recovery of X using 3 stages with the recovery obtained using single stage option. The ratio of total Y to feed water remains the same at 2:1 in both the cases. In multi-stage option, solvent can be assumed to be evenly distributed over the stages. Solve graphically. **[16]**

Total No. of Questions : 10]

SEAT No. :

P2026

[Total No. of Pages : 4

[4858] - 228

T.E. (Petrochemical Engineering)

REACTION ENGINEERING - I

(2008 Pattern) (Semester - II)

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

Instructions to the candidates:

1) ***Question No.1 and 6 are Compulsory***
2) ***Answer Any Two questions each from remaining questions from Section - I and Section - II.***
3) ***Answers to the Two Sections should be written in separate answer books.***
4) ***Neat diagrams must be drawn and well commented***
5) ***Use of logarithmic tables and electronic pocket Calculator is allowed.***
6) ***Figures to the right indicate full marks.***
7) ***Assume suitable data, if necessary.***

SECTION - I

Q1) AttemptAny Three from the following : **[18]**

a) A human being (75 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) Milk is pasteurized if it is heated to 63°C for 30 min, but if it is heated to 74°C it only needs 15 s for the same result. Find the activation energy of this sterilization process.

c) At 500 K, the rate of a bimolecular reaction is ten times the rate at 400K. Determine the activation energy of this reaction :

   a) From Arrhenius Law

   b) From Collision theory.

   c) What is the percentage difference in rate of reaction at 600 K predicted by these two methods?

P.T.O.

d) Derive an expression for a Second order irreversible reaction taking place in an isothermal variable volume batch reactor.

e) Define elementary and non- elementary reactions, molecularity and order of reaction. Discuss in brief temperature dependency according to Arrhenius theory.

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) Using the integral method of analysis, obtain a relationship for determining 'k' for a Second order reversible reaction. **[8]**

Q3) a) For irreversible first order reaction, $A \xrightarrow{k_1} B \xrightarrow{k_2} C$, the values of rate constants k_1 and k_2 are reported as 0.19 min^{-1} and 0.12 min^{-1} respectively.

Calculate

i) the time at which the concentration of B is maximum.

ii) maximum concentration of B

Data: C_{A0} = 1.25 mole/liter. **[8]**

b) Describe in adequate detail, showing all necessary steps, how you would calculate the time required to achieve 90% conversion of *A*. You need NOT calculate the numerical value of the time required. **[8]**

Q4) The following liquid-phase reaction is taking place under isothermal conditions in a continuous stirred tank reactor (CSTR) operated at steady-state:

$$A + B \xrightarrow{k} products$$

The reaction rate is given by $r_A = -kC_A$, with $k = 0.0257$ per h. The total volumetric flow rate is 1.8 m^3/h. The inlet molar flow rates of *A* and *B* are 1 mol/h and 2 mol/h, respectively. Conversion of A required is 40%. Determine the CSTR volume required, if, for safety, it can only be filled to 75% capacity. **[16]**

Q5) A liquid-phase reaction involving the following two parallel steps is to be carried out in an isothermal plug flow reactor (PFR) operated at steady state: **[16]**

$$A \xrightarrow{k_1} P; \quad r_P = k_1 C_A$$
$$P \xrightarrow{k_2} Q; \quad r_Q = k_2 C_P$$

Assume that the feed contains only A at a concentration of 1.0 mol/litre. 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

SECTION - II

Q6) Attempt Any Three from the following : **[18]**

a) Explain the graphical procedure for finding the composition in a series of unequal sized mixed reactors for which the space times are known.

b) Explain recycle ratio and derive the performance equation of recycle plug flow reactors.

c) A first order reaction is to be treated in a series of two mixed reactors. Show that the total volume of the two reactors is minimum when the reactors are equal in size.

d) Discuss equal sized mixed flow reactors in series.

e) Explain in brief Optimum temperature progression

f) Write a note on : Causes of nonideality behavior in process vessels.

Q7) Between 0°C and 100°C determine the equilibrium conversion for the elementary aqueous reaction **[16]**

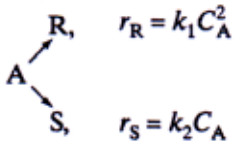
$$A \Leftrightarrow R, \begin{cases} \Delta G^0_{298} = -14630 \text{ J/mole} \\ C_{P_A} = C_{P_R} = \text{Constant} \\ \Delta H^0_{298} = -75900 \text{ J/mole} \end{cases}$$

a) Present the results in the form of a plot of temperature versus conversion.

b) What restrictions should be placed on the reactor operating isothermally if we are to obtain a conversion of 75% or higher

Q8) a) Explain the best operating conditions for parallel reactions. **[6]**

b) Substance A in the liquid phase produces R and S by the following reactions: **[10]**



The feed (C_{A0} = 1.0, C_{R0} = 0, C_{S0} = 0.35) enters two mixed flow reactors in series (τ_1 =2.5 min, τ_2 =10min.)

Knowing the composition in the first reactor (C_{A1} = 0.5, C_{R1} = 0.18, C_{S1}, = 0.6), find the composition leaving the second reactor.

Q9) Derive an expression for a first order and second order reaction system of N equal- size mixed reactors in series. Show final graphical representations of the final equations. **[16]**

Q10) A large tank (860 liters) is used as a gas-liquid contactor. Gas bubbles up through the vessel and out the top, liquid flows in at one part and out the other at 5 liters. To get an idea of the flow pattern of liquid in this tank a pulse of tracer (M = 150 gm) is injected at the liquid inlet and measured at the outlet, as shown in Figure 1. **[16]**

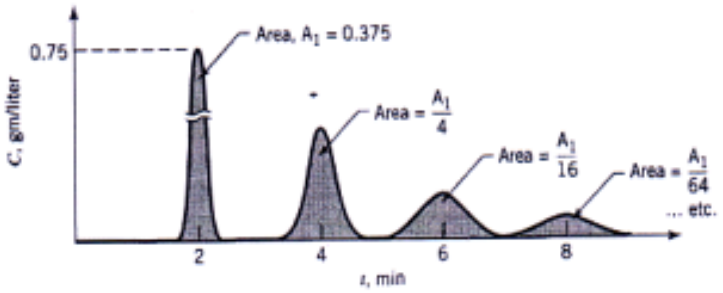


Figure 1

a) Is this a properly done experiment?

b) If so, find the liquid fraction in the vessel.

c) Determine the E curve for the liquid.

d) Qualitatively what do you think is happening in the vessel?

● ● ●

Total No. of Questions : 12] SEAT No. :

P3128 [Total No. of Pages : 4

[4858] - 229
T.E. (Petrochemical Engg.)
TRANSPORT PHENOMENA
(2008 Pattern)

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

Instructions to the candidates :

1) ***Answer 3 questions from each sectoin.***
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, electronic pocket calculator, and steam table is allowed.***
6) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Discuss the importance of Transport Phenomena discuss the macroscopic versus microscopic view of it. **[8]**

b) Heat is conducted through a metal rod, draw neat diagram and expalin the process with help of mathematical expression. List down the assumptions if any. **[8]**

OR

Q2) a) With help of neat diagram differentiate between Newtonian and non-Newtonian fluids. **[8]**

b) Write a short note on analogies between Heat, Mass and Momentum transfer - discuss their usefulness. **[8]**

Q3) a) Derive three dimensional form of mass conservation equation over a control volume. **[8]**

b) Derive Boundary Layer equation for the Momentum transfer. **[8]**

OR

Q4) a) A smooth flat plate is exposed to wind velocity of 6 km/mimute. If the

P.T.O.

laminar boundary layer exists upto a value of $Re=2\times10^5$, find the maximum distance upto which laminar boundary layer exists and its maximum thickness. **[8]**

b) Derive Navier Stokes equation and give the significance of each term involved in it. **[8]**

Q5) 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) Explain with neat sketch the thermal boundary layer and with respect to Prandtl number variation compare it with the hydrodynamic boundary layer. **[10]**

OR

Q6) a) What is turbulence? Discuss the effect of turbulence on process plants. What is intensity of turbulence and scale of turbulence? **[9]**

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 lenght 0.2 m with a velocity 20m/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 **[9]**

Calculate :

i) the average mass transfer coefficient over the flat plate

ii) the rate of loss of naphthalene

SECTION - II

Q7) a) It is desired to agitate a liquid having viscosity of 2.2×10^{-3} Pa.s and density 1200kg/m^3 in a tank having a diameter of 1.20 m. The agitator will be a six-blade open turbine having a diameter of 0.6 m operating at 180 rpm. The tank has four vertical baffles, assume standard values for *W* and *J*. Calculate the required kW. (Use the graph provided at the end). **[8]**

b) With help of suitable industrial examples explain the purpose of agitation. **[8]**

OR

Q8) a) Name various types of agitator normally used - provide a comparative study of them. **[6]**

b) A turbine agitator having six blades and a disk diameter of 0.203m is used in a tank having diameter of 0.61m and height of 0.61m. The width W=0.0405 m. Four baffles are used with J=0.051m. The turbine operates at 275 rpm in a liquid having density 909 kg/m^3 and viscosity of 0.020 Pa.s. Scale up the system to a vessel having a volume of 40 times the original for the case of equal mass transfer rates. (Graph provided at the end can be used). **[10]**

Q9) a) Cold water available at 10^{o}C is flowing through pipe of 10 cm diameter. The wall of the pipe is maintained at constant temperature of 50^{o}C. 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]**

OR

Q10)a) A steel plate of 750 × 750 mm^2 has its two adjacent sides maintained at 100^{o}C while other two sides are kept constant at 0^{o}C. Draw a neat diagram of the process and obtain the relevant mathematical expressions. **[8]**

b) Obtain the generalized Unsteady state Conduction Equation. **[8]**

Q11)a) With help of a neat sketch derive the mathematical expression for 1-Dimensional Unsteady State Molecular Diffusion through a slab. **[6]**

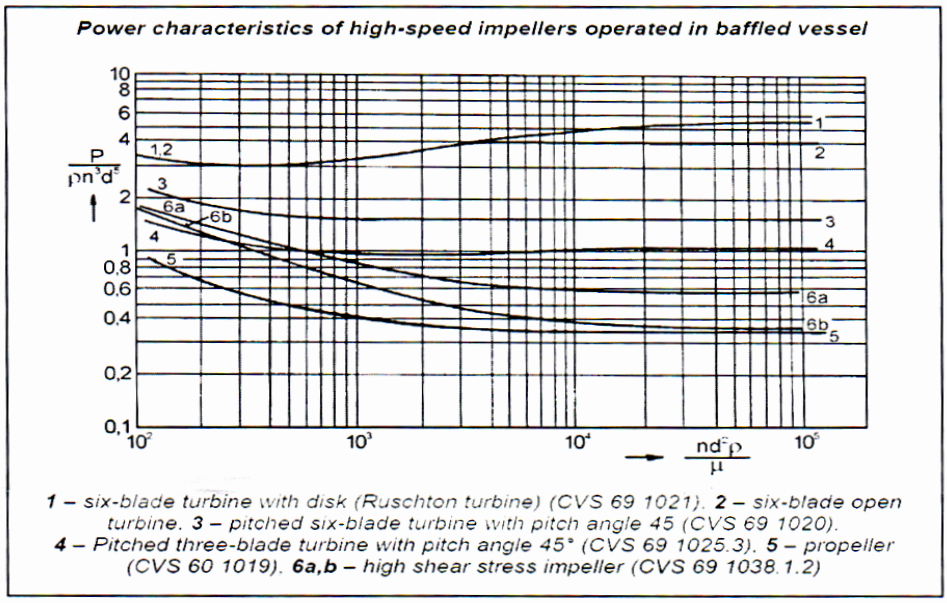
b) Obtain the Finite Difference discretization of the above defined problem.Aslo provide the simplified Schmidt method expression. **[6]**

c) Write a short note on Turbulent Mass Diffusivity. **[6]**

OR

Q12)a) A solid slab 0.01m thick has an initial uniform concentration of solute *A* of 1.0 kg mol/m^3. The diffusivity of *A* in the solid is D_{AB}=1.0×10–10^{-10}m^2/s. All surfaces of the slab are insulated except the top surface. The surface concentration is suddenly dropped to zero concentration and kept constant at that value. Unsteady-state diffusion occurs in the one x-direction with rear surface insulated. Using a numerical method, determine concentrations after 12 × 10^4 seconds. Use $\triangle$x=0.002 m and *M*=2.0. The value of *K* can be considered to be 1. **[10]**

b) What do you mean by turbulent shear stresses? Express Reynolds Average Navier Stokes equation and give the significance of each term involeved. **[8]**



Total No. of Questions : 12]

SEAT No. :

P1438

[Total No. of Pages : 4

[4858] - 230

T.E. (Petrochemical Engineering)

PROCESS EQUIPMENT DESIGN & DRAWING

(2008 Pattern) (Semester -II)

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

Instructions to the candidates:

1) ***Answers 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) ***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 is difference between Mechanical design and Process design? **[7]**

b) What do you mean by stress concentration? What are the causes of stress concentration? **[7]**

c) What do you mean by Factor of Safety? **[2]**

OR

Q2) a) How Factor of Safety (FOS) is important in design? What is general limit of FOS taken in designing various types of equipment? Discuss the factor on which this limit depends. **[8]**

b) How codes and standard provides facility to design engineer? Name 8 organizations which create Code and Standards. **[8]**

Q3) 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. **[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 150°C	= 140 N/mm^2
Internal pressure	= 0.35 N/mm^2
Weight	= 38000 N
Joint Efficiency	= 0.85
Torque offset piping	= 500 N-m

Material used is stainless steel.

OR

Q6) a) Draw different types of heads used in pressure vessel along with their criteria for selection. **[9]**

b) Write a note on overprotection devices used in pressure vessel. (with neat sketch). **[9]**

i) Pressure relief valves

ii) rupture disc

iii) Steam trap

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. **[8]**

OR

Q8) 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. **[16]**

Q9) a) Discuss the various types of losses in storage vessels. **[8]**

b) Draw various types of roofs used in storage vessel along with conditions in which it is used. **[8]**

OR

Q10) 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 × 1.2 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. **[16]**

Q11) Shell, Bottom plate of Circular Cylindrical Tank for storage of crude oil with conical roof. **[18]**

Tank diameter = 20 m (Approx)

Tank height = 12 m (Approx)

Material carbon Steel with permissible stress = 142 N/mm^2

Joint efficiency = 85%

Superimposed load = 1250 N/m^2

Density = 7.7

Plate size available are

(6300mm × 1800mm, 5000 mm × 2500mm, 5600mm × 1100mm)

OR

Q12) Write Short Notes on (Any four) : **[18]**

a) Pipeline color codes for different pipe lines

b) lmportance of study of PEDD for Chemical Engineers

c) IS Code for design of equipment

d) Pipeline Design considerations

e) Classification of Pipe supports

f) Steps in design activity

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Total No. of Questions : 12]

SEAT No. :

P2017

[Total No. of Pages : 5

[4858]-231

T.E. (Petroleum Engg.)

NUMERICAL METHODS AND GEO-STATISTICS

(2008 Pattern)

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) ***Figures to the right indicate full marks.***
4) ***Use of logarithmic books, electronic pocket calculator is allowed.***
5) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Determine the analytic function whose real part is $u = 3x^2 - 3y^2 + 2y$. **[6]**

b) Evaluate using residue theorem $\oint \frac{2z^2 + 2z + 1}{(z+1)^3(z-3)} dz$, where C is the contour $|z + 1| = 2$. **[5]**

c) Find the bilinear transformation which maps the points l, 0, i of the z-plane on to the points $\infty, -2, -\frac{1}{2}(1+i)$ of the w-plane. **[6]**

OR

Q2) a) If $f(z) = u + iv$ is an analytic function, find $f(z)$ if $u + v = e^{-x}[\cos y - \sin y]$ **[6]**

b) Evaluate $\oint_c \frac{\sin^2 z}{(z - \pi/6)^3} dz$, where C is $|z| = 1$. **[6]**

c) Show that, under the transformation $w = \frac{i - z}{i + z}$, x-axis in z-plane is mapped onto the circle $|w| = 1$. **[5]**

P.T.O.

Q3) a) Calculate the co-efficient of correlation for the following ages of husbands and wives. **[9]**

Husband's age	23	27	28	28	29	30	31	33	35	36
Wife's age	18	20	22	27	21	29	27	29	28	29

b) Goals scored by two teams A and B in a football season were as follows:

No. of goals in a match	0	1	2	3	4
No. of matches Team A	27	9	8	5	4
No. of matches Team B	17	9	6	5	3

Find out which team is consistent. **[8]**

OR

Q4) a) The first four moments about the working mean 30.2 of a distribution are 0.255, 6.222, 30.211 and 400.25. Calculate the first four moments about the mean. Also evaluate β_1 and β_2 and comment on the skewness and Kurtosis of the distribution. **[9]**

b) The regression equations are $8x - 10y + 66 = 0$ and $40x - 18y = 214$. The value of variance of x is 9. Find (i) the mean values of x and y, (ii) the correlation between x and y and (iii) Standard deviation of y. **[8]**

Q5) a) On an average 1.3 gamma particles/millisecond come out of a radioactive substance, determine (i) mean (ii) variance (iii) probability of more than one gamma particles emanate from the substance (Use Poisson). **[6]**

b) Team A has probability $\frac{2}{3}$ of winning whenever A plays. If A plays 4 games, find the probability that A wins (i) exactly 2 games (ii) at least 1 game. **[5]**

c) If 4 tickets are drawn from tickets numbered 1 to 30 inclusive, determine the probability that the tickets marked 1 and 2 are among the four of them. **[5]**

OR

Q6) a) A class consists of 6 girls and 10 boys. If a committee of 3 is chosen at random from the class, find the probability that (i) 3 boys are selected (ii) at least one boy is selected. **[5]**

b) On an average a box containing 10 articles is likely to have 2 defectives. If we consider a consignment of 100 boxes, how many of them are expected to have three or less defectives. **[6]**

c) Suppose heights of students follows normal distribution with mean 190 cm and variance 80 cm^2. In a school of 1000 students, how many would you expect to be above 200 cm tall. **[5]**
Area = 0.3636 when $z = 1.12$.

SECTION - II

Q7) a) Establish the following results : **[9]**

i) $$E = \left(\frac{\delta}{2} + \sqrt{1 + \frac{\delta^2}{4}} \right)^2$$

ii) $$(1 + \Delta)(1 - \nabla) = 1$$

iii) $$\frac{1}{\nabla} y_n - \frac{1}{\Delta} y_0 = y_0 + y_1 + y_2 \ldots\ldots\ldots y_n$$

b) For the following data **[8]**

t = time	2	4	6	8	10	12	14	16	18	20
V = speed km/hr	10	18	25	29	32	20	11	5	2	0

Using Simpson's rule, find approximately the total distance run in 20 minutes.

OR

Q8) a) For the following data : **[9]**

x	0	1	2	3	4	5
y	1	2	9	28	65	126

Find the polynomial passing through the data, using Forward difference method. Find $\frac{dy}{dx}$ at $x = 2$.

b) Use Simpson's $\frac{1}{3}rd$ rule to obtain the value of the integral $\int_0^{\pi/2} \frac{\sin x}{x} dx$, dividing the interval in four parts. **[8]**

Q9) a) Solve the equation $e^x - 5x = 0$, to find one root, using method of successive approximations. Take $x_0 = 0.15$ and perform seven iterations. **[7]**

b) Using method of least squares, fit a parabola of the form $y = ax^2 + bx + c$ to the following data. **[9]**

x	0	1	2	3	4	5	6
y	1	4	11	22	37	56	79

OR

Q10) a) Solve the following system of equations by using Gauss-Seidal method. **[8]**

$10x_1 + 2x_2 - x_3 = 11$

$x_1 + 20x_2 + 3x_3 = 50$

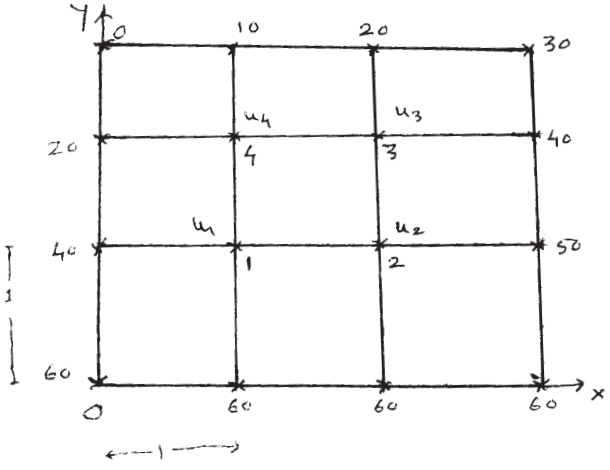
$2x_1 + 3x_2 - 30x_3 = -82$

b) Solve the equation : **[8]**

$$\frac{dy}{dx} = 1 + xy, \quad y(0) = 1$$

to find y at $x = 0.1$ and $x = 0.2$, using modified Euler's method. Take $h = 0.1$.

