Total No. of Questions : 12]

SEAT No. :

P2177

[Total No. of Pages :4

[5058]-1
T.E. (Civil)
STRUCTURAL ANALYSIS- II
(2008 Course) (Sem - 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 & Q.7 or Q.8, Q.9 or Q.10, Q.11or Q.12 from Section -II.***
2) ***Answers to the two sections should be written in separate books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Use of electronic pocket calculator is allowed.***
6) ***Assume suitable data, if necessary.***

SECTION-I

Q1) Analyze the Continuous beam ABCD as shown in fig Q.1.by Slope Deflection Method &Draw SFD & BMD **[16]**

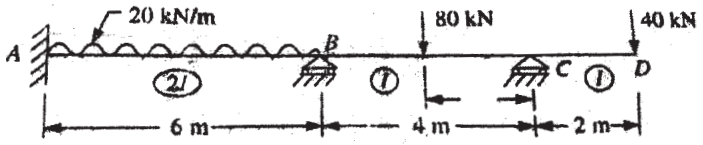

Fig. Q.1

OR

Q2) Analyze the portal frame loaded as shown in figQ.2 by Slope Deflection Method & Also draw SFD, BMD. **[16]**

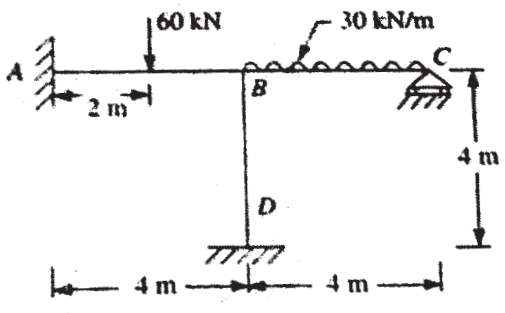

Fig. Q.2

P.T.O.

Q3) Analyze the continuous beam as shown in fig Q.3 by using Moment Distribution Method & Plot SFD, BMD. **[16]**

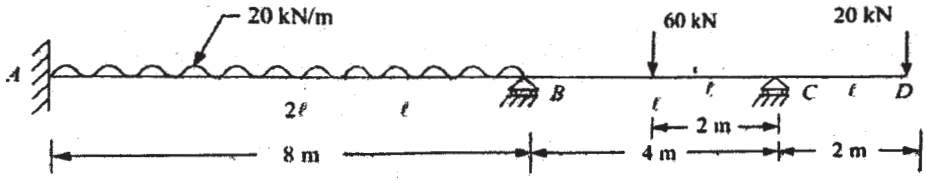

Fig. Q.3.

OR

Q4) Analyze the portal frame loaded as shown in fig Q.4 by using MDM.Plot SFD & BMD. **[16]**

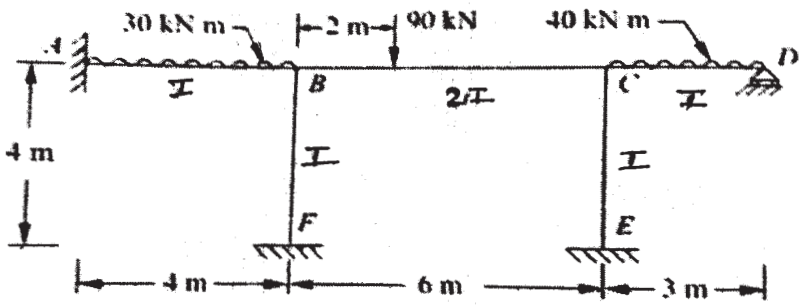

Fig. Q.4

Q5) a) A Three Hinged semicircular arch is loaded & Supported as shown in fig.Q.5.a.Determine Vertical & Horizontal reactions at supports. **[9]**

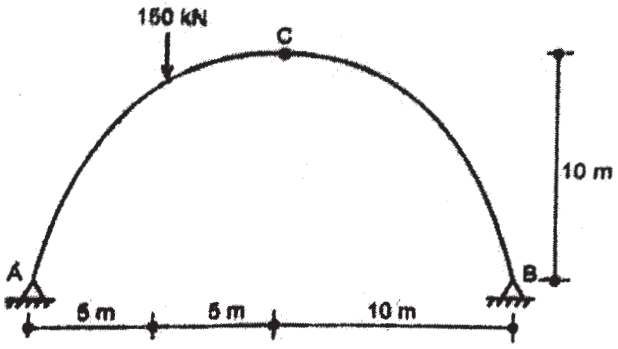

Fig. Q.5.a

b) Derive the Equation or a Horizontal thrust of Two hinged arch for concentrated load at Crown. **[9]**

OR

Q6) a) A Two hinged arch of span 30m is loaded with concentrated load 50KN situated at 7.5m from left support. Rise of arch is 6m.Find the horizontal thrust. **[9]**

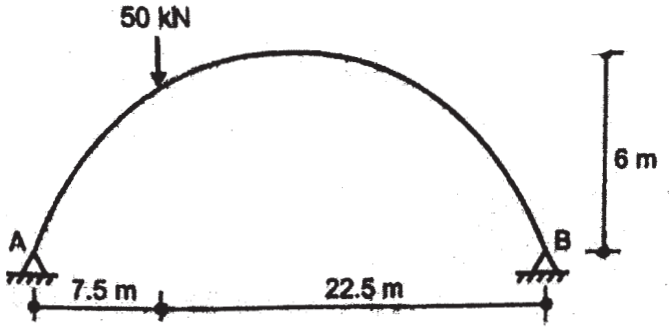

Fig. Q.6.a

b) Derive Equation for a Horizontal thrust of Two hinged arch loaded with UDL on the Whole Span. **[9]**

SECTION-II

Q7) Analyze the frame as shown in fig.Q.7 by Flexibility method. Draw SFD & BMD Assume EI constant. **[16]**

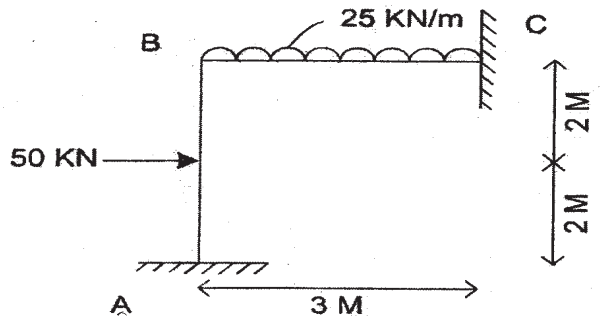

Fig. Q.7

OR

Q8) Analyze the beam as shown in fig.Q.8 by using Flexibility Method. Draw SFD & BMD. **[16]**

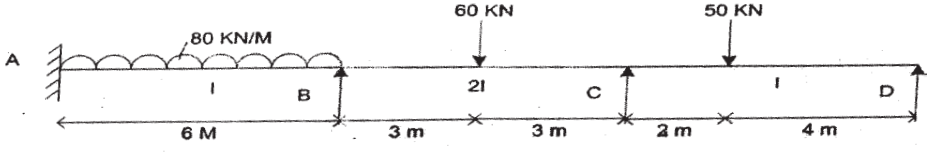

Fig Q.8

Q9) Find the end moments of the beams as shown in fig Que -9 by stiffness matrix method and draw SFD and BMD. Take EI=3800 KN-m^2 **[16]**

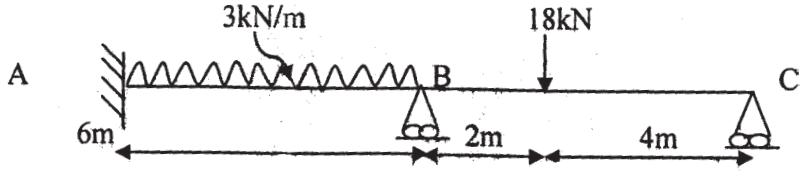

Fig Q-9

OR

Q10) Analyze the frame by matrix stiffness method and sketch the Bending Moment Digram. **[16]**

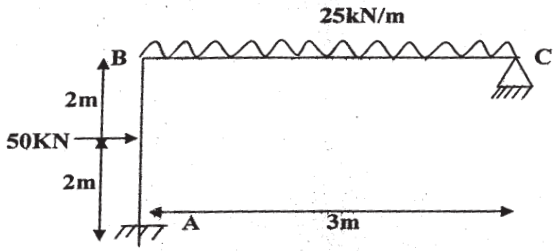

Fig Q-10

Q11)a) Analyze the portal frame under lateral loading by cantilever method. The columns are assumed to have equal cross sectional areas. Fig11 (a)**[10]**

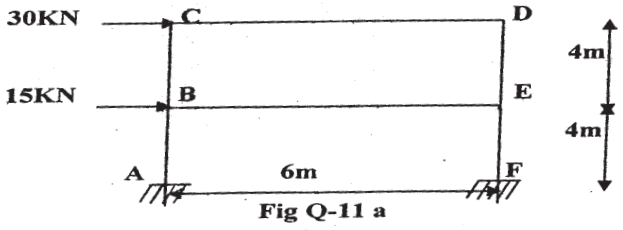

Fig Q-11 a

b) The beam is loaded and supported as shown in fig 11 (b). Determine the deflection at the centre of the beam. **[8]**

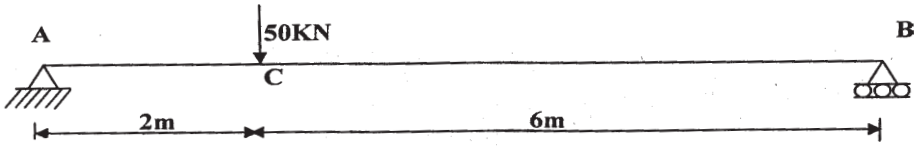

Fig 11 (b)

OR

Q12)a) Analyze the frame shown in Q.11 (a) by portal Method. **[10]**

b) Determine the deflection at the nodal points for beam AB loaded and supported as shown in fig.12 (b) **[8]**

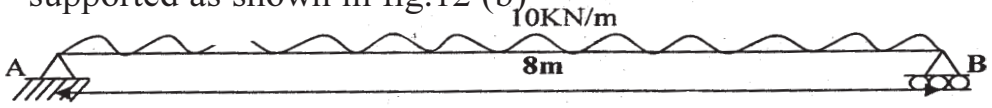

Fig12(b)

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Total No. of Questions :12]

SEAT No. :

P2936

[Total No. of Pages :4

[5058]-10

T.E.(Civil)

PROJECT MANAGEMENT & ENGINEERING ECONOMICS

(2008 Pattern) (Semester-II)

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

Instructions to the candidates:

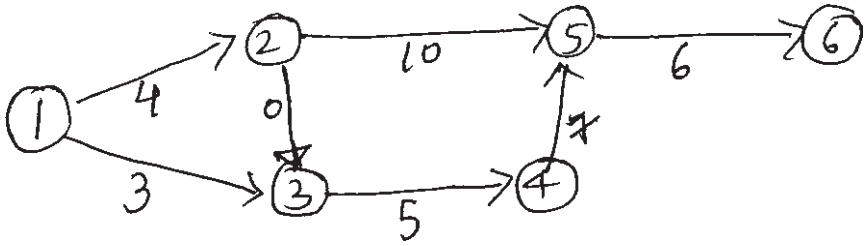
1) ***Answers to the two sections should be written in separate answer books.***
2) ***Answer any three questions from each section.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right side indicate full marks.***
5) ***Assume suitable data, if necessary.***

SECTION-I

Q1) a) Define the following terms: Activity, critical activity,critical path dummy activity, total float. **[5]**

b) Explain project life cycle with help of suitable example. **[5]**

c) Find out Est, Eft, Lst, Lft and Total float. Also mark critical path of network given below, indicates project duration. **[8]**

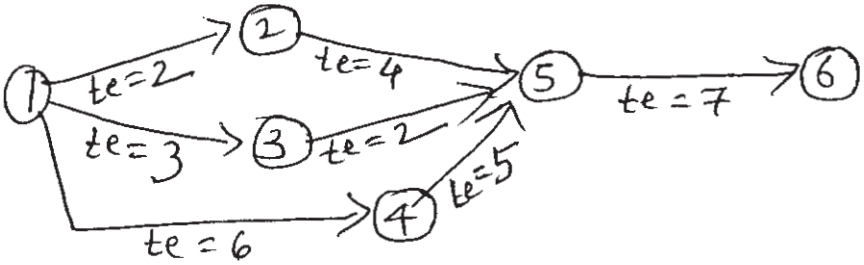


OR

Q2) a) Define the following terms: event, critical event, slack, network diag., planning. **[5]**

b) Differentiate between CPM & PERT. **[5]**

c) Find out total expected project duration and slack for the network given below also mark critical path. **[8]**



P.T.O.

Q3) a) What do you understand by crashing of network? **[4]**

b) For the following information find out minimum project duration and minimum cost of project also find out cost slope for each activity.Take indirect cost Rs. 1000 per day. **[12]**

Activity	Normal time(days)	Normal cost	Crash time(days)	Crah cost
1-2	3	3000	2	4000
1-3	5	5000	3	6000
2-3	6	6000	4	7500
2-4	4	4000	2	5200
3-4	2	2000	1	2500

OR

Q4) a) Define cost slope with the help of suitable example. **[4]**

b) List out step by step procedure of crashing of network diag. **[4]**

c) What do you understand by resource smoothing & resource leveling. **[4]**

d) Draw time scale version diag. and Histogram for the following data. **[4]**

Activity	Duration(days)	Manpower
1-2	4	5
2-3	7	6
2-4	3	2
3-4	3	2
4-5	1	8

Q5) a) Write a note on material procurement process adopted on construction site. **[4]**

b) Explain break even analysis with the help of suitable diag. **[4]**

c) Define EOU. Listout assumptions made in EOU. **[4]**

d) Write a note on A-B-C analysis. **[4]**

OR

Q6) a) Define break even quantity, Break even sales, contribution & Break even point. **[4]**

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

c) Seggregate the items as per their annual expenditure and plot ABC curve for the data as follows. **[8]**

Sr. No.	Item	Annual expenditure (Rs.)
1	Steel	5,00,000
2	Cement	4,00,000
3	Tiles	3,50,000
4	Doors	2,00,000
5	Water	1,00,000
6	Oil	50,000
7	Plywood	1,50,000
8	Nails	30,000
9	Grease	28,000
10	Paint	45,000

SECTION-II

Q7) a) Write down safety programme to be followed on construction of Roads. **[4]**

b) What are the factors affecting on site layout? **[6]**

c) Draw a site layout for construction of residential complex. **[6]**

OR

Q8) a) Write a note on personal protective equipment used on construction site . **[4]**

b) Draw a site layout for construction tunnel. **[6]**

c) Define injuri frequency rate, injury severity rate and injuri index. **[6]**

Q9) a) What are the factors affecting on demand and supply. **[6]**

b) Explain with the help of example law of substitution. **[6]**

c) Write a note on 'law of diminishing marginal utility' and 'Elasticity of demand'. **[6]**

OR

Q10)a) State and explain law of supply. **[6]**

b) Define **[6]**

i) Wealth

ii) Goods

iii) Wants

iv) Cost

v) Price

vi) Value

c) Discuss applications of economics in civil engineering. **[6]**

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

a) Working capital

b) Break even analysis

c) Sinking fund annuity

d) Methods of capital budgeting.

OR

Q12) Attempt the following

a) What do you understand by NPV method? Cost of project is Rs. 1,00,000 has cash flow of Rs. 25,000 for a period of 5 yrs. What is the NPV if the firm expects 15% per annum ? Also state whether the project is feasible or not. **[8]**

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

i) Pay back period.

ii) Concept of cost-benefit analysis.

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Total No. of Questions :12]

SEAT No. :

P1650

[Total No. of Pages :3

[5058]-100
T.E. (Instrumentation & Control)
PROCESS LOOP COMPONENTS
(2008 Pattern) (Semester - II)

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

Instructions to the candidates:

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

SECTION-I

Q1) a) Draw and explain temperature control loop using neat symbols. **[8]**

b) Describe the concept of process variables, set-point, controlled variable, manipulated variable and load variable. **[10]**

OR

Q2) a) Explain the concept of live and dead zero. **[8]**

b) Draw and explain 2-wire and 4-wire transmitter in details. **[10]**

Q3) a) Describe process characteristics like process load, process lag, self-regulation and dead time. **[8]**

b) Explain discontinuous action like ON-OFF with neat diagram. **[8]**

OR

P.T.O.

Q4) a) Describe control system parameters like error, variable range, control lag, direct/reverse action. **[8]**

b) Explain discontinuous action like floating with neat diagram. **[8]**

Q5) a) Describe the terms like quarter amplitude decay ratio and loop disturbance in details. **[8]**

b) Explain open loop tuning method like process reaction curve. **[8]**

OR

Q6) a) Describe the terms like optimum control and stability criterion in details. **[8]**

b) Explain closed-loop tuning method like Ziegler-Nicholas. **[8]**

SECTION-II

Q7) a) Describe in details PLC architecture with neat diagrams. **[8]**

b) Describe any five PLC specifications in details. **[10]**

OR

Q8) a) Describe timers and counters instructions for PLC with symbols. **[8]**

b) Write short note on relay logic and PLC logic. **[10]**

Q9) a) Draw and explain pneumatic control valve operation. **[8]**

b) Explain various specifications of control valves. **[8]**

OR

Q10) a) Draw and explain solenoid control valve operation. **[8]**

b) Draw and explain the ideal characteristics of control valves. **[8]**

Q11)a) Explain the operation of valve positioner using neat diagrams. **[8]**

b) Describe the selection points for the control valves. **[8]**

OR

Q12) a) Define valve coefficient. Give the equations of valve coefficient for liquid, gas and vapor services. **[8]**

b) What is cavitation and flashing? Describe with neat diagrams. **[8]**

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Total No. of Questions : 6]

SEAT No. :

P2947

[Total No. of Pages : 2

[5058]-101
T.E. (Printing)
OFFSET MACHINES - I
(2008 Course) (Semester-I) (308281)

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

Instructions to the candidates:

1) ***All questions are compulsory***
2) ***Answers to two sections should be written in separate 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

Q1) What is the purpose gear mechanism in offset machine? Explain with diagram the gears used to drive plate and blanket cylinder **[16]**

Q2) a) Explain the steps involved in any CTP platemaking procedure **[8]**

b) Explain in detail the effects of exposure and development on image reproduction on P.S platemaking **[8]**

OR

Q2) 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]**

Q3) a) Explain multiroller inking unit **[9]**

b) Rollers in inking unit have varying diameters. Explain **[5]**

c) Explain roller pressure setting by strip method. **[4]**

OR

Q3) a) Compare EB and UV inks used for sheet fed offset. **[9]**

b) How does ink dry in sheet fed offset **[9]**

P.T.O.

SECTION-II

Q4) Explain **[18]**

a) Dampener covers in conventional dampening

b) Explain relation of conductivity and concentration of F.S.

OR

Q4) a) Explain plate feed dampening system **[5]**

b) What is the role of alcohol 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) Conveyor belts and forwarding roller in feeders.

b) No Sheet and double detectors.

OR

Q5) a) Why is swing gripper more preferred in offset presses. Explain working. **[8]**

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

i) Side lay push type

ii) Front lays from below

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

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

a) Color control bar

b) Grey balance

c) Star target

d) Register marks

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Total No. of Questions :6]

SEAT No. :

P2948

[Total No. of Pages :2

[5058] - 103

T.E. (Printing)

COLOR MANAGEMENT AND STANDARDIZATION

(2008 Course) (308283) (Semester-I)

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

Instructions to the condidates:

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 how the printing sequence affects the trapping and color gamut.

b) Explain the color theories used in color reproduction process.

c) Explain the visible spectrum of Electromagnetic spectrum.

Q2) Solve any two: **[16]**

a) Explain the blue cone deficiencies of Human vision.

b) Explain concept of Metamerism.

c) Explain Spectral Power Distriution of CIE Standard Illuminant.

Q3) Answer any two: **[16]**

a) Explain CIE Lab color system with their two advantages and two disadvantages.

b) Calculate chromaticity co-ordinates for A and D65 Illuminants.

c) Explain Hunter color system based on Color Perception.

P.T.O.

SECTION - II

Q4) Answer any one: **[16]**

a) Explain Visual color measurement.

b) Explain the term color difference used in color reproduction.

Q5) Explain any two: **[16]**

a) Need of color management.

b) Input and Output Profile.

c) Explain the Scanner test chart and Scanner profiling.

Q6) Explain any two: **[18]**

a) Three C's of Digital Printer Profiling.

b) Explain the concept of soft proof. How to do soft proofing with Photoshop software.

c) Calculate L, a, b for given sample

Sample 1 : X = 30, Y = 80, Z = 90 and

Sample 2 : X = 20, Y = 70, Z = 80.

Total No. of Questions :12]

SEAT No. :

P1651

[Total No. of Pages :2

[5058] - 104

T.E. (Printing Engg. & Graphics Communication)

DESIGN OF PRINTING MACHINE COMPONENTS

(2008 Course) (Semester - I)

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

Instructions:

1) ***Answer two sections in separate book.***
2) ***Assume suitable data if necessary.***

SECTION - I

Q1) Explain creativity in Design & explain basic procedure of machine Design. **[16]**

OR

Q2) Explain Geometric Tolerance respresentation in printing machine pans in detail. **[16]**

Q3) Explain Design of cotter joint in detail. **[16]**

OR

Q4) Explain types of levers? Design any one type. **[16]**

Q5) Explain - types of keys in detail? **[18]**

OR

Q6) Explain Bush - Pin type flexible coupling. **[18]**

SECTION - II

Q7) Explain in detail design of C-clamp. **[16]**

OR

P.T.O.

Q8) Explain design of Turn buckle. **[16]**

Q9) Explain difference between threaded and welded joint. **[16]**

OR

Q10) Explain welded symbols? & Also the advantages and limitations of welded Joints? **[16]**

Q11) Explain the load - stress equation in detail. **[18]**

OR

Q12) Explain & derive the load - deflection equation. **[18]**

Total No. of Questions :6]

SEAT No. :

P2949

[Total No. of Pages :2

[5058]-105
T.E. (Printing)
MANAGEMENT INFORMATION SYSTEM & COST ESTIMATION
(2008 Course) (Semester - I) (308284)

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

Instructions to the candidates:

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

SECTION-I

Q1) List down various types of business organizations and explain any two types in detail with suitable examples. **[16]**

OR

Q1) Explain the difference between the elements of Competitive Environment for the Manufacturing industry and Service industry with suitable examples. **[16]**

Q2) Explain the role of MIS in the process of deciding the strategy for the printing industry with suitable examples. **[16]**

OR

Q2) Draw the workflow of CIP3 and CIP4 technology. **[16]**

Q3) Explain the structure of Decision Support System with suitable examples. **[18]**

OR

Q3) Explain the structure of Group Decision Support System with suitable examples. **[18]**

P.T.O.

SECTION-II

Q4) Draw the flow diagram of Decision making process and explain the same in detail. **[16]**

OR

Q4) Explain with suitable examples, how MIS helps the manager in taking correct decisions. **[16]**

Q5) Explain the standard costing system in detail. **[16]**

OR

Q5) Explain the British Federation of Costing System used in Printing in detail. **[16]**

Q6) Explain various factors which affect the estimate of a job in detail with suitable examples. **[18]**

OR

Q6) Write short note on: **[18]**

a) Qualification of an estimator.

b) Tools of an estimator.

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Total No. of Questions :6]

SEAT No :

P2950

[Total No. of Pages : 3

[5058]-106
T.E. Printing
OFFSET MACHINES - II
(2008 Course) (Semester - II)

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: **[16]**

a) Describe parts of reel with help of neat diagram.

b) Describe any 3 splice patterns.

OR

Q1) Explain the following: **[16]**

a) Revolving Reel stands.

b) Dancer roller.

c) Y type configuration.

d) Tower press used in newspaper printing.

Q2) Explain the use of:

a) Ink doctor and oscillator in offset. **[8]**

b) Anilox short inking system used on web offset machines. **[8]**

OR

Q2) Write short notes on : **[16]**

a) Different paper grades used in web offset.

b) Percentage of IPA in F.S.

c) Relationship of conductivity, PH and concentration.

d) Cylinder packing and its importance.

P.T.O.

Q3) Explain:

a) Chill roll plumbing arrangement. **[9]**

b) Different dryer temperature setting for LWC and SC-A papers. **[9]**

OR

Q3) a) Write short notes on:

a) Impaling pins, cut -off cylinder and nipping rollers. **[9]**

b) Slitter, turner bar, tucker blades. **[9]**

SECTION - II

Q4) Explain the following terms w.r.t. web tension: **[18]**

a) Modulus of Elasticity in paper.

b) Former board web tension.

OR

Q4) Explain: **[18]**

a) Image control elements.

b) Fan-out.

c) Slur guides.

d) Star target.

Q5) Explain the significance of following: **[16]**

a) Remoisturizer unit.

b) Web preheaters.

c) Sidelay sensors.

d) Web preconditioners.

OR

Q5) With respect to chill roll systems explain the purpose of cleaning (maintenance) chill roll surface and internal scaling. **[16]**

Q6) Explain troubles due to following: **[16]**

a) Wet and dry tensions.

b) Incorrect temperatures of ink roller train, dampening solution.

OR

Q6) Explain following paper problems: **[16]**

a) Loose paper edges.

b) Splice pattern bursts open before splice.

c) Web creases in infeed.

d) Wrapping effects: Glue on end.

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Total No. of Questions : 6]

SEAT No. :

P2951

[Total No. of Pages : 4

[5058]-107
T.E. (Printing)
STATISTICAL PROCESS CONTROL
(2008 Course) (Semester - II)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) Explain the role of Control charting tool in SPC with examples. **[8]**

b) Explain the concept of Quality with reference to Detection Technique and Prevention Technique in detail with suitable example. **[8]**

OR

What is Process Mapping? And Process Flow charting? Also explain the importance of Process analysis in detail with the help of suitable example from printing industry. **[16]**

Q2) Explain the various Histogram patterns in short with diagrams and its probable causes. **[16]**

OR

From the given data, arrange the data, prepare frequency distribution table and draw the Histogram only and comment on the same. **[16]**

0.912	0.910	0.904	0.905	0.910	0.911
0.914	0.912	0.910	0.913	0.908	0.914
0.907	0.909	0.913	0.912	0.909	0.913
0.902	0.906	0.909	0.907	0.906	0.908
0.915	0.909	0.910	0.911	0.912	0.909
0.910	0.909	0.908	0.910	0.909	0.907

P.T.O.

Note 1: From G Chart, the recommended number of groups should be 7 for Number of measurements between 30 to 40.

Note 2: It was observed later on that the measuring instrument is having an error of +0.003 measurement value.

Q3) a) Explain the classification of process variation in detail with examples. **[8]**

b) Explain the concept of Distribution of measurement data with reference to the characteristics of distribution. **[10]**

OR

Explain the following: **[18]**

a) Relationship between Mean, Median and Mode.

b) Relationship between Range, Variance and Standard Deviation.

c) Normal Distribution & 3SD spread.

SECTION - II

Q4) Prepare X bar R chart from the given data on graph paper. **[16]**

Sample No.	1	2	3	4	5	6	7	8	9	10
Measurement	933	911	889	882	903	890	892	908	895	916
	897	898	915	913	930	940	912	920	920	890
	885	900	905	930	890	895	895	896	922	891
	900	905	902	900	890	909	896	894	928	920
	879	862	873	871	900	915	902	906	926	915

Note: Take fractional values only up to two digits

Shewhart's Constants : A2 = 0.577

D3 = 0

D4 = 2.114

OR

Prepare X bar S chart from the given data on graph paper. **[16]**

Sample No.	1	2	3	4	5	6	7	8	9	10
Measurement	933	911	889	882	903	890	892	908	895	916
	897	898	915	913	930	940	912	920	920	890
	885	900	905	930	890	895	895	896	922	891
	900	905	902	900	890	909	896	894	928	920
	879	862	873	871	900	915	902	906	926	915

Note : Take fractional values only up to two digits.

Shewhart's Constants: A3 = 1.427

B3 = 0

B4 = 2.089

Q5) a) Explain what is Pareto chart. **[4]**

b) Prepare the Pareto chart on the graph paper from the given data, also show the cumulative Percentage chart on the same on the graph. **[12]**

Sr. No.	Defect Category	Number of Shirts
1	Loose threads	2300
2	Hemming wrong	1650
3	Material flaw	300
4	Collar wrong	250
5	Cuffs wrong	200
6	Buttons	100
7	Stitching	100
8	Button holes	50
9	Material tear	50
	Total	5000

OR

Comment on the following: **[16]**

a) Cause and Effect Analysis.

b) Scatter diagram.

Q6) a) Explain DOE with suitable examples from printing industry. **[9]**

b) Define Six Sigma and its benefits. **[9]**

OR

Explain in detail Cp and Cpk Analysis with suitable diagrams. **[18]**

Total No. of Questions : 6] **SEAT No. :**

P3754 **[Total No. of Pages : 2**

[5058]-108

T.E. (Printing)

DIGITAL WORKFLOW AND IMAGE SETTING

(2008 Pattern)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Write answers to different sections on separate answer sheets.***

SECTION - I

Q1) Compare and contrast between conventional and digital workflow. **[16]**

OR

What is jobflow. Explain the different steps used in the same.

Q2) Write short notes on : **[18]**

a) JDF workflow.

b) PDF workflow.

OR

Explain following in details :

a) Archiving-Purpose and ways of doing it.

b) Trapping.

Q3) What are different modules used in workflow? Explain each in details. **[16]**

OR

Write short notes on:

a) Pre-flight check.

b) OPI/APR software.

P.T.O

SECTION - II

Q4) Explain raster image processor in terms of : **[16]**

a) Objectives.

b) Functions.

OR

Explain rational and irrational screening with neat diagrams.

Q5) What is image compression? Why it is required? What are different ways of compression? **[16]**

OR

Explain fundamental steps in digital image processing with neat diagram.

Q6) Explain the working principle with neat diagram for electro photographic printer. **[18]**

OR

Explain :

a) Drop on demand.

b) Continuous flow types inkjet printer with principle diagram of working.

Total No. of Questions : 6]

SEAT No. :

P2952

[Total No. of Pages : 1

[5058]-109
T.E. (Printing)
TECHNOLOGY OF FLEXOGRAPHY
(2008 Course) (Semester - II)

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 in detail the making of a rubber plate. **[18]**

OR

Explain the reasons of flexo plate wear. **[18]**

Q2) Explain the off-press mounting technique for flexo plates. **[16]**

OR

Calculate % shortening and new negative length for 2.84 mm plate thickness having printed length of 50 cm **[16]**

Q3) Explain the process of making 2.84 mm photopolymer plate. **[16]**

OR

Explain standardization test for Main Exposure. **[16]**

SECTION - II

Q4) Explain the making of digital flexo Photopolymer plate. **[16]**

OR

Explain the effect of PerC and Butanol used for plate reproduction. **[16]**

Q5) Explain in detail CI Flexo process. **[18]**

OR

Describe in detail flexo press used for rigid packaging. **[18]**

Q6) Explain in detail role of Anilox screen ruling on flexo print quality. **[16]**

OR

Explain in detail fountain roll inking system of a flexo press. **[16]**

Total No. of Questions :12]

P1596

SEAT No. :

[Total No. of Pages :7

[5058]-11
T.E.(Mechanical Engineering)
MACHINE DESIGN-I
(Semester-I) (302041) (2008 Course)

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 there 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 pulley weighing 1.2 KN and 500 mm diameter is driven by a horizontal belt drive. The power is transmitted through a solid shaft to a pinion keyed to the shaft which in turn meshes with a gear. The belt tension and the components of gear reactions on the pinion are as shown in Fig.1. Design the shaft and square key using the values of allowable shear stress for shaft accounting the keyway effect is 41.25 N/mm^{2}and for key the allowable shear stress is 55 N/mm^2. Assume shaft and key are made of the same material. The shock and fatigue factors are: K_b=2.0 and K_t=1.5 Find the torsional deflection of the shaft. **[16]**

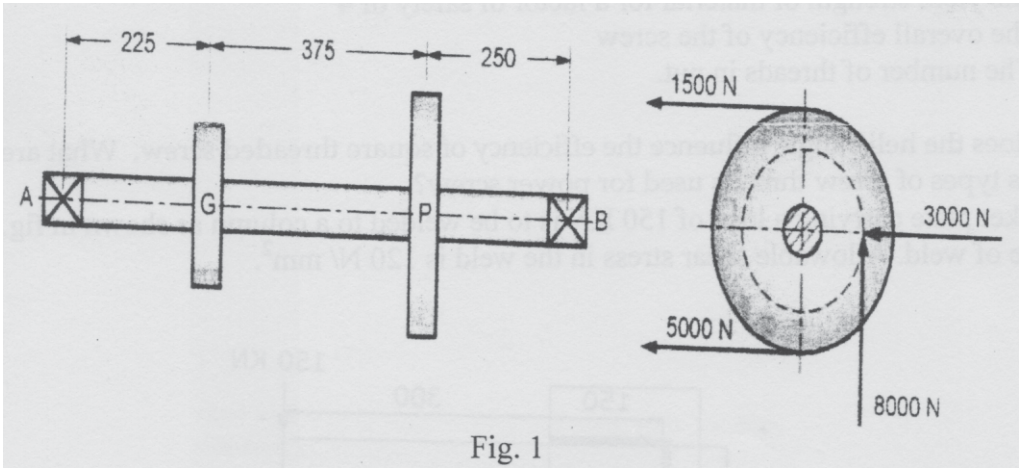

Fig. 1

OR

P.T.O.

Q2) a) A protected type flange coupling is used to transmit 25 KW power at 500 rpm from an engine to a machine. Design the coupling for an overload capacity of 25 % Assume following permissible stresses: **[12]**

	C.I. Flanges	Shaft&Key	Bolts
Permissible tensile stress (N/mm^2)	20	60	60
Allowable shear stress(N/mm^2)	12	35	28
Allowable compressive stress(N/mm^2)	60	60	60
Number of bolts	6		

b) Compare Flexible Coupling with Rigid Coupling & state applications of both. **[4]**

Q3) a) It is required to design a double start screw with square threads for a C - clamp The maximum force exerted by the clamp is 5 KN. It is assumed that the operator will exert a force of 250 N at the ball handle of the hand wheel. The screw is made of plain carbon steel 45C8 ($Syt=330N/mm^2$) while the nut is made of grey cast iron FG200.The factor of safety is 2.5.The distance between axis of handle and nut surface in clamped condition is 275 mm. The mean collar diameter is 12.5mm.The coefficient of friction at screw threads and collar is 0.15 and 0.17 respectively. The permissible bearing pressure is 15 N/mm^2.Design the screw and nut for a C-clamp and determine the following parameters: **[12]**

i) Standard dimensions of screw

ii) Stresses in screw body at two critical sections

iii) Height of nut

iv) Stresses in nut threads

v) Length of handle.

Standard dimensions of square threads(Normal Series)

Nominal Diameter(d)mm	Core Diameter (dc) mm	Pitch(p)mm
22	17	5
24	19	5
26	21	5

b) Show that efficiency of square threads is always less than 50 %. **[4]**

OR

Q4) a) A 26 X 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 MP a 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.

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

Q5) A bracket plate carrying a load of 150 KN is to be welded to a column as in fig.2. Find the size of weld. Allowable shear stress in the weld is 120 N/mm^2 **[18]**

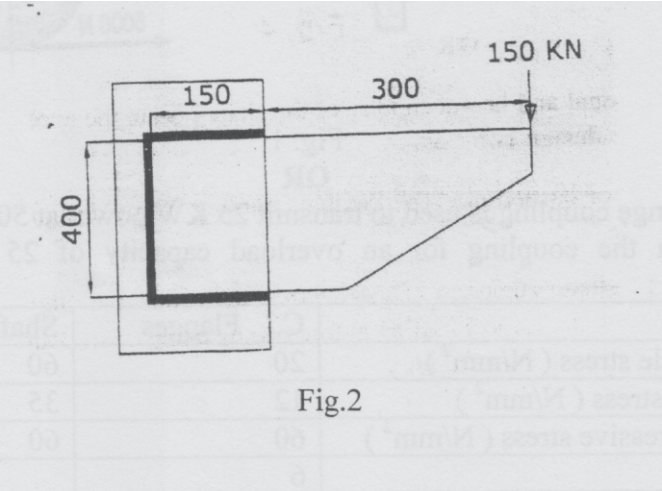

Fig.2

OR

Q6) A bracket is subjected to loading as shown in Fig.3. Determine the size of the bolts if the permissible tensile stress in the bolts is not to exceed 75 MPa. Assume maximum normal stress theory of failure. **[18]**

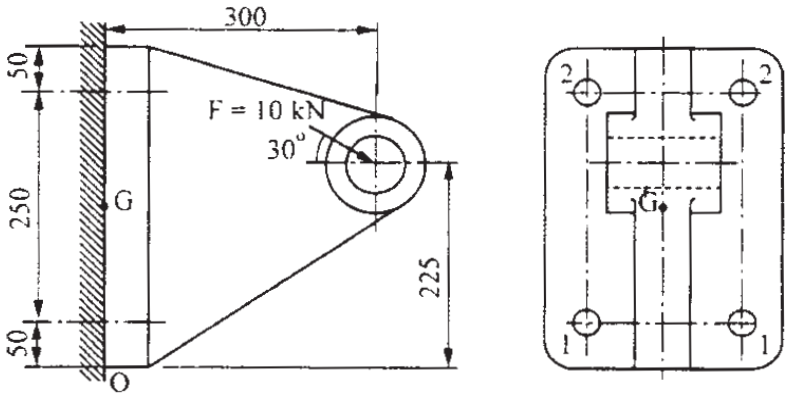

Fig.3

SECTION-II

Q7) A rimmed flywheel is to be used for a four stroke diesel engine which develops 20 KW power at 530 rpm.The load torque is constant throughout the cycle.The hoop stress developed in the flywheel rim is 4.5 N/mm^2. The fluctuation of the speed is limited to $\pm$ 1.5 % of the mean speed. The work done during the power stroke is 40% more than the work done during the whole cycle. The flywheel is made of grey cast iron for which the mass density is 7200 Kg/m^3 and allowable tensile stress is 15 N/mm^2. The rim contributes 90 % of the required mass moment of inertia. The rim has a rectangular cross-section with width to thickness ratio of 2.0. The number of arms is 6 having an elliptical cross-section with major axis twice the minor axis If the allowable shear stress for the key and shaft is 80 N/mm^2, design the flywheel rim, arms, hub and key. **[18]**

OR

Q8) The torque developed by the engine and the load torque of the machine are given by the following expression:

$T_i = 10000 + 5000 \sin 2\theta$ N-m, $T_o = 10000 + 5000 \cos 2\theta$ N-m.

Where θ is the crank angle.

Design a rimmed flywheel made of grey cast iron using the following data:

Maximum speed of the flywheel during the cycle=245 rpm.

Minimum speed of the flywheel during the cycle =235rpm.