Q11) a) Solve the Laplace equation $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$ at the pivotal points of the grid shown below. **[8]**



b) Solve the following LPP by using Simplex technique. **[9]**

Maximize $Z = 50x_1 + 60x_2$

Subject to $2x_1 + x_2 \leq 300$

$3x_1 + 4x_2 \leq 509$

$4x_1 + 7x_2 \leq 812$

and $x_1, x_2 \geq 0$

OR

Q12) a) Using the finite difference method, solve the boundary value problem

$$x^2 \frac{d^2y}{dx^2} + x\frac{dy}{dx} = 1. \quad \textbf{[9]}$$

Subject to the conditions

$y(1) = 0, y(1.4) = 0.0566, h = 0.1$

b) Solve the following LPP by using Simplex method. **[8]**

Maximize $Z = 3x_1 + 2x_2$

Subject to : $x_1 + x_2 \leq 4$

$x_1 - x_2 \leq 2$

and $x_1, x_2 \geq 0$

Total No. of Questions : 11]

SEAT No. :

P3611

[Total No. of Pages : 3

[4858] - 232
T.E. (Petroleum) (Semester - I)
PETROLEUM GEOLOGY - I
(2008 Pattern)

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 (compulsory) Q.10 or Q.11.***
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) Describe volume percent and weight percent distribution of igneous, sedimentary and metamorphic rocks in the earth. **[8]**

b) What are cohesive and incohesive clay minerals? How these are recognized in the field? Discuss their significance in sedimentary rocks. **[8]**

OR

Q2) a) Draw and explain in brief, processes involved in the formation of sedimentary rocks. **[8]**

b) How to distinguish conglomerate and breccia on the basis of texture, composition, source of sediments and origin? **[8]**

Q3) a) How mass movement is classified based on moisture content, grain size variation and velocity? **[8]**

b) Explain hydration and hydrolysis with the help of suitable examples. **[8]**

OR

Q4) Discuss in brief: **[16]**

a) Convergent plate boundary.

b) Hazards associated with earthquakes.

P.T.O.

Q5) a) Describe in brief factors controlling deformation in rocks in confined condition. **[9]**

b) What are the similarities and differences between a fault zone and a shear zone? **[9]**

OR

Q6) Answer in brief with suitable diagrams: **[18]**

a) Types of fold based on interlimb angle.

b) Mohr composite failure envelope.

c) Sealing faults.

Q7) a) Explain Compaction and Cementation with the help of suitable diagram. **[8]**

b) Discuss the Dunham's scheme of classification for carbonates. **[8]**

OR

Q8) Explain in brief: **[16]**

a) Dolomitization.

b) Matrix supported framework in clastic sedimentary rocks.

Q9) Write short notes on (ANY TWO): **[16]**

a) Marine Depth Zones.

b) Use of microfossils for time correlation.

c) Use of Trace fossils to study various sedimentary environments.

d) Index fossils and zone fossils.

Q10) a) Write Geological Time Scale in a tabular form with important event in each era. **[10]**

b) What is an unconformity? Explain the different types of unconformities with the help of neat sketches. **[8]**

OR

Q11) a) What is geological correlation? **[6]**

b) Explain in brief with suitable diagrams, geological conditions that promote regression, transgression and aggradation of sediments. **[12]**

Total No. of Questions : 6] SEAT No. :

P3129 [Total No. of Pages : 2

[4858] - 233
T.E. (Petroleum Engineering)
DRILLING OPERATIONS
(2008 Pattern) (Semester - I)

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

Instructions to the candidates :

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

SECTION - I

Q1) a) Discuss Drill string components and their functions in detail. **[10]**

b) What are different types of bit and explain IADC classification of bit. **[8]**

Q2) a) Discuss different down hole problems and explain differential sticking problem in detail. **[10]**

b) Discuss working of triplex single acting pump in brief. **[6]**

Q3) a) Explain different types of ram preventer and schematic sketch of BOP. **[8]**

b) Discuss different types of directional wells in details. **[8]**

SECTION - II

Q4) a) Discuss typical casing policy and casing accessories in detail. **[8]**

b) Explain primary cementation process with suitable figure. **[8]**

P.T.O.

Q5) a) Discuss different types of drilling fluids and explain any one in detail. **[8]**

b) Define : **[8]**

i) Newtonian fluid

ii) Turbulent flow

iii) Yield point

iv) Plastic viscosity

Q6) a) Draw circulation system of drilling rig. **[10]**

b) What is hydraulics? Discuss effect of ECD on BHP. **[8]**

Total No. of Questions : 12]

SEAT No. :

P1439

[Total No. of Pages : 3

[4858] - 234

T.E. (Petroleum Engineering)

HYDROCARBON PROPERTIES AND THERMODYNAMICS

(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 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 indicate full marks.***
5) ***Use of Calculator is allowed.***
6) ***Assume suitable data if necessary.***

SECTION - I

Q1) a) What are the limitations of the first law of thermodynamics? How does the second law help to overcome these limitations? **[6]**

b) Prove that internal energy is a state function. **[6]**

c) What is the zeroth law of thermodynamics? How is it useful in measuring temperature? **[6]**

OR

Q2) a) A steel casting at a temperature of 725 K and weighing 35 kg is quenched in 150 kg oil at 275 K. If there are no heat losses, determine the change in entropy. The specific heat of steel is 0.88 kJ/kg.K and that of oil is 2.5 kJ/kg.K. From the results obtained can you predict whether the process reversible or irreversible? **[9]**

b) Explain the Clausius inequality. **[9]**

P.T.O.

Q3) a) With the help of a neat phase envelope, discuss the following terms: **[8]**

i) Cricondentherm

ii) Cricondenbar

b) What is the principle of corresponding states? Explain the use of compressibility charts. **[8]**

OR

Q4) Suppose it is desired to charge 15 kg of ethane at 300K into a cylinder of volume 0.08 m^3, determine the pressure to which the cylinder is to be charged. Also if 20 kg of ethane is charged into a cylinder of capacity 0.15 m^3 and the cylinder is held at a pressure of 15 MPa, determine the temperature of the gas in the cylinder. Assume that ethane behaves like an ideal gas. **[16]**

Q5) a) Differentiate between reference properties, energy properties and derived properties. **[8]**

b) Define Gibbs free energy and show that at constant temperature and pressure the decrease in the Gibbs free energy measures the maximum net work available from a given change of state. **[8]**

OR

Q6) a) Calculate the fugacity of liquid water at 303 K and 10 bar if the saturation pressure at 303 K is 4.241 kPa and the specific volume of liquid water at 303 K is 1.004×10^{-3} m^3/kg. **[6]**

b) Discuss the Gibbs Duhem equation and its various forms. **[8]**

c) State the Raoult's law and Henry's law. **[2]**

SECTION - II

Q7) a) How do you estimate the bubble point temperature and bubble point pressure for a multicomponent mixture of hydrocarbons containing i-propane, n-propane, i-butane, n-butane and n-pentane? **[9]**

b) What are azeotropes? Distinguish between minimum and maximum boiling azeotropes with the help of neat diagrams. **[9]**

OR

Q8) A binary system, acetone(l) –acetonitrile(2) conforms closely to Raoult's law. Using the vapour pressure data given below plot the following $T\text{-}x_1$ and $T\text{-}y_1$ curves at 53.32 kPa **[18]**

T,K	311.45	315	319	323	327	331	335.33
P_1^S,kPa	53.32	61.09	70.91	81.97	94.36	108.2	124.95
P_2^S,kPa	21.25	24.61	28.90	33.79	39.75	45.62	53.32

Q9) a) Derive the Laplace Young equation. **[8]**

b) What do you mean by imbibition and drainage? **[8]**

OR

Q10) a) Derive the Kelvin equation for lowering of vapour pressure. **[8]**

b) State and explain the Darcy's law. **[8]**

Q11) a) Write a note on the gas hydrate formation equilibria. **[8]**

b) Write a note on the Asphaltene Precipitation Envelope (APE). **[8]**

OR

Q12) a) Discuss the various models for wax precipitation. Give their limitations. **[8]**

b) With the help of neat diagrams, explain the solid liquid equilibrium phenomena. **[8]**

Total No. of Questions : 12] SEAT No. :

P3130 [Total No. of Pages : 3

[4858] - 235
T.E. (Petroleum)
PETROLEUM PRODUCTION OPERATIONS
(2008 Pattern) (Semester - I)

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 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, calculator is allowed.***
6) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Compare between christmas tree and well head equipment. **[10]**

b) Write and explain the exact sequence of operations for closing and opening of the chistmas tree. **[8]**

OR

Q2) a) Discuss the functions of any six components of a well head assembly and chrismas tree together. **[12]**

b) Explain the, 'role and responsibilities', of a Petroleum production engineer in brief. **[6]**

Q3) a) Draw the schematic sketch of a SSSV used in a well bore and explain its working. **[8]**

b) Describe blast joint and flow couplings in brief. **[8]**

P.T.O.

OR

Q4) a) Draw neat schematic sketch of a completion string and indicate position of various down hole equipments and tools on it. **[10]**

b) Explain the concept of, 'packer unseating', in brief. **[6]**

Q5) a) Draw the schematic of a typical Gilbert chart and explain its application in choke performance analysis. **[10]**

b) Draw and explain the typical IPR curves for water drive and solution gas drive reservoir. **[6]**

OR

Q6) a) Explain heading cycle in brief. **[6]**

b) Discuss different multiphase flow regimes and explain, 'Poettetmann and Carpenter method'. **[10]**

SECTION - II

Q7) a) Write the typical well completion procedure in brief. **[8]**

b) Discuss multilateral well completion in brief. **[10]**

OR

Q8) a) Explain the advantages and limitations of well perforation in brief. **[8]**

b) Write the general factors affecting well completion program. **[10]**

Q9) a) Describe oil and water formation volume factor, B_o and B_t in brief. **[10]**

b) Discuss Standing's extension and Vogel's work. **[6]**

OR

Q10)a) Discuss generic variation of any three pvt properties with pressure and temperature on a graph. **[8]**

b) Write and discuss the applications of horizontal wells in brief. **[8]**

Q11)a) Describe water and gas shut off job in brief. **[8]**

b) Write any two flow assurance related workover problems and remedy for them in brief. **[8]**

OR

Q12)a) Write in brief, short note on : **[10]**

i) liquid loading problem.

ii) matrix acidization.

b) Draw neat schematic sketch of cased hole gravel pack well completion and write its advantages. Name and indicate all the features of it. **[6]**

Total No. of Questions : 8] SEAT No. :

P3131 [Total No. of Pages : 2

[4858] - 236
T.E. (Petroleum) (Semeste - II)
PETROLEUM GEOLOGY - II
(2008 Pattern)

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

Instructions to the candidates :

1) ***Answers to the questions of each section should be written in sparate answer books.***
2) ***Question 4 and 8 are compulsory. Solve any two questions from remaining questions each from section I and sections II.***
3) ***Draw neat diagrams wherever necessary.***

SECTION - I

Q1) Explain the terms : sour gas, sweet crude, gas hydrate, porphyrins, and geochemical fossils. **[15]**

Q2) With the help of neat figures give important surface and subsurface occurrences of hydrocarbons. **[15]**

Q3) a) Compare the change that take place during diagenesis of clastic sediments and the organic matter accumulated within them in a typical marine environment. **[10]**

b) Explain one chemical and one genetic classification of oil field water. **[5]**

Q4) Answer any two of the following : **[20]**

a) Types of structural traps

b) Trapping mechanisms in sand-shale sequences

c) Unconventional hydrocarbon resources

d) Source rock evaluation

P.T.O.

SECTION - II

Q5) Explain in brief important marine environments of deposition of carbonates with sketches. **[15]**

Q6) Descirbe geology and hydrocarbon potential of anyone of the hydrocarbon producing basins of India. **[15]**

Q7) a) Write in brief about spatial and temporal distribution of hyrocarbons. **[10]**

b) What is kerogen? **[5]**

Q8) a) Describe in brief the procedure to carry out analysis of drill cuttings. **[10]**

b) Draw and explain Geological factors giving rise to abnormal pressures. **[10]**

Total No. of Questions : 8] SEAT No. :

P3132 [Total No. of Pages : 2

[4858] - 237
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 flash and differential Liberation Process. **[4]**

b) Derive the equation for radial laminar flow of gas in porous media. **[8]**

c) A gas reservoir drains 165 acres and is partially pressured by a water aquifer. The reservoir permeability is 5 md, porosity is 12% and average pressure is 4000psia Temperature is 140F and formation thickness is 127 ft. Gas viscosity is 0.012 cp and z is 0.9 if the well is flowing at 3050 psia and rw is 0.32 ft, calculate.

i) Flow rate

ii) BHP if rate is increased to 9.5 MMSCF/D **[4]**

Q2) a) What is the difference between a compressible fluid and an incompressible fluid? Draw an appropriate graph to distinguish the two. **[2]**

b) Derive an expression for fluid flow of a slightly compressible fluid flowing inside a porous media. **[10]**

c) A fluid of viscosity 3.5 cp and compressibility 65×10^{-6}/psi, flows through a porous media of 350 ft length and a cross sectional area of 60 sq ft of permeability 312 md. Find the flow rate through the system in bbl/day. **[6]**

i) If the fluid is incompressible.

ii) If the fluid is slightly compressible.

P.T.O.

Q3) How is capillary pressure and wettability related? Draw appropriate diagrams. **[16]**

Q4) Draw phase diagrams of single, two three and multiphase fluids and explain. **[16]**

SECTION - II

Q5) What do you mean by recovery factor? How is it related to EUR? Explain in detail. **[16]**

Q6) Derive an expression for gas in place and explain the p/z graph, as well as F/Eg graph. What is the difference between the two? **[16]**

Q7) Explain, compare and contrast drive mechanisms and drive indices for different reservoirs by showing various graphs. Do drive indices change for a reservoir? Explain. **[16]**

Q8) Derive the generalized material balanced equation for oil as well as for gas. **[18]**

Total No. of Questions : 12] SEAT No. :

P3133 [Total No. of Pages : 3

[4858] - 238
T.E. (Petroleum)
PETROLEUM PRODUCTION ENGINEERING - I
(2008 Pattern)

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 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) Classify different types of artificial lift systems and write the working principle of each in brief. **[18]**

OR

Q2) a) With the help of neat schematic sketch explain the well loading and unloading operation in plunger lifting technique. **[9]**

b) Classify different types of gas lift valves and discuss working of a tubing pressure operated valve. **[9]**

Q3) a) For a continuous flow injection, discuss the graphical method to decide the single point of gas injection. **[10]**

b) Discuss intermittent gas lifting operation in brief. **[6]**

OR

Q4) Describe in detail design procedure for any one gas lift operation having multi-point gas injection system. **[16]**

P.T.O.

Q5) a) Write and explain any two well parameters that can affect the working of an ESP pump. **[6]**

b) Draw neat schematic sketch of surface and subsurface components of an ESP and indicate them. **[10]**

OR

Q6) Write usability of ESP, and jet pump, only in terms of excellent/good/fair/poor in a tabular form for following well parameters. High PI, Low GOR, adaptability to deviated wells, capability to produce sand, high volume lift capability, usefulness in offshore and ability to handle viscous oil. **[16]**

SECTION - II

Q7) a) Draw neat schematic sketch of surface and subsurface set-up of Sucker rod Pumping system and write applications of it for suitable well parameters. **[10]**

b) A pump with a 1 ¾ inch plunger is set on 4500ft., of ¾inch rods. The fluid level is known to be low and the tubing is anchored with pumping at 20 SPM and 64 inch stroke length. The production is to the tune of 350 BOPD of specific gravity of 0.85. Calculate the effective plunger stroke. Assume, modulus of elasticity of steel = 30×10^6 psi. **[8]**

OR

Q8) a) Draw the typical sketch and explain, 'dynagraph', in brief. **[8]**

b) Derive the equation to calculate, 'ideal counterbalance effect', in case of SRP system. **[10]**

Q9) Draw the typical graphs to demonstrate the following : **[16]**

a) Choke performance.

b) Pressure drop inside a production tubing Vs Production rate at optimum GLR point and for various values of GLR.

c) Vertical lift performance.

d) Production rate Vs tubing diameter to demonstrate liquid loading conditions.

OR

Q10) What are the objectives of system or nodal analysis? What are the applications of it in petroleum production facility? Draw typical relevant graphs and explain optimization of tubing and surface pipe line for given IPR of a reservoir using nodal analysis. **[16]**

Q11) a) Discuss in brief the general basis for well stimulation job in an oil well. **[8]**

b) Write the reaction of 15% HCl solution with calcite. Calculate the volumetric dissolving power of acid solution and describe the necessary steps if, specific gravity of acid is 1.05 and calcite density is 120 lbm/ft^3. **[8]**

OR

Q12) a) Explain the process of hydraulic fracturing in brief. **[6]**

b) Explain the role of different elements involved in the successful completion of a fracturing job. **[10]**

Total No. of Questions : 12] SEAT No. :

P3134 [Total No. of Pages : 5

[4858] - 239
T.E. (Petroleum Engineering)
NATURAL GAS ENGINEERING
(2008 Pattern) (Semester - II)

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

Instructions to the candidates :

1) ***Answer Q.No.1 or 2, Q.No.3 or 4, Q.No.5 or 6 from section-I and Q.No.7 or 8, Q.No.9 or 10, Q.No.11 or 12 from section-II.***
2) ***Answers to the two sections should be written in separate answer book.***
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) Draw the graph of viscosity, Bg, Cg and viscosity versus pressure and explain? **[6]**

b) Write a short note on the chart used to compute the z-factor? **[5]**

c) Calculate the reserves in a gas field of 3,000 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) Define and explain the importance of Pseudo critical & Pseudo reduced gas pressure and temperatures? **[5]**

Q3) a) What is the difference between isochronal and modified isochronal test? **[4]**

b) Explain what do you mean by pseudo-critical properties, and how are they used in natural gas engineering? **[8]**

c) Explain the various points on a two phase envelope. **[4]**

P.T.O.

OR

Q4) a) Explain the elements of orifice meter. What are the different pressure taps used in a flow measurement. Draw orifice meter diagram? **[8]**

b) A 50-in x 200 Ib gauge has a differential pressures 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 = 2300Psia, and average temperature of the flow string is 117 F. Gas flow rate = 5 MMscfd, Dia = 2inches 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) Write short notes on temperature at choke. **[4]**

c) A 0.65 specific gravity gas flows 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 frost does not clog the orifice?

iii) What is the expected pressure at the orifice outlet?
C=0.62, assume NRe is very high, $\mu = 0.01245$ **[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 carbon dioxide and explain the process? **[8]**

b) Write short note on 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 selections 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 stage 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 temperatur of the gas? k = 1.28, gas gravity = 0.6, Z at 400 and 1600 psia are 0.985, e 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 a 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]**

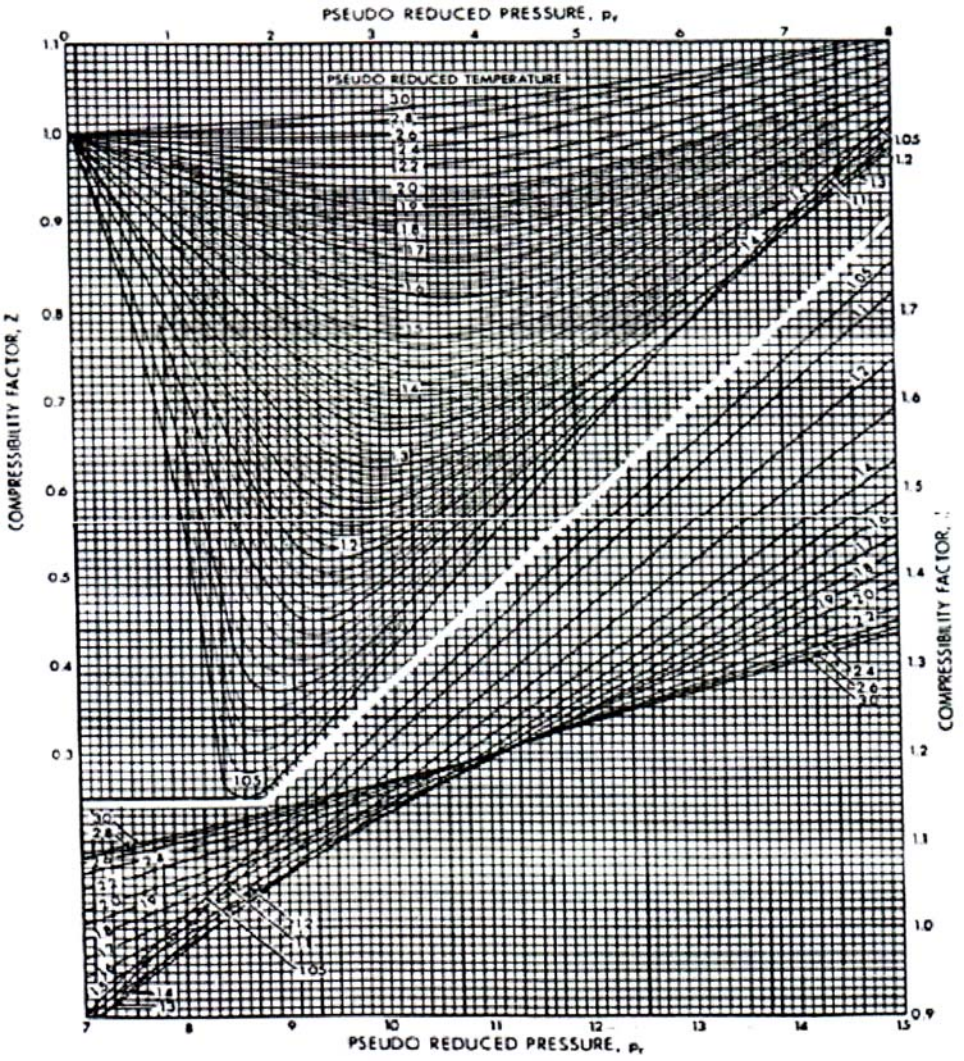
c) Give solutions for liquid loading problem? **[3]**

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
COMPRESSIBILITY FACTOR, Z
PSEUDO REDUCED PRESSURE, p_r

Total No. of Questions : 12]

P3135

SEAT No. :

[Total No. of Pages : 3

[4858] - 240

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

PETROLEUM EQUIPMENT DESIGN AND DRAWING

(2008 Pattern)

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

Instructions to the candidates:

1) ***Answer 3 questions from Section-I and 3 questions from Section-II.***
2) ***Answers to the two sections should be written in separate 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) What are the roles of design engineer in designing of Petroleum equipments? Discuss with necessary example. **[9]**

b) Discuss the following types of keys: **[9]**

i) Feather key

ii) Tangent keys

iii) Saddle keys

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) Elaborate on different types of pulley and uses of pulleys on drilling rig. **[8]**

OR

Q4) Two pulleys. one 450 mm diameter and other 200 mm diameter, on parallel shafts 1.95 m apart are connected by crossed belt. Find the length of belt required & angle of contact between each belt and pulley.