Contribution of the rim to the flywheel effect =90%

Flywheel rim width to thickness ratio=2.0

Limiting linear rim speed at mean radius =21 m/s

Numbers of arms=8

Permissible tensile stress for the flywheel =14 N/mm^2

Mass density of the flywheel material=7200 Kg/m^3

Radius of the flywheel hub =80 mm

Also find the power delivered by the engine. **[18]**

Q9) a) Two helical springs are arranged in a concentric manner, with one inside the other. Both the springs have same free length and carry a total load of 5500 N.The outer spring has8 coils with mean coil diameter of 128 mm and wire diameter 16 mm. The inner spring has 12 coils with mean coil diameter of 84 mm and wire diameter 12 mm. Determine: Maximum deflection of each spring and maximum stress in each spring. Assume G=81 GPa. **[12]**

b) Why shot peening is needed for springs. **[4]**

OR

Q10)a) A closed coiled helical compression spring having 12 active coils has a spring stiffnes 'K' This spring is cut into 2 springs having 5 and 7 turns. What will be the stiffness of the resulting springs. **[4]**

b) A loaded narrow gauge rail car weighing 2000 kg mass and moving at 4.32 Km/hr velocity is brought to rest by a bumper consisting of two helical compression springs of spring index6.In bringing the rail car to rest, both the bumper springs get compressed by 140 mm.The spring steel has permissible shear stress of 400 N/mm^2 and the modulus of rigidity is 84000 N/mm^2. Determine the greatest load on each spring, the diameter of spring wire, mean coil diameter, number of coils and the free length of the spring. **[12]**

Q11) The following date is given for an open type V-belt drive

Diameter of driving pulley=120 mm

Diameter of driven pulley=240mm

Centre distance =0.8m

Groove angle=40^o

Mass of belt=0.25 Kg/m

Maximum possible tension=800 N

Coefficient of friction=0.18

Plot a graph of the maximum tension and power transmitted against the belt velocity. **[16]**

OR

Q12) It is required to select a flat belt drive to connect two transmission shafts rotating at 800 rpm and 400 rpm respectively. The centre distance between the two shafts is approximately 3 m and the belt drive is open type. The power transmitted by the belt is 30 KW and the load correction factor is 1.3. The belt should operate at a velocity between 17.8 m/s to 22.9 m/s. The power transmitting capacity of the belt per mm width perply at 180^o arc of contact and a belt velocity of 5.08 m/s is 0.0147 KW. Select the preferred pulley diameters and specify the belt Use the following data:

Standard pulley diameters :

90,100, 112, 125, 140, 160, 180, 200, 224, 250,280, 315, 355, 400,450, 500, 560, 630, 710,800, 900 mm. **[16]**

Arc of contact correction factor(F_d):

Arc of Contact	120^o	130^o	140^o	150^o	160^o	170^o	180^o
	1.33	1.26	1.19	1.13	1.08	1.04	1.00

Number of plies and standard belt widths:

Number of plies	Standard belt widths ‘b’in mm
4	40,44,50,63,76,90,100,125,152
5	76,100,125,152

❄ ❄ ❄

Total No. of Questions :12]

P2953

SEAT No. :

[Total No. of Pages :4

[5058]-110

T.E.(Printing Engg.)

THEORY OF PRINTING MACHINE AND MACHINE DESIGN

(2008 Course) (Semester-II) (302290)

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

Instructions to the candidates:

1) ***Answer 3 questions from section* I *and 3 questions from section* II.**
2) ***Answers to the two sections should be written in separate answer books.***
3) ***Figures to right indicate full marks.***
4) ***Use of electronics pocket calculator is allowed.***
5) ***Assume suitable data if necessary.***

SECTION-I

Q1) a) Explain modified involute method to avoid interference in involute gear. **[6]**

b) A spur pinion of 19 teeth is in mesh with a gear of 45 teeth. The pressure angle is 20^{o}, module 5 mm and standard addendum of one module is used. Calculate

i) Length of path of contact
ii) Length of arc of contact
iii) Contact ratio
iv) Maximum length of contact to avoid interference for above pair of gears. **[10]**

OR

Q2) a) What are the various forms of gear tooth profile? Show that the involute teeth satisties the necessary condition for constant angular velocity. **[8]**

b) 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. **[8]**

Q3) a) In an epicyclic gear as shown in fig 3a the wheel A fixed to S_1 has 30 teeth and rotates at 500 rpm. B gears with A and fixed rigidly to C, both being free to rotate on S_2. The wheels B, C and D have 50,70, and 90 teeth respectively. If D rotates at 120 rpm in a direction opposite to that of A, find the speed of the shaft S_2. **[10]**

P.T.O.

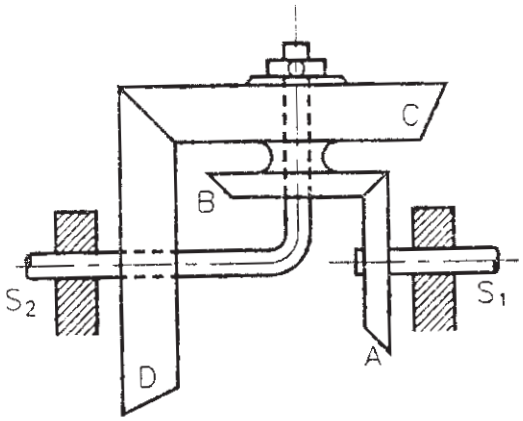

Fig 3a

b) What is difference between a simple gear train and compound gear train? Explain with the help of sketches. **[6]**

OR

Q4) In the epicyclic gear train shown in Fig. The compound wheels 'A' and 'B' as Internal wheels 'C' and 'D' rotates independently about the axis 'O' . The wheels 'E' and 'F' rotates on the pins fixed to arm 'a' . All the wheels are of the same module. The number of teeth on the wheels are T_A=52, T_B=56, T_E=T_F=36 **[16]**

Determine the speed of 'C' if:

i) The wheel 'D' fixed and arm 'a' rotates at 200 rpm clockwise.

ii) The wheel 'D' rotates at 200 rpm counterclockwise and the arm 'a' rotates at 200 rpm clockwise.

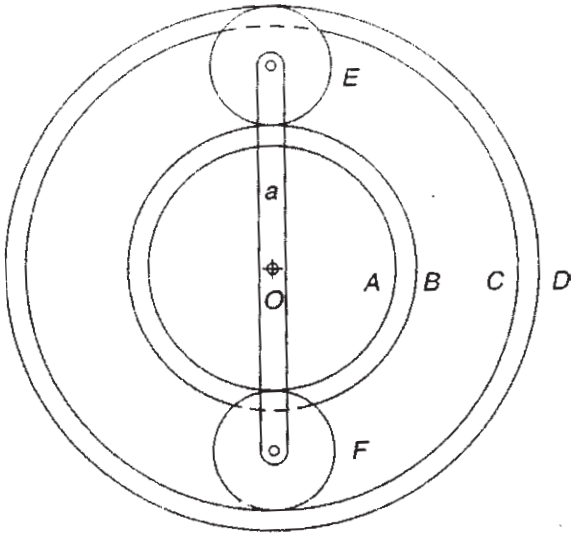

Fig 4

Q5) Draw the profile of a cam operating a flat face follower and with the following data: Minimum radius of cam = 25 mm, Lift of follower = 40 mm, the cam lifts the follower for 120^o with cycloidal motion followed by a dwell period of 40^o. Then the follower lowers down during 120^o of the cam rotation with uniform acceleration and deceleration followed by a dwell period. If the cam rotates at a uniform speed of 200 rpm, calculate the maximum velocity and maximum acceleration of the follower during the lift and return. **[18]**

OR

Q6) a) Draw the displacement, velocity and acceleration diagram for a follower moves with uniform velocity. **[6]**

b) Why a roller follower is preferred to that of a knife-edged follwer? **[6]**

c) Write short note on" **[6]**
Follower displacement diagram of a cam.

SECTION-II

Q7) a) Define the terms theoretical stress concentration factor and fatigue stress concentration factor. Establish a relation between them. **[8]**

b) Explain the effect of following modifying factors on endurance strength:
i) Surface finish factor. **[8]**
ii) Size factor
iii) Reliability factor
iv) Modifying factor to account stress concentration.

OR

Q8) a) What is Soderberg's line? Develop an equation for the same. **[8]**

b) Explain the method for fatigue testing of a component. **[8]**

Q9) A spur gear is to be designed for the data given below:
Pressure angle=20^o, module = 6mm, center distance=300 mm, Velocity ratio= 4, Face width 60 mm, Tooth hardness= 250, Permissible bending strength, For steel pinion = 75 MPa, for steel gear = 60 MPa, dynamic factor = 114 N/mm,pinion speed = 1500 rpm, Desing overload factor = 1.5. Calculate the maximum power that the gears can transmit safely by the gear pair. What will be the effect on power transmission, if center distance is reduced to 270 mm? **[18]**

OR

Q10)a) Compare wear strength of a pinion meshing with external gear and pinion meshing with internal gear, having identical materials, pitch circle diameters, face width and hardness. **[8]**

b) A system comprising of three gears as shown in fig 10 b. Spur gear A receives 5 kW power at 600 rpm through its shaft. Gear B is an idler and the gear C is the driven gear. The gears have a module of 6 mm with 20^{o} full depth involute profile. Determine the reaction forces on the idler shaft. **[10]**

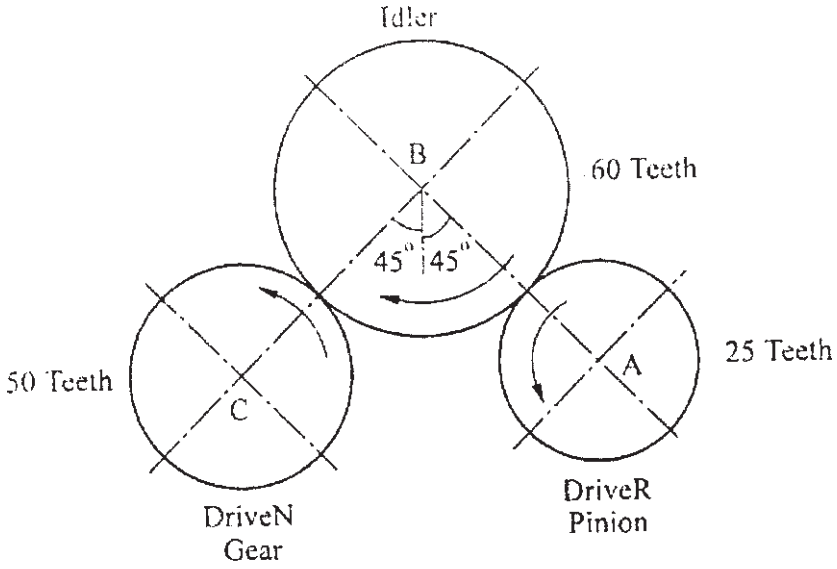

Fig 10 b

Q11)a) Explain the parameters used in selecting the type of a rolling contact bearing. **[10]**

b) Write short note on dynamic load carrying capacity of rolling bearing. **[6]**

OR

Q12)a) What are typical causes of failure in rolling contact bearing. **[8]**

b) Find the value of 'C' in N for a suitable radial deep groove ball bearing having life of 10000 hrs. The data is as: Belt drive, pulley is placed centrally with belt tensions acting vertically downwards. The load factor = 3, Diameter of pulley = 300 mm, shaft diameter= 25 mm, power transmitted = 7.5 Wk, speed = 720 rpm, ratio of belt tension. **[8]**

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Total No. of Questions :12]

SEAT No. :

P1652

[Total No. of Pages :3

[5058] - 111

T.E. (Chemical Engineering)

CHEMICAL ENGINEERING MATHEMATICS

(2008 Course) (Semester - I)

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

Instructions to the candidates:

1) ***Answers to the two sections should be written in separate answer books.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right 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) Find real root of equation $x^3 - 5x + 3 = 0$ using Newton Raphson method, take initial guess is zero. Do 3 iterations only. **[8]**

b) What are the different types of errors associated with the numerical methods. **[8]**

OR

Q2) a) State and explain the graphical interpretation of Bisection method. **[8]**

b) Solve the equation $x^3 + 2x^2 + 3x - 4 = 0$ using secant method. Do 5 iterations. **[8]**

Q3) a) Solve the following system of equations using Gauss elimination method
$3x + 6y + z = 16,\ 2x + 4y + 3z = 13,\ x + 3y + 2z = 9$ **[8]**

b) Discuss in short the drawbacks of Elimination methods. **[8]**

OR

P.T.O.

Q4) a) Solve the following system of equations using Gauss Siedal method. $83x+11y-4z=95,\ 7x+52y+13z=104,\ 3x+8y+29z=71.$ **[8]**

b) Explain Thomas Algorithm for Tridiagonal Matrix. **[8]**

Q5) a) Use least square regression to fit a straight line to the following data: **[9]**

x	1	2	3	4	5	6	7
y	0.5	2.5	2.0	4.0	3.5	6.0	5.5

b) Explain Quantification of error of linear regression. **[9]**

OR

Q6) a) Find the integration of $(4x + 2)$ in the limits 1 to 4 by Trapezoidal Rule using six strips. **[8]**

b) Explain the principle of least square method to show the sum of the squares of the residuals is minimum. **[10]**

SECTION - II

Q7) a) Discuss the stability region of Runge-Kutta method. **[8]**

b) Using 4th order Runge-Kutta method solve $\frac{dy}{dx}-y=0$. Given $y(0)=2$, $h = 0.1$. Find y at $x = 0.2$. **[8]**

OR

Q8) a) Using Euler's method, find an approximate value of y for $\frac{dy}{dx}=x-y^2$, for given boundary conditions, $x = 0$, $y = 1$, find y at $x = 4$. Take step size $h = 1$. **[8]**

b) Explain graphical interpretation of effect of step size on Euler's method. **[8]**

Q9) State the PDE representing neat flow in one-dimensional problem (i.e. parabolic equation). Using finite difference approximation. Derive Crank - Nicholson formula for solving the PDE. **[16]**

OR

Q10) Discuss in detail the algorithm and flow chart to generate forward differences. **[16]**

Q11) a) How one dimensional search is applied in a multidimensional problem. **[10]**

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

i) Feasible solution

ii) Optimal solution.

iii) Constraints.

iv) Objective function.

OR

Q12) a) What is process optimization & state different methods of optimization? **[10]**

b) Write the working procedure of the simplex method. **[8]**

Total No. of Questions :12]

SEAT No. :

P2954

[Total No. of Pages :3

[5058] - 112

T.E. (Chemical Engineering)

CHEMICAL ENGINEERING THERMODYNAMICS - II

(2008 Course) (Semester - I) (309344)

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

Instructions to the candidates:

1) ***Answers to the two sections should be written in separate answer books.***
2) ***Answer Q 1 or 2, Q 3 or 4, Q5 or 6 from section I and Q7 or 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) How is fugacity determined for a pure gas? **[6]**

b) Define fugacity. **[2]**

c) Show that fugacity of a gas obeying van der Waals equation is given by

$$\ln f = \frac{b}{V-b} - \frac{2a}{RTV} + \ln \frac{RT}{V-b}$$ **[8]**

OR

Q2) a) What is chemical potential? Show how chemical potential can be a criterion for equilibrium. **[8]**

b) State and explain in detail the Lewis Randall Rule. **[8]**

Q3) a) A vessel is divided into two compartments, one containing 100 moles nitrogen at 298 K and 1 bar and the other containing 100 mole of oxygen at the same condition. If the barrier between the compartments is lifted and the gases are allowed to mix adiabatically what is the change in entropy of the contents of the vessel? **[4]**

b) What is activity coefficient and its significance? **[4]**

c) What is cxcess Gibbs free energy? Derive a correlation between excess Gibbs free energy and activity coefficient. **[8]**

OR

P.T.O.

Q4) a) What are partial molar properties? What is the physical meaning of partial molar properties? **[8]**

b) The two suffix Margule's equation is the simplest expression for Gibbs free energy, obeyed by chemically similar materials. $G^E = Ax_1 x_2$, where A is an empirical constant. Derive an expression for activity coefficient. **[8]**

Q5) a) Give the various criteria for phase equilibrium. **[8]**

b) Derive the Clausius Clayperon equation. **[8]**

c) What is an azeotrope? **[2]**

OR

Q6) a) Explain the P-x, y diagram. **[8]**

b) An equimolar solution of benzene and toluene is totally evaporated at a constant temperature of 363 K. at this temperature the vapor pressures of benzene and toluene are 135.4 and 54 kPa respectively. What are the pressures at the beginning and end of the vaporization? **[8]**

c) Define dew point and bubble point. **[2]**

SECTION - II

Q7) a) Construct the P-x, y diagram for the cyclohexane (1) – benzene (2) system at 313 K given that 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

$\ln \gamma_1 = 0.458\, x_2^2$ and $\ln \gamma_2 = 0.458\, x_1^2$. **[10]**

b) Draw and explain a ternary equilibrium diagram. **[8]**

OR

Q8) a) Describe the Redlich Kister and the Coexistence equation methods for finding thermodynamics consistency. **[10]**

b) Give the three suffix Wohl's equations and Margules equation. **[8]**

Q9) a) A gas mixture containing 2 moles of nitrogen 8 moles of hydrogen and 1.5 moles of ammonia initially undergoes the following reaction $N_2 + 3H_2 \rightarrow 2NH_3$. **[8]**

b) For a system in which the following reaction occurs $CH_4 + H_2O \rightarrow CO + 3H_2$ assume there are 4 mol CH_4, 2 mol H_2O, 2 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. **[8]**

OR

Q10)a) Explain the feasibility criteria for reacting systems. **[8]**

b) Derive a relation between change in Gibbs free energy and equilibrium constant for a reaction. **[8]**

Q11)a) Does the presence of inerts have an effect on the reaction equilibrium? Derive an expression giving the relation between equilibrium constant and composition for gas phase reactions and state the effect of presence of inerts. **[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 behavior calculate the fractional dissociation of steam when CO is supplied in 90% 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 standard heat of formation of ammonia and the corresponding Gibbs free energy by the reaction at 298 K: $N_2 + 3H_2 \rightarrow 2NH_3$ are – 46, 100 and –16,500 J/mol respectively. Calculate the equilibrium constant for the reaction at 600 K. **[8]**

Total No. of Questions : 12]

SEAT No. :

P1653

[Total No. of Pages : 2

[5058]-113
T.E. (Chemical)
CHEMICAL PROCESS TECHNOLOGY
(2008 Course) (Semester-I)

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

Instructions to the candidates:

1) ***Answer any 3 questions from each section.***
2) ***Answers to the two sections should be written in separate books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***

SECTION-I

Q1) a) Discuss the operation and unit process with example and application. **[10]**

b) Described the production of aluminium. **[8]**

OR

Q2) a) Discuss the recovery of Mg salt from sea water. **[8]**

b) Described the production of soda ash. **[10]**

Q3) a) Described the production of urea with engineering problem. **[8]**

b) Discuss in detail the problem associated with phosphorus industry. **[8]**

OR

Q4) a) Describe production of single super phosphate. **[8]**

b) Explain production of sulphuric acid. **[8]**

Q5) a) Explain manufacturing of starch and one of it's derivate dextrine. **[8]**

b) Explain the production of paper. **[8]**

OR

P.T.O.

Q6) Write a short note on: **[16]**

a) Triple superphosphate.

b) Kraft pulp process.

SECTION-II

Q7) a) Explain with diagram hydrogenation of oil. **[8]**

b) Explain destructive distillation of coal. **[8]**

OR

Q8) a) Explain solvant extraction of oil. **[8]**

b) Describe production of natural glycerine. **[8]**

Q9) a) Enlist various refining operation and explain the catalytic cracking in short. **[8]**

b) Discuss the construction of fuel cell. **[8]**

OR

Q10)Explain (Any 4): **[16]**

a) Catalytic cracking

b) Pyrolysis

c) Polymerisation

d) Alkylation

e) Hydrogenation

Q11)a) Describe production of styrene it's engineering problem. **[12]**

b) Explain production of methanol in brief with a neat process flow diagram. **[6]**

OR

Q12)a) Explain production of propylene. **[6]**

b) Discuss production of ocetylene using steam cracking of the hydrocarbons. **[12]**

●●●●●

Total No. of Questions : 6]

SEAT No. :

P1654

[Total No. of Pages : 2

[5058]-114

T.E. (Chemical Engineering)

INDUSTRIAL ORGANISATION AND MANAGEMENT

(2008 Course) (Semester - I) (307351)

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.***

SECTION - I

Q1) a) Planning is looking ahead and Control in looking back. Comment. **[6]**

b) Define Management. Explain in details various functions of Management. **[10]**

OR

Distinguish between Private Limited and Partnership Firm. State and Explain the formation of Joint Stock Company with its advantages and disadvantages. **[16]**

Q2) a) What is job evaluation? Describe any two methods of job evaluation. **[8]**

b) Explain the various types of recruitments and process of recruitments. **[8]**

OR

a) Define Manpower Planning. What are the objectives and benefits of Manpower Planning. **[8]**

b) Explain the functions of wage and salary administrations. **[8]**

Q3) Write short notes on the following: **[18]**

a) Purchase Process.

b) Functions of Store Keeper.

c) Inspection and Quality Control.

OR

a) Vendor Development.

b) Inventory Control.

c) EOQ.

[18]

P.T.O.

SECTION - II

Q4) Explain the following:

a) Marketing and Selling. **[5]**

b) Role of Advertisement. **[5]**

c) Distribution Channels. **[6]**

OR

Define Market Research. What are the different methods of market research? Discuss how will you carry out market research for selling chemical product in competitive market. **[16]**

Q5) a) Define Patent. Explain the obligations and the rights of Patent holder. **[8]**

b) Explain the procedure of imports of goods in India. **[8]**

OR

a) Define TQM. Explain the role of TQM to improve the productivity of chemical industry. **[8]**

b) Explain the role of Quality Circle in Chemical Industry. **[8]**

Q6) Write short notes on the following: **[18]**

a) FERA and FEMA.

b) Flow Diagram.

c) Contract and Conditions of Valid Contract.

OR

a) Work Study.

b) MRTP Act.

c) Warranty and Guarantee.

[18]

Total No. of Questions :12]

SEAT No. :

P1655

[Total No. of Pages :4

[5058] - 115

T.E. (Chemical)

MASS TRANSFER - I

(2008 Pattern) (Sem. - I) (Theory)

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

Instructions to candidates:

1) ***Answer 3 questions from each Section.***
2) ***Answers to the two Sections should be written in separate answer books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable data if necessary.***
5) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is permitted.***

SECTION - I

Q1) a) State Fick's First law of diffusion. Derive an expression for steady state equimolar counter current Diffusion. **[8]**

b) A cylindrical tank of 4 m diameter was filled with acetone to the depth of 2.3cm from the top for storage and is exposed to ambient temp. of 18.8ºC in gentle current of air.
i) calculate the fall of level after 1 hr.
ii) calculate the loss in Rs. of acetone worth Rs. 2/- per litre. Density of acetone = 0.79, pressure is 765.5 mmHg and vapor pressure of acetone at 18.8ºC = 170 mmHg. Diffusivity of acetone = 0.09 cm^2/sec. **[10]**

OR

Q2) a) Calculate the amount of diffusion of acetic acid (A) in 2 hours across a film on non diffusing water (B) solution, 1 mm thick at 17ºC, when concentration on opposite side of the film are 9 and 3 weight % acid respectively. The diffusivity of acetic acid in solution is 0.95×10^{-9} m^2/sec. **[10]**

Data: At 17ºC:
Density of 9% solution = 1012 kg/m^3
Density of 3% solution = 1003kg/m^3
Molecular weight of acetic acid = 60
Molecular weight of water = 18

P.T.O.

b) Write Maxwell laws of diffusion. **[4]**

c) Derive Stefan's equation for diffusion through tube. **[4]**

Q3) a) In a typical chemical process component A is absorbed from aqueous solution in to an air stream in a mass transfer tower at a certain operating conditions. P_{AG} = 12 mmHg, C_{AL} = 4 kmol/m^3. The overall mass transfer coefficient K_G = 0.269 kmol A/m^2.hr.atm. If the Henry's law is applicable and 56% of the total mass transfer resistance is encountered in gas film, calculate **[10]**

i) Gas film coefficient,

ii) Liquid film coefficient,

iii) Molar flux of component A. Henry's law constant = 7.5×10^{-3} atm/m^3.mol.

b) Write short note on Chilton-Colburn Analogy and Reynolds Analogy. **[6]**

OR

Q4) a) Explain Two-Film theory and Penetration theory. **[8]**

b) Ammonia is absorbed by waters in a wetted wall column being operated at 20ºC and l atm. The overall gas coefficient is l kmol/m^3. atm. At the one point in the column the gas contain 10 mol% NH_3 and the liquid phase contain 0.155 mole NH_3/m^3 of solution. 96% of total resistance is in the gas phase. Assume Henry's law constant = $4.247*10^{-3}$ atm/mol NH_3/m^3. Determine the individual coefficients and interfacial compositions. **[8]**

OR

Q5) a) Derives Kremser-Borwn-Sounder equation. **[8]**

b) Ammonia gas is to be removed from its mixture with air by scrubbing with water in a packed tower. A gas mixture entering the column contains 6% NH_3 (Vol %) and rest air (Vol.), water free of NH_3 enters in the column in countercurrent direction. If 90% of the ammonia is to be removed using NH_3 free water at the rate of 2 mole water per mole of air. Determine the exit concentration of ammonia. The gas-liquid equilibrium

Relationship is Y = 0.08 X, **[8]**

Where, Y = moles of NH_3/mole of air,

X = moles of NH_3/mole of water.

OR

Q6) a) In packed tower SO_2 is to be absorbed from air by scrubbing with water. The entering gas is 20% SO_2 by volume and leaving gas contain 0.5% SO_2 by volume. The entering water is SO_2 free. The water flow rate is to be twice the minimum. The air flow rate is 975 kg/m^3.hr. the temperature is 30ºC and total pressure is 2 atm. The equilibrium data is governed by [Y/ 1 + Y] = 21.8 [X/ 1 + X] where Y and X are the mole fraction units, compute the no. of overall gas phase transfer units. **[10]**

b) Define HTU and NTU. **[2]**

c) Explain the concept of HETP. **[4]**

SECTION - II

Q7) a) An air-water sample has DBT 50ºC and WBT 35ºC. Using humidity chart, calculate, **[10]**

i) Absolute humidity

ii) Dew point

iii) Humid heat

iv) % relative humidity

v) Enthalpy of saturated air

vi) Humid volume. The total pressure is 1 atm, average molecular weight of air is 28.84, vapor pressure of air at 50ºC is 0.1234×10^5 N/m^2, latent heat of liquid is 2502 kJ/kg.

b) What are various types of cooling towers and equipments used for humidity measurement. **[6]**

OR

Q8) a) Derive the relation between humidity and percentage relative humidity. **[8]**

b) In process benzene used as a solvent is evaporated into dry nitrogen. The resulting mixture at a temperature of 297 ºK and pressure of 101.3 KN/m^2 has a relative humidity of 60%. It is required to recover 80% of benzene present by cooling to 283 ºK and compressing to suitable pressure. What should this pressure be?. Vapor pressure of benzene at 297 ºK and 283 º K are 12.2 KN/m^2 and 6 KN/m^2 respectively. **[8]**

Q9) a) Define **[8]**

i) Murphree tray efficiency
ii) Overall tray efficiency
iii) Coning
iv) Weeping
v) Gas holdup and liquid holdup
vi) Ideal tray

b) What are the various equipments used for gas-liquid contact. With neat sketch explain. **[8]**

i) Venturi Scrubber
ii) Packed Tower

OR

Q10)a) Differentiate between packed and plate columns. **[8]**

b) Give classification of packing's used in packed columns. **[4]**

c) What are the different types of trays? Explain working of bubble cap tray. **[4]**

Q11)a) A batch of wet solid, whose drying rate data is given below, is to be dried from free moisture content of 0.38 kg H_2O/kg dry solid to 0.04 kg H_2O/ kg dry solid. The weight of dry solid is 399 kg. And area of top surface is 18.58 m^2. Calculate the total time for drying. **[10]**

X:-	0.480	0.350	0.250	0.195	0.150	0.100	0.065	0.050	0.040
N:-	1.20	1.51	1.51	1.51	1.21	0.90	0.71	0.37	0.27

Where X = kg H_2O/kg dry solid, N = kg H_2O/m^2. hr.

b) Explain rate of drying curve with neat sketch. **[8]**

OR

Q12)a) A wet solid is to be dried from 35% to 10% moisture under constant drying conditions in five hours. If the equilibrium moisture content is 4% and critical moisture content is 14% how long it will take to dry solids to 6% moisture under same conditions? **[8]**

b) What are factors affecting the rate of drying. **[2]**

c) Give classification of drying equipments in detail. Explain the working of fluidized bed dryer. **[8]**

Total No. of Questions : 12]

SEAT No. :

P2189

[Total No. of Pages : 3

[5058]-116
T.E. (Chemical Engineering)
TRANSPORT PHENOMENA
(2008 Course) (Semester-II)

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

Instructions to the candidates:

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

SECTION-I

Q1) a) Explain time independent fluids and time dependent fluids. **[6]**

b) Derive the velocity profile and momentum profile for a Newtonian fluid through a circular pipe inclined at an angle β. Find the ratio of maximum velocity to average velocity. **[12]**

OR

Q2) a) Derive the expression for volumetric flow rate 'G' for Ellis fluid. **[12]**

b) Explain Bingham model of non-Newtonian fluids. **[6]**

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 1.1 lit/s. Density of diethylamine is 935 kg/m^3 and velocity is 1.95 Cp.

Assume friction factor f = 0.0063. **[6]**

OR

P.T.O.

Q4) a) Derive navier stokes equation for a system of horizontal parallel plates. Fluid flow is laminar with constant density and viscosity. The flow is driven by pressure gradient under isothermal condition. **[10]**

b) Discuss friction factors for packed columns. **[6]**

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 = 1.26 mm and length L = 91 cm. The wire has a resistance of 0.126 Ω. The outer surface temperature T_W is held at 422.1 K. The average thermal conductivity K = 22.5 W/mK. Calculate the centreline temperature. **[10]**

OR

Q6) a) Derive the expression of temperature distribution for viscous heat source. **[12]**

b) What is Brinkman number and state its criteria for maximum temperature. **[4]**

SECTION-II

Q7) a) What are the characteristic dimensionless group that arise in the correlations for Nusslet number for forced convection and free convection. Give its significance. **[6]**

b) What are semiepirical expression for Turbulent energy flux and what are their applications. **[12]**

OR

Q8) a) Derive expression for temperature distribution for the nuclear heat source stored at the centre in a spherical shell. Where will the temperature be maximum. **[12]**

b) State and explain comparison of forced and free convection in isothermal systems. **[6]**

Q9) a) State and explain theories of ordinary diffusion in liquids. **[8]**

b) The value of D_{AB} for a dilute solution of methanol in water at 15 °C is 1.28×10^{-5} cm^2/s. Calculate D_{AB} for the same solution at 100 °C, using the wilke - change equation.

μ_1 at 15 °C = 1.14 Cp

μ_2 at 100 °C = 0.284 Cp **[8]**

OR

Q10)a) Derive equation for molar flux for a diffusion with heterogeneous chemical reaction. **[10]**

b) What is binary mass transfer coefficient in one phase. Explain with suitable example. **[6]**

Q11)a) Discuss transfer coefficients at high transfer rates by film theory. **[8]**

b) Distinguish between macroscopic and microscopic balance. **[8]**

OR

Q12)a) Write analogies among heat, mass and momentum transfer. **[8]**

b) Write short note on chilton - colburn analogy. **[8]**

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Total No. of Questions : 12]

SEAT No. :

P2190

[Total No. of Pages : 4

[5058]-117
T.E. (Chemical)
CHEMICAL REACTION ENGINEERING-I
(2008 Course) (Semester-I)

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

Instructions to the candidates:

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

SECTION-I

Q1) a) Explain classification of chemical reactions with suitable examples. **[8]**

b) For a first order reaction the following data is available. Estimate activation energy for the reaction. **[8]**

Temperature °C	310	330
K $(sec)^{-1}$	0.000886	0.0139

Assume R = 8.134 J/mol K.

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 $-r_A = 0.005\ C_A^2$, $mol/cm^3.min$

If the concentration is expressed in mol/lit and time in hours, what would be the value and unit of rate constant? **[6]**

c) Explain the kinetic model for non-elementary reaction. **[4]**

Q3) a) What is meaning of Autocatalytic reaction? Draw and explain the X_A vs t and $-r_A$ vs C_A/C_{A0} curves for autocatalytic reactions. **[4]**

b) Derive integrated rate expression for first order reaction A $\rightarrow$ Product with variable volume system which is as follows.

$$\ln(1-X_A) = -\ln\left(1-\frac{\Delta V}{\in_A V_0}\right)$$ **[6]**

c) Explain in detail Integral method of analysis. **[6]**

OR

P.T.O.

Q4) a) Aqueous A at a concentration C_{A0} = 1 mol.lit is introduced into a batch reactor where it reacts away to form product R according to stoichiometry A $\rightarrow$ R. The concentration of A in the reactor is monitored at various times as shown below.

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]**

b) Show that, $C_A = C_{A0}(1–X_A)$. **[4]**

Q5) a) Show that the decomposition of N_2O_5 at a 70°C is first order reaction, calculate the value of rate constant, reaction is $N_2O_5 \rightarrow N_2O_4 + \frac{1}{2}O_2$. **[10]**

b) At certain temperature, the half life period and initial concentration for a reaction are

$t_{1/2}$ = 420 sec, C_{A0} =0.405 mol/lit

$t_{1/2}$ = 275 sec, C_{A0} = 0.64 mol/lit

Find the rate constant of reaction. **[6]**

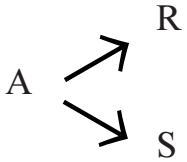
OR

Q6) a) Deduce the performance equation for recycle reactor. **[8]**

b) Derive the performance equation for Batch reactor. **[8]**

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, $C_{A0} = 2$.

$$A \begin{cases} \nearrow R & r_R = 1 \\ \rightarrow S & r_S = 2C_A \\ \searrow T & r_T = C_A^2 \end{cases}$$

Find the maximum expected C_S for isothermal operations

a) In a mixed reactor.

b) In a plug flow reactor. **[16]**

Q9) Consider the following aqueous reaction. **[16]**

$$A + B \begin{cases} \nearrow R \\ \searrow S \end{cases}$$

$$\frac{dC_R}{dt} = 1.0\, C_A^{1.5} C_B^{0.3}$$

$$\frac{dC_S}{dt} = 1.0\, C_A^{0.5} C_B^{1.8}$$

For 90% conversion of A find the concentration of R in the product stream. Equal volumetric flow rates of the A and of B stream are fed to the reactor,

and each stream has a concentration of 20 mol/lit of reactant. The flow in the reactor follow:

a) Plug flow.

b) Mixed flow.

c) Plug fow with low concentration of B when plug flow A with mixed flow B.

OR

Q10) Calculate the heat or reaction at 600 °C of the reaction **[16]**

$$A \rightleftarrows B + C$$

Heat capacities of the reacting species may be expressed as

$C_p = \alpha + \beta T + \gamma T^2 + \delta T^3$

Component	A	$\beta \times 10^2$	$\gamma \times 10^5$	$\delta \times 10^9$
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) A sample of the tracer hytane at 320 K was injected as a pulse to a reactor and the effluent concentration measured as a function of time resulting in the following data **[18]**

t (min)	0	1	2	3	4	5	6	7	8	9	10	12	14
C (g/m^3)	0	1	5	8	10	8	6	4	3	2.2	1.5	0.6	0

a) Construct figures showing C(t) and E(t) as function of time.

b) Determine fraction of material leaving the reactor that has spent between 3 and 6 min in the reactor.

c) Determine fraction of material that has spent 3 min or less in the reactor.

OR

Q12) Write notes on (Any Three): **[18]**

a) Tank in series model.

b) C and E curve.

c) Micro and macro mixing of fluids.

d) Seggregation model.

e) Dispersion flow model.

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Total No. of Questions : 12]

SEAT No. :

P1656

[Total No. of Pages : 3

[5058]-118
T.E. (Chemical)
CHEMICAL ENGINEERING DESIGN - I
(2008 Course) (Semester - II) (309349)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) Explain various optimization techniques. **[10]**

b) Defines a pressure vessel and gives some industrial example where these commonly used. **[6]**

OR

Q2) a) Explain the role of plastics as MOC for chemical plants. **[7]**

b) Explain the method for calculating thickness of torispherical head subjected to **[9]**

i) Internal pressure

ii) External pressure

Q3) a) Write a note on classification of flanges. **[9]**

b) Discuss proportioning of pressure vessels and selection of L/D ratio. **[9]**

OR

Q4) a) A vessel is to have one end closed by a blind flange. Calculate the minimum thickness of blind flange with the help of following data: **[10]**

Design pressure = 170 kg/ cm^2, Design temp = 121 ºC, Allowable bolt stress at gasket seating and operating condition = 1306 kg/cm^2, Allowable flange stress at gasket seating and operating condition = 1190 kg/cm^2, Inside diameter of gasket = 34.4 cm, Width of gasket = 2.5 cm, m = 3. Gasket seating stress = 680 kg/cm^2, Bolt circle diameter = 56.2 cm, (16 bolts of 50 mm diameter are to be used).

b) Explain the design of compensation for nozzle openings. **[8]**

P.T.O.

Q5) a) A high pressure vessel is to be operated at 100 MN/m^2. The inside diameter of vessel is 30.5 cm. Steel having yield stress 466 MN/m^2 is selected for fabrication. Estimate the wall thickness required by various theories with factor of safety of 1.6. **[9]**

b) Explain the different types of roofs used for storage tanks. **[7]**

OR

Q6) a) A storage vessel is to be covered by using a conical roof. Check the suitability of 10 mm thick plates for the construction of conical roof with permissible slope of 1 in 5. Superimposed load = 1250 N/m^2. Density of steel = 7700 Kg/m^3. Diameter of vessel = 10 m. **[8]**

b) With neat sketch explain the stresses developed in the wall of a high pressure vessel. **[8]**

SECTION - II

Q7) Skirt support is to be design for tall vertical vessel having dia. 2.5 m and height 37 m. Skirt dia. is equal to diameter of vessel while skirt is 3.5 m. The weight of vessel with all its attachments is 2,22,000 Kg. the minimum weight of vessel is 1,70,000 Kg. the wind pressure acting on vessel is 130 Kg/cm^2. Seismic coefficient = 0.08, K for cylinder = 0.7, Permissible tensile stress of material = 1400 Kg/cm^2, Yield stress of material 2000 Kg/cm^2, Permissible stress of concrete = 45 Kg/cm^2, BCD is 32 cm greater than skirt diameter, No of bolts to be used 24. **[18]**

OR

Q8) a) Explain the design of saddle supports with all the relevant equations. **[10]**

b) Explain the various parameters which determine the selection of appropriate support for a vessel and with neat sketches explain the bracket support. **[8]**

Q9) 1.2 Kg/sec of any organic liquid to be cooled from 45 ºC to 20ºC. The organic liquid is cooled by chilled water supplied from refrigeration unit at a temperature of 50 ºC and can be heated up to 10ºC. Properties of organic liquid and water are: **[16]**

Properties	Organic liquid	Water
Specific heat J/Kg.K	2150	4180
Viscosity $N.S/m^2$	0.25×10^{-3}	0.8×10^{-3}
Thermal conductivity W/m.K	0.133	0.61

Steel tubes are available with 12mm ID and 2 mm thick, Length of tube = 1.6 m, Thermal conductivity of steel tubes = 45 W/mK, Fouling resistance can be neglected. Design a suitable heat exchanger.