What power the belt can transmit when larger pulley rotates at 200 r.p.m., if max^m permissible tension in the belt is 1 KN, and the coefficient of friction between belt and pulley is 0.25? **[16]**

P.T.O.

Q5) a) Draw different types of heads used in pressure vessel along with their equation. When these different heads are used? **[8]**

b) What are the different types springs? Discuss compression helical in detail. **[8]**

OR

Q6) a) What are the different types springs? Discuss compression helical indetail **[8]**

b) Discuss selection of drilling rig mud pump in details. **[8]**

SECTION - II

Q7) 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]**

OR

Q8) a) Discuss design factors considered for pressure vessel. **[9]**

b) Discuss detailed procedure of calculation of resultant stresses in pressure vessel. **[9]**

Q9) a) What are the types of heads used in pressure vessel. **[8]**

b) Discuss in details about design of fixed roof cylindrical storage tank along with the design of shell and bottom plate. **[8]**

OR

Q10) Calculate the different stresses which are to be considered while designing half coil jacket with the help of given data, **[16]**

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.

Q11)a) Discuss design consideration for mixing. **[8]**

b) Write shorts notes on, **[8]**

i) Importance of baffles

ii) Sulphur containing fluids

OR

Q12)a) Discuss transverse baffles and longitudinal baffles in heat exchanger. **[8]**

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

i) Agitators

ii) Highly volatile HC

Total No. of Questions : 12]

SEAT No. :

P2027

[Total No. of Pages : 3

[4858] - 241
T.E. (Polymer Engineering)
Mass Transfer And Reaction 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 books.***
2) ***Draw neat diagrams wherever necessary.***
3) ***Numbers to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***
5) ***Use of logarithmic table, electronic pocket calculators is allowed.***

SECTION - I

Q1) a) Write a note on Steady state diffusion in Multi-component mixtures. **[5]**

b) Find $D_{N2\text{-Gas mix}}$ if the gas mixture composition by volume % is as follows: N_2=69%, CO_2=16%, CO = 9%, O_2=6% at 373 °K, 1.5atm pressures. Data: **[8]**

$D_{N_2-O_2}$ = 18.15×10^{-6} m^2/sec at 273 °K, 1 atm pressure.

D_{N_2-CO} = 19.15×10^{-6} m^2/sec at 288 °K, 1 atm pressure.

$D_{N_2-CO_2}$ = 15.15×10^{-6} m^2/sec at 298 °K, 1 atm pressure.

c) Explain the term Mass transfer Operation with two important applications. **[5]**

OR

Q2) a) By what percentage would the rate of absorption be increased or decreased by increasing the total pressure from 150 to 250 KN/m^2 in the following case. Ammonia from ammonia and air mixture containing 15 % ammonia by volume is absorbed by using pure water as solvent; assume all the resistance to mass transfer lies within the gaseous phase. Assume the diffusivity is inversely proportional to the pressure. **[8]**

b) Find the steady state flux of Ethanol (A) – Water (B) solution in the form of a stagnant film of 2 mm thick at 20 °C is in contact with an organic solvent in which A is soluble and B is non diffusing. When the concentration on the opposite sides are 16.8 wt% and 6.8 wt% of ethanol

P.T.O.

respectively. **[10]**

Diffusivity of Ethanol is 0.74×10^{-9} m^2/sec.

Density of 16.8 wt% acetic Acid = 972 Kg/m^3.

Density of 6.8 wt% acetic Acid = 988 Kg/m^3.

Q3) a) Derive Rayleigh Equation for Simple Distillation. **[8]**

b) Write a note on minimum liquid to gas ratio for gas absorber. **[8]**

OR

Q4) a) Discuss the term Relative Volatility of vapor liquid systems and Calculate the variation in relative volatility for benzene-toluene system at 85 °C and 105 °C. Vapor Pressure of Benzene = 116 kPa and Vapor Pressure of Toluene = 46 kPa at 85 °C and at 105 °C Vapor Pressure of Benzene = 204 kPa and Vapor Pressure of Toluene = 86 kPa. **[10]**

b) Differentiate between Tray tower and Packed tower. **[6]**

Q5) Discuss the following terms: Absolute Humidity, Relative Humidity, Saturation Humidity, Percentage Humidity, Humid Heat, Humid Volume, Total Enthalpy of Air-Water vapor Mixture. Adiabatic Saturation temperature, Dew Point, Wet Bulb and Dry Bulb temperature. **[16]**

OR

Q6) a) Explain the terms such as Moisture Content, Equilibrium Moisture, Free Moisture, Bound and Unbound Moisture Content, Critical Moisture Content, Drying rate and Drying time. **[8]**

b) Discuss any two drying equipments in detail. **[8]**

SECTION - II

Q7) Explain the following terms:

Conversion, Molecularity of reaction, Order of Reaction, Reaction rate Constant, first order and second order reaction. Write a short note on

Classification of chemical reactions useful for the reactor design. **[18]**

OR

Q8) Explain temperature dependency from Collision, Transition and Arrhenius theory. Explain in short factors affecting rate of reaction. Explain Elementary and Non-Elementary reaction with example. **[18]**

Q9) a) What will the volume of reactor for 45% decomposition.Under appropriate conditions, 0.12 kg/sec of reactant is to be decomposed at 520°C and 1 atm in a plug flow reactor. Assume reaction is second order and value of rate constant K= 0.44 m^3/kgmole.sec. **[8]**

b) Explain half life period for first and second order reaction. **[8]**

OR

Q10)a) Discuss the Integral Method of analysis of kinetics of constant volume batch reactor for the irreversible first order, second order, nth order and zero order reaction. **[8]**

b) Under appropriate conditions, 0.1 kg/sec of reactant is to be decomposed at 520°C and l atm in a plug flow reactor. Assume reaction is second order and value of rate constant K= 0.43 m^3/kgmole.sec. what will the volume of reactor for 35% decomposition. **[8]**

Q11)a) Explain the size comparison of Single Batch Reactor.

Explain the size comparison of Mixed Flow Reactor and Plug Flow Reactor for first and second order reactions. **[8]**

b) Derive the necessary performance equation for the Equal size Two CSTR in series. **[8]**

OR

Q12)a) Write a short note on design of polymer reactors. **[8]**

b) Derive the relation for plug flow reactors in series. **[8]**

Total No. of Questions : 12]

SEAT No. :

P3612

[Total No. of Pages : 3

[4858] - 242

T.E. (Polymer Engineering) (Semester - I)

POLYMER CHEMISTRY - I (Backlog)

(2008 Pattern)

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

Instructions to the candidates:

1) ***Answers to Section - I and Section - II should be written on separate answer book.***
2) ***Solve 3 questions from Section - I and 3 questions from Section - II.***
3) ***Neat diagrams should be drawn whenever necessary.***
4) ***Figures to right indicate full marks.***
5) ***Assume suitable data, if necessary.***
6) ***Use of electronic pocket calculator is allowed.***

SECTION - I

Q1) a) Explain in detail Light Scattering method used to determine molecular weight. **[8]**

b) Explain the classification of polymers based on polymerization mechanism. Give suitable examples of each. **[5]**

c) Write down the mathematical equations to calculate number-and weight-average molecular weight. Explain the terms in the equations. **[3]**

OR

Q2) a) Write short note on Osmometry technique used for molecular weight determination. **[8]**

b) With appropriate examples explain the concept of homochain and heterochain polymers. **[5]**

c) With repeating unit structures explain the classification of polymers based on tacticity. Give suitable examples. **[3]**

Q3) a) With merits and demerits explain bulk and solution polymerization techniques. **[8]**

b) What are living polymers? Explain the polymerization mechanism used to prepare these. **[8]**

OR

P.T.O.

Q4) a) With appropriate schematic explain the emulsion polymerization technique. **[8]**

b) Explain in detail kinetics of free radical polymerization. **[8]**

Q5) a) Explain in detail various steps involved in condensation step-growth polymerization. **[7]**

b) Write a short note on melt polymerization. **[7]**

c) Explain why it is necessary to have stoichiometric control in condensation polymerization. **[4]**

OR

Q6) a) Explain in detail kinetics of step growth polymerization. **[8]**

b) Explain the interfacial polymerization technique. Give its merits and demerits. **[7]**

c) Briefly comment on experimental observations of gel point. **[3]**

SECTION - II

Q7) a) Explain the Q-e scheme in copolymerization. **[6]**

b) Explain the concept of reactivity ratio. With suitable examples its relevance. **[7]**

c) Give two examples of commercially used copolymers. Draw their repeating unit structures. **[3]**

OR

Q8) a) With suitable reactions explain the mechanism of copolymerization. **[6]**

b) Write short note on Ionic copolymerization. **[7]**

c) With appropriate schematics explain block and graft copolymers. **[3]**

Q9) a) Write a short note on Polymer Waste Management. **[9]**

b) With suitable examples and reactions explain polymer modification by Hydrolysis, Aminolysis and Hydrogenation. **[9]**

OR

Q10) a) Write short note on Biodegradation of polymers. **[9]**

b) Explain the concept of 3-R in polymer waste management. **[9]**

Q11) a) Write short note on Metallocene catalysts used in polymerization. **[8]**

b) What are stereo-regular polymers? Briefly comment on effect of stereoregularity on polymer properties. **[8]**

OR

Q12) a) Write a short note on Ziegler-Natta catalysts. **[8]**

b) Explain the concept of configuration and confirmation. Give suitable examples and repeating unit structures. **[8]**

Total No. of Questions : 12]

P3136

SEAT No. :

[Total No. of Pages : 2

[4858] - 243
T.E. (Polymer)
POLYMER MATERIALS
(2008 Pattern)

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

Instructions to the candidates:

1) ***Answer 3 questions from Section-I. Answer question 3 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) ***All question carry equal marks.***
6) ***Assume suitable data wherever necessary.***
7) ***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 rubbe rand 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) Give Industrial manufacturing processes, properties, applications, for butyl rubber **[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]

P3137

SEAT No. :

[Total No. of Pages : 3

[4858] - 244

T.E. (Polymer)

POLYMER STRUCTURE PROPERTY RELATIONSHIP

(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) ***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 the effect of bonds formed by carbon atom on various polymer properties like mechanical, chemical,thermal and electrical. **[8]**

b) Explain the role of various additives on polymer properties with examples. **[10]**

OR

Q2) a) Why Nylon is hygroscopic material?Explain with structure. **[5]**

b) Why PP melt at higher temperature than LDPE and why density is less than LDPE? **[5]**

c) Why presence of halogen make a polymer self-extinguishable. **[5]**

d) What is an isocynate linkage? **[3]**

Q3) a) Explain any two conversion methods used to convert from low to high molecular weight during processing. **[8]**

b) During blow molding.What type of M.w & M WD is required and why. **[8]**

OR

Q4) a) Explain what is meant by narrow and broad molecular weight and what effect it has on polymer properties. **[8]**

b) What is meant by dielectric constant and give the background for dielectric properties of polymers and factors affecting these properties. **[8]**

P.T.O.

Q5) a) Why molecular flexibility is important in polymer.Explain with examples. **[6]**

b) Explain potential energy barrier. **[6]**

c) Explain what is meant by super cooled state & how does it affect the morphology. **[4]**

OR

Q6) a) What is the effect of Intermolecular forces on mechanical, thermal and electrical properties of polymers. **[8]**

b) What are the chemical groups that influence adhesion ? Explain the adhesion mechanism. **[8]**

SECTION - II

Q7) a) Give factors leading to crystallinity and its effect on various properties like processing, mechanical, thermal etc. **[9]**

b) Explain the similarity and differences between crystallinity and orientation. **[9]**

OR

Q8) a) How sphenulitic growth takes place and which properties are affected by it. which instrument is used to study sphenulitic growth. **[9]**

b) What is fringed micdle model and how does it help in understanding polymer morphology **[9]**

Q9) a) Give the effect of cross linking and polarity on polymer properties like mechanical, chemical, thermal, electrical, optical etc. **[8]**

b) Explain what are Intermolecular bonding forces? Explain induced and permanent Dipole and effect of these forces on structure and properties like solubility, melting, CED,permeability etc. **[8]**

OR

Q10)a) Explain how kinetic forces affect crystallisation in polymers **[6]**

b) Give the morphological changes that takes place during orientation.How is orientation giving resemblence to crystalline structure? Can crystalline polymers be oriented? **[10]**

Q11) a) Explain different types of foams. **[8]**

b) Explain the term multiple phases and also explain role of membranes. **[8]**

OR

Q12) a) Explain the significance of temporary heterogeneity required for processing. **[8]**

b) Explain how size and shape of product influences the properties obtained from same polymer with few egs. [8]

Total No. of Questions : 12]

P3138

SEAT No. :

[Total No. of Pages : 3

[4858] - 245

T.E. (Polymer)

DESIGN EQUIPMENT AND MACHINE ELEMENTS

(2008 Pattern)

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

SECTION - I

Q1) a) Explain maximum stress biaxial failure theory. **[4]**

b) Write short notes with neat sketches, if required. **[6]**

i) Factor of safety

ii) Stress concentration factors

c) A clamp or compression coupling is to be designed for transmitting 25 KW at 500 rpm. Take number of bolts as six. The following permissible stresses may be used. **[6]**

i) Shear stress for shaft and key = 35 MPa

ii) Permissible tensile stress for bolt = 90 MPa

Coefficient of friction between muff and shaft=0.35. Draw neat sketch with proportions. Assume suitable data, if required. Give standard proportions with sketch. Design for shaft, muff, bolts and key.

OR

Q2) a) Design a bushed pin flexible coupling for transmitting 40 KW at 700 rpm. Take number of bolts as six. The following permissible stresses may be used.

Shear stress for shaft and key = 35 MPa

Permissible tensile stress for bolt= 90 MPa

Allowable shear stress for cast iron= 16 MPa

Allowable bearing pressure for rubber bush= 0.8 N/mm^2. Draw a neat sketch with proportions. Assume suitable data, if required. **[10]**

b) Discuss with neat sketches various types of keys. **[6]**

P.T.O.

Q3) a) A hollow shaft having 0.5 m outside diameter and 0.25 m inside diameter transmits 5000 KW at 100 rpm. The shaft is mounted on two bearings 5 meters apart. Maximum thrust is 200 KN and shaft weighs 80 KN. Determine maximum shear stress in the shaft and angular twist between the bearings. **[9]**

b) V belts transmit 50 KW at 750 rpm to a shaft rotating at 300 rpm. Larger pulley diameter is 1500 mm. and center distance between the two pullies is 1500 mm. Design V- belt drive. A belt having 300 mm^2 and density of 1000 kg/m^3 is available and has allowable tensile strength of 2 MPa. Take coefficient of friction between the belt and pulley as 0.3. The driven pulley is overhung to the extent of 300 mm from the nearest bearing and is mounted on shaft having permissible shear stress of 40 MPa. Design the complete system. **[9]**

OR

Q4) a) Obtain expression for length of cross belt drive. **[7]**

b) A hollow shaft is subjected to torque of 1,5 KN-m , bending moment of 3 KN-m and axial load of 10 KN. The ratio of inner diameter to outer diameter is 0.5. If outer diameter is 80 mm, find shear stress induced in the shaft. **[7]**

c) Discuss with sketch compound belt drives. **[4]**

Q5) a) Discuss the concept of reliability of bearing with reference to rolling contact bearings. **[6]**

b) With sketch, discuss Ruppert drive. **[6]**

c) With a neat sketch, discuss Norton Gear Box. **[4]**

OR

Q6) a) Draw neat sketch of Plummer Block and give design calculations for bearing cap and bolts. **[6]**

b) A foot step bearing supports a shaft of 100 mm. If the bearing pressure is to be limited to 0.6 N/mm^2, find the load to be supported and heat generated at the bearing. Take rom as 100. **[5]**

c) Discuss angular contact and self aligning ball bearings. **[5]**

SECTION - II

Q7) a) Discuss with a neat sketch the balanced vane type of pump. **[6]**

b) Draw a neat sketch for counter balance valve. Explain the operation. **[6]**

c) Draw a neat sketch of sequence valve and explain the functioning with the help of hydraulic circuit to sequence the operations. **[6]**

OR

Q8) a) Draw a hydraulic circuit to show basic rotary motion. **[5]**

b) Discuss with sketch external gear type hydromotor. **[5]**

c) Draw at least four different positions of four way three position directional control valve. **[4]**

d) Explain the functioning of inline ball type check valve. **[4]**

Q9) a) Draw a hydraulic circuit to show only tonnage development using intensifier in case of injection moulding. **[8]**

b) Draw a hydraulic circuit and explain only fill or velocity phase of injection operation. Give valve sequencing. **[8]**

OR

Q10)a) Explain how toggle system uses mechanical advantage. Explain also why in toggle machines opening stroke is independent of actual mould height. **[6]**

b) Discuss with a neat sketch the vane type of pump. **[6]**

c) Why do all electric machines prove to be more efficient? **[4]**

Q11)a) A cylindrical pressure vessel is 1.8 m in diameter and 4 m height. It is subjected to internal pressure of 7.5 kg/cm^2. Assume corrosion allowance of 1.5 mm. The pressure vessel is fabricated as i) Class 'C' with joint efficiency J :0.45 and ii) Class 'B' with joint efficiency J: 0.65. What will be thickness of vessel when fabricated as class 'B' and class 'C'? What is percentage saving in material? **[8]**

b) Write a note on torispherical and hemispherical head. **[8]**

OR

Q12)Write short notes on: **[16]**

a) Gaskets used in pressure vessels

b) Nozzle reinforcement procedure

c) Supports for pressure vessels

d) Factor of safety

Total No. of Questions : 12]

SEAT No. :

P2018

[Total No. of Pages : 6

[4858]-246

T.E. (Polymer Engg.)

MATHEMATICAL METHODS FOR POLYMER ENGINEERING

(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) *Figures to the right indicate full marks.*
4) *Use of electronic non-programmable calculator is allowed.*
5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Show that $\delta = \Delta(1+\Delta)^{-1/2}$. **[3]**

b) Using Newton's forward interpolation formula, find y at $x = 8$ from the following table. **[7]**

x :	0	5	10	15	20	25
y :	7	11	14	18	24	32

c) Evaluate $\int_2^6 \log_{10} x \, dx$ by using Simpson's $\frac{1}{3}$ rule taking $n = 6$. **[7]**

OR

Q2) a) The following data gives the melting point of an alloy of lead and zinc, where T is the temperature in ºC, and p is the percentage of lead in the alloy. **[6]**

p (%) :	60	70	80	90
T :	226	250	276	304

Find the melting point of the alloy containing 84% of lead, using Newton's interpolation formula.