OR

Q10) 0.8 kg/sec of furnace oil is to be heated from 10° to 90° C in a shell and tube heat exchanger. Heating is done by steam available at 120°C. Oil is circulated through the tubes while steam is circulated in shell. Tubes of 16.5 mm ID and 19 mm OD are available. Length of tubes = 3m. The film coefficient of heat transfer for oil is 90 $W/m^2.K$ while film coefficient of heat transfer for condensing steam is 7400 $W/m^2.K$.

Density of furnace oil = 900 kg/m^3, Specific heat of furnace oil = 1970 J/kg.K

Fouling resistance for furnace oil = 0.0009m^2. K/W, Fouling resistance for steam side = 0.00005 m^2.K/W, Suggest a suitable design of the shell and tube heat exchanger. Maximum oil velocity that can be used is 0.05 m/sec. Estimate the number of passes on tube side required in a heat exchanger. **[16]**

Q11) a) A single evaporator is used to concentrate 7 Kg/sec of a solution from 10% solids to 50% solids. Steam is available at 205 KN/m^2 and evaporation takes place at 3 $kW/m^2.K$. Calculate the heating surface required and amount of steam used if the feed to evaporator is at 294 K and condensate leaves the heating space at 352.7K. Specific heat of 10% solid solution = 3.76 KJ/Kg.K, Specific heat of 50% solid solution = 3.14 KJ/Kg.K. **[10]**

b) Draw a neat sketch of backward feeding and parallel feeding system used for multiple effect evaporators. **[6]**

OR

Q12) a) Explain boiling point rise and Duhring plot. **[8]**

b) Give detail classification of different industrial evaporators. **[8]**

Total No. of Questions :12]

SEAT No. :

P1657

[Total No. of Pages :3

[5058]-119
T.E. (Chemical)
PROCESS INSTRUMENTATION AND CONTROL
(2008 Course) (309351) (Semester- II)

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

Instructions to the candidates:

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

SECTION-I

Q1) a) What are transducers. Explain types of transducers? **[8]**

b) Explain all the dynamic characteristics of measuring instruments. **[8]**

OR

Q2) a) Give the classification of instruments. **[8]**

b) Define all the process variable and state application. **[8]**

Q3) a) Explain with diagram, construction and working, calibration of pressure sensors using dead - weight tester. **[8]**

b) Explain with diagram, construction and working bellows. **[8]**

OR

Q4) a) Define temperature and give temperature scales with inter-relation. **[8]**

b) Explain with diagram, construction and working pyrometer. **[8]**

P.T.O.

Q5) a) Explain classification of flow measuring instruments. **[9]**

b) Explain with diagram, construction and working venturimeter. **[9]**

OR

Q6) a) Explain classification of level measuring instruments. **[9]**

b) Explain with diagram, construction and working ultrasonic level measurement method. **[9]**

SECTION-II

Q7) Describe with diagram the following techniques of composition analysis **[16]**

a) IR absorption spectroscopy.

b) Mass spectroscopy.

OR

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

a) gas chromatography

b) refractometry

c) Ph meter

Q9) a) Describe the heat exchanger automatic control system with block diagram. **[8]**

b) Describe the characteristics of step response of second order underdamped system. **[8]**

OR

Q10) a) State the differences between first order and second order system. **[8]**

b) Write note on 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%.

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: **[9]**

i) 15%

ii) 25%

b) Explain with diagram different control actions. **[9]**

OR

Q12) a) State the differences between feedback and feed forward control. **[9]**

b) Explain with diagram, temperature control system in reactor. **[9]**

EEE

Total No. of Questions :12]

P2180

SEAT No. :

[Total No. of Pages : 3

[5058]-12

T.E. (Mechanical /Automobile)

COMPUTER ORIENTED NUMERICAL METHODS

(2008-Course)(Semester-I) (302045)

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

Instructions to the candidates:

1) ***Answers to the two sections should be written in separate answer books.***
2) ***Answer any three questions from each section.***
3) ***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) Find a root of $y=x^3-3*x-5$ correct to four decimal places using iteration method. **[8]**

b) Draw a flowchart for simpson's 3/8 Rule of integration. **[7]**

OR

Q2) a) Draw a flowchart for modified Newton Raphson method. **[7]**

b) A curve is drawn to pass through the points given by the following table. **[8]**

x	1	1.5	2	2.5	3	3.5	4
y	2	2.4	2.7	2.8	3	2.6	2.1

Estimate the area bonded by the curve, using trapezoidal rule and Simpson's 1/3 rd rule.

P.T.O.

Q3) a) Draw flowchart for Newton's Forward Difference Interpolation method. **[7]**

b) Find f(9) using Lagrange's Interpolation. **[8]**

x	5	7	11	13	17
f(x)	150	392	1452	2366	5202

OR

Q4) a) Write a note on Inverse interpolation and explain it with suitable example. **[7]**

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

Q5) a) Draw a flow chart for solving system of linear simultaneous equations by Gauss elimination method. **[10]**

b) Using Gauss Siedel method, solve the following set of simultaneous equations upto three decimal place accuracy. Do Partial Pivoting. **[10]**

$X + 3Y + Z = 10$

$X + 2Y + 5Z = 12$

$4X + Y + 2Z = 16$

OR

Q6) a) Draw a flow chart for solving system of linear simultaneous equations by Gauss Seidel method. **[10]**

b) Solve the following simultaneous equations by Gauss Seidal Method. Five iterations only. **[10]**

$2x+3y+10z = 27.1$, $5x+ y–z=4.7$, $x +8y + 2z = 15.7$

SECTION-II

Q7) a) Write a note on Error Propagation and types of errors. **[7]**

b) If x and y are connected by the relation $x = ax^2 + by^2$ Find the values of a & b using least square criteria. **[8]**

OR

Q8) a) Derive the equation to fit a straight line using least square criteria. **[7]**

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

x	1	3	4	6	9
y	0.8400	0.4116	0.2888	0.1410	0.0480

Q9) a) Draw a Flow Chart for 'Euler's Method'. **[7]**

b) Given dy /dx = 3* x+ y/2, with initial condition y(0) = 1, find y(1.0) taking step size as 0.5. Use Runge Kutta forth order method. **[8]**

OR

Q10)a) Draw a flow chart for Runge Kutta fourth order method. **[7]**

b) Solve the equation dy/dx = (y+x*y)/(x). Given the initial condition y(1.0) = 2.718. Find y(1.2) taking a step size of 0.1 and accuracy = 0.001.Use modified Euler's Method. **[8]**

Q11)a) Draw a flow chart for solving 1 D Heat equation. **[8]**

b) Second order differential equation is y"–64*y+10=0, subject to condition y(0) = 1,y(1) =1,take h=1/3, Solve by finite difference method and find y(1/3) and y(2/3). **[12]**

OR

Q12)a) Draw a flow chart for solving parabolic equation. **[10]**

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

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Total No. of Questions :12]

SEAT No. :

P1658

[Total No. of Pages :4

[5058]-120
T.E. (Chemical)
MASS TRANSFER - II
(2008 Course) (Semester - II)

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

Instructions to the candidates:

1) ***Answer three questions from each section.***
2) ***Answers to the two sections should be written in separate answer books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable data, if necessary.***
5) ***Use of logarithmic tables, slide ruler, Mollier Charts, electronic pocket calculator and steam tables is permitted.***

SECTION-I

Q1) a) Define relative volatility and give significance. **[4]**

b) A liquid mixture containing 1200 gmole of mixture containing 30 mole% naphthalene and 70 mole% dipropylene glycol is subjected to differential distillation at pressure 100 mmHg and final distillate contain 55 mole% of feed solution the VLE data are: **[12]**

X	8.4	11.6	28.0	50.6	68. 7	80.6	88
Y	22.3	41.1	62.9	74.8	80.2	84.4	88

OR

Q2) a) Give detail procedure of finding number of plates by using ponchon savarit method. **[12]**

b) Define all types of tray efficiencies. **[4]**

Q3) a) Derive equation of operating line for enriching section in fractionating column. **[9]**

b) Write note on Azeotropic distillation and extractive distillation. **[9]**

OR

P.T.O.

Q4) a) A saturated liquid mixture containing 60 mole% benzene and 40 mole% toluene is to be separated continuously in to a distillate product contianing 90 mole% benzene and the bottom product containing 5 mole% benzene. The fractional distillation column will operate at 1 atm. The reflux ratio is 2. How many theoretical plates must be the columns have if the feed is introduced in to the eight plates? **[12]**

X	0	0.017	0.075	0.13	0.211	0.288	0.37	0.411	0.581	0.78	1.0
Y	0	0.039	0.161	0.261	0.393	0.496	0.591	0.632	0.777	0.9	1.0

b) Derive equation of operating line for stripping section in fractionating column. **[6]**

Q5) a) Derive an expression for finding the number of stages under the condition of constant underflow. **[12]**

b) Give the classification of liquid-liquid extraction equipments. **[4]**

OR

Q6) A 2500 Kg batch of pyridine - water solution, 50% pyridine is to be extracted with chlorobenzene three times and each time 2200 Kg of solvent is used. Determine the concentration of pyridine in the final raffinate. Equilibrium tie-line data for the system water-chlorobenzene-pyridine at 25°C are given below **[16]**

Pyridine	Chlorobenzene	Water	Pyridine	Chlorobenzene	Water
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	62.02
35.05	61.00	3.95	44.95	4.18	50.87
40.60	53.00	6.40	53.20	8.90	37.90
49.00	37.8	13.2	49.00	37.80	13.20

SECTION-II

Q7) Oil is to be extracted from meal by means of benzene using continuous counter-current extraction unit. The unit is expected to treat 1000 Kg of meal per hour the untreated meal contains 365 Kg of oil and 30 Kg of benzene. The solvent used contains 14 Kg of oil and 590 Kg of benzene. The exhausted solid are to contain 55 Kg of unextracted oil. Experimental data on the extraction of oil from meal are as follows. **[16]**

Solution Composition Kg oil/ Kg solution	0	0.10	0.20	0.30	0.40	0.50	0.60	0.70
Solution retained Kg oil/kg solid	0.5	0.505	0.515	0.530	0.550	0.571	0.595	0.620

Find the number of ideal stages required

OR

Q8) a) Write material balance for single stage leaching. **[4]**

b) Roasted copper ore containing copper as $CuSO_4$ is to be extracted in a counter current extractor. The feed charge to be treated per hour comprises of 10 tones of gangue, 1.2 tons of copper sulphate and 0.5 tone of water. The strong solution produced is to consist of 90% H_2O and 10% $CuSO_4$ is to be 98% of that of ore. Pure water is to be used as the fresh solvent. After each stage one tone of gangue retains 2 tonnes of water plus copper sulphate dissolved in that water. Equilibrium is attained in each stage. How many stages are required? **[12]**

Q9) a) The equilibrium relation for the decolourisation operation is $Y = 0.5\ X^{0.5}$ where Y = gm color removed / gm of adsorbent, X = gm color in oil / 1000 gm of color free oil. 100 Kg oil containing one part of color to three part of oil is agitated with 25 Kg of adsorbent. Calculate the percentage color removed, if all 25 Kg of adsorbent is used in one stage. **[10]**

b) Explain Break through curve? **[6]**

OR

Q10)a) Explain Langmuir Isotherm. **[8]**

b) State application of adsorption and explain industrial adsorbents. **[8]**

Q11)a) Give classification of crystallization equipments. Explain construction and working of Swenson-Walker Crystallizer. **[12]**

b) Explain reverse osmosis for water purification? **[6]**

OR

Q12)a) Explain the electrodialysis. **[6]**

b) Calculate the yield of $MgSO_4$. $7H_2O$ crystals when 1000 Kg saturated solution of $MgSO_4$ at 353 K is cooled to 303 K. Assuming 10% of the water is lost by evaporation during cooling. **[12]**

Data: Solubility of $MgSO_4$ at 353 K = 64.2 Kg/ 100 Kg water.

Solubility of $MgSO_4$ at 303 K = 40.8 Kg/ 100 Kg water.

Atomic Wt. Mg: 24, S: 32, O: 16, H: 1

EEE

Total No. of Questions :12]

SEAT No. :

P2955

[Total No. of Pages :5

[5058] - 121

T.E. (Petroleum)

NUMERICAL METHODS AND GEOSTATISTICS

(2008 Course) (Semester - I)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) If $f(z)=u+iv$ is an analytic function, find $f(z)$ *if* $u=2x^2-2y^2-3y$. **[5]**

b) Evaluate $\oint_C \frac{z^2+2z-3}{z(z+1)(z-3)}\,dz$, where C is the circle $|z| = 3$. **[6]**

c) Find the bilinear transformation, which sends the points, 1, i, –1 from z plane into the points i, 0, $-i$ of w – plane. **[6]**

OR

Q2) a) If $f(z)$ is analytic, show that **[6]**

$$\left(\frac{\partial^2}{\partial x^2}+\frac{\partial^2}{\partial y^2}\right)|f(z)|^4 = 16\,|f(z)|^2\,|f'(z)|^2.$$

b) Evaluate $\oint_C \frac{2z^2+z+5}{(z-1)^2}\,dz$, where 'C' is the ellipse $\frac{x^2}{4}+\frac{y^2}{9}=1$. **[6]**

c) Show that under the transformation **[5]**

$w=z+\frac{4}{z}$, the circle $|z| = 3$ is mapped on to the ellipse.

P.T.O.

Q3) a) Compute correlation coefficient between supply and price of commodity using following data: **[9]**

Supply	152	158	169	182	160	166	182
Price	198	178	167	152	180	170	162

b) The first four moments of a distribution about the value '4' of the variable are, –1.5, 17, –30 and 108. Find the central moments β_1 and β_2 and comment about kurtosis. **[8]**

OR

Q4) a) Calculate the first four moments of the following distribution about the mean. **[9]**

x :	0	1	2	3	4	5	6	7	8
f :	1	8	28	56	70	56	28	8	1

Also evaluate β_1 and β_2.

b) Find two lines of regression and correlation coefficient for the data given below. **[8]**

$n = 18, \sum x = 12, \sum y = 18$

$\sum x^2 = 60 \quad \sum y^2 = 96$ and $\sum xy = 48$

Q5) a) A manufacture knows that the condensers he makes contain on an average 1% defective. He packs them in boxes of 100. What is the probability that a box picked at random will contain 3 or more faulty condensers.**[6]**

b) If the probability that a new born child is a male is 0.6. Find the probability that in a family of 5 children there are exactly 3 boys. **[5]**

c) If X is a normal variate with mean 30 and S.D. 5, find the probability that **[5]**

$26 \leq X \leq 40$ and $X \geq 45$

[Area = 0.2881 when $z = 0.8$.

Area = 0.4772 when $z = 2$.

Area = 0.4987 when $z = 3$].

OR

Q6) a) An envelope contains 6 tickets 1, 2, 3, 5, 6, 7. Another envelope contains 4 tickets 1, 3, 5, 7. An envelope is chosen at random and a ticket is drawn from it. Find the probability that the ticket bears the numbers 2 or 5 and 2. **[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 $80cm^2$. In a school of 1000 students, how many would you expect to be above 200 cm tall. [When z = 1.118 Area 0.3869]. **[5]**

SECTION - II

Q7) a) Establish the following: **[9]**

i) $\mu^2 = 1 + \frac{\delta^2}{4}$

ii) $\mu\delta = \frac{\Delta}{2} + \frac{\Delta E^{-1}}{2}$

iii) $\Delta = \mu\delta + \frac{1}{2}\delta^2$

b) Use Simpson's $\frac{1}{3}$rd rule to obtain $\int_0^{\pi/2} \frac{\sin x}{x}\,dx$ by dividing the interval into four parts. **[7]**

OR

Q8) a) For the tabulated data **[8]**

x	0	1	2	3	4	5
y	1	4	13	34	73	136

Find y at $x = 1.5$ by using forward difference interpolation.

b) Find the area of the circle of radius one, by using any numerical integration rule. **[8]**

Q9) a) Obtain the root of the equation $x^3 - 4x - 9 = 0$ correct to four decimal places by using Newton-Raphson method. **[8]**

b) Use method of least squares to fit a parabola of the form $y = ax^2 + bx + c$, to the data **[9]**

x	0	1	2	3	4	5	6
y	3	6	11	18	27	38	51

OR

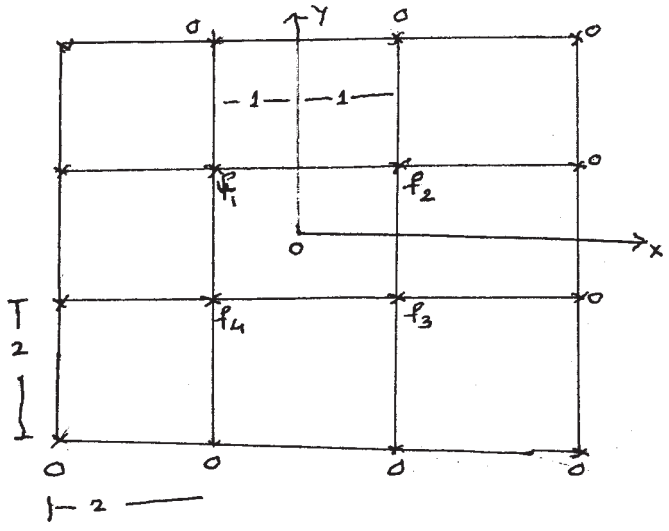
Q10)a) Use Gauss-Seidel method to solve the system of equations **[8]**

$$20x + 3y + 4z = 27$$
$$2x + 20y + 5z = 27$$
$$3x + 4y + 30z = 37$$

b) Use Runge - Kutta method of fourth order to solve the equation $\frac{dy}{dx} = x - y^2$ with $y(0) = 1$. Calculate y at x = 0.4 in two steps. **[9]**

Q11)a) Solve the equation **[9]**

$\frac{\partial^2 f}{\partial x^2} + 2\frac{\partial^2 f}{\partial y^2} = \frac{1}{xy}$ corresponding to the grid.



b) Solve the following LPP by simplex method. **[8]**

Minimize : $z = x_1 - 3x_2 + 2x_3$

Subject to:
$$3x_1 - x_2 + 3x_3 \leq 7$$
$$-2x_1 + 4x_2 \leq 12$$
$$-4x_1 + 3x_2 + 8x_3 \leq 10$$
and $x_1, x_2, x_3 \geq 0$

OR

Q12)a) Explain explicit and implicit finite difference methods to solve a partial differential equation numerically, by taking a suitable example. Compare the two methods. **[9]**

b) Maximize: $z = 3x_1 + 2x_2$

Subject to:
$$x_1 + x_2 \leq 4$$
$$x_1 - x_2 \leq 2$$
and $x_1, x_2 \geq 0$ **[8]**

Total No. of Questions : 6]

SEAT No. :

P2191

[Total No. of Pages : 1

[5058]-123
T.E. (Petroleum Engineering)
DRILLING OPERATIONS
(2008 Course) (Semester-I)

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

Instructions to the candidates:

1) ***Write Section-I and Section-II on separate answer sheets.***
2) ***All questions are compulsory.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right side indicate full marks.***
5) ***Assume suitable data if necessary.***

SECTION-I

Q1) a) Write different systems on a drilling rig, explain power system on a rig in detail. **[10]**

b) Discuss different grades, classification of drill pipes. **[8]**

Q2) a) Describe down hole problem sloughing shale and Lost circulation. **[8]**

b) Explain Reciprocating pump working principle in detail. **[8]**

Q3) Write short note on Coring and Whip stock. **[16]**

SECTION-II

Q4) a) Explain primary cementation in detail. **[10]**

b) Discuss types of casings and API 5CT standards. **[8]**

Q5) a) Discuss functions of drilling fluid and types of drilling fluid. **[14]**

b) Well depth = 10,000 ft, density = 10 ppg. Find out bottom hole pressure. **[2]**

Q6) a) What is hydraulics? Discuss optimum hydraulics in detail. **[14]**

b) Write note on Desander in brief. **[2]**

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Total No. of Questions : 12]

SEAT No. :

P1659

[Total No. of Pages : 3

[5058]-124

T.E. (Petroleum Engineering)

HYDROCARBON PROPERTIES AND THERMODYNAMICS

(2008 Course) (Semester - I) (312384)

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

Instructions to the candidates:

1) ***Answer to the two sections should be written in separate answer-books.***
2) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right side indicate full marks.***
5) ***Use of Calculator is allowed.***
6) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Write a note on the Joule Thomson (JT) effect. Elaborate its importance in petroleum production systems. **[8]**

b) Oil at 500 K is to be cooled at a rate of 5000 kg/h in a counter current exchanger using cold water available at 295 K. A temperature approach of 10 K is to be maintained at both ends of the exchanger. The specific heats of oil and water are respectively 3.2 and 4.2 kJ/kg K. Determine the total entropy change in the process. **[8]**

OR

Q2) a) Derive the first law of thermodynamics for flow systems. **[8]**

b) Explain the Carnot principle. Give its applications. **[8]**

Q3) a) Write a note on the Virial equation and explain the significance of the Virial coefficients. **[9]**

b) Discuss the PVT behaviour of pure fluids. Draw the phase diagrams for various reservoir fluids. **[9]**

OR

P.T.O.