P.T.O.

b) Use Lagrange's interpolation formula to find y when $x = 5$ from the following data : **[6]**

x :	0	1	3	8
y :	1	3	13	123

c) Use trapezoidal rule to evaluate $\int_0^1 x^3\,dx$ by considering five sub-intervals. **[5]**

Q3) a) Use Newton-Raphson method to find the real root near 2, of the equation $x^4 - 11x + 8 = 0$ accurately (Four steps). **[6]**

b) Solve the following equation by Gauss-Seidal method. **[6]**

$8x + 2y - 2z = 8$

$x - 8y + 3z = -4$

$2x + y + 9z = 12$

c) Fit a Second-order polynomial to the data below. **[5]**

x	0	1	2	3	4	5
y	2	8	14	27	41	61

OR

Q4) a) Solve by using Gauss-elimination method, the following system of equation. **[6]**

$-12x_1 + x_2 - 8x_3 = 80$

$x_1 - 6x_2 + 4x_3 = 13$

$-2x_1 - x_2 + 10x_3 = 90$

b) Fit a least squares straight line to the following data : **[5]**

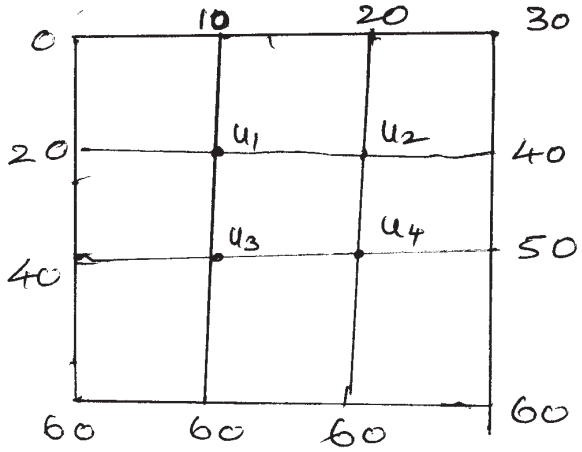
X : 2 7 9 1 5 12

Y : 13 21 23 14 15 21

c) Using Regula-Falsi method, compute the real root of the equation $x^3 - 4x - 9 = 0$. **[6]**

Q5) a) Use Euler modified method to solve the equation $\frac{dy}{dx} = x^2 + y,\ y(0) = 1$ to find y at $x = 0.02$ and 0.04, $h = 0.02$. **[8]**

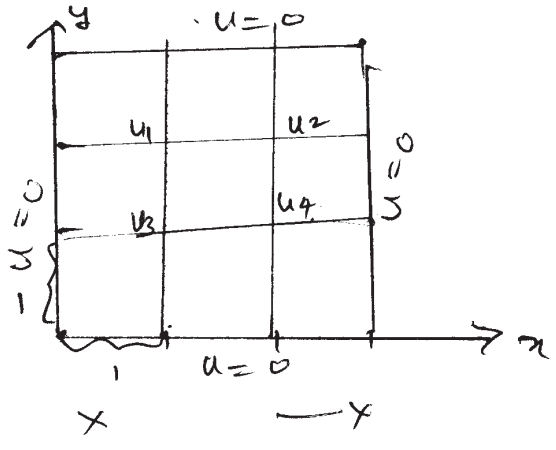
b) Solve $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$ for the following square meshes with boundary conditions as denoted in the figure below. **[8]**



OR

Q6) a) Use Runge-Kutta method of fourth order to solve $\frac{dy}{dx} = \sqrt{x + y}$, $y(0) = 1$, to find y at $x = 0.2$, taking $h = 0.1$. **[8]**

b) Solve the equation $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = -10(x^2 + y^2 + 10)$ over the square mesh with sides $x = 0$, $y = 0$, $x = 3$, $y = 3$ with $\mu = 0$ on the boundary of mesh length = 1. **[8]**



SECTION - II

Q7) a) Use Simplex Technique to solve the following LP problem. **[10]**

Maximize $Z = 4x_1 + 3x_2 + 6x_3$

Subject to $2x_1 + 3x_2 + 2x_3 \leq 440$

$4x_1 + 3x_3 \leq 470$

$2x_1 + 5x_2 \leq 430$

$x_1, x_2, x_3 \geq 0$

b) Write the dual of the following LPP. **[6]**

Minimize $Z = 3x_1 - 2x_2 + 4x_3$

Subject to $3x_1 + 5x_2 + 4x_3 \geq 7$

$6x_1 + x_2 + 3x_3 \geq 4$

$7x_1 - 2x_2 - x_3 \leq 10$

$x_1 - 2x_2 + 5x_3 \geq 3$

$4x_1 + 7x_2 - 2x_3 \geq 2$

$x_1, x_2, x_3 \geq 0$

OR

Q8) a) Using Simplex technique solve the following : **[10]**

Maximize $Z = 3x_1 + 6x_2 + 2x_3$

Subject to $3x_1 + 4x_2 + x_3 \leq 2$

$x_1 + 3x_2 + 2x_3 \leq 1$

and $x_1, x_2, x_3 \geq 0$

b) Write the dual of the following LPP. **[6]**

Maximize $Z = 2x_1 - 4x_2 + 5x_3$

Subject to $x_1 - 2x_2 + 3x_3 \leq 2$

$2x_1 - 3x_2 \leq 4$

$3x_1 + 2x_3 \leq 5$

$x_2 + 2x_3 \leq -1$

and $x_1, x_2, x_3 \geq 0$

Q9) a) The mean and Standard deviation of 25 items is found to be 11 and 3 respectively. It was observed that one item 9 was incorrect. Calculate the mean and Standard deviation if the wrong item is omitted. **[5]**

b) The following are marks obtained by 10 students in Economics and Mathematics. **[7]**

No.	1	2	3	4	5	6	7	8	9	10
Marks in Economics	25	28	35	32	31	36	29	38	34	32
Marks in Mathematics	43	46	49	41	36	32	31	30	33	39

Marks are out of 50, obtain regression equation to estimate marks in Mathematics if marks in Economics are 30.

c) An unbiased coin is thrown 10 times. Find the probability of getting exactly 6 Heads, atleast 6 Heads. **[5]**

OR

Q10) a) In a Poisson distribution if $p(r=1) = 2p(r=2)$, find $p(r=3)$. **[5]**

b) For a normal distribution when mean $\bar{x} = 1, \text{S.D} = 3$ find the probabilities for the intervals.

i) $3.43 \leq \times \leq 6.19$

ii) $-1.43 \leq \times \leq 6.19$

$[A_1 = 0.4582, Z_1 = 1.73; A_2 = 0.2910, Z_2 = 0.81]$ **[6]**

c) The first four moments of a distribution about the value 5 are 2,20, 40 and 50. Obtain the first four moments about the mean. Find the coefficients of Skewness and Kurtosis. **[6]**

Q11) a) A covariant tensor has components y^2x, x^2y in two dimensional rectangular cartesian coordinates. Find it's covariant components in polar coordinate system. **[6]**

b) Prove that sum and difference of two tensors of the same rank and type are tensors. **[5]**

c) Show that : **[6]**

i) $[pq, r] = [qp, r]$

ii) $\dfrac{\partial g^{pq}}{\partial x^m} = -g^{pn}\left\{ {q \atop mn} \right\} - g^{qn}\left\{ {p \atop mn} \right\}.$

OR

Q12) a) If A^{pq}_{rst} is a tensor, then show that A^{pq}_{rsp} is a tensor with rank reduced by two. **[6]**

b) Show that every tensor can be expressed as sum of two tensors, one of which is symmetric and the other skew-symmetric in a pair of covariant or centravariant indices. **[5]**

c) Find the conjugate metric tensor for spherical polar and cylindrical coordinate system. **[6]**

Total No. of Questions : 12]

P3139

SEAT No. :

[Total No. of Pages : 3

[4858] - 247

T.E. (Polymer Engineering)

POLYMER CHEMISTRY - II (Backlog)

(2008 Pattern) (Semester - II)

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

Instructions to the candidates:

1) ***Answers to Section-I and Section-II should be written on separate answer book.***
2) ***Solve 3 questions from Section-I and 3 questions from Section-II.***
3) ***Neat diagrams should be drawn whenever necessary.***
4) ***Figures to right indicate full marks.***
5) ***Assume suitable data, if necessary.***
6) ***Use of electronic pocket calculator is allowed.***

SECTION - I

Q1) a) Alongwith appropriate reactions explain in detail the synthesis of UF and MF resins. **[9]**

b) What are silicones? State the properties and applications of silicones. **[9]**

OR

Q2) a) Briefly explain the concept of RTV silicone Elastomers. **[6]**

b) Resols can be cured without hardener while novolaks cannot. Do you agree? Justify. **[5]**

c) Between UF and MF which one is preferred for high temperature applications? Why? **[3]**

d) Explain the rearrangement of organochlorosilanes route for silicone synthesis. **[4]**

Q3) a) What are vinyl ester resins? Explain their curing systems. Enlist their applications. **[8]**

b) Explain how raw materials choice affects properties of polyesters. **[8]**

P.T.O.

OR

Q4) a) Explain in detail room temperature and high temperature curing systems for unsaturated polyester resins. **[8]**

b) Write short note on Alkyd Resins. **[8]**

Q5) a) Comment on the paramaters used for characterizing DGEBA epoxy resins. **[8]**

b) Compare between polyether-based and polyester-based polyurethanes. **[8]**

OR

Q6) a) With appropriate chemical reactions explain in detail epoxy resin synthesis. **[8]**

b) Write short note on Thermoplastic PU rubber and Spandex® fibers. **[8]**

SECTION - II

Q7) a) Briefly explain the commercially important routes to synthesize linear polyamides. **[9]**

b) Write short note on Polyetherimides. Mention its merits and demerits. **[9]**

OR

Q8) a) What are polyimides and polyamide-imides? **[3]**

b) Write short note on Aromatic Polyamides. **[6]**

c) Comment on the properties and processing of polyacetals **[9]**

Q9) a) Briefly comment on two routes of synthesizing polysulphones. **[6]**

b) Write down the repeating unit structure of PEK and PEEK. Differentiate between these two on properties and applications. **[6]**

c) State the properties of poly(phenylene oxide). **[4]**

OR

Q10) a) Write short note on Styrenic PPO. **[6]**

b) State the key characteristics of polysulphone. **[6]**

c) Briefly comment on processing of polysulphones. **[4]**

Q11) a) With suitable examples explain the concept of conducting polymers. **[6]**

b) Write short note on classification of liquid crystalline polymers. **[6]**

c) State merits and demerits of plasma polymerization technique. **[4]**

OR

Q12) a) Explain the concept of biodegradable polymers. **[4]**

b) Explain the mechanism of controlled drug delivery system. **[6]**

c) Write short note on polymers used in membranes. **[6]**

Total No. of Questions : 12]

SEAT No. :

P2028

[Total No. of Pages : 3

[4858] - 248
T.E. (Polymer Engineering)
Instrumentation And Process Control
(2008 Pattern) (Semester - II)

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

Instructions :

1) ***Answers to the two sections should be written in separate books.***
2) ***Draw neat diagrams wherever necessary.***
3) ***Numbers to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***
5) ***Use of logarithmic table, electronic pocket calculators is allowed.***

SECTION - I

Q1) a) Discuss any six terms used to describe the dynamic characteristics of any instrument. **[12]**

b) An instrument is specified as having range of 0-500 bar and an accuracy of +/- 0.5 bar and sensitivity of 0.3 divisions/bar and resolution of 0.1% full scale deflection. Find range, sensitivity, and accuracy. **[6]**

OR

Q2) a) Discuss any six terms used to describe the static characteristics of any instrument. **[10]**

b) Write short note on i) classification of instruments ii) Transducer **[8]**

Q3) a) Explain with neat diagram, principle, construction, working, merits and demerits of any one instrument used to measure temperature. **[14]**

b) Define the term Temperature. **[2]**

P.T.O.

OR

Q4) a) Define the term Pressure. **[2]**

b) Explain with neat diagram, principle, construction, working, merits and demerits of any one instrument used to measure pressure. **[14]**

Q5) Differentiate between Differential Pressure flow meters Vs Variable Area Flow meters. Explain in detail Capacitance liquid level indicator system. **[16]**

OR

Q6) a) Discuss the importance of Level measurement with the help of any one instrument. **[8]**

b) Explain the importance of viscosity measurement in polymer industry and suggest suitable instruments for doing so **[8]**

SECTION - II

Q7) a) Explain the term Process control with its benefits. **[10]**

b) Describe the response of First Order System for step Input Forcing Function. **[8]**

OR

Q8) a) Derive the Transfer Function of Second order System. **[10]**

b) Explain the terms: Transfer Function, Block Diagram. **[8]**

Q9) a) Explain with standard block diagram Open loop Transfer Function and closed loop Transfer Function. **[8]**

b) Write a note on Servo and Regulator problem control system. **[8]**

OR

Q10)a) Explain with neat diagram the negative feedback control system with one example and compare with the positive feedback system. **[8]**

b) Write a note on Controller Tuning. **[8]**

Q11)a) Write a note on Feed forward, ratio control system. **[8]**

b) Discuss the importance of Programmable Logic Control. **[8]**

OR

Q12)Write a note on advanced process control. **[16]**

Total No. of Questions : 12]

P3140

SEAT No. :

[Total No. of Pages : 2

[4858] - 249

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

POLYMER PROCESSING OPERATION - 1

(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) ***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

Q1) 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]**

P.T.O.

Q5) a) Explain PVT diagram and injection moulding cycle. **[8]**

b) Explain Orientation and its importance during injection moulding and its effects. **[8]**

OR

Q6) a) Give characteristics of polymeric materials used for injection molding along with their processing parameters and their effect on product quality. **[8]**

b) Give trouble shooting during 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 compression 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]

P3141

SEAT No. :

[Total No. of Pages : 2

[4858] - 250
T.E. (Polymer)
POLYMER RHEOLOGY
(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) ***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

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]**

P.T.O.

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 factors 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) Derive 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 rheology during extrusion of film and sheet. **[8]**

b) Explain Rheology in regards Compression and transfer moulding. **[8]**

Total No. of Questions : 12]

SEAT No. :

P1440

[Total No. of Pages : 4

[4858] - 251
T.E. (Production)
KINEMATICS OF MANUFACTURING MACHINES
(2008 Pattern) (Semester - I)

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

Instructions to the candidates:

1) ***Answers to the two sections should be written in separate 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 electronic pocket calculator is allowed.***
6) ***Assume suitable data if necessary.***

SECTION - I

Q1) a) Explain C-14, K-25 structures with suitable examples. **[8]**

b) Explain in detail different mechanisms used in machine tool with suitable sketches. **[8]**

OR

Q2) a) Explain angle relationship for function generation. **[8]**

b) Design a slider crank mechanism to co-ordinate three positions of input and output links as follows:- **[8]**

$\theta_1 = 20^\circ$ $\theta_2 = 35^\circ$ $\theta_3 = 50^\circ$

$S_1 = 80$ mm $S_2 = 60$ mm $S_3 = 30$ mm

Q3) a) Explain various standard tooth systems. **[4]**

b) Explain characteristics of involute gear tooth profile. **[4]**

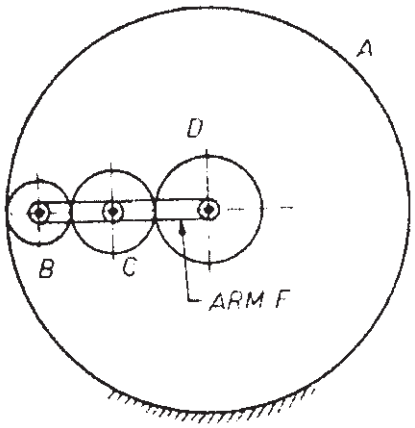
c) Two 20° involute spur gear have module of 8 mm. Gear ratio 2.5. speed of gear wheel 120 rpm. Number of teeth on gear wheel 80. The addendum is such that the path of approach and path of recess on each side are 40% of maximum possible length each. Determine the addendum for pinion and wheel. Also determine the length of arc of contact. Does the interference occur? **[10]**

OR

P.T.O.

Q4) a) Derive an equation for length of path of contact. **[8]**

b) An epicyclic train as shown below given figure. It comprises a fixed annular wheel A having 155 teeth. Wheel B meshes with wheel A and drives wheel D through an idler C. The wheel A and D are concentric. Arm F carries wheels B and C and rotate at 100 rpm anticlockwise about axis of A. If wheel B,C and D has number of teeth 30,35 and 45 repectively. Determine speed and direction of rotation of wheel D.**[10]**



Q5) a) Explain turning moment diagram for single cylinder double acting steam engine. **[6]**

b) A flywheel of mass 250 kg and radius of gyration 600 mm is attached to shaft. The shaft is rotate at a speed of 200 rpm and drives a machine. The torque of a machine varies in a cyclic manner over a period of the revolution. The torque rises from 250 Nm to 1000 Nm uniformly during first half revolution and remain constant for next one revolution, It then falls uniformaly to 250 Nm during next half revolution and remain constant for one revolution, the cycle being repeated there after. Determine **[10]**

i) Power required driving machine

ii) Percentage fluctuation in speed if driving torque applied to the shaft is constant.

OR

Q6) a) Explain the following terms : **[6]**

i) Coefficient of fluctuation of energy

ii) Coefficient of fluctuation of speed

b) A punching machine carried out 8 holes per minute. Each hole of 30 mm diameter and 25 mm thick plate requires 6 Nm of energy per square mm of sheared area. The punch has stroke 100 mm. Find power of motor required if the mean speed of flywheel is 18 m/s. If total fluctuation of speed is not to exceed 2.5% of the mean speed, determine the mass of flywheel. **[10]**

SECTION - II

Q7) a) Explain following terms as applied to cam with neat sketches. **[6]**

i) Pressure angle

ii) Stroke of follower

iii) Prime circle

b) Following data relate to a cam profile, in which the follower moves with uniform velocity during the lift and returning it with SHM. **[10]**

The minimum cam radius = 45 mm.

The diameter of a roller = 1 8 mm

Lift of roller follower = 40 mm

Offset of follower axis = 10 mm towards right

Angle of ascent = 90º

Angle of descent = 110º

Angle of dwell between ascent and descent = 60º

Cam speed = 200 rpm. Draw cam profile.

OR

Q8) a) Explain with sketches cams with specified contour. **[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 80º of cam rotation. Then it remains in lifted position for the next 60º of cam rotation and returns its original position during next 90º of the cam rotation. Remaining is a dwell period. Follower is required to be lifted with SHM where as during return, it is expected to follow uniform acceleration and retardation. Minimum cam radius is 35 mm and follower axis is offset by 10 mm. Draw cam profile. **[10]**

Q9) a) Explain static balancing and dynamic balancing. **[6]**

b) A radial engine has three cylinders whose axes are spaced at angular interval of 120º. The three connecting rods are coupled directly to a single crank. The stroke is 120 mm and the length of each connecting rod is 180 mm. The mass of the reciprocating parts per cylinder is 2 kg. Find the resultant primary and secondary forces acting on frame of the engine when running at 2100 rpm. **[10]**

OR

Q10) a) Explain multi cylinder inline engine. How they can be balanced? **[6]**

b) An inside cylinder locomotive has its cylinder centre lines 0.7 m apart and has a stroke of 0.60 m. The rotating masses per cylinder are 150 Kg at crank pin and reciprocating masses per cylinder 180 Kg. The wheel centre lines are 1.5 m apart. The cranks are at right angles. The whole of rotating and 2/3 of reciprocating masses are to be balanced by masses placed at radius of 0.6 m. Find magnitude and direction of balancing masses. **[10]**

Q11) a) Derive frequency equation for spring mass system. **[8]**

b) In a single degree damped vibrating system, a suspended mass of 3.75 kg makes 12 oscillations in 7 second when disturbed from its equilibrium position. The amplitude of vibration reduces to 0.33 of its initial value after four oscillations. Determine **[10]**

i) Stiffness of spring

ii) Logarithmic decrement

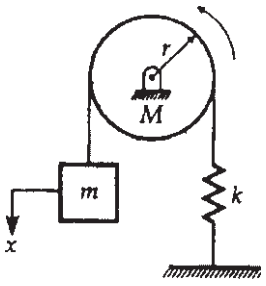
iii) Damping factor

iv) Damping coefficient.

OR

Q12) a) What are the causes and effects of vibration? **[8]**

b) Determine natural frequency of vibration of spring mass pulley System shown in given fig. **[10]**



Total No. of Questions : 12]

SEAT No. :

P3635

[Total No. of Pages : 2

[4858] - 252

T.E (production Engineering)

METROLOGY & MECHANICAL MEASUREMENTS

(2008 Pattern)

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) State the Abbe's principle of alignment and explain the sine and cosine errors with neat sketch. **[8]**

b) Sketch the set up and explain working principal of Angle Dekkor. **[8]**

OR

Q2) a) Write a short note with neat sketch sine bar and sine center. **[8]**

b) State and explain constant deviation prism. **[8]**

Q3) a) Describe Taylor's principal in design of limit gauges. **[6]**

b) Design a workshop type GO and NO GO ring gauge for inspection of 30f8 shaft. Use the following data with usual notations: **[12]**

i) $i=0.45\sqrt[3]{D}+0.001D$

ii) The standard tolerance for grade IT8=25i.

iii) Fundamental deviation for F shaft= $-5.5\ D^{0.41}$

OR

Q4) a) Explain hole basis system. **[6]**

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 = $-16D^{0.44}$. **[12]**

P.T.O

Q5) a) Explain with neat sketch working principle of Taylor Hobson Talysurf surface tester. **[8]**

b) Prove that db = p/2sec (θ/2) **[8]**

OR

Q6) a) Write a short note on profile projector. **[6]**

b) Derive the relation for calculating the chord length & depth of gear by using constant chord method. **[10]**

Calculate chord length and its distance below tooth tip for a gear module 5mm and pressure angle 20°.

SECTION - II

Q7) a) Differentiate between Sensor and Secondary Transducer. **[8]**

b) Explain different types of calibration. **[8]**

OR

Q8) a) Draw generalized block diagram of measurement system and explain function of each elements in it. **[8]**

b) Explain in brief performance characteristics of measuring instruments. **[8]**

Q9) a) Define temperature and explain different temperature scales. **[8]**

b) Explain with neat sketch construction and working of venturimeter. **[8]**

OR

Q10)a) Discuss the criteria for selection of a flow meter & explain differential pressure flow meter. **[8]**

b) Explain Rotameter with sketch. **[8]**

Q11)a) Explain with neat sketch Poney brake & Eddy current dynamometers. **[9]**

b) Discuss vibration measurement using accelerometer. **[9]**

OR

Q12)a) State and explain various types of strain gauges. **[6]**

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

i) Wheatstone bridge gauge

ii) Gauge factor.

Total No. of Questions : 12]

SEAT No. :

P1441

[Total No. of Pages : 4

[4858] - 253
T.E. (Production Engineering)
PRODUCTION MANAGEMENT
(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 electronic pocket calculator is allowed.***
6) ***Assume suitable data if necessary.***

SECTION - I

Q1) a) Define Production, Production Management and state the objectives of Production Management. **[9]**

b) Define Operation Management and discuss the history of Operation Management. **[9]**

OR

Q2) a) Explain the relationship of Production with Finance, Stores and Purchase department. **[9]**

b) What are the different types of Production Systems? Explain any two with their merits and demerits. **[9]**

Q3) a) Explain the concept of Product Design and Product Cost. **[8]**

b) Explain with block diagram functions of Production Planning and Control. **[8]**

OR

Q4) a) With the help of figure explain stages in Life Cycle of Product. **[8]**

b) Explain the concept of Concurrent Engineering. **[8]**

Q5) a) Explain different types of material handling equipments with its applications in Manufacturing industries. **[8]**

P.T.O.

b) A company is engaged in the assembly of a Machine on a continuously 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 Precedence Task	Duration (Min)
1	---	5
2	1	3
3	1	7
4	1	5
5	3	6
6	3,4	3
7	2	4
8	5,6	6
9	4	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) What is the relationship between good Plant Layout and Material Handling system? **[8]**

b) Explain any two types of computerized plant layout. **[8]**

SECTION - II

Q7) a) Define sales forecasting. List different methods of Sales Forecasting and explain any one in detail. **[9]**

b) The demand for a product is given below. The forecast for the August was 250 units. Forecast the demand for the month of November taking the value of $\alpha = 0.4$. **[9]**

Month	August	September	October
Demand	210	270	320

OR

Q8) a) Explain in detail the need of forecasting for manufacturing industry involved in Mass Production. **[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
Cost	100	118	130	142	160	175
Price	125	140	152	164	188	198

Q9) a) Define Critical Path Method (CPM) and Project Evaluation and Review Technique (PERT). Differentiate between CPM and PERT. **[8]**

b) There are seven jobs, each of which has to go through the machines A and B in the order of BA. Processing times in hours are given as: **[8]**

Job	1	2	3	4	5	6	7
Machine A	9	11	11	7	13	2	4
Machine B	4	13	16	7	11	12	10

OR

Q10) a) Why scheduling is required? Explain in brief Forward and Backward Scheduling. **[8]**

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 activities. **[8]**

Activity	Immediate Predecessor	Activity Time (Week)
A	--	12
B	--	20
C	--	28
D	C	12
E	A,B	28
F	E,D	12
G	D	8
H	F,G	8

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

i) Concept of Waste Management

ii) Just in Time

OR

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

i) Energy Conservation

ii) Computerized Production Management

Total No. of Questions : 12]

SEAT No. : ____

P1442

[Total No. of Pages : 3

[4858] - 254

T.E. (Production Engineering) (Semester - I)

CUTTING TOOL ENGINEERING

(2008 Course)

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
UNIT - I

Q1) a) Draw with neat sketch forces on drill tool and its measurement. **[10]**

b) A tool with l2degree rake angle is used at a speed 25 m/min, feed 0.50 mm/rev, chip thickness ratio 0.55. cutting force is 1l00N and feed force 300N ,Find- i) chip thickness, ii) Shear plane angle, iii) coefficient of friction, iv) shear force on shear plane ,v)Velocity of chip along tool face. **[10]**

OR

Q2) a) A medium carbon steel bar 50 mm diameter is turned on lathe with a cutting tool having rake angle 25 degree and with a cutting speed of 30 m/min. If the cutting force is 300 kg, feed force is 100 kg, feed given to tool is 0.18 mm/rev, and length of chip in one revolution = 80 mm, determine the following: a)Shear angle. b)Chip thickness, c) Velocity of the chip along the tool face,d) coefficient of friction, e) normal force on shear plane. **[10]**

b) Prove that according to Ernst Merchant theory the relation between rake angle (α), shear angle ($\varnothing$) and friction angle (β) is given by

$2^{\varnothing} + \beta - \alpha = \frac{\pi}{2}$. **[10]**

P.T.O.

UNIT-II

Q3) a) What is the importance of heat treatment on tool? explain methods for heat treatment. **[10]**

b) What is the use of chip breakers? Sketch various types of chip breakers. **[5]**

OR

Q4) a) Explain with suitable sketch the nomenclature of broach tool. **[10]**

b) Sketch the different methods for mounting of inserts on tool holder. **[5]**

UNIT-III

Q5) a) Derive the relation for optimum tool life and cutting speed for minimum cost criteria. **[10]**

b) Define Machinability and its rating, criteria for Machinability. **[5]**

OR

Q6) a) Find out optimum cutting speed and corresponding tool life for minimum cost for machining of mild steel work piece with HSS tool from following data. When the cutting speed was 25 m/min the tool life was 170 minutes and when the speed was increased to 40 m/min, the tool life was dropped to50 minutes. Operating cost is 25 paise/ min, Tool cost/cutting edge/tool failure is Rs2 and tool changing time=l .5 min. **[8]**

b) Explain different types of tool wear and mechanism of tool wear. **[7]**

SECTION - II

UNIT-IV

Q7) a) Calculate the cross section of a straight shank single point turning tool made of HSS. Data given are, allowable bending stress of HSS = 200 MPa, Young's modulus of HSS = 2×10^5 MPa, Main cutting force = 1100 N ,Permissible deflection of tool tip = 0.05 mm **[8]**

Also draw the tool geometry of the tool by assuming angles

b) Explain the various design aspect of broach tool **[7]**

OR

Q8) a) Explain the various design aspect of twist drill tool. **[8]**

b) Explain the various design aspect for circular form tool. **[7]**

UNIT - V

Q9) a) What is an indexing jig? Describe various indexing devices commonly used with suitable sketch. **[8]**

b) List the different principles of location .Explain any one principle of locating. **[7]**

OR

Q10) a) Explain the concept of economics of jigs and fixtures. **[8]**

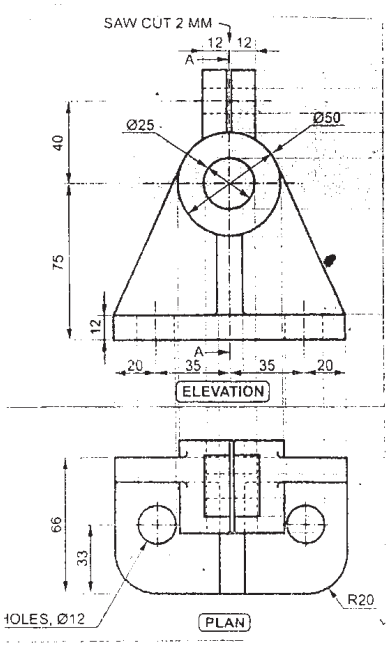
b) Describe criteria for a strap clamp. **[7]**

UNIT - VI

Q11) Design a jig for drilling ϕ 12 mm 2 holes for a component shown in fig .no 1. **[20]**

OR

Q12) Design a milling fixture for cutting a slot of 2mm at location "A" as shown in fig .no 1 Draw minimum two views of your design, show the component in position, name all important elements in drawing, write a part list of your design and draw detail view for locating, clamping, and bushing.**[20]**



Total No. of Questions : 12]

SEAT No. :

P1953

[Total No. of Pages : 3

[4858] - 255

T.E. (Production)

MATERIAL FORMING

(2008 Course)

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

Instructions to the candidates:

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

SECTION - I

Unit - I

Q1) a) Explain and differentiate between Hot forming and Cold forming. **[8]**

b) Explain and draw Mohr's circle for various two and three dimensional stress conditions. **[8]**

OR

Q2) a) Derive an equation for the work done in elastic and plastic deformation. **[8]**

b) Explain direct compression type of forming process. **[8]**

Unit - II

Q3) a) Explain in detail how the stock size is calculated in impression die forging. **[10]**

b) Explain shot blasting and tumbling process with neat sketch. **[8]**

OR

P.T.O.

Q4) Write short note :

a) Double acting steam hammer. **[6]**

b) Board drop hammer. **[6]**

c) Upsetting. **[6]**

Unit - III

Q5) Derive an equation for the drawing stress (σ_d) in tube drawing operation using moving cylindrical mandrel. **[16]**

OR

Q6) a) Explain with neat sketch the various forces acting on a wire during wire drawing operation. **[6]**

b) Explain construction and working of Rod drawing machine. **[4]**

c) Explain construction and working of multistage wire drawing machine. Also state its advantages and limitations. **[6]**

SECTION - II

Unit - IV

Q7) a) Explain two high and three high rolling stand arrangements. **[8]**

b) Explain four high rolling mills and planetary mill with neat sketch. **[8]**

OR

Q8) a) Explain mill spring, mill modulus, ragging, overshooting and hunting in rolling. **[8]**

b) Explain the breakdown pass in rolling with its principal series [sequence]. **[8]**

Unit - V

Q9) a) Derive and equation for work done in extrusion. **[8]**

b) Explain types of flow patterns with neat sketches in extrusion. State various extrusion defects. **[8]**

OR

Q10) a) Explain the variation of extrusion pressure with ram travel in direct, indirect and hydrostatic extrusion process with suitable graph. **[8]**

b) Explain **[8]**

i) Extrusion ratio.

ii) CCD.

iii) Shape factor.

iv) Ugine - Sejornet process.

Unit - VI

Q11) a) Explain Petro - Forge forming with neat sketch. **[8]**

b) Explain the importance of field shaper and drivers in electro-magnetic forming. **[5]**

c) Distinguish between explosive forming and electro-hydraulic forming. **[5]**

OR

Q12) Explain the following with neat sketches :

a) electro-magnetic forming. **[6]**

b) die material in Explosive forming. **[6]**

c) electro-hydraulic forming. **[6]**

Total No. of Questions : 12]

SEAT No. :

P1954

[Total No. of Pages : 3

[4858] - 256

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

TOOL DESIGN

(2008 Pattern)

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 whenever necessary.*
4) *Figures to the right indicate full marks.*
5) *Assume suitable data, if necessary.*
6) *Use of electronic pocket calculator is allowed.*

SECTION - I

Unit - I

Q1) Design a blanking die for the component shown in figure 1.

a) Draw strip layout and find percentage utilisation of the strip. **[6]**

b) Determine centre of pressure. **[4]**

c) Find cutting force and press tonnage. **[6]**

Given : Strip length = 2440 mm, Thickness of strip = 2 mm, Percent penetration = 70%, Shear strength of the material = 300 MPa.

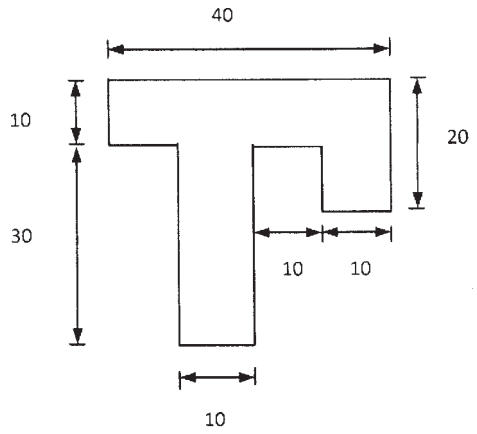


Figure 1

P.T.O.

OR

Q2) a) Explain and differentiate various types of die blocks with neat sketch. **[6]**

b) Classify and explain various types of presses. **[10]**

Unit - II

Q3) Design a Drawing die for the component as shown in figure 2.

a) Calculate blank size. **[4]**

b) Calculate number of draws, cup diameter and height in each draw. **[6]**

c) Determine punch and die diemensions. **[3]**

d) Determine press capacity. **[3]**

(Assume stock thickness = 1 mm, yield strength of material = 427 N/mm^2)

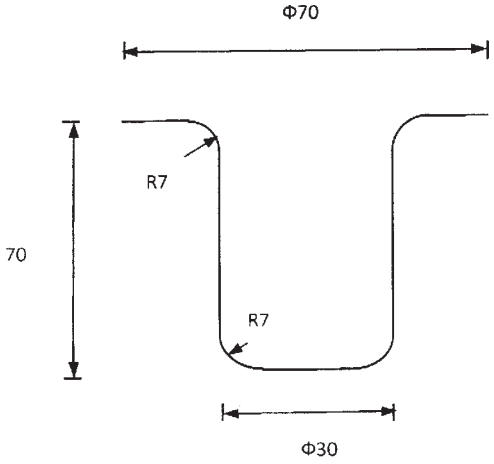


Figure 2

OR

Q4) a) Calculate blank size required to form a cup (figure 2) using graphical method. **[8]**

b) Explain bending terminology. **[8]**

Unit - III

Q5) Design a complete progressive die for a component having circular blank of diameter 70 mm with central square hole 10 mm × 10 mm. (Assume Strip length = 2440 mm, Thickness of strip = 2 mm, Percent penetration = 70%, Shear strength of material = 300 MPa). **[18]**

OR

Q6) Design a compound die for the component having circular blank of diameter 70 mm with central square hole 10 mm × 10 mm. (Assume Strip length = 2440 mm × 1220 mm, Thickness of strip = 2 mm, Percent penetration = 70%, Shear strength of material = 300 MPa). **[18]**

SECTION - II

Unit - IV

Q7) a) Explain the steps to determine stock size in drop forging operation. **[8]**

b) Explain the purpose of the flash and state how flash thickness, flash width, gutter thickness and gutter width dimensions are determined. **[8]**

OR

Q8) a) Explain various allowances are considered while designing Multi-Impression die. **[8]**

b) Explain the procedure to design Edging impression. **[8]**

Unit - V

Q9) a) Explain the process to make plastic (polymers). Also explain and differentiate between Thermoplastic and Thermosetting. **[8]**

b) State and explain injection molding terminology with neat sketch. **[8]**

OR

Q10) a) Explain various types of ejector grid. **[8]**

b) Explain Fan gate and Overlap gate with neat sketch. **[8]**

Unit - VI

Q11) a) Explain various types of ejection system. **[9]**

b) Explain the procedure to design cooling system. **[9]**

OR

Q12) a) Explain various elements to be designed for feed system with important design considerations. **[9]**

b) State various runner profiles with neat sketch. Explain the important factors to be considered while runner designs. **[9]**

Total No. of Questions : 11]

SEAT No. :

P1443

[Total No. of Pages : 4

[4858] - 257

T.E. Production

INDUSTRIAL ENGINEERING AND QUALITY ASSURANCE

(2008 Pattern)

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 Industrial Engineering. Explain in detail the contribution of F.W. Taylor and Gantt in the development of Industrial Engineering. **[10]**

b) Explain how the bad design of component increases total work content. **[8]**

OR

Q2) a) What are the tools and techniques of Industrial Engineering? Explain in brief. **[10]**

b) What are the functions of Industrial Engineering? **[8]**

Q3) a) Explain in short the economic, technical and human considerations in selecting the job for method study **[8]**

b) Explain in brief the steps involved in the method study. **[8]**

OR

Q4) a) Explain with neat sketch standard five symbols used in method study for recording the activities. **[8]**

b) Explain with example flow process chart and SIMO charts used in method study **[8]**

P.T.O.

Q5) a) What are the types of elements in time study? What are the reasons for breaking the job into elements? **[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:

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 $\bar{X}$ 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 : a) Normal distribution

b) d_2 for sub-group size 5 is 2.326 **[8]**

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:

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. **[8]**

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.

Total No. of Questions : 12]

P3142

SEAT No. :

[Total No. of Pages : 3

[4858] - 258

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

MACHINE TOOL ENGINEERING

(2008 Pattern)

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, and Q. 11 or Q12.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of electronic pocket calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) Design and draw cam profile for the component shown in figure below. Also work out the following requirements. **[18]**

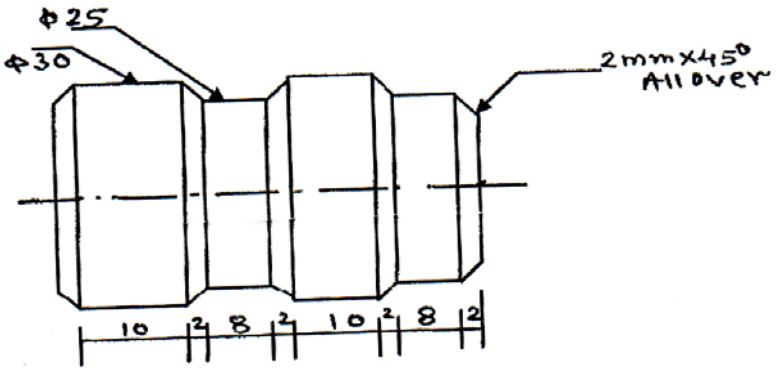
a) Sequence of operation,

b) Table for cam angle and cycle time,

c) Cam profile for turret operation.

Data given

Operation	Speed	Feed
Turning	25M/min	0.2 mm/rev.
Grooving	12M/min	0.1 mm/rev.



P.T.O.

OR

Q2) a) How does an automates differ from a Capstan Lathe? **[6]**

b) Compare progressive action automate with multi-spindle automate. **[6]**

c) Explain with figure rotary type transfer machine. **[6]**

Q3) a) Explain Positioning system in Computer Numerical Controlled (CNC) machining. **[8]**

b) Write down use of G and M code in CNC. Write down the meaning for following. **[8]**

N00l G00 X25 Y30 S3000 F0.5 T0102 M04

N002 G03 X-l5 Y-20 R5 S1000 F0.5 M30

OR

Q4) a) Explain open loop system and closed loop system of numerical control with suitable diagram. **[8]**

b) Define Interpolation used in Computer Numerical Controlled machine. Explain any two types of Interpolation. **[8]**

Q5) a) The system is capable of making 55 delivers/hr. The following specifies the performance characteristics of the system. **[8]**

Average distance travelled /delivery = 160m

Vehicle velocity = 50 m/mim

Pick up time = 50 Sec

Drop off time = 50 Sec

Average distance traveling empty = 110 m

Traffic factor = 0.85

b) Write short note on vehicle guidance in Automated Guided Vehicle System (AGVS) giving suitable example. **[8]**

OR

Q6) a) State and explain with neat sketch Machine Vision System used in material handling system. **[8]**

b) What are the objectives of Automated Storage and Retrieval System (AS/RS). Explain any two types of automated storage and retrieval system (AS/RS) **[8]**

Q7) a) Explain with neat diagram Electric Discharge Machine (EDM). Also explain RC circuit used in EDM. **[8]**

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

i) Chemical machining

ii) Abrasive jet machining.

OR

Q8) a) Explain the principle of working WJM. **[8]**

b) Explain working principle of Plasma Arc Machining with neat sketch. **[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) List different gear cutting processes and Explain in detail bevel gear manufacturing with generation method. **[9]**

b) Differentiate between gear hobbing and Gear shaping. **[5]**

c) Explain helical gear machining by using left hand/right hand hob. **[4]**

OR

Q12)a) Explain schematically the set up of a hobbing machine for cutting a spur gear. **[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. :

P1444

[Total No. of Pages : 4

[4858] - 259

T.E. (Production Engg.(S/W)) (Semester - II)

NUMERICAL TECHNIQUES AND DATABASE

(2008 Pattern)

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

Instructions to the candidates:

1) ***Answer any one question from each unit.***
2) ***Answers to the two sections should be written in separate books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***All questions carry equal marks.***
6) ***Use of electronic pocket calculator is allowed.***
7) ***Assume suitable data if necessary..***

SECTION - I

Unit - I

Q1) a) Draw a neat line diagram for organization of a database and explain? **[6]**

b) What are the advantages and limitations of database processing? **[6]**

c) Explain the entity-relationship model with a suitable example? **[6]**

OR

Q2) Explain the following : **[18]**

a) Data types used in SQL.

b) Hierarchical and Relational database management systems.

c) Data models.

Unit - II

Q3) a) Explain with an example the primary key and foreign key concepts in databases? **[6]**

b) Create a table 'emp' with the following columns by assuming suitable data type and size with correct syntax in SQL.