Q4) Determine the molar volume of gaseous methane at 300 K and 600 bar by the following methods: **[18]**

a) Using the ideal gas equation.

b) Using the van der Waals equation given that 'a' = 0.2285 Nm^4/mol^2 and 'b' = 4.27×10^{-5} m^3/mol.

c) Using Redlich Kwong equation given that T_c = 191.1 K and P_c = 46.4 bar.

Q5) a) What are the Maxwell's equations and what is their importance in establishing relationships between thermodynamic properties? **[8]**

b) Write a note on the Clausius-Clayperon equation. **[8]**

OR

Q6) a) Derive an expression for fugacity coefficient of a gas obeying the equation of state P(V – b) = RT and estimate the fugacity of ammonia at 10 bar and 298 K, given that b = 3.707×10^{-5} m^3/mol. **[8]**

b) Explain the need for partial molar properties. Discuss briefly the methods to determine the same. **[8]**

SECTION - II

Q7) a) For a heterogeneous multicomponent system, what is the general criterion of phase equilibrium? **[6]**

b) What is vaporization equilibrium constant? **[6]**

c) How do you estimate the bubble point temperature and dew point temperature for a multicomponent hydrocarbon system? **[6]**

OR

Q8) a) An equimolar solution of benzene and toluene is totally evaporated at a constant temperature of 363 K. At this temperature, the vapour pressures of benzene and toluene are 135.4 and 54 kPa respectively. What are the pressures at the beginning and at the end of the vaporization process? **[9]**

b) How are the concepts of vapour liquid equilibrium used in separator design? **[9]**

Q9) a) Explain wettability. Give the effect of wettability on vapour pressure in a capillary. **[8]**

b) Write a note on the Kelvin equation. Give its limitations. **[8]**

OR

Q10)a) Write a note on Knudsen diffusivity. **[8]**

b) State and explain the Darcy's law. **[8]**

Q11)a) What are gas hydrates? Give their significance in flow assurance issued. **[8]**

b) Write a note on solid liquid equilibria. **[8]**

OR

Q12)a) Discuss the various methods of determination of WAT. **[8]**

b) What are asphaltenes? Why is the study of asphaltenes so important? **[8]**

Total No. of Questions : 12]

SEAT No. :

P3859

[Total No. of Pages : 2

[5058]-125
T.E. (Petroleum)
PETROLEUM PRODUCTION OPERATIONS
(2008 Course) (Semester - I) (312385)

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

Instructions to the candidates:

1) ***Answer Q.No.1 or Q.No.2, Q.No.3 or Q.No.4, Q.No.5 or Q.No.6, from Section - I and Q.No.7 or Q.No.8, Q.No.9 or Q.No.10, Q.No.11 or Q.No. 12 from Section - II.***
2) ***Answers to the two sections should be written in separate answer books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right side indicate full marks.***
5) ***Use of calculator is allowed.***
6) ***Assume Suitable data if necessary.***

SECTION - I

Q1) a) What is well head equipment? Write the name of each component of a well head equipment and functions of each. **[10]**

b) Draw neat schematic sketch of a typical well head equipment and indicate various features of it. **[8]**

OR

Q2) a) Compare in brief, general challenges in onshore and offshore production operations. **[8]**

b) What are the applications of Christmas tree? Write functions each component of it. **[10]**

Q3) Draw the typical schematic sketch of, **[16]**

a) SSSV.
b) Landing nipple.
c) Choke.
d) Chrismas tree.

OR

Q4) Explain: **[16]**

a) Expansion joint.
b) Blast joint.
c) Circulation devices.
d) Flow couplings.

P.T.O.

Q5) What is multiphase flow? State and explain any two multiphase correlations and discuss applications of Gilbert chart with examples. **[16]**

OR

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

a) Optimum production rate.

b) Well productivity and PI.

c) Choke.

d) SSV and SSSV.

SECTION - II

Q7) Draw schematic sketch and explain any three well completion methods. **[18]**

OR

Q8) Discuss different types of well completion fluid and their functions. Compare between well completion fluid, packer fluid and workover fluid. **[18]**

Q9) a) Write and explain IPR using Vogels and Standings equation. **[8]**

b) Draw graph and explain, oil and gas formation volume factor with its unit. **[8]**

OR

Q10) What is formation damage? How to measure it? Discuss its diagnosis and relation with flow efficiency of a well, in detail. **[16]**

Q11) Discuss in any four workover problems and their solution for remedial action in brief. **[16]**

OR

Q12) Write short notes on, **[16]**

a) Coning.

b) Liquid loading of gas well.

c) Squeeze cementation.

d) Water and gas shut off job.

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Total No. of Questions : 10]

SEAT No. :

P3741

[Total No. of Pages : 2

[5058] - 126
T.E. (Petroleum Engineering)
PETROLEUM GEOLOGY - II

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

Instructions to the candidates:

1) ***Answers to the two sections should be written in separate books.***
2) ***Question no 5 of Section - I and question no 10 of Section - II is compulsory. Solve any other two questions from remaining from each section.***
3) ***Figures to the right indicate marks.***
4) ***Draw neat diagrams whenever necessary.***

SECTION - I

Q1) a) With the help of neat diagrams give important types of subsurface occurrences of petroleum. **[10]**

b) What are the different ways in which commercial quantities of natural gas can be found? **[5]**

OR

Q2) Explain important physical and chemical properties of crude oil. **[15]**

Q3) a) What is kerogen? Explain types of kerogen. How does type of kerogen affect final product? **[10]**

b) Give any two classifications of oilfield water. **[5]**

OR

Q4) How does transformation of organic matter to hydrocarbons take place in nature? Draw a neat illustrative diagram. **[15]**

Q5) What is the need to assume that migration of hydrocarbons takes place from the source rocks? Give evidences of short distance and long distance migration. Explain the migration mechanisms known to you. **[20]**

P.T.O.

SECTION - II

Q6) What are the different carbonate depositional environments? Explain any one of them with neat figures and examples. **[15]**

OR

Q7) Write in brief about spatial and temporal occurrence of hydrocarbons.

Q8) Write notes on any three of the following : **[15]**

a) Geological occurrence of gas hydrates.

b) Abnormal pressure in sediments.

c) Plate tectonics in relation to occurrence of oil and gas.

d) Significance of transgressive and regressive cycles in reaction to petroleum occurrence.

OR

Q9) Describe geology and hydrocarbon potential of

a) Krishna Godavari basin or

b) Mumbai Offshore or

c) Cambay basin of India.

Q10)Write in brief any two of the following : **[20]**

a) Draw generally accepted symbols to show different types of sedimentary rocks and types of wells

b) How is gas analysis carried out at the drill site? Which gases are generally looked for?

c) Explain different types of subsurface maps.

d) Give importance of Geo-Technical order (Well Plan) and give its contents in general.

❖ ❖ ❖ ❖

Total No. of Questions : 8]

SEAT No. :

P2956

[Total No. of Pages : 3

[5058]-127

T.E. (Petroleum Engineering)

RESERVOIR ENGINEERING - I

(2008 Course) (Semester - II) (312387)

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

Instructions to the candidates:

1) ***Answers to the two sections should 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) ***Answers 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 oil formation volume factor? Draw and explain graph of B_o vs. Pressure. **[8]**

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

i) Porosity

ii) Permeability

iii) Effective Permeability

iv) Relative Permeability

c) Calculate the API gravity of a crude oil system with a measured density of 45 lb/ft^3 at standard conditions. The density of the water is approximately 62.4 lb/ft^3. **[4]**

Q2) a) Write short note on residual oil saturation. **[2]**

b) Derive an expression for flowrate flowing inside a porous media of a Horizontal Radial Flow System. State necessary assumptions. **[10]**

P.T.O.

c) A fluid of viscosity 3.58 cp and compressibility 45×10^{-6}/psi, flows through a porous media of 450 ft length and a cross sectional area of 45 sq. ft. of permeability 150 md. Find the flow rate through the system in bbl/day. **[6]**

i) If the fluid is in compressible.

ii) If the fluid is slightly compressible.

Q3) Draw and explain in detail relative permeability curves for oil wet and water wet reservoir? Hence determine which one of these is better reservoir? **[16]**

Q4) Explain types of crude oils. Draw their phase diagrams as well as Liquid volume vs. pressure diagrams. **[16]**

SECTION - II

Q5) What do you mean by transition zone in a reservoir? Explain with the help of diagram, and show how it varies with the permeability of the reservoir. **[16]**

Q6) Derive an expression for gas in place and explain the p/z graph. Also explain effect of water drive on p/z graph. **[16]**

Q7) Explain and compare drive mechanisms and drive indices for different reservoirs on the basis of following parameters: **[16]**

a) Pressure

b) GOR

c) Recovery factor

Q8) The XYZ field is a combination-drive reservoir. The current reservoir pressure is estimated at 2500 psi. The reservoir production data and PVT information are given below: **[18]**

	Initial Reservoir Conditions	Current Reservoir Conditions
P (psi)	3000	2500
B_o (bbl/STB)	1.35	1.33
R_s (scf/STB)	600	500
N_p (MMbbl)	0	5
G_p (MMMscf)		5.5
B_w (bbl/STB)	1.00	1.00
W_e (MMbbl)	0	3
W_p (MMbbl)	0	0.2
B_g (bbl/SCF)	0.0011	0.0015
$C_f C_w$	0	0

The following additional information is available:

Volume of bulk oil zone = 100,000 ac-ft

Volume of bulk gas zone = 20,000 ac-ft

Calculate the initial oil in place.

Total No. of Questions : 12]

SEAT No. :

P3745

[Total No. of Pages : 3

[5058] - 128

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 answer books.***
3) ***Neat diagrams must be draw 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) Explain the selection criteria for various artificial lifting techniques in detail. **[18]**

OR

Q2) Discuss usability of ESP, hydraulic lift and intermittent gas Lift only in terms of excellent/good/fair/poor in a tabular form for following well conditions. High PI, high GOR, offshore applications, adaptability to deviated wells, sand production, high volume lift capability and ability to handle viscous fluids. **[18]**

Q3) a) Write the advantages and disadvantages of Electrical submersible pumping system over other methods of ALT. **[9]**

b) Draw schematic sketch and explain in brief operation of intermittent gas lifting system. **[9]**

OR

P.T.O.

Q4) a) Which method or methods of artificial lifting you will propose for the following requirements and Why? Explain, **[8]**

i) HPHT wells

ii) Wells with high GOR and sand problem

b) Explain graphical method to determine depth of point of gas injection for an intermittent gas lifting system. **[8]**

Q5) Discuss design and working of progressive cavity pumping system in detail. **[16]**

OR

Q6) a) What is the effect of gas and sand production on functioning of SRP? Explain. **[8]**

b) Draw neat schematic sketch of an ESP system. **[8]**

SECTION - II

Q7) Discuss operating and workover problems of gas lifting system in detail. **[18]**

OR

Q8) Draw and explain plunger lift system in detail. **[18]**

Q9) Draw neat schematic sketch and describe various nodes with their inflow and outflow equations for a petroleum production system in detail. **[16]**

OR

Q10) What is petroleum production system, analysis? Explain in detail, applications of it in VLP and choke performance analysis. **[16]**

Q11) Discuss planning, design and field execution of hydraulic fracturing job in detail. **[16]**

OR

Q12) Write short notes on **[16]**

a) Skin factor

b) Flow efficiency

c) IPR and PI

d) Matrix acidization

Total No. of Questions : 12]

SEAT No. :

P2957

[Total No. of Pages : 5

[5058]-129
T.E. (Petroleum Engineering)
NATURAL GAS ENGINEERING
(2008 Pattern) (312389) (Semester - II)

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 6 from section - I and Q.No. 7 or Q.No.8, Q.No.9 or Q.No.10, Q.No.11 or 12 from section - II.***
2) ***Answers to the two sections must be written in separate answer book.***
3) ***Figures to the right indicate full marks.***
4) ***Neat diagrams 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 Z factor versus pressure and explain? **[6]**

b) Explain the chart you use to correct gas properties for N2 impurities?**[5]**

c) Calculate the reserves in a gas field of 2000 acres, with 20ft sand thickness, 15% porosity, 15% water saturation, BHP = 3000 Psi gauge, BHT = 200 F. The natural gas has the following weight composition:**[7]**

Ci = 0.85, C2 = 0.05, N2 = 0.1.

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, 227 R. ωi and μi are 0.01,0.09,0.04 and 0.001, 0.002, 0.0015 cp 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]**

P.T.O.

Q3) a) Why is gas flow in porous media different from liquid flow? **[4]**

b) Explain all the constants in the gas flow meter equation. **[8]**

c) Short note on Gas well testing. **[4]**

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 × 100 Ib gauge has a differential pressure range of Rh = 50 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) Explain sonic and subsonic flow. **[4]**

b) Write short notes on temperature at choke. **[4]**

c) A 0.6 specific gravity gas flows from a 2-in pipe through a 1-in orifice - type choke. The upstream pressure and temperature are 800 psia and 75 F, respectively. The downstream pressure is 200 psia (measured 2 ft from the orifice). The gas-specific heat ratio is 1.3. **[8]**

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, μ = 0.01245.

SECTION - II

Q7) a) i) What is the criterion for choosing a CO_2 removal process? **[8]**

ii) Draw a process flow diagram showing the removal of carbon dioxide and explain the process?

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 selection and working of spherical separator with a neat sketch? **[6]**

c) Explain amine sweetening process with a neat process flow diagram? **[6]**

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 temperature of the gas? k = 1.28, gas gravity = 0.6 Z at 400 and 1600 psia are 0.985, 0.94 respectively. **[8]**

OR

Q10)a) Find the horsepower required with and without intercooling when compressing 16,000 cfm of natural gas, k = 1.28, measured at 60 F and 14.7 psia from atmospheric pressure of 14.4 to 125 psig. Inlet temperature is 70F. 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]**

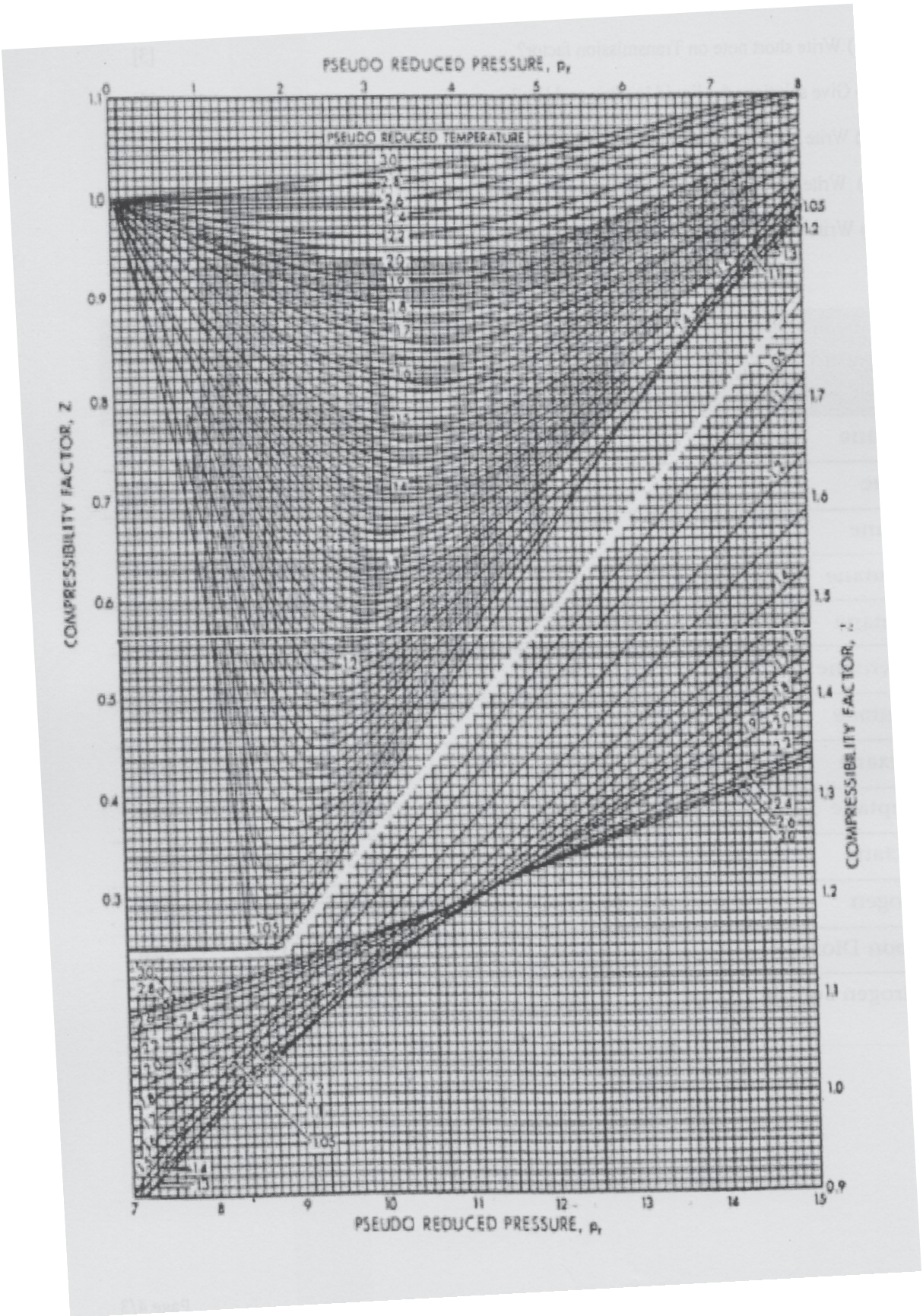
c) Give solutions for liquid loading problem? **[3]**

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]

SEAT No. :

P1597

[Total No. of Pages :4

[5058]-13
T.E.(Mech.)
HEAT TRANSFER
(2008 Course)(Semester-I)

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

Instructions to the candidates:

1) ***Answer to the two sections should be written in separate answer books.***
2) ***Answer any 3Questions from each section.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of non programmable calculator is allowed.***
5) ***Assume suitable data, if necessary.***

SECTION-I

Q1) a) State Fourier law of heat conduction with notations and deduce an expression for steady state heat conduction in a hollow cylinder of radii r_1 and r_2, subjected to temp T_1 and T_2. **[6]**

b) The walls of a house 4m high, 5m wide and 0.3 m thick are made with brick (k = 0.9W/m-K). Temperature of air inside house is 20°C and out side air is at -10°C. There is heat transfer coefficient of 10W/m^2-K at inside wall and 30W/m^2-K at outside wall. Calculate inside and outside wall temperatures heat flux and total heat transfer rate through the wall.**[10]**