Emp_id, Ename, City, State, Salary, Age, Hire_date **[4]**

P.T.O.

c) Give an expression in SQL to solve each of the following queries: **[6]**

i) Find the names of all employees whose name starts with 'Ma'

ii) List all the employees name and salary whose age is less than 20 years

iii) Select the employees whose salary is between Rs. 10000 and Rs.60000

OR

Q4) a) Why should you avoid duplication of field in relations? Is duplication allowed in databases? If yes, under what conditions? **[4]**

b) Explain the following with reference to SQL programming: **[6]**

i) Principles of NULL value

ii) Grouping data from tables

iii) SQL operators (Any four)

c) Explain the use of compound conditions AND, OR, Joining in SQL programming with an example? **[6]**

Unit - III

Q5) a) Define electronic commerce. List the consumer's benefits of electronic commerce? **[5]**

b) What is electronic fund transfer? How does it work? **[6]**

c) Explain the difference between conventional and artificial intelligent computing? **[5]**

OR

Q6) Explain the following in brief : **[16]**

a) Data warehousing

b) Electronic data interchange

c) IT in marketing and sales system

SECTION - II

Unit - IV

Q7) a) Write a C program to determine the area of a triangle using the formula. **[6]**

$$\text{area} = \sqrt{s(s-a)(s-b)(s-c)}\ ,\ \text{where S} = \frac{a+b+c}{2}$$

b) Compute the percentage of error in the time period $T = 2\Pi.\sqrt{\frac{l}{g}}$ for l = 1m, if the error in the measurement of l is 0.01 **[5]**

c) Find a real root of $e^x = 3.x$ by bisection method **[5]**

OR

Q8) a) If $u = 2.V^6 - 5.V$, find the percentage error in u at $V = 1$, if error in V is 0.05. **[5]**

b) Given a circle $x^2 + y^2 = c$, write a C program to determine whether a point (x, y) lies inside the circle, on the circle or out side the circle. **[6]**

c) Perform 4 iterations of the Gauss-Seidal method for finding the solution of the linear system of equations: Assume the initial approximation as $x_1 = 0.6$, $x_2 = -0.2$ and $x_3 = 0.5$. **[5]**

$4x_1 - 2x_2 + x_3 = 4$

$x_1 + 2x_2 + x_3 = 0.75$

$3x_1 - 3x_2 + 5x_3 = 5.5$

Unit - V

Q9) a) Fit a second degree parabola to the following data taking y as dependent variable: **[8]**

x	1	2	3	4	5	6	7	8	9
y	2	6	7	8	10	11	11	10	9

b) Use Lagrange's interpolation formula to fit a polynomial to the data

x	:	-1	0	2	3
u_x	:	-8	3	1	12

Hence or otherwise find the value of u_1 **[8]**

OR

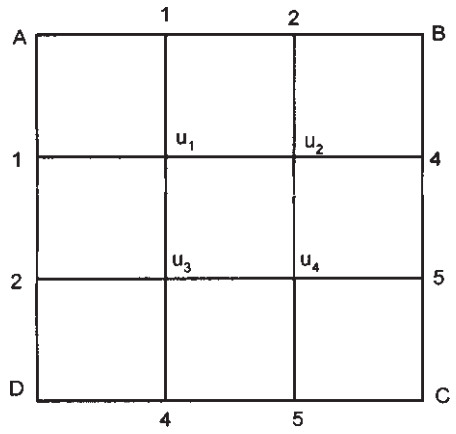
Q10) a) Write an algorithm for solving the interpolation using Newton forward difference method? **[8]**

b) Compute *f(27)* from the following data using Lagrange's interpolation formula : **[8]**

x	:	14	17	31	35
f(x)	:	68.7	64.0	44.0	39.1

Unit - VI

Q11) a) Solve the elliptic equation $u_{xx} + u_{yy} = 0$ for the following square mesh with shown boundary values. Iterate until the maximum difference between two successive values at any point is less than 0.001. **[9]**



b) Given $dy/dx = y - x$, $y(0) = 2$. Find $y(0.1)$ and $y(0.2)$ correct to four decimal places using Runge – Kutta method. **[9]**

OR

Q12) a) Solve the differential equation $d^4y/dx^4 - 16\ y = x$ for $y(0.25)$, $y(0.5)$ and $y(0.75)$ using finite difference method, given that

$y(0) = 0$, $y'' = 0$, $y(1) = 0$ and $y'(1) = 0$ **[9]**

b) Solve $dy/dx = yz + x$, $dz/dx = xz + y$ by using Runge - Kutta method given that $y(0) = 1$, $z(0) = -1$ for $y(0,1)$, $z(0,1)$. **[9]**

Total No. of Questions : 12]

SEAT No. :

P2029

[Total No. of Pages : 3

[4858] - 260
T.E. (Production Engineering)
PRODUCTION METALLURGY
(Common to Production S/W)
(2008 Pattern) (Semester - II)

Time :3.00 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) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***
5) ***Use of logarithmic tables, slide rules, Mollier charts, electronic pocket calculator and steam table is allowed.***

SECTION - I

Q1) a) Explain the three reactions in the Fe-Fe_3C equilibrium diagram. **[6]**

b) Explain with composition:- FeE270, AISI050, 60C10. En31. 80T11, T85W6Mo5Cr4V2. **[6]**

c) Define :- δ Ferrite, Cementite, Ledeburite and Pearlite **[6]**

OR

Q2) a) Explain in brief the classification of steels with examples. **[6]**

b) Calculate amounts of phases that are obtainable at room temperature if 1.2% C Steel is cooled under equilibrium cooling condition with a suitable diagram. Also define those phases. **[6]**

c) Compare macroscopy with microscopy. **[6]**

Q3) a) Explain the transformation of Austenite to bainite with a neat diagram. **[8]**

b) State the advantages of isothermal Annealing over Conventional Annealing with a neat diagram. **[8]**

P.T.O.

OR

Q4) a) What is retained austenite? Explain the ways to eliminate it. **[8]**

b) Explain the changes taking place during the various stages of tempering. **[8]**

Q5) a) Compare Pack carburizing with Liquid carburizing **[8]**

b) Explain Martempering and Austempering. **[8]**

OR

Q6) a) Write short notes on: i) Induction Hardening ii) Isoforming **[8]**

b) Explain: i) Carbonitriding ii) Nitriding. **[8]**

SECTION II

Q7) a) Write Shortnotes: i) Weld decay in stainless steels ii) High Speed Tool Steels **[8]**

b) Which alloy steels would you suggest for the following applications and justify: Milling cutters, Die casting dies for Aluminium alloys, Plastic moulding dies, Master gauges, Surgical instruments. **[10]**

OR

Q8) a) Write shortnotes: i) Ductile Cast iron ii) Malleable Cast iron **[8]**

b) Explain the effect of the following alloying elements: Cr, W, Ni, Mn and V. **[10]**

Q9) a) Give the composition, one property and one application for the following: i) LM11 ii) Elinvar iii) Gun metal iv) Cartridge brass **[8]**

b) What is equivalent zinc? Explain with an example? **[8]**

OR

Q10)a) Give the composition, one property and one application :i) Plumber's Solder ii) Bell Metal iii) Monel 4]Alnico **[8]**

b) What are the requirements of bearing materials? How they are fulfilled? **[8]**

Q11)a) Write shortnote on Nanomaterials and Metal matrix composites **[8]**

b) Explain hand lay-up and filament winding process. **[8]**

OR

Q12)a) Compare Metal matrix composites with Ceramic matrix composites. **[8]**

b) State the properties and applications of Biomaterials. **[8]**

Total No. of Questions : 6]

SEAT No. :

P3613

[Total No. of Pages : 2

[4858] - 261

T.E. (Production S/W) (Semester - I)

MANUFACTURING TECHNOLOGY

(2008 Pattern) (Self Study)

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

Instructions to the candidates:

1) ***Section - I 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-conventional machining processes. Give detailed classification of non-conventional machining processes with their applications w.r.t real life examples. **[16]**

OR

Draw only schematic sketches for following processes (Any four) **[16]**

a) Abrasive Jet Machining.

b) Ultrasonic Machining.

c) EDM.

d) Electrochemical machining.

e) Ion Beam Machining.

Q2) Why plastic processing is required? Explain various molding processes in detail. **[16]**

OR

For plastic processing, explain : **[16]**

a) Thermoforming.

b) Laminating and Reinforcing.

P.T.O.

Q3) What is MEMS? What are its practical applications? For MEMS explain necessity of Semiconductor and Silicon, Crystal growing and wafer preparation. **[18]**

OR

Write shorts notes on following (Any Three) : **[18]**

a) Lithography.
b) Printed Circuit Boards.
c) Nanofabrication.
d) Film Deposition.

SECTION - II

Q4) Compare between Electrical, Optical and Pneumatic Comparators. **[16]**

OR

For light wave interference, explain : **[16]**

a) Optical Flats.
b) Fringe Patterns.

Q5) Explain applications and principle of working of autocollimator and angle dekkor. **[16]**

OR

Draw sketch only showing measurement setup of (Any Three) : **[16]**

a) Sine Bar.
b) Constant deviation prism.
c) Surface Finish.
d) Spirit Level.

Q6) Explain objectives and functions of cost estimating and enumerate estimating procedures with real life examples. **[18]**

OR

Write a short notes on (Any Three) : **[18]**

a) Estimation of Weights and Materials.
b) Time Value of Money.
c) Replacement Techniques.
d) Need and Provision for Scrap.

❖ ❖ ❖ ❖

Total No. of Questions : 12]

SEAT No. :

P1445

[Total No. of Pages : 5

[4858] - 262
T.E. (Production)
KINEMATICS DESIGN OF MANUFACTURING
(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 30º, determine the following:

i) the linear velocity and acceleration of the slider and

ii) the angular velocity and angular acceleration of the connecting rod. **[8]**

b) Explain "Three position synthesis by Chebychev Spacing' with figure. **[8]**

OR

Q2) a) Explain various Kinematics principles used in the operation of gear hobbing machine used to generate helical gear. **[10]**

b) Explain the following terms related to Kinematic Synthesis. **[6]**

i) Function Generation

ii) Dimensional Synthesis

iii) Path Generation.

P.T.O.

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

i) Notch Sensitivity

ii) Fatigue stress concentration factor $\mathbf{K_f}$

iii) Fatigue

b) 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 up 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.

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 for infinite life. (Use distortion energy theory) **[10]**

OR

Q4) a) A steel bar is subjected to two dimensional stresses; the tensile stress along the X- axis varies from 45MPa to 100MPa, whereas 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]**

b) 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]**

Q5) a) The following data is given for a spur gear pair made of steel and manufactured by shaping having 20º full depth involute system.

Module = 8mm

Centre distance = 380mm

Permissible bending stress for pinion and gear = 60N/mm^2

Pinion & Gear speed = 1500 & 400 rpm. respectively

Face width = l0x module

Application factor = 1.5

Factor of safety = 2.0

Assuming the velocity factor accounts for the dynamic load; calculate the rated power that the gear pair can transmit. Suggest the surface hardness.

Use following data: Velocity Factor $Kv = \frac{6}{6+v}$ &

Lewis Factor = $Y = 0.484 - \frac{2.87}{Z}$

Notations have usual meaning. **[12]**

b) What do you understand by formative number of teeth? Explain its significance in the design of helical gear. **[6]**

OR

Q6) a) i) State purpose of providing lubrication in Gear Box

ii) State different types of lubricant used.

iii) State modes of lubrication. **[6]**

b) A helical pinion having 21 teeth to be made up of plain carbon steel 55C8 (S_{ut} = 720 N/mm^2) is to mesh with a gear to be made up of plain carbon steel 40C8 (S_{ut} = 580 N/mm^2). The gear pair is required to transmit 10 kW power from an electric motor running at 1000 r.p.m. to a machine running at 300 r.p.m. The starting torque of the motor is 150% of the rated torque. The factor of safety required is 2.0 The face width is 10 times the normal module and tooth system is 20º full depth involute. The helix angle is 25º. The gears are to be machined to meet the specifications of grade 7. The gear and pinion are to be case hardened to 300BHN and 350BHN respectively. Design the gear pair by using the dynamic factor and Spoott's equation for dynamic load.

Use Following Data:

For Grade 7 $\rightarrow e = 11.0 + 0.9\left\lfloor m_n + 0.25\sqrt{d} \right\rfloor$

$$Fd = \frac{e.np.Zp.b.rp.rg}{2527\sqrt{rp2 + rg2}} \cos\phi n \cos\psi, \quad Z' = \frac{Z}{\cos 3\psi}$$

and $Y' = 0.487 - \frac{2.87}{Z'}$; $Kv = \frac{5.6}{5.6 + \sqrt{V}}$ **[12]**

SECTION - II

Q7) a) What is preloading of bearings? How it is achieved? **[6]**

b) Explain the following terms as applied to journal bearings. **[6]**

i) Bearing characteristic number ii) Bearing modulus

c) How you will select bearing from manufacturer's catalogue, explain in detailed? **[6]**

OR

Q8) a) A ball bearing operates on a work cycle consisting of three parts as shown in table:

SN	Fraction of Cycle	Radial Load 'Fr'	Speed in rpm
1	30%	4000N	720
2	50%	6000N	1400
3	20%	5000N	1000

The basic dynamic capacity of the bearing is 30700 N

Calculate :

i) The rating life of the bearing in hours.

ii) The average speed of rotation.

The life of the bearing with 95% reliability. **[12]**

b) Explain the following properties of sliding contact bearing material.**[6]**

i) Conformability

ii) Bondability

iii) Corrosion resistant

Q9) A single cylinder internal combustion engine working on four stroke cycle develops 75KW at 360rpm. The fluctuation of energy can be assumed to be 0.9 times the energy developed per cycle. If the fluctuation of speed is not to be exceeds 1% and the maximum centrifugal stress in the flywheel is to be 5.5MPa, estimate the mean diameter and the cross sectional area of the rim. The material of the rim has a density of 7200kg/m3. **[16]**

OR

Q10) a) Derive expression & show that tensile stress in the rim of the flywheel due to the centrifugal force is given by

$$\sigma t = \rho R2\ \omega 2 = \rho v2$$ **[8]**

(Notations have usual meaning)

b) Write short note on 'Construction of Flywheel'. **[8]**

Q11) a) It is observed from a sample of 200 pins produced on an automatic machine that their diameters are normally distributed with a mean of 10.5mm and a standard deviation of 0.02mm. If the rejection is to be limited to 10 pins, determine the design tolerance.

Assume the process is centred.

The areas below the standard normal distribution curve are as follows:

Z	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0
Area	0.3849	0.4032	0.4192	0.4332	0.4452	0.4554	0.4641	0.4713	0.4772

Use linear interpolation for intermediate values. **[10]**

b) Explain the following terms used in Johnson's method of optimum design.

i) Primary design equation

ii) Subsidiary design equation

iii) Limit equations **[6]**

OR

Q12) a) The recommended class of fit for the journal and the bearing of a hydrodynamic bearing is $20H_7$-e_8. The diameters of the journal and bearing are normally distributed. From the consideration of hydrodynamic action and bearing stability, the maximum and minimum clearances are limited to 0.08 and 0.05 mm respectively. Determine the percentage of rejected assemblies.

The tolerances in micron are as follows:

Diameter in,mm	H7		e8	
20	es	ei	es	ei
	+21	0	-40	-73

Z	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5
Area	0.4641	0.4713	0.4772	0.4821	0.4861	0.4893	0.4918	0.4938

Z	2.6	2.7	2.8
Area	0.4953	0.4965	0.4974

Use linear interpolation for values in between. **[10]**

b) Explain the difference between 'design tolerance' & 'natural tolerance'. How the designer would select the tolerance for the minimum rejection of the components? **[6]**

Total No. of Questions : 12]

P3143

SEAT No. :

[Total No. of Pages : 3

[4858] - 263

T.E. (Production Sandwich Engineering)

MATERIAL FORMING AND MOULD DESIGN

(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) ***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 jf 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 material forming & classify material forming processes on the basis of applied load with neat sketch. **[8]**

b) A specimen of original length 50 mm undergoes deformation in various steps given in table below. Calculate true strain & show that true strains are additive in nature. **[8]**

Step	Original length (l_0)	Instantaneous length (l_i)
1	50	55
2	55	60.5
3	60.5	66.55

OR

Q2) a) Explain role of friction & Lubrication on metal forming processes. **[8]**

b) What is a yield criterion? Explain various yield criteria in detail. **[8]**

Q3) a) Explain manufacturing of seamless tubes using extrusion process. **[8]**

b) Explain Following (any two) **[8]**

i) No draft forging

ii) Isothermal Forging

iii) Liquid Metal forging

P.T.O.

OR

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 following for forging with neat sketch (any two) **[8]**

i) Flash & Flash gutter

ii) Rotary swaging

iii) Press Forging

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 30 % reduction in area on 12 mm diameter wire given that the yield stress of metal is 240 N/mm^2 die angle is 12° and coefficient of friction is 0. 1. **[10]**

b) Explain Electro-Hydraulic forming in detail with neat sketch. **[8]**

SECTION - II

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

i) Roll Flattening

ii) Roll camber

b) Explain various passes 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. Assume young's modulus (E) =1.005 MN/mm^2 and Poissons ratio (r) = 0.35. **[8]**

b) Explain automatic gauge control rolling. **[8]**

Q9) a) What is Chvorinov's rule? Explain its importance in design of casting **[8]**

b) Explain following **[8]**

i) Hot Chamber Die Casting

ii) Cold Chamber Die Casting

OR

Q10) a) Explain various points (aim) to be considered while designing sand casting. **[8]**

b) Explain following in case of Die casting **[8]**

i) Draft

ii) Die wear

iii) Die lubricants

iv) Parting line shape & location

Q11) a) Explain various forging operations to be carried out in multi-impression die with neat sketch. **[8]**

b) Explain importance of selection of parting line in forging die design **[5]**

c) Explain pin ejection technique for injection moulding with suitable sketch. **[5]**

OR

Q12) a) Explain how stock size is determined for forging operation. **[8]**

b) Explain various allowances considered in forging die design. **[5]**

c) Explain sleeve ejection technique for injection moulding with suitable sketch. **[5]**

Total No. of Questions : 12]

SEAT No. :

P1955

[Total No. of Pages : 2

[4858] - 264

T.E. (Production Sandwich Engineering)

PRODUCTION & INDUSTRIAL MANAGEMENT II

(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.*

SECTION - I

Unit - I

Q1) a) Explain the functions of Marketing Management. **[8]**

b) What is Market research? **[6]**

c) What are the different forms of Money? **[4]**

OR

Q2) a) What happens when an entrepreneur starts his business without conducting a market survey. **[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]**

P.T.O.

OR

Q6) a) What is the Purpose and utilization of Tolerance chart? **[8]**

b) Explain Six Point location system? **[8]**

SECTION - II

Unit - IV

Q7) a) Define following terminologies **[8]**

i) Sampling Plan.

ii) Sampling Inspection.

iii) Lot Size.

iv) Sample Size.

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 mean by variation and discuss the reasons for 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 Maintenance (TPM). **[12]**

b) What is 5'S? **[4]**

Unit - VI

Q11) a) Write down the short note on Design of Experiments? **[8]**

b) Explain Taguchi Method. **[8]**

c) Define : Fault Tree Analysis (FTA). **[2]**

OR

Q12) a) State advantage and disadvantages of ISO 9000. **[8]**

b) State the elements of Quality System. **[8]**

c) What is "continual improvement"? **[2]**

Total No. of Questions : 11]

P3144

SEAT No. :

[Total No. of Pages : 2

[4858] - 271
T.E. (BIOTECHNOLOGY)
Genetic Engineering (Semester - 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) ***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) What do you mean by PCR? What are the components of a PCR reaction? Using appropriate diagram, describe steps involved in typical PCR reaction. **[16]**

OR

Q2) What is DNA sequencing? Enlist different methods of DNA sequencing and explain Maxam and Gilbert method in detail. **[16]**

Q3) What are multiple cloning sites? Explain their significance in Genetic Engineering. **[16]**

OR

Q4) Write Short Notes: **[16]**

a) Phagemids

b) Selection Markers

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) With a neat diagram, explain the process of DNA sequencing using the Sanger's method. Add a note on automated sequencing method. **[16]**

OR

Q8) Give an account of different methods gene isolation. **[16]**

Q9) Answer in Brief: **[16]**

a) Bacterial Conjugation

b) Vaccines

OR

Q10) What is BT cotton? Explain role of genetic engineering in development of BT Cotton **[16]**

Q11) Write notes on: (Any 2) (9M Each) **[18]**

a) Humulin

b) Golden Rice

c) Transfection

d) AFLP

Total No. of Questions : 12]

SEAT No. :

P3145

[Total No. of Pages : 2

[4858]-272
T.E. (Biotechnology) (Semester - I)
FERMENTATION TECHNOLOGY - I
(2008 Pattern)

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) a) What is fermentation? Enlist the types of products obtained out of fermentation. **[6]**

b) Explain in detail methods of isolation of microorganisms. **[10]**

OR

Q2) What is Monod equation? Explain with a typical microbial Growth Curve. Explain each growth phase and enlist fermentation products linked to each phase. **[16]**

OR

Q3) What is nutrient medium? What is the importance of medium optimisation? Explain different methods of medium optimisation. **[16]**

OR

Q4) State the importance of sterilisation in fermentation technology? Discuss in situ sterilisation and HTST sterilisation in brief. **[16]**

OR

Q5) Explain in detail activities of lactic acid bacteria and industrial production of lactic acid. **[18]**

OR

Q6) Explain the industrial production, recovery and applications of any industrial alcohol in detail. **[18]**

P.T.O.

SECTION - II

Q7) Explain Single Cell Protein. Explain production, recovery and applications of SCP in detail. **[16]**

OR

Q8) Define enzymes. Explain in detail isolation, production and use of any two microbial enzymes in detail. **[16]**

OR

Q9) Enlist the products of solid and liquid state fermentation. Draw neat labeled diagram of CSTR. Explain the parts and their functions of bioreactor in detail. **[16]**

OR

Q10) What are fermenters? Explain in detail about industrially used four types of fermenters. **[16]**

OR

Q11) Why is the study of fermentation economics necessary? Explain with one example. **[18]**

OR

Q12) What is scale up of fermenters? What are the principles of scaling up? Explain the theoretical considerations and techniques used in scaling up any fermentation process. **[18]**

Total No. of Questions : 12]

SEAT No. :

P3146

[Total No. of Pages : 4

[4858]-273
T.E. (Biotechnology) (Semester - I)
HEAT TRANSFER
(2008 Pattern)

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

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7or 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.***

SECTION - I

Q1) a) Explain Fourier's law of heat conduction and Newton's law of cooling. **[4]**

b) How dimensional analysis is useful in data reduction and data analysis? **[4]**

c) Explain convection and types of convection with suitable example. **[4]**

d) What is Buckingham pi-theorem and what are it's limitations? **[4]**

OR

Q2) a) Discuss the mechanism of thermal conduction in gases and solids. **[6]**

b) What are different modes of heat transfer? Explain with suitable example. **[10]**

Q3) a) Derive the heat flow equation for steady state heat conduction through composite plane wall. **[8]**

b) Calculate the critical radius of insulation for asbestos (K = 0.172W/mk) surrounding a pipe & exposed to room air at 300 K with h = 2.8 W/m^2k. Calculate the heat loss from 475 K, 60 mm diameter pipe when covered with the critical radius of insulation & without insulation? **[8]**

P.T.O.

OR

Q4) Calculate the critical radius of insulation for asbestos (K = 0.172W/mk) surrounding a pipe & exposed to room air at 299 K with h = 2.8 W/m^2 k. Calculate the heat loss from 475 K, 60 mm diameter pipe when covered with the critical radius of insulation & without insulation? **[16]**

Q5) a) Calculate the inside heat transfer coefficient for fluid flowing at a rate of 300 cm^3/sec through 20 mm inside diameter of tube of heat exchanger from the data given: **[12]**

Data: Viscosity of flowing fluid = 0.8 NS/m^2

Density of flowing fluid = 1100kg/m^3

Specific heat of fluid = 1.26 KJ/kg.K

Thermal conductivity of fluid = 0.384 w/mK

Viscosity at wall temperature = 1.0 NS/m^2

Length of heat exchanger = 6 m

b) Differentiate between Film and Drop wise condensation. **[6]**

OR

Q6) a) What is boiling? What are it's types? Explain the different regimes of pool boiling. **[10]**

b) Explain the concept of thermal boundary layer. **[8]**

SECTION - II

Q7) a) Define following terms: **[10]**

i) Emissivity ii) Absorptivity iii) Black Body

iv) Gray Body v) Opaque Body

b) Explain Kirchoff's law. **[6]**

OR

Q8) a) A 48 mm internal diameter iron pipe at 423°K passes through a room in which the surroundings are at temperature of 300°K. If the emissivity of the pipe metal is 0.8. what is the net interchange of radiation energy per meter length of pipe? The outside diameter of pipe is 60 mm. **[8]**

b) Calculate the net exchange of radiant heat flux between two infinite parallel gray surfaces which are maintained at absolute temperatures T_1 and T_2 and have emissivities ε_1 and ε_2 respectively. **[8]**

Q9) a) Define the effectiveness and NTU of heat exchanger. Derive the relation between them for parallel flow heat exchanger? **[8]**

b) What is LMTD? Derive the expression for LMTD in counter-current flow. **[8]**

OR

Q10) A parallel flow heat exchanger has a hot and cold water streams flowing through it. The flow rates are 600 kg/h and 1500 kg/hr and inlet temperatures are 343 K and 298 K on the hot and cold side respectively. The exit temperature on hot side is required to be 323 K. Calculate the area of heat exchanger if the individual heat transfer coefficients on both sides are 1600 W/(m^2.K) by

a) LMTD approach and

b) Effectiveness-NTU approach.

Also find outlet temperature of cold water. Use C_p for both hot and cold water as 4187 J/(kg.K.) **[16]**

Q11) a) Give classification of evaporators? Explain agitated film evaporator in detail? **[6]**

b) Explain backward feeding method in multiple effect evaporators. **[6]**

c) Define **[6]**

i) Capacity of an evaporator

ii) Economy of an evaporator

iii) Boiling point elevation

OR

Q12)a) A solution containing 10% solids is to be concentrated to a level of 50% solids. Steam is available at a pressure of 0.20MPa [saturation temperature of 393 K]. Feed rate to the evaporator is 30000 kg/h. The evaporator is operating at a reduced pressure such that the boiling point is 323K. The overall heat transfer coefficient is 2.9 kW/(m^2.K).

Estimate (i) The steam economy and (ii) The heat transfer surface for

A) Feed introduced at 293 K

B) Feed introduced at 308 K.

Data: Specific heat of feed = 3.98 kJ/(kg.K)

Latent heat of condensation of steam at 0.20MPa = 2202 KJ/kg

Latent heat of vaporisation of water at 323 K (i.e. at the pressure in the vapour space = 2383KJ/kg **[12]**

b) What is the objective of evaporation? Explain what happens to concentration, density, viscosity and boiling point during evaporation.**[6]**

Total No. of Questions : 12]

SEAT No. :

P3614

[Total No. of Pages : 3

[4858] - 274
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.***

SECTION - I

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 Y = a + bx using following data **[9]**

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's 1/3rd rule.

b) Weddle's rule.

c) Trapezoidal rule.

d) Simpsons'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]**

SECTION - II

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) Write short note on "Activated sludge systems". **[9]**

OR

Q12)Define unlimited cell growth kinetics. Write the modeling equations for a continuous culture for unlimited growth reactors. **[18]**

❖ ❖ ❖ ❖

Total No. of Questions : 12]

SEAT No. :

P3615

[Total No. of Pages : 3

[4858] - 275

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

MASS TRANSFER

(2008 Pattern)

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

Instructions to the candidates:

1) ***Answer any three from Section - I and anythree 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) 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 mixture containing benzene and toluene with 40% benzene and 60% toluene is to be separated in a fractionating column to give product containing 96% benzene and bottom product containing 95% toluene. Feed is a mixture of two-third vapour and one-third liquid. Find out the no. of theoretical stages required if reflux ratio is 1.5 times the minimum is required. **[8]**

Data: Relative volatility α_{AB}=2.5

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) 5000 kg/hr of a SO_2-air mixture containing 10% 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 0.20%. 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.

If the packed bed height of tower is 0.52 m, Calculate the height of transfer unit. **[9]**

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, 5% 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.

Data: Mol. Wt. Na = 23, S = 32, O = l6, H = 1 **[16]**

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Total No. of Questions : 12]

SEAT No. :

P3147

[Total No. of Pages : 3

[4858]-276
T.E. (Biotechnology)
REACTION ENGINEERING
(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 Q1 or2, Q3 or 4, Q5 or 6 from section I and Q7or 8, Q9 or 10, 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) Discuss about the temperature dependency influences the activation energy? **[8]**

b) Explain the kinetic model for non-elementary reaction. **[8]**

OR

Q2) a) A human of 65 Kgs consumes about 5000 KJ of food per day. Assume that the food is all glucose and overall reaction is **[8]**

$C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O, \ \Delta Hr = 281$ KJ

Find man's metabolic rate in terms of oxygen used per m^3 of person per second?

b) Give classification of reactions. **[8]**

Q3) a) Obtain the equation relating time, initial concentration and conversion of an ideal batch reactor for constant density system. **[9]**

b) Derive the performance equation for plug flow reactor. **[9]**

P.T.O.

OR

Q4) a) Discuss on integral method of analysis of kinetic data. **[9]**

b) Define: i) Residence time ii) Space velocity and iii) Space time **[9]**

Q5) a) Derive the expression for calculating E- curve and their significance. **[8]**

b) Write detail note on Segregated flow model. **[8]**

OR

Q6) a) Derive the expressions for residence time distribution for pulse input method. **[8]**

b) Discuss about the degree of segregation influence conversion and product distribution in batch and plug flow reactor. **[8]**

SECTION - II

Q7) a) Derive the expression relating time and conversion for shrinking core model for spherical particles of radius R and unreacted core radius r_c of unchanging size for diffusion through ash layer control. **[12]**

b) State the different factors affecting on heterogeneous reaction. **[6]**

OR

Q8) a) Two solid samples are kept in a constant environment in over for a period of 1 hr. 4 mm particles are 67 % converted and 2 mm particles are 87 % converted. Find the time required for complete conversion of 1 .5 mm particle in this oven? **[9]**

b) Derive overall rate equation for a given system

$$A_{(l)} + B_{(s)} \rightarrow R_{(l)}$$

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. **[9]**

Q9) Discuss on: i) Mixed flow reactor ii) Fluidized bed reactor and iii)Recycle reactor. **[16]**

OR

Q10)Give detail note on : i) Slurry reactor ii) Packed bed catalytic reactor. **[16]**

Q11)a) Write a short note on substrate limiting microbial fermentation. **[8]**

b) Discuss on Enzyme deactivation kinetics. **[8]**

OR

Q12)a) Differentiate between microbial and enzyme fermentation. **[8]**

b) Discuss about Michaelis-Menten Kinetics. **[8]**

Total No. of Questions : 12]

SEAT No. :

P3526

[Total No. of Pages : 2

[4858]-277

T.E. (BIO TECHNOLOGY) (Semester-II)

FERMENTATION TECHNOLOGY - II

(2008 Pattern)

Time : 3 Hours] *[Maximum Marks : 100*

Instructions to the candidates:

1) ***Asnwer 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

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]**

P.T.O.

Q5) Write short notes on: **[18]**

a) Langmuir adsorption isotherm

b) Freundlich adsorption isotherm

OR

Q6) A volume of $1m^3$ contanin a mixture of air and acetone vapour. The temperature is 30ºC 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 30ºC. 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]**

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Total No. of Questions : 11]

SEAT No. :

P3148

[Total No. of Pages : 2

[4858]-278
T.E. (Biotechnology)
BIOSEPARATION - I
(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) Give an overview of Bioseparation techniques. **[8]**

b) Explain any two physical / mechanical cell disruption methods in detail. **[8]**

OR

Q2) a) Describe any two chemical / biological cell disruption methods in details. **[8]**

b) Define the mechanism of adsorption process. State the factors affecting adsorption. With examples of few adsorbents write note on application of adsorbents. **[8]**

OR

Q3) a) With how many dimensions chromatographic methods can be classified? Draw classification chart and give example of each type of chromatography technique. **[8]**

b) Differentiate between planner versus column chromatography. **[8]**

OR

Q4) What is chromatography? Depict theory of column chromatography in detail. **[16]**

P.T.O.

Q5) Write short notes on: (Any 2) (9 M each) **[18]**

a) Sedimentation

b) Centrifugation

c) Filtration

d) membrane Filtration

SECTION - II

Q6) What is liquid-liquid extraction? Explain Aqueous Two Phase Separation in details. **[16]**

OR

Q7) Write short notes on:(4 M each) **[16]**

a) Crystallization

b) Lyophilzation

c) Leaching

d) Drying

Q8) Draw "Typical flow diagram of a protein production facility" and explain the process with one example. **[16]**

OR

Q9) Write importance of Bioseparations in Biotechnology and write notes on Economics of Bioseparation Process. **[16]**

Q10)Explain the following case studies in details: (9M each) **[18]**

a) Cell disruption methods

b) Aqueous Two Phase Extraction

OR

Q11)Elaborate on recent industrial advances in Bioseparation processes with example of secondary metabolite product like Antibiotics. **[18]**

Total No. of Questions : 10]

SEAT No. :

P3149

[Total No. of Pages : 2

[4858]-279

T.E. (Biotechnology Engg.)

IMMUNOLOGY AND DIAGNOSTICS

(2008 Pattern) (Semester - II)

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 various Innate Immune Mechanisms. **[18]**

OR

Q2) Describe the role of primary lymphoid organs in development of immunity. **[18]**

Q3) Describe various types of antigen- antibody reactions and comment on their sensitivity. **[16]**

OR

Q4) Write short notes on (any two) (8 marks each) **[16]**

a) Antigens

b) Monoclonal antibodies

c) Structure of antibody

Q5) Give comparative account of Immunoglobulin classes. **[16]**

OR

Q6) With the help of diagram describe the process of autograft acceptance and rejection. **[16]**

P.T.O.

SECTION - II

Q7) Write notes on ANY TWO (8 marks each) **[16]**

a) IgE mediated allergy

b) Erythroblastosis foetalis

c) MHC

OR

Q8) Attempt ANY TWO (8 marks each): **[16]**

a) Cytokines

b) HLA

c) arthus reaction.

Q9) Write short notes on ANY TWO (8 marks each) **[16]**

a) Toxoid

b) Immune sera

c) DNA vaccine

d) Attenuated vaccines

Q10) Write notes on any TWO of following (9 marks each) **[18]**

a) Autoimmunity

b) IR in cancer

c) B cells,

d) IR in HIV

Total No. of Questions : 12]

SEAT No. :

P3150

[Total No. of Pages : 2

[4858]-280
T.E. (Biotechnology) (Semester - II)
BIOINFORMATICS AND MANAGEMENT
(2008 Pattern)

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 database management system? Describe NCBI in detail. Add a note on relational and object oriented databases. . **[18]**

OR

Q2) What is SRS? How does it work? Write a note on network of databases for Entrez. **[18]**

Q3) Describe briefly: (any 4, 4 marks each) **[16]**

a) Genbank

b) EMBL

c) DDBJ

d) NCBI

OR

Q4) What are specialised genomic databases? Explain any one in detail. **[16]**

Q5) What are protein databases? How are they classified? Name a few primary and secondary protein databases. What is the importance of structure classification databases in structural biology? **[16]**

P.T.O.

OR

Q6) Write a note on Protein Data Bank. **[16]**

SECTION - II

Q7) Answer the following (9 marks each) **[18]**

a) Computer Aided Drug Designing.

b) BLAST

OR

Q8) Write a note on paiwise and multiple sequence alignment. **[18]**

Q9) Explain the terms-Phylogeny, Homologs, orthologs and paralogs. How can bioinformatics tools be used in vaccine design? **[16]**

OR

Q10) What are different ways for drawing a phylogenic tree? Draw a sample phylogenetic tree and explain basic terminologies used. What is the importance of phylogenetic analysis in biology? **[16]**

Q11) What is the importance of financial and human resource management in Biotechnology? How can the field of management shape Biotechnology industry? **[16]**

OR

Q12) How can SWOT analysis be used as a strategic planning method? Add a note on how organisational management is carried out in biotechnology industries. **[16]**

Total No. of Questions : 12]

SEAT No. :

P3602

[Total No. of Pages : 3

[4858] - 3
T.E. (E&TC/Electronics)
ANALOG INTEGRATED CIRCUITS - DESIGN & APPLICATIONS
(2003 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) Why level shifter / translator is needed in an OPAMP? What are its different types? Explain level shifter with constant current bias using diodes. **[8]**

b) A dual input, balanced-output (DIBO) differential amplifier has following specifications: $R_{C1} = R_{C2} = 2.2\ K\Omega$, $R_E = 4.7\ K\Omega$, $R_{in\ 1} = R_{in\ 2} = 50\Omega$, $+V_{CC} = 10V$, $-V_{EE} = -10\ V$, $\beta_{dc} = \beta_{ac} = 100$ and $V_{BE} = 0.715V$. Calculate **[6]**

i) I_{CQ}

ii) V_{CEQ}

iii) Voltage gain: A_d

c) State characteristics of an ideal OPAMP? **[4]**

OR

Q2) a) Explain block diagram of an OPAMP. **[4]**

b) Design a dual-input, balanced-output differential amplifier with a constant current bias (using diodes) to satisfy the following requirements: **[6]**

Differential voltage gain $A_d = 40 \pm 10$

Current supplied by the constant current bias circuit = 4 mA

Supply voltage is ± 10. ($+V_{CC} = 10V$, $-V_{EE} = -10V$)

c) Derive the expressions for A_d using r parameters for dual input balanced output differential amplifier. **[8]**

P.T.O.

Q3) a) Draw an inverting summing amplifier with three inputs? Derive an expression for its output voltage Vo = – (Va + Vb + Vc). **[8]**

b) Draw & explain an I-V converter and derive an expression for its output voltage (Vo)? **[8]**

OR

Q4) a) In a V-I converter with grounded load, Vin = 5V, R = 10KΩ and voltage at non inverting terminal is 1V. Assuming that OPAMP is initially nulled, Calculate : **[4]**

i) Load current

ii) The output voltage Vo

b) Draw & explain in brief an instrumentation amplifier interfaced with RTD bridge for temperature measurement. **[12]**

Q5) a) For an inverting Schmitt trigger R1 = 100Ω, R2 = 56KΩ (where R2 is connected in feedback path) . If Vin = $1V_{(P-P)}$ sine wave and Vs = ±15V, calculate: **[4]**

V_{UT} , V_{LT} & V_H

b) Draw an inverting comparator using OPAMP with +ve & –ve references & explain its operation with waveforms? **[6]**

c) Draw half wave precision rectifier & explain its operation in brief? **[6]**

OR

Q6) a) Draw & explain in brief a sample & hold circuit with waveforms? **[6]**

b) Explain peak detector circuit using OPAMP. **[6]**

c) Compare Schmitt trigger with comparator. **[4]**

SECTION - II

Q7) a) Explain V to F converter in detail with neat diagram. **[10]**

b) Explain how to generate a triangular wave using OPAMP. **[8]**

OR

Q8) a) Explain F to V converter in detail with neat diagram. **[10]**

b) Explain with neat diagram square wave generator using OPAMP. **[8]**

Q9) a) Give classification of filters? What are the advantages of active filters? **[6]**

b) Explain sallen & key low pass & high pass filters with suitable circuit diagram. **[10]**

OR

Q10)a) Explain first order low pass Butterworth filter with suitable circuit diagram. **[8]**

b) Design second order low pass Butterworth filter with cut off frequency of 1KHz. **[8]**

Q11)a) Draw the block schematic of PLL and explain each block in detail. **[8]**

b) Explain FM demodulator using PLL in detail. **[8]**

OR

Q12)a) For a PLL 565, the free running frequency is 2.5KHz, +Vcc = + 10V, $-V_{EE} = -10V$. If demodulation capacitor (C2) is 10μF, find lock range & capture range. **[4]**

b) State applications of PLL? **[4]**

c) Explain PLL as frequency synthesizer. **[8]**

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Total No. of Questions : 12]

SEAT No. :

P3603

[Total No. of Pages : 3

[4858] - 4

T.E. (E&TC Engineering)

ADVANCED MICROPROCESSORS

(2003 Pattern)

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

Instructions to the candidates:

1) ***Answer Q.1 or Q.2 and Q.3 or Q.4 and Q.5 or Q.6 from Section - I and Q.7 or Q.8 and Q.9 or Q.10 and Q.11 or Q.12 from Section - II.***
2) ***Answers to the two sections should be written in separate answer book.***
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 different addressing modes of 8086 microprocessor. **[10]**

b) Write a 8086 microprocessor assembly program to check the user input string for palindrome. **[8]**

OR

Q2) a) State the advantages of memory segmentation in 8086 microprocessor. **[6]**

b) Draw and explain 8086 architecture in detail. **[6]**

c) Write a 8086 microprocessor assembly program to reverse the accepted user string. **[6]**

Q3) a) Describe 80386 Real mode. **[8]**

b) Draw and explain 80386 programmers model in protected mode detail. **[8]**

OR

P.T.O.

Q4) a) State the important features of virtual and protected mode of 80386 microprocessor. **[8]**

b) Describe TSS and its role in Multitasking. **[8]**

Q5) a) Draw and explain memory organization in Personal Computer. **[8]**

b) Explain various data encoding formats used to storing data on magnetic disk. **[8]**

OR

Q6) Write short note on any two. **[16]**

a) VGA

b) CDROM interfacing.

c) Keyboard Interfacing.

SECTION - II

Q7) a) Describe EISA input interface. **[10]**

b) Explain VXI bus in detail. **[8]**

OR

Q8) Write short note on any three : **[18]**

a) USB

b) PCMCIA

c) PCI

d) ISA

Q9) a) Explain different types of task scheduling in OS. **[8]**

b) What is shell and shell programming? Write a small shell program. **[8]**

OR

Q10)a) Explain different methods used for inter process communication. **[8]**

b) What is device driver. Explain structure of linux device driver. **[8]**

Q11)a) Draw and explain dataflow model of ARM. **[8]**

b) What are the different types exception occurs in ARM. **[8]**

OR

Q12)a) Explain ARM programmers model. **[8]**

b) Explain following ARM instructions. **[8]**

i) LDR r4,[r3],#4

ii) ADD r1,r3,r4

iii) MLA r1,r2,r3,r4

iv) BL Next

❖ ❖ ❖ ❖

Total No. of Questions : 12]

P4425

SEAT No. :

[Total No. of Pages : 3

[4858] - 5
T.E. (E&TC/Elex) (Semester - II)
POWER ELECTRONICS
(2003 Pattern)

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

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 from section - I.***
2) ***Answer Q7 or Q8, Q9 or Q10, Q11 or Q12 from section - II.***
3) ***Answers to the two sections must be written in separate answer books.***
4) ***Assume suitable data if necessary.***

SECTION - I

Q1) a) What are power devices? Explain V-I characteristics of SCR. State its specifications. **[9]**

b) Draw structural schematic of MOSFET. Explain operation of power MOSFET with input and output characteristics. Why there is need of driver circuit. **[9]**

OR

Q2) a) What do you understand by safe operating area (SOA) of semi conductor device? Draw forward biased SOA of IGBT and explain how it is superior to that of power BJT. **[9]**

b) Why resistance trigger circuit has maximum firing angle of 90^o. Suggest modification in the circuit so that firing can be extended beyond 90^o and explain its working. **[9]**

Q3) a) Draw the circuit diagrams of symetrical and asymetrical single phase half controlled bridge rectifiers. Explain operation with neat wave forms with inductive load. **[8]**

b) A single phase full wave converter has R-L load with L = 6.5 mH, R = 0.5 Ω and E = 10V. The input voltage is V_s = 120 V (rms) 60Hz **[8]**

Determine:

i) Load current I_L at $\alpha = 60^o$

ii) Avg. thyristor current (I_A)

iii) RMS thyristor current ($I_{T\,RMS}$)

iv) RMS output current ($I_{o\,rms}$)

P.T.O.