OR

Q2) a) Define

i) Thermal conductivity and explain effect temperature on thermal conductivity of metals. **[3]**

ii) Electrical analogy for steady state heat conduction across a slab.**[3]**

b) A long hollow cylinder (k= 50 W/m-K) has an inner radius of 10 cm and outer radius of 20 cm. The inner surface is heated uniformly at constant rate of 1.16×10^5 W/m^2, while outer surface is maintained at 30°C. Calculate temperature at inner surface. **[10]**

Q3) a) Discuss the application of insulation on electrical cables. **[4]**

b) A hollow sphere of inside radius 30 mm and outside radius 50 mm is electrically heated at its inner surface at a constant rate of 10^5W/m^2. The outer surface is exposed to air at 30°C with h=170 W/m^2-K. Thermal conductivity of material is 20W/m-K. Calculate inner and outer surface temperatures. **[10]**

P.T.O.

c) Define thermal diffusivity. **[2]**

OR

Q4) a) Explain electrical analogy for steady state heat conduction through hollow sphere. **[4]**

b) Explain the concept of critical thickness of insulation on hollow cylinder with the help of material and surface resistances. **[6]**

c) Deduce an expression for overall heat transfer coefficient based on inner suface for 3 layers hollow cylinder of radii r_1, r_2, r_3, r_4 and length L. The cylinder is also subjected to convection heat transfer at inner and outer surfaces with h_1 and h_2 respt. **[6]**

Q5) a) Derive an expression for temperature distribution in constant cross sectional fin subjected temperature T_o at its base and insulated at its tip. **[6]**

b) Three identical straight fins, 10 mm in diameter and 120 mm long are exposed to an ambient with h= 32W/m^2-K. Compare their fin efficiency and relative heat flow performance. The material and thermal conductivity of three materials are **[12]**

Copper k= 380 W/m-K

Aluminium k= 210 W/m-K

Mild steel k= 45 W/m-K

OR

Q6) a) Define with physical significance

i) Biot Number **[3]**

ii) Fourier number **[3]**

b) A thermocouple junction in a form a 4 mm diameter sphere. The properties are

C = 420 J/kg.K k = 40 W/m-K

ρ = 800 kg/m^3 h = 40 W/m^2-K

The junction is initially at 40°C is inserted in a stream of hot air at 300°C.Find

i) Time constant

ii) After 10 minute exposure in air at 300°C junction is then kept in air stream at 30°C with h = 10 W/m^2-K for 20 seconds. Calculate the temperatures of junction at two states. **[12]**

SECTION-II

Q7) a) Define with notation and dimensions. **[8]**

i) Black body

ii) Irradiation

iii) Emissive power

iv) Radiosity

b) A spherical liquid oxygen tank 0.3 m in dia is enclosed concentrically in a spherical container of 0.4 m dia. The space in between is evacuated. The tank surface is at-183°C and has an emissivity of 0.2. The container outer surface is at 15C with emissivity of 0.25. Calculate net radiation heat exchange. **[8]**

OR

Q8) a) What is gray body approximation? **[6]**

b) Define radiation **[4]**

i) surface resistance and

ii) space resistance.

c) State **[6]**

i) Kirchoff's law

ii) Wien's displacement law

iii) Lambert cosine law

Q9) a) Make difference between natural and forced convection. **[4]**

b) Explain the physical mechanism of natural convection. **[4]**

c) Discuss the dimensional analysis for forced convection. **[8]**

OR

Q10)a) Define with physical significance **[6]**

i) Reynolds number

ii) Grashoff number

iii) Prandtl number

b) Water at 20°C flow through a small tube 1 mm in diameter with uniform velocity of 0.2m/s. The flow is fully developed and constant heat flux of 6kW/m^2 is imposed. How much further down water in tube will reach a temp of 74°C? **[10]**

The properties of water at 320K

ρ= 989 kg/m^3 C_p = 4180 J/kg.K

μ= 577 x 10^{-6} kg/ms k_f = 0.640 W/m-K.

Pr = 3.77

Q11)a) What are the different types of heat exchangers. Draw sketch of atleast two types. **[6]**

b) Derive an expression for LMTD for parallel flow heat exchanger. **[8]**

c) What do you mean by fouling of heat exchangers? Explain causes. **[4]**

OR

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

b) State Limitations of LMTD method. **[4]**

c) A heat exchanger is required to cool 55000 kg/h of alcohol from 66°C to 40°C in a parallel flow heat exchanger using 40,000 kg/h of water entering at 5°C. Calculate **[10]**

i) Exit temperature

ii) Heat transfer rate

iii) Surface area required.

Take U = 580 W/m^2-K

C_p of alcohol = 3760 J/kg.K

C_p of water = 4180 J/kg.K

Total No. of Questions :12]

P2958

SEAT No. :

[Total No. of Pages :3

[5058]-130

T.E.(Petroleum Engg.)

PETROLEUM EQUIPMENT DESIGN & DRAWING

(2008 Course) (Semester-II)

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

Instructions to the candidates:

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

SECTION-I

Q1) a) How design fundamentals are applied to petroleum equipment discuss with necessary example. **[9]**

b) Discuss the following types of keys: **[9]**

i) Tangent keys

ii) Saddle keys

iii) Feather key

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 handworks. **[8]**

b) Elaborate on different types of pulleys and uses of pulleys on drilling rig. **[8]**

OR

P.T.O.

Q4) A corss belt arrangement has center distance between pulleys as 1.5 m. The diameter of bigger and smaller pulleys are 'D' and 'd' respectively. The smaller pulley rotates at 1000 r.p.m. and the bigger pulley at 500 r.p.m. The flat belt is 6 mm thick and transmits 7.5 kW power at bell speed of 13 m/s approximately. The coefficient of belt friction is 0.3 and the density of belt material is 950 kg/m^3. If the permissible tensile stress for the belt material is 1.75 MPa. Calculate: Diameter of pulleys & length and width of belt. **[16]**

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

i) Rupture disc.

ii) Blow down

iii) Rotary compressor

iv) Pressure relief valve

b) What are the different types springs? Discuss compression helical in detail. **[8]**

SECTION-II

Q7) A pressure vessel having outer diameter 1.3m 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 fabricted 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 effeciency 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 storge 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, Interanal 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 shorts notes on, **[8]**

i) Agitators

ii) Highly volatile HC

❄ ❄ ❄

Total No. of Questions :12]

SEAT No. :

P2959

[Total No. of Pages :6

[5058] - 131

T.E. (Petrochemical Engineering)

NUMERICAL AND STATISTICAL METHODS

(2008 Course) (Semester - I)

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

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 from Section I and Q7 or Q8, Q9 or Q10, Q11 or Q12 from section II.***
2) ***Answers to the two sections should be written in separate answer books.***
3) ***Neat diagram must be drawn necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Use Electronic Pocket Calculator is allowed.***
6) ***Assume suitable data wherever necessary.***

SECTION - I

Q1) a) Find all basic solutions to the system of equations **[6]**

$$4x_1 + 3x_2 - 2x_3 = 3$$

$$2x_1 + 5x_2 + 4x_3 = 5$$

b) Use simplex method to solve following Linear programming problem: **[10]**

Maximize $z = 3x_1 + 2x_2 + 5x_3$

Subject to the constraints:

$$x_1 + 2x_2 + x_3 \leq 430$$
$$3x_1 + 2x_3 \leq 460$$
$$x_1 + 4x_2 \leq 420$$
$$x_1,\ x_2, x_3 \geq 0.$$

OR

P.T.O.

Q2) a) Use duality to solve **[10]**

Minimize $z = 3x_1 + x_2$

Subject to the constraints:

$x_1 + x_2 \geq 1$

$2x_1 + 3x_2 \geq 2$

$x_1,\ x_2 \geq 0$

b) Write the dual of the following problem **[6]**

Maximize $z = x_1 - x_2 + 3x_3$

Subject to the constraints:

$x_1 + x_2 + x_3 \leq 10$

$2x_1 - x_3 \leq 2$

$2x_1 - 2x_2 + 3x_3 \leq 6$

$x_1, x_2, x_3 \geq 0.$

Q3) a) Solve the following transportation problem, using Vogel's Approximation method. **[10]**

			To	Available
From	2	7	4	5
	3	3	1	8
	5	4	7	7
	1	6	2	14
Required	7	9	18	

b) Solve the following cost minimizing Assignment problem. Find also the minimum cost. **[6]**

Jobs / Machines	A	B	C	D
I	5	3	2	8
II	7	9	2	6
III	6	4	5	7
IV	5	7	7	8

OR

Q4) a) Solve the following transportation problem, applying Vogel's Approximation method (VAM). **[10]**

		To I	II	III	IV	Supply
From	A	15	10	17	18	2
	B	16	13	12	13	6
	C	12	17	20	11	7
	Demand	3	3	4	5	

b) Solve the following Assignment problem. **[6]**

	A	B	C	D
I	1	4	6	3
II	9	7	10	9
III	4	5	11	7
IV	8	7	8	5

Q5) a) Following are the values of import of raw material and export of finished product in suitable units. Calculate the coefficient of correlation between the import values and export values. **[7]**

Export	10	14	19	26	30	34	39
Import	12	16	18	26	29	35	38

b) If on an average one ship in every ten is wrecked, find the probability that out of 5 ships expected to arrive, 4 at least will arrive safely. **[5]**

c) Fit a Poisson distribution to the set of observations and calculate it's theoretical frequencies. **[6]**

x	0	1	2	3	4
f	122	60	15	2	1

OR

Q6) a) Obtain lines of regression for the following data. **[7]**

X	2	3	5	7	9	10	12	15
Y	2	5	8	10	12	14	15	16

Estimate the values of Y when X = 6 & X when Y = 20.

b) In an intelligence test administrated to 1000 students, the average score was 42 and standard deviation 24. Find the number of students with score lying between 30 and 54. **[5]**

(Given :- For z = 0.5, Area = 0.1915)

c) Among 64 offsprings of a certain cross between guinea pigs 34 were red, 10 were black and 20 were white According to genetic model, these numbers should be in the ratio 9:3:4. Are the data consistent with the model at 5% level? (Given $\chi^2_{2:0.05} = 5.991$) . **[6]**

SECTION - II

Q7) a) With usual notation prove the following **[8]**

i) $\left(E^{1/2} + E^{-1/2}\right)(1+\Delta)^{1/2} = 2 + \Delta$

ii) $\delta = \Delta(1+\Delta)^{-1/2} = \nabla(1-\nabla)^{-1/2}$

b) Given that **[9]**

x :	1.0	1.1	1.2	1.3	1.4	1.5	1.6
y :	7.989	8.403	8.781	9.129	9.451	9.75	10.031

Find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ at $x = 1.1$

OR

Q8) a) The table gives the distances in nautical miles of the visible horizon for the given heights in feet above the earth's surface. **[9]**

x: (height)	100	150	200	250	300	350	400
y: (distance)	10.63	13.03	15.04	16.81	18.42	19.90	21.27

Find the value of y when

i) $x = 160$ ft and

ii) 410 ft

b) Use Lagrange's formula to find the form of $f(x)$, given **[8]**

x :	0	2	3	6
y :	648	704	729	792

Also find $f(4)$:

Q9) a) Find the real root of $x^3 - 3x + 1 = 0$ lying between 1 and 2 by Newton – Raphson method. **[8]**

b) Solve the following system of equations using Gauss elimination method. **[9]**

$$2x - 3y + z = -1$$
$$x + 4y + 5z = 25$$
$$3x - 4y + z = 2$$

OR

Q10)a) Solve the following system of equations by Gauss-Seidel method. **[9]**

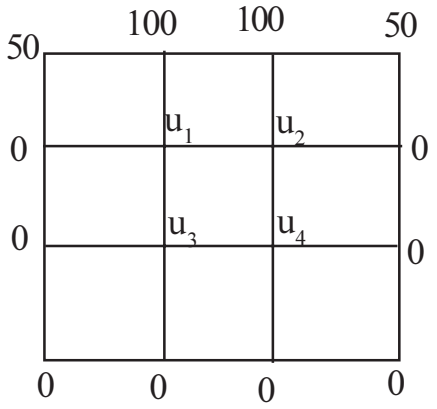
$$83x + 11y - 4z = 95$$
$$7x + 52y + 13z = 104$$
$$3x + 8y + 29z = 71.$$

b) Solve the following equation for a positive root by False position method. **[8]**

$$2x - 3\sin x = 5$$

Q11)a) Solve the boundary value problem **[8]**

$\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$ for the square of sides three units.



b) Use Modified Euler method and obtain y at 0.2, given **[8]**

$\frac{dy}{dx} = y - x^2,\ y(0) = 1$

OR

Q12)a) Apply the fourth order Runge-Kutta method to find $y(0.2)$ given that **[8]**

$\frac{dy}{dx} = x + y,\ y(0) = 1.$

b) Solve the following Poisson's equation over the square region bounded by the lines $x = 0,\ y = 0,\ x = 3,\ y = 3$ given that $u = 0$ throughout the boundaries taking h = 1, and **[8]**

$\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = -(x + y)^2.$

Total No. of Questions : 12]

SEAT No. :

P2192

[Total No. of Pages : 3

[5058]-132

T.E. (Petrochemical Engineering)

APPLIED HYDROCARBON THERMODYNAMICS

(2008 Course) (Semester-I) (312402)

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

Instructions to the candidates:

1) ***Answers to the two sections should be written in separate answer books.***
2) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right side indicate full marks.***
5) ***Use of Calculator is allowed.***
6) ***Assume suitable data if necessary.***

SECTION-I

Q1) a) Give the various statements of the second law of thermodynamics and explain. **[8]**

b) Formulate the first law of thermodynamics for non-flow systems. **[8]**

OR

Q2) a) Calculate ΔU and ΔH in kJ for 1 kmol of water, as it is vaporized at the constant temperature of 373 K and constant pressure of 101.3 kPa. The specific volumes of liquid and vapour at these conditions are 1.04×10^{-3} and 1.675 m^3/kmol respectively. Also 1030 kJ of heat is added to water for this change. **[8]**

b) State the third law of thermodynamics and give its significance. **[8]**

Q3) a) What do you mean by equation of state for real gases? Describe any two. **[8]**

b) Write a note on the Virial equation. **[8]**

OR

Q4) Estimate the molar volume of carbon dioxide at 500 K and 100 bar using van der Waals equation. The van der Waals constants are 0.364 $m^4/N/mol^2$ and 4.267×10^{-5} m^3/mol. **[16]**

P.T.O.

Q5) a) What are the fundamental differential equations for the energy properties? Explain. **[9]**

b) Give the significance of Maxwell relations with examples. **[9]**

OR

Q6) a) What is fugacity? Explain any two methods for estimating the fugacity. **[9]**

b) Define Gibbs free energy and show that at constant temperature and pressure the decrease in Gibbs free energy measures the maximum net work available from a given change of state. **[9]**

SECTION-II

Q7) a) Distinguish between minimum and maximum boiling azeotropes. **[9]**

b) For a heterogeneous multicomponent system, what is the general criterion of phase equilibrium? Explain the various cases. **[9]**

OR

Q8) a) The vapour pressures of benzene and toluene are given below. **[9]**

T, K	353.1	358	363	368	373	378	383	383.6
P_A^S, kPa	101.3	116.9	135.4	155.7	179.1	204.2	233	240
P_B^S, kPa	39.6	46	54	63.3	74.2	86	99	101.3

Calculate the equilibrium data for the system at 101.3 kPa and formulate an equation for the equilibrium diagram in terms of average relative volatility.

b) What is the boiling point diagram? Why does the boiling point diagram at a higher pressure lie above that at a lower pressure? **[9]**

Q9) a) Define chemical potential. What is its significance? **[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) An organic liquid solution containing A (molecular weight 46) and B (molecular weight 78) form an azeotrope containing 52% by weight A at 333 K and 101.3 kPa. Vapour pressures of A and B are 69.31 kPa and 68 kPa respectively. Determine the van Laar constants. **[8]**

b) Write a note on van Laar equation. **[8]**

Q11)One mole of steam undergoes the water-gas shift reaction at a temperature of 1100 K and a pressure of 1 bar. $CO(g) + H_2O(g) \rightarrow CO_2(g) + H_2(g)$. The equilibrium constant for the reaction is K = 1. Assuming ideal gas behavior, calculate the fractional dissociation of steam in the following cases and discuss the effect of the presence of excess reactant on the extent of reaction. **[16]**

a) CO supplied is 100% in excess of the stoichiometric requirement.

b) CO supplied is only 50% of the theoretical requirement.

OR

Q12)a) Define equilibrium constant K. How is the equilibrium constant K related to standard free energy? **[8]**

b) What is the phase rule for a reacting system? How do you determine the number of independent reactions in a reacting system? **[8]**

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Total No. of Questions : 8]

SEAT No. :

P3860

[Total No. of Pages : 3

[5058]-133
T.E. (Petrochemical)
MASS TRANSFER - I
(2008 Course) (Semester - I)

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

Instructions to the candidates:

1) ***Attempt any three questions from each section.***
2) ***Answer to the two sections should be written in two separate 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) Answer the following questions in brief **[16]**

a) Correlations for liquid diffusivity prediction.

b) Derive Fick's second law of diffusion.

Q2) In absorption of a toxic component A from air into an aqueous solvent, at a particular point in the column, the partial pressure of A on gas side is P_{AG}=0.012 atm and concentration of A on liquid side is C_{AL}= 0.021mol/m^3. The Henry's constant for A in the solvent is 32 atm. cm^3/mol. The overall gas side mass transfer coefficient is given as 7×10^{-6} gmol/cm^2. sec. atm. It is also given that 50% of the total resistance to mass transfer lies in the gas film. **[18]**

Determine:

a) Whether stripping or absorption will take place.

b) Molar flux of A across the interface.

Q3) In an instantaneous irreversible catalytic gas phase reaction $2A \rightarrow B+C$, calculate observed reaction rate in Kmol A per hr per m^2 surface area of the catalyst. DATA: Gas side contains 10% A and the rest inerts. Pressure and temperature:600 Kpa and 100 C respectively. Assume film thickness to be 1×10^{-4} m and diffusivity of A through the film to be 3×10^{-9} m^2/s. **[16]**

Q4) a) Discuss graphical method for solving liquid-liquid extraction in a single stage contact.

b) Define mass transfer coefficient and state its significance in process design of a separation column.

[16]

P.T.O.

SECTION - II

Q5) A flow of air with a bulk velocity of 35 m/sec at 190 kPa pressure and 320 K is flowing over the top surface of a thin flat sheet of solid naphthalene of length 0.2 m and width of 0.01 m. Determine the possible rate of vaporization of naphthalene from the surface **[16]**

Data:-

Kinematic viscosity of air = 1.7×10^{-5} m^2/s.

Mass diffusivity of naphthalene vapour in air = 5.0×10^{-6} m^2/sec.

Vapor pressure of naphthalene at 320 K = 0.15 mm Hg.

Q6) A batch of solids is to be dried from 45% on wet basis to the moisture content that is 5% higher than the equilibrium moisture. The initial weight of the wet solids is 250 Kg and the drying surface is reported to be 0.55 m^2 per 50 kg of dry weight. The critical moisture content is 25% dry basis and constant drying rate is 0.30 kg/hr.m^2. For the falling rate period data available are given in the table below. **[16]**

x	25	22	19	16	13.6	11	8,2	7.5	6.4
N	0.3	0.27	0.24	0.21	0.18	0.15	0.07	0.044	0.025

x is % moisture content on dry basis and N is drying rate in Kg/m^2.hr.

Calculate the batch time required for given drying duty.

Q7) Answer the following by using psychrometric chart for air-water system with reference to the air having dry bulb temperature of 35 C and wet bulb temperature of 20 C. **[18]**

a) Report Absolute, Relative and Percent saturation.

b) Report humid enthalpy.

c) Report dew point temperature and calculate dew point pressure.

Q8) Write notes: **[16]**

a) Cooling tower working principle.

b) Tray dryer design fundamentals.

c) Use of Spray Chamber.

d) Tray hydraulics.