OR

Q4) a) What are 3 phase converters? Explain with neat circuit dig and wave forms, the operation of 3 phase semiconverter with 'R' load. **[8]**

b) Draw the circuit diagram and wave forms, explain operation of three phase full converter for 'R' load for $\alpha = 30^o$, 60^o and 90^o. **[8]**

Q5) a) Draw and explain typical circuit of full bridge inverter using power MOSFET's. Explain working with neat wave forms. **[8]**

b) Explain with neat circuit diagram use of PWMIC's for inverter control. **[8]**

OR

Q6) a) Explain 180^o conduction scheme for 3 phase bridge inverter having balanced star 'R' load. Explain with neat circuit and wave forms operation of this circuit. **[8]**

b) Explain the working of single phase transistorised bridge inverter to produce quazi - square wave by considering inductive load. **[8]**

SECTION - II

Q7) a) With the help of circuit diagram, mode equivalent circuits and wave forms, explain the operation of step up chopper. How energy transfer takes place explain the same. **[8]**

b) The step down chopper with resistive load R = 10 Ω and input voltage V_S = 220V. When the chopper switch remains ON, its voltage drop is V_{ch} = 2V and chopping frequency is 1KHz. If duty cycle is 50% determine **[8]**

i) Average output voltage

ii) RMS output voltage

iii) Chopping efficiency

OR

Q8) a) Explain the operation of fly back converter used in SMPS with the help of circuit diagram and necessary wave forms. **[8]**

b) What is the need of resonant converter. Give the classification of resonant converters What are its advantages over switched mode converters. **[8]**

Q9) a) Draw the circuit diagram of triac based single phase AC voltage controller using diac as trigger device. Explain the operation of this circuit with necessary wave forms. **[8]**

b) A single phase AC voltage controller using two inverse parallel SCRs operated from 230v, 50Hz mains supply and used to control room heater (Resistive load) **[8]**

i) Calculate resistance of heater so that maximum power dissipation is 5 KW.

ii) If the controller is operated in ON/OFF control mode, calculate heat power dissipation and input power factor if on time is 10 cycles.

OR

Q10)a) With the help of circuit diagram and wave forms explain the operation of three phase full wave AC power controller with balanced star 'R' load.**[8]**

b) Using IC, TCA - 785, draw and explain the firing scheme for single phase full wave AC controller with resistive load (SCR based) **[8]**

Q11)a) What is UPS. How it is different from conventional regulators. Explain with neat circuit diagram and wave forms working of on-line ups. State its specifications. **[9]**

b) Explain with neat diagram and wave forms speed control of single phase separately excited DC motor. **[9]**

OR

Q12)Write the short notes (any three) **[18]**

a) HVDC transmission

b) H F induction heating

c) Electric welding

d) Electronic ballast

e) Battery charger rating calculations

Total No. of Questions : 12]

SEAT No. :

P3549

[Total No. of Pages : 3

[4859] - 53

B.E. (Mechanical)

INDUSTRIAL AUTOMATION

(2008 Pattern)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Answer to the two sections should be written in separate answer sheets.***
3) ***Figures to the right indicate full marks.***

SECTION - I

Q1) a) What is the need of a control system in Industrial Automation? **[4]**

b) Explain difference between Feed forward and feedback control system. **[6]**

c) Define converter in control system? Explain Pneumatic-to-Electronic Converter. **[6]**

OR

Q2) a) Explain proportional controller with its advantages and disadvantages. **[8]**

b) Define transmitter in control system? Explain one in detail. **[8]**

Q3) a) Draw the Block diagram of PLC and explain types of Inputs, Outputs, used in PLC applications. **[8]**

b) Write a short note on DCS with respect to important specifications, programming platform, communication protocols and any one advantage of DCS over PLC. **[8]**

OR

Q4) a) Enumerate the list of important PLC specifications referred in selection of PLC for industrial automation. **[4]**

b) Develop a PLC program for an elevator. Given START, UP, DOWN buttons (push-to-ON, NO), STOP button (push-to-OFF, NC), limit switches LS1 (Down, NO), LS2 (UP, NO), The objectives are. **[12]**

P.T.O.

i) START button should put ON, the elevator.

ii) STOP button should stop the elevator where it is.

iii) When STARTed, and UP button is pushed, the elevator should start moving up, if at bottom, till UP LS1 is pushed.

iv) When STARTed and DOWN button is pushed, the elevator should start moving down, if at top, till DOWN LS2 is pushed.

Q5) a) Enumerate advantages of DNC in Manufacturing system. **[3]**

b) What is an AGV? Explain working of wire guided AGV? **[8]**

c) What is the role of Robots in Manufacturing system? **[5]**

OR

Q6) a) Draw the layout of a typical FMS system and explain main components of FMS. **[6]**

b) Explain basic components of a robot. How robots are classified? **[6]**

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

SECTION - II

Q7) a) Discuss in brief any four important components of SCADA systems. **[8]**

b) Compare SCADA system with HMIs used in Industrial Automation. **[8]**

OR

Q8) a) Explain SCADA with respect to definition, advantages, limitations and any one field application. **[8]**

b) Compare SCADA system over networked PLCs. **[8]**

Q9) a) Explain the advantages/disadvantages of using pneumatics vis a vis hydraulics as power source for drives. **[6]**

b) Explain working of stepper motor in details also enumerate advantages and disadvantages. **[10]**

OR

Q10)a) Explain criteria for selection of drives in power transmission. **[6]**

b) Explain working of Geneva mechanism and rotary table mechanism. **[10]**

Q11)a) What is compliance? Explain working of RCC device used for compliance. **[8]**

b) Explain assembly automation in detail. **[10]**

OR

Q12)a) What is assembly configuration system? Explain its types. **[10]**

b) Explain in short, procedure for automation can be implemented in drilling machine. **[8]**

Total No. of Questions : 12] SEAT No. :

P4436 [Total No. of Pages : 4

[4858]-6
T.E. (Mechanical)
TRIBOLOGY
(2003 Pattern)

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

Instructions to the candidates:

1) ***Answer any three questions from each section.***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data, wherever necessary.***
4) ***Answer to the two sections to be written in two answers books.***

SECTION - I

Q1) a) Explain basic modes (Regimes) of lubrication with the help of Stribeck curve. **[8]**

b) What are the alternatives for Disposal and reuse of the used oils. **[8]**

OR

Q2) a) Explain any four important properties of Lubricants. **[8]**

b) Give comparison of Sliding and Rolling contact Bearings. **[8]**

Q3) a) Explain the Adhesion theory of Friction. **[8]**

b) Discuss various factors affecting the wear. **[8]**

OR

Q4) a) Explain mechanism of following type of wear. **[8]**

i) Erosive wear

ii) Wear by Surface Fatigue

b) Explain ploughing theory of wear. **[8]**

Q5) a) Derive Reynolds equation in two dimensions for the flow inside a hydrodynamic Journal bearing and state the assumptions made while obtaining the equation. **[12]**

b) What is Sommerfeld number? Discuss its importance in the design of Hydrodynamic bearing. **[6]**

P.T.O.

OR

Q6) a) A 360° hydrodynamic bearing has following data

Journal diameter = 50 mm

Length of Journal = 50 mm

Radial Load on Journal = 15 KN

Journal Speed = 1450 rpm

Eccentricity Ratio = 0.75

Radial Clearance = 20 μm

Specific gravity of oil = 0.86

Specific heat = 2.09 KJ/Kg°C

Estimate :

i) Coefficient of friction in the bearing

ii) Viscosity of the oil

iii) Min oil film thickness

iv) Quantity of the oil in circulation

v) Oil leakage through sides &

vi) The average oil temperature if the oil is supplied at 28°C

[10]

Dimensionless parameters are as follows :

$\frac{l}{d}$	$\frac{h_0}{C}$	$\in$	S	$\left(\frac{r}{c}\right) f$	$\frac{Q}{r.C.n.l}$	$\frac{Q_L}{Q}$	$\frac{P_{max}}{P}$
	0.2	0.8	0.0446	1.7	4.62	0.842	3.195
1	0.4	0.6	0.121	3.22	4.33	0.680	2.409
	0.6	0.4	0.264	5.79	3.99	0.497	2.066

b) Explain the mechanism of pressure development in a hydrodynamic action. **[8]**

SECTION - II

Q7) a) Obtain an equation for volume of viscous flow through a rectangular slot. **[8]**

b) Discuss different types of hydrostatic bearings and state few of their applications. **[8]**

OR

Q8) a) The following data is related with the hydrostatic step bearing : **[8]**

Shaft Speed = 720 RPM

Oil Film thickness = 0.16 mm

Shaft diameter = 500 mm

Recess diameter = 250 mm

Viscosity of the lubricant = 31.2×10^{-9} N-s/mm^2

Specific gravity of lubricant = 0.86

Specific heat of lubricant = 1.76 kJ/kg°C

Thrust load = 450 KN

Calculate :

i) Supply pressure;

ii) Frictional Power loss;

iii) The flow rate in liters/min.

iv) The Pumping power loss.

v) The temperature rise, assuming the total power loss in bearing is converted into the frictional heat.

b) Starting from the equation of flow rate of lubricant from the rectangular slot i.e. $Q = (\Delta p.h^3.b)/(12.\mu.l)$, obtain the equation of pressure distribution for the same. **[8]**

Q9) a) A circular Plate is approaching a plane surface initially, the oil film thickness was 0.08 mm. A load of 50 KN acts on a plate for a period of 18 sec. Oil viscosity is 45 CP. After application of load the oil film thickness finally reduces to 0.02 mm estimate diameter of plate. **[8]**

b) Explain the mechanism of hydrostatic squeeze film and give its practical applications. **[8]**

OR

Q10)a) A rectangular plate having 50 mm length and an infinite width is approaching a fixed plane surface. Initially the oil film thickness is 0.035 mm & viscosity of oil is 75 CP. The load supported per unit width of plate is 50 KN/m, Calculate : **[10]**

i) The time required to squeeze the film to 0.008 mm

ii) The maximum pressure

iii) Average pressure

b) Discuss merits and demerits of Gas Lubricating bearings. State at least two applications of Gas Lubrication. **[6]**

Q11)a) Discuss various types of Hydrodynamic thrust Bearings. **[6]**

b) Discuss at least 2 types of Oil seals and gaskets used in bearings. **[6]**

c) Discuss any 3 types of bearing materials. **[6]**

OR

Q12)Write short notes on any three of the following : **[18]**

a) Tribological aspect of metal working.

b) Additives in Lubricants

c) Tribology in Design and Tribology in Industry.

d) Methods of wear Measurement

e) Elastohydrodynamic Lubrication

Total No. of Questions : 12]

P4438

SEAT No. :

[Total No. of Pages : 2

[4858] - 7
T.E. (Electronics/E&TC) (Semester - I)
MECHATRONICS
(2003 Pattern)

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 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 & explain: **[8]**
- i) Accuracy
- ii) Precision
- iii) Resolution
- iv) Repeatability

b) Explain Mechatronics system design approach with reference to robotics. **[10]**

OR

Q2) a) Define & explain **[8]**
- i) Drift
- ii) Hysterics
- iii) Linearity
- iv) Sensitivity

b) Explain scope & its importance with respect to interdisciplinary approach. **[10]**

Q3) a) Explain construction & working of local cell with example. **[8]**

b) Explain Ultrasonic Transducer application as position. **[8]**

OR

Q4) a) With the help of neat diagram explain LVDT - working. **[8]**

b) Explain fibre optic sensors. **[8]**

Q5) a) Define PLC. Explain architecture of PLC with block diagram. **[8]**

b) Need of ADC in instrumentation system. State & explain selection factors of ADC. **[8]**

P.T.O.

OR

Q6) a) Explain IC based instrumentation Amplifier. **[8]**

b) Explain interfacing of sensors with PLC. **[8]**

SECTION - II

Q7) a) Explain strip - chart recorder in mechatronics. **[8]**

b) Explain computer based data aquisition system with examples. **[8]**

OR

Q8) a) With the help of block diagram, Explain data logger. **[8]**

b) Explain **[8]**

i) IEEE 488 standard bus

ii) RS 232 standard

Q9) a) What is the difference between control valve and actuator? Explain selection criteria of control valve. **[8]**

b) With the help of neat diagrams, explain signal cables & power cables. **[8]**

OR

Q10)a) Explain. Electro-Pneumatic Motor. **[8]**

b) Explain important specifications & selection criteria of stepper motor. **[8]**

Q11)Explain with neat block diagram, Design of coin counter. **[18]**

OR

Q12)Explain with neat block schematic pick and place robot with actuators and sensors. Give reasons for selection of these components. **[18]**

Total No. of Questions : 12]

SEAT No. :

P3604

[Total No. of Pages : 3

[4858] - 8

T.E. (E&TC/Electronics)

ELECTROMAGNETIC WAVES & RADIATING SYSTEMS (EWRS)

(2003 Pattern)

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) ***Assume suitable data if necessary.***
5) ***Use of logarithmic tables, slide rule, electronic pocket calculator is allowed.***
6) ***Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 from Section - I & Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12 from Section - II.***

SECTION - I

Q1) a) Define Electric field intensity & Electric flux density. Derive the expression for E using coulomb's law of force. **[8]**

b) State & derive Biot-savart law. **[8]**

OR

Q2) a) Derive the boundary conditions for electric field at an interface between 2 dielectric media. **[8]**

b) State & prove Ampere's circuital law in integral & differential form. **[8]**

Q3) a) What is poynting vector? What is its significance? Derive the expression for the poynting vector. **[8]**

b) In a nonmagnetic medium $E = 4 \sin(2\pi \times 10^7 t - 0.8x)a_z$ v/m **[10]**
Find

i) $\varepsilon r, \eta$
ii) The time - average power carried by the wave
iii) The total power crossing 100 cm^2 of the plane $2x + y = 5$.

OR

P.T.O.

Q4) a) State & explain Maxwell's equations in differential, integral & scalar form. **[8]**

b) In a medium characterized by $\sigma = 0$, $\mu = \mu_0$, ε_0, &
$E = 20\sin(10^8 t - \beta z)\, a_y$ V/m.
Use Maxwell's equations to find β & H. **[10]**

Q5) a) Derive an expression for plane wave in lossless dielectric medium. **[8]**

b) A lossy dielectric has an intrinsic impedance of $200\angle 30°\Omega$ at a particular radian frequency w. If, at that frequency, the plane wave propagating through the dielectric has the magnetic field component.

$$H = 10e^{-\alpha x} \cos\left(wt - \frac{1}{2}x \right) a_y \text{ A/m}$$

find E & α. **[8]**

OR

Q6) a) Define & explain in detail. **[8]**

i) Skin depth
ii) Phase velocity
iii) Group velocity
iv) Velocity propagation

b) A uniform plane wave propogating in a medium has
$E = 2e^{-\alpha z} \sin(10^8 t - \beta z)\, a_y$ V/m
If the medium is characterized by $\varepsilon_r = 1$, $\mu_r = 20$, & $\sigma = 3$ S/m, find α, β, & H. **[8]**

SECTION - II

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

i) Reflection
ii) Reflection coefficient
iii) Standing wave
iv) VSWR & ISWR

b) An air line has a characteristic impedance of 70Ω and a phase constant of 3 rad/m at 100 MHz. Calculate the inductance & the capacitance per meter of the line. **[8]**

OR

Q8) a) Draw the equivalent circuit of a transmission line. Explain the primary & secondary constants of a transmission line. **[8]**

b) A distertion less line has $Z_0 = 60\Omega$, $\alpha = 20$ m Np/m, u = 0.6C, where C is the speed of light in a vacuum. Find R, L, G, C & λ at 100 MHz. **[8]**

Q9) a) The radiation intensity of a certain antenna is **[8]**

$$U(\theta,\phi) = \begin{bmatrix} 2\sin\theta\sin^3\phi, & 0 \le \theta \le \pi, 0 \le \phi \le \pi \\ 0 \quad , & else\ where \end{bmatrix}$$

Determine the directivity of the antenna.

b) Explain the following antenna parameters. **[10]**

i) Radiation pattern
ii) Radiation Intensity
iii) Radiation power density
iv) Directivity

OR

Q10)a) Show that the radiation resistance of a Hertizian dipole is $80\pi^2\left(\frac{dl}{\lambda}\right)^2$. **[10]**

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

i) Antenna polarization
ii) Reciprocity of the antenna

Q11)a) What is antenna array? What are the 5 different controls to shape the beam? Derive the expression for the array factor of an N-element uniform linear array. **[8]**

b) Explain in detail Broadband antenna. **[8]**

OR

Q12)a) Compare Dipole & Folded dipole antenna. Explain with neat sketch working of a Yagi-Uda antenna. **[8]**

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

i) Helical antenna.
ii) Parabolic antenna.
iii) Horn antenna.

❖ ❖ ❖ ❖

Total No. of Questions : 12]

SEAT No. :

P4442

[Total No. of Pages : 4

[4858] - 9

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

INFORMATION THEORY AND CODING TECHNIQUE

(2003 Pattern)

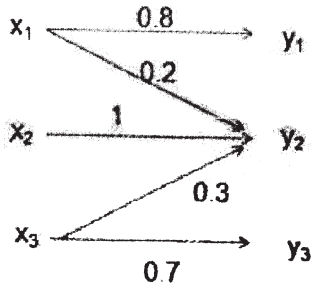
Time : 3 Hours] *[Max. Marks : 100*

Instructions to the candidates:

1) ***Answers to the two sections should be written in separate answer books.***
2) ***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) A discrete source transmits message x_1, x_2 and x_3 with probabilities 0.3, 0.4 and 0.3. The source is connected to the channel. **[10]**



Calculate all entropies, mutual information and channel capacity.

b) Draw the binary symmetric channel and find out the channel capacity of binary symmetric channel. **[6]**

OR

Q2) a) Consider a DMS with source alphabets. **[8]**

X Determine the Lempel-Ziv code for the following bit stream.

0001011100101001 01

b) Explain Differential Entropy and Mutual Information for continuous Ensembles. **[8]**

P.T.O.

Q3) a) For a AWGN channel explain the Shannon Hartely theorem with bandwidth efficiency diagram and show that Shannon limit is - 1.6 dB. **[10]**

b) Write in short about implications of information capacity theorem. **[6]**

OR

Q4) a) An analog signal having 4kHz bandwidth; is sampled at 1.25 times of Nyquist rate and each sample is quantized in 1 of 256 equi-likely level. Assume that successive samples are statistical independent. **[10]**

i) Calculate information rate of the source.

ii) Can the output of source transmitted without error over AWGN channel with bandwidth = 10kHz and SNR = 20 dB.

iii) Find the S/N ratio required for error free transmission for part b.

iv) Find bandwidth required for AWGN channel for error free transmission if SNR is 20 dB.

b) What do you mean by hamming bound and explain perfect code? **[6]**

Q5) a) Consider a (7, 4) block code for which H matrix is given as, also find the code words of the code. **[10]**

1 1 1 0 1 0 0

1 1 0 1 0 1 0

1 0 1 1 0 0 1

i) Write down the generator matrix G.

ii) Construct all possible code words.

b) Write in short about **[8]**

i) CRC codes

ii) Fire code

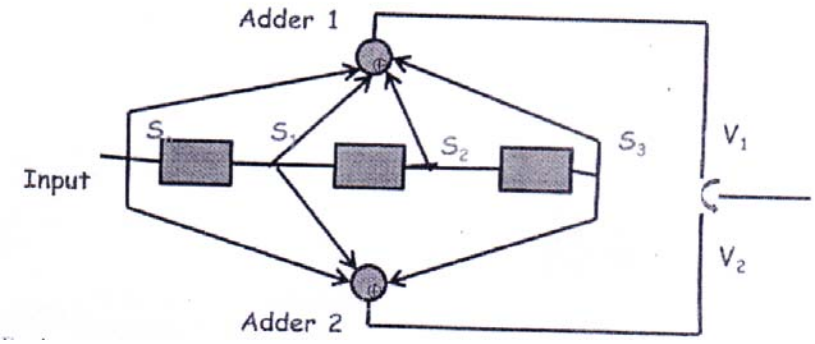
OR

Q6) a) Write a note on Rate distortion Theory. **[9]**

b) Find a generator polynomial g(x) for a systematic (7, 4) cyclic codes and find the code vectors for the following data vectors 1010, 1111, 0001 and 1000. **[9]**

SECTION - II

Q7) a) **[10]**

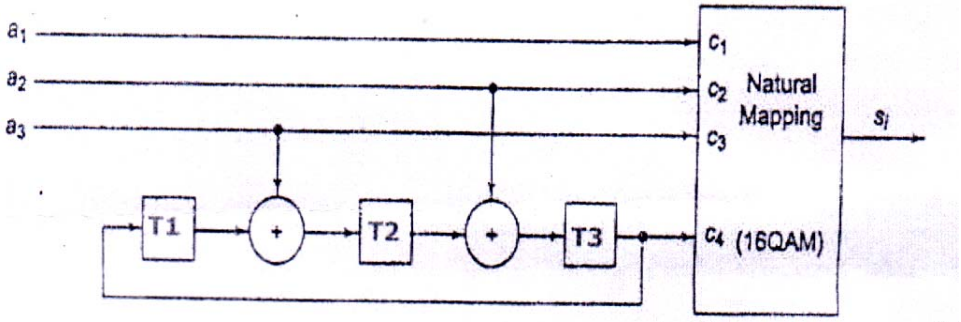


For the convolutional encoder shown above encode the sequence 10111 with Time Domain approach.

b) Compared state, tree and Trellis representation of convolution codes with example. **[8]**

OR

Q8) a) **[10]**



Find the Asymptotic Coding Gain for the above TCM Encoder.

b) State Ungerboeck's TCM design rules and draw are explain TCM Structure. **[8]**

Q9) a) Find the generator polynomial for BCH code over GF (16) using the primitive polynomial $p(z) = z^4 + z + 1$ over GF (2) codeword. The code should correct t = 1, 2, 3 errors. **[10]**

b) Define the terms related to BCH Codes Primitive Polynomial, Minimal Polynomial and Generator Polynomial. **[6]**

OR

Q10)a) Define (15, 11) RS code and Find out the generator polynomial equation g(x). If message m(x) = x + 1; find out the RS code after RS coding. **[10]**

b) Write note on Cryptography. **[6]**

Q11)a) Write a note on Radio link analysis for satellite communication. **[8]**

b) Explain the terms related to cellular communication frequency reuse, cell splitting and co channel interference. **[8]**

OR

Q12)a) Write a note on satellite communication. **[8]**

b) What are different multiple accessing techniques explain them. **[8]**