PSYCHROMETRIC CHART
Adiabatic saturation curve
Enthalpy of dry air
Saturated air
100% humidity
Enthalpy of saturated air
Specific volume of saturated humid volume
Specific volume of dry air
H = enthalpy, kJ/kg dry air
H' = enthalpy, kJ/kg dry air
Y' = absolute humidity, kg water vapor/kg dry air
V_H = humid volume, m³/kg dry air

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Total No. of Questions : 8]

SEAT No. :

P3861

[Total No. of Pages : 2

[5058]-134
T.E. (Petrochemical)
PETROCHEMICAL PROCESSES - I
(2008 Course) (Semester - I)

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

Instructions to the candidates:

1) ***Attempt any three questions from each section.***
2) ***Answer to the two sections should be written in two separate answer books.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data where ever necessary.***
5) ***Use of steam tables and electronic calculator is allowed.***

SECTION - I

Q1) Discuss in brief emerging trends in the market growth for the following important petrochemicals at global and national level : **[16]**

a) HDPE

b) SBR

c) LAB

d) PVA

Q2) Discuss mass and heat transfer 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) Benzene

b) Acetic Acid

Q4) a) Write a brief note on reactive distillation. **[9]**

b) Explain operating challenges involved in styrene production. **[9]**

P.T.O.

SECTION - II

Q5) a) Discuss how the polymers can be produced from agro-residues. **[8]**

b) Describe in brief lactic acid production from a bio-resource. **[8]**

Q6) a) Explain in detail solution polymerization. **[8]**

b) Discuss in detail how molecular weight distribution can decide the strength and processing properties of polymers. **[8]**

Q7) a) Explain in brief properties and synthesis of graphenes (CNT). **[9]**

b) Write a note on possible applications of graphenes in chemical industry. **[9]**

Q8) Write notes: **[16]**

a) Bioprocesses.

b) Catalyst for Polymer Manufacture.

c) Uses of Styrene.

d) Manufacture of Ethylene Glycol.

Total No. of Questions :6]

SEAT No. :

P2960

[Total No. of Pages :3

[5058]-135
T.E. (Petrochemical)
INSTRUMENTATION & INSTRUMENTAL ANALYSIS
(2008 Course) (Semester - I)

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

Instructions to the candidates:

1) ***Attempt Q1 A or B, Q2A or B, Q3A or B, Q4A or B, Q5A or B, Q6A or B.***
2) ***Figures to the right indicate full marks.***
3) ***Use of electronic calculators is allowed.***
4) ***Draw neat sketch where ever necessary.***

SECTION-I

Q1) A) a) Explain the types of measurement uncertainties in detail. **[8]**

b) Define: Accuracy, Precision, Repeatability, Reproducibility, Hysterisis, Drift, Fidelity, Dead zone. **[8]**

OR

B) a) Give the classification of the measuring instruments. **[8]**

b) Explain hierarchy of standards and calibration. **[8]**

Q2) A) a) Explain the principle, construction and working of a radiation pyrometer. **[8]**

b) Explain pressure measurement using different types of manometers. **[8]**

OR

B) a) Explain the various types of level indicators using magnetic properties. **[8]**

b) Write a note on electromagnetic flow meter. **[8]**

P.T.O.

Q3) A) a) Explain the use of psychrometric chart. **[6]**

b) What do you mean by 'inherent characteristics' of control valves? **[6]**

c) Write a note on the programmable logic controller. **[6]**

OR

B) a) Write a note on hygrometer. **[6]**

b) What are the factors to be considered while selecting a control valve? **[6]**

c) Explain feed back control loop in automatic process control. **[6]**

SECTION-II

Q4) A) a) Describe the various sampling techniques. **[8]**

b) Write a note on HPLC. **[8]**

OR

B) a) Classify analysis instruments. **[8]**

b) Write a note on NMR spectroscopy. **[8]**

Q5) A) a) Zirconia cells are now frequently used as oxygen analysis cells, specially in power plants. Describe this method of analysis. **[8]**

b) Explain the method of analysis using thermal conductivity. **[8]**

OR

B) a) Discuss CO analyzer. **[8]**

b) Write a note on the mass spectrometer. **[8]**

Q6) A) a) Differentiate between turbidity meter and nephelometer. **[6]**

b) Describe the principle of FTIR and hence describe IR spectroscopy. **[6]**

c) Discuss Orsat analysis. **[6]**

OR

B) a) Explain composition analysis using refractive index method. **[6]**

b) Describe in brief pH measurement. **[6]**

c) Discuss the various methods of density measurement. **[6]**

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Total No. of Questions : 12]

SEAT No. :

P1660

[Total No. of Pages : 2

[5058]-136

T.E.(Petrochemical Engineering)

PETROCHEMICAL PROCESSES -II

(2008 Course) (Semester - II) (312410)

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 Q12.***
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 various reasons as to why the inorganic theory was given up in the favour of organic theory. **[8]**

b) Write a note on the cloud point and the pour point. Give their significance. Draw a neat labeled diagram of the test apparatus used for these tests. **[8]**

OR

Q2) a) Write a note on TBP distillation. **[8]**

b) Write the correlations for the following: (a) Watson Characterization factor (b) Correlation Index. Explain these terms. **[8]**

Q3) a) Why is double stage desalting process preferred over the single stage desalting.Explain with the help of neat diagrams. **[8]**

b) Write a note on the atmospheric distillation column. What modifications are done to reduce the top diameter of the column? **[8]**

OR

Q4) a) Discuss the dry wet and damp operations in the vacuum distillation column **[8]**

b) Discuss the hydrofluoric acid process for alkylation. **[8]**

Q5) a) What is catalytic cracking? Discuss the process of Fluid Catalytic Cracking. **[9]**

b) Explain the process of Fluid coking with a neat diagram. **[9]**

OR

P.T.O.

Q6) a) Differentiate between the SCOT and the Claus process for sulphur recovery. **[9]**

b) What is the composition of Bitumen? What are the desirable properties? Explain how will you enhance them. **[9]**

SECTION-II

Q7) a) Explain the semi regenerative process for catalytic reforming. **[9]**

b) Write a note on the recovery of C_8 aromatics. **[9]**

OR

Q8) a) Describe in brief the various sections in the steam cracking process technology for olefins. **[9]**

b) Give the different processes for the recovery of hydrogen from the various gas streams. **[9]**

Q9) a) Classify polymerization reactions. **[8]**

b) Give the various process technologies for the manufacture of polyethylene. **[8]**

OR

Q10)a) Describe the Union Carbide process for the manufacture of polypropylene. **[8]**

b) Describe the method of manufacture of urea formaldehyde resin. **[8]**

Q11)a) Give the various routes for the manufacture of caprolactum. **[8]**

b) Differentiate between Nylon 6 and Nylon 66. **[8]**

OR

Q12)a) Give the manufacturing process for polyester from dimethy1 terepthalate(DMT) **[8]**

b) Discuss the various routes for the manufacture of Terepthalic Acid. **[8]**

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

P3743 **[Total No. of Pages : 3**

[5058]-137
T.E. (Petrochemical)
MASS TRANSFER - II
(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 answerbooks.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data whereever necessary.***
5) ***Use of steam tables and electronic calculator is allowed.***

SECTION - I

Q1) Feed to distillation column consists of mixture of 40% by mol benzene and 60% by mol toluene. The column is supposed to recover bottom and top products at 99% purity each. For 100 Kmol/hr of saturated liquid feed. **[18]**

a) Calculate column material balance.

b) Assuming relative volatility of benzene as 3.0 with respect to toluene, calculate the number of theoretical stages required and the optimum feed plate location.

Q2) Feed to flash chamber consists of mixture of A (80 Mol%) and B (20 Mol%) at the flow rate of 1000 Kmol/hr. It is reported that the top vapour purity is 85 mol% A and the bottom liquid purity is 70 mol% A. **[16]**

a) Relative volatility of A with respect to B.

b) Percent vaporization of feed.

c) Percent recovery of A in the distillate.

d) Vapour and liquid molar flow rates out of the chamber.

P.T.O.

Q3) Write notes (Any Two): **[16]**

a) Steam Distillation.

b) Azeotropic Distillation.

c) Extractive Distillation.

Q4) With reference to distillation, define and state significance of: **[16]**

a) Theoretical stage

b) Ideality

c) Reflux ratio

SECTION - II

Q5) Calculate the number of ideal stages required for the absorber if it is being designed for removing organic vapors from a gas mixture. Feed gas flow rate is 100.0 m^3/s at NTP and contains 3% by volume organic vapours. Expected recovery is 95%. Solvent (MW 200) fed counter-currently is pure and is fed at the rate of 1.5 times the minimum. Henry's law statement is given as : $y = 0.125x$, where y is gas side mol fraction of the organic and x is its 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 : $\mathbf{Y = 0.9\ X}$ where **Y** is kg nicotine/kg kerosene and **X** is kg nicotine/kg water at equilibrium. Water and kerosene are immiscible with each other. The scheme of extraction is to contact 100 kg of the aqueous solution containing 1 wt% nicotine with 70 kg pure kerosene in a single equilibrium contact. Calculate % recovery of nicotine form the feed solution. **[16]**

Q7) With reference to adsorption as a unit operation write the following notes : **[16]**

a) Adsorption Isotherm

b) Types of adsorbent

c) Temperature Swing Adsorption

Q8) Write notes : **[16]**

a) Choice of a separation method

b) Equipment for liquid extraction

c) Triangular Diagram in LLE

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Total No. of Questions : 8]

SEAT No. :

P1661

[Total No. of Pages : 4

[5058]-138
T.E. (Petrochemical Engineering)
REACTION ENGINEERING - I
(2008 Course) (312409) (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) Solve the following: **[18]**

a) The decomposition of NO_2 follows a second order rate equation. The reaction is given by : $2NO_2 \rightarrow 2NO + O_2$.

Data at different temperature are as follows:

Initial pressure of N_2O (mm Hg)	82.5	139	296	360
Half-life (sec)	860	470	255	212

Compute the energy of activation from the data.

b) Determine the order of the reaction and the reaction rate constant for the thermal decomposition of nitrous oxide at 1030 K using following data:

T(K)	592	603	627	651.5	656
k(cm^3/gmol. sec)	522	755	1700	4020	5030

c) Derive an expression for a Second order irreversible reaction taking place in an isothermal variable volume batch reactor.

P.T.O.

Q2) a) The first order homogeneous gaseous reaction A $\rightarrow$ 3R is carried out in an isothermal batch reactor at 2 atm pressure with 20 mole % inerts present, and the volume increases by 40% in 18 min. In case of constant volume reactor, determine the time required for the pressure to reach 8 atm if the initial pressure is 5 atm, 2 atm of which consists of inerts. **[6]**

b) For the elementary reactions in series

$$A \xrightarrow{k_1} R \xrightarrow{k_2} S, k_1 = k_2, \ at \ t=0 \begin{cases} C_A = C_{A0}, \\ C_{R0} = C_{S0} \end{cases}$$

Find the maximum concentration of R and when it is reached. **[10]**

Q3) The aqueous reaction $A \rightarrow B+C$ proceeds and data of time versus concentration is reported in the following table:

Time, min	0	36	65	100	160	∞
C_A, mole/lit.	0.1823	0.1453	0.1216	0.1025	0.0695	0.0490

Find the suitable rate equation for this reaction.

Additional Data: C_{A0} = 0.1850 mole/lit, C_{P0} = 0 and C_{Q0} = 50 mole/lit. **[16]**

Q4) A homogeneous liquid phase reaction: $A \rightarrow P, \ -r_A = kC_P^2$ takes place with 50% conversion in mixed flow reactor. **[16]**

a) Determine the conversion if this reactor is replaced by another mixed flow reactor, having volume 6 times that of original reactor-all else remains unchanged.

b) Determine the conversion if the original reactor is replaced by plug flow reactor, of same size-all else remains unchanged.

SECTION - II

Q5) Answer 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) 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.

c) An elementary liquid phase reaction (irreversible first order) $A \rightarrow B$ takes place in a PFR and the conversion is 96%. If a mixed flow reactor of 10 times as large as the PFR is hooked up in parallel with the existing unit, by what fraction could the production be increased for the same 96% conversion?

Q6) Substance A in the liquid phase produces R and S by the following reactions:

$$A \begin{cases} \nearrow R, & r_R = k_1 C_A^2 \\ \searrow S, & r_S = k_{2C_A} \end{cases}$$

The feed (C_{AO} = 1.0, C_{RO} = 0, C_{SO} = 0.3) enters two mixed flow reactors in series ($\tau_1 = 2.5$ min, $\tau_2 = 10$ min.).

Knowing the composition in the first reactor (C_{A1} = 0.4, C_{R1} = 0.2, C_{S1}, = 0.7), find the composition leaving the second reactor. **[16]**

Q7) a) Write a brief note on: Causes of Nonideal Behavior in Process Vessels. **[6]**

b) The tracer output concentration and time data are given below in Table 1 represent a continuous response to a pulse input into a closed vessel which is to be used as a chemical reactor. Calculate the mean residence time of fluid in the vessel t, and tabulate and plot the exit age distribution E. **[10]**

Table 1. Time versus Tracer Output Concentration

Time t, min	Tracer Output Concentration, C_{pulse}, gm/liter fluid
0	0
5	3
10	5
15	5
20	4
25	2
30	1
35	0

Q8) Between 0ºC and 100ºC determine the equilibrium conversion for the elementary aqueous reaction **[16]**

$$A \Leftrightarrow R, \begin{cases} \Delta G^{o}_{298} = -14180 \text{ J/mole} \\ \Delta H^{o}_{298} = -75900 \text{ J/mole} \end{cases} C_{P_A} = C_{P_R} = \text{Constant}$$

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 80% or higher.

Total No. of Questions : 10]

SEAT No. : ____

P2193

[Total No. of Pages : 3

[5058]-139
T.E. (Petrochemical Engineering)
TRANSPORT PHENOMENA
(2008 Course) (Semester-II)

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) ***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) With help of suitable examples discuss the importance of Transport Phenomena for process industries. **[8]**

b) Write a short note on Film theory in mass transfer - provide necessary diagrams. **[8]**

Q2) a) What is no slip condition? Explain Newton's law of viscosity. What is the role of viscosity in momentum transfer? **[8]**

b) Express equations that give the analogies between Heat, Mass and Momentum transfer. Why do we need these analogies? **[8]**

Q3) a) A furnace is constructed with 200 mm of fire brick (k = 5.2), 100mm of insulating brick (k = 0.5) and 200 mm of building brick (k = 2.0). The inside temperature is 650°C and the outside temperature is 165°C. Find the heat loss per unit area and the temperature at the junction of the fire brick and the insulating brick. Here 'k' is the thermal conductivity kcal/ hr m °C. **[8]**

b) Derive three dimensional form of mass conservation equation over a control volume. **[8]**

P.T.O.

Q4) a) What is turbulence? Briefly explain key characteristics of turbulence. Draw neat diagram to explain turbulence and explain the practical applications of turbulence. **[8]**

b) With help of a representative diagram derive the Mass Transfer Boundary Layer Equation. **[8]**

Q5) a) Compute the steady-state momentum flux τ_{yx} in Pa when the lower plate velocity V in Fig. 1 is 1 m/s in the positive x direction, the plate separation Y is 0.004m, and the fluid viscosity μ is 0.7 cp.

If the fluid is replaced by a viscous fluid having viscosity 0.12 cP, how much will be change in steady-state momentum flux, keeping all other conditions identical. **[6]**

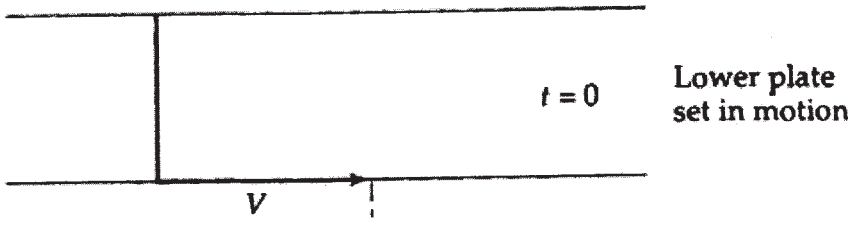

Fig 1:

b) With help of neat diagram discuss Newtonian fluid and non-Newton fluids and their stress-strain relationship. **[6]**

c) Derive Reynolds Analogy and highlight all the assumptions clearly. **[6]**

SECTION-II

Q6) a) With help of a neat labeled diagram discuss the design of a stirred vessel. What are the critically important parameters need to be considered at the design stage? Also provide a thoughtful discussion on design of a tall tank and indicate the flow patterns. **[10]**

b) With help of suitable industrial examples explain the purpose of agitation. **[6]**

Q7) a) A slab of material 2.0m thick is at uniform temperature of 150°C. The front surface is suddenly exposed to a constant bulk temperature of 0 °C. The convective resistance is zero and back surface of the slab is insulated. Considering thermal diffusivity (α) of 2.0×10^{-5} m^2/s. Using five slices of thickness 0.4m each, calculate the temperature profile at t = 4000 s. Schmidt method can be used for the simulation. **[10]**

b) Obtain the generalized Unsteady state Conduction Equation. **[6]**

Q8) a) With help of a neat sketch derive the mathematical expression for 1-Dimensional Unsteady State Molecular Diffusion through a slab. **[8]**

b) Obtain the Finite difference discretization of the above defined problem. Also provide the simplified Schmidt method expression. **[8]**

Q9) a) With help of neat diagram obtain the temperature distribution expression for a fixed bed axial flow reactorwhere reactants enter at $z = -\infty$ and leaves at $z = +\infty$. The reaction zone extends from $z = 0$ to $z = L$. **[10]**

b) Calculate the heat loss per unit area of surface for an insulating wall a cold storage room to be maintained at 4 °C when the outside temperature in 30 °C. The wall is made of 25.4 mm of corkboard having thermal conductivity $k = 0.0433$ W/(m.K). **[6]**

Q10)Write short notes on: **[18]**

a) Usage of CFD in Process Industry.

b) Prandtl Boundary Layer.

c) Navier Stokes Equation and its solution.

d) Models of Turbulence.

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Total No. of Questions :12]

SEAT No. :

P1598

[Total No. of Pages :5

[5058] - 14

T.E. (Mechanical & Auto)

THEORY OF MACHINES - II

(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) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of logarithmic tables, slide rule, electronic pocket Calculator is allowed.***
5) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Explain the following terms: **[9]**

i) Virtual coefficient of friction.

ii) Angle of repose.

iii) Angle of friction.

iv) Friction circle.

b) A centrifugal clutch transmits 10kW power at 900 rpm. The shoes are four in number. The speed at which shoes engages with the drum is 75% of running speed. The inner radius of drum is 15 cm and the radial distance of center of gravity of shoe from axis of rotation of the spider in the engaged position is 12 cm. If the coefficient of friction is 0.25 and maximum permissible pressure intensity of is 0.1 N/mm^2 . Determine the mass of each shoe. **[9]**

OR

Q2) a) Derive an expression for tension ratio in case of band and block brake with the help of necessary sketch. **[9]**

P.T.O.

b) A simple band brake is applied to a shaft carrying a flywheel of mass 250 kg and radius of gyration 350 mm. The shaft speed is 200 rpm. The drum diameter is 200mm & coefficient of friction is 0.25. The free end of band is attached at 100 mm from fulcrum and effort of 120 N is applied on lever at 280 mm from fulcrum. The angle of embraced by belt is 225°. Determine for counter clockwise rotation of drum. **[9]**

i) Braking Torque.

ii) The number of turns of flywheel before it comes to rest.

iii) The time taken by flywheel to come to rest.

Q3) A cam, with a minimum radius of 25 mm, rotating clockwise at a uniform speed is to be designed to give a roller follower, at the end of a valve rod, motion described below: **[16]**

a) To raise the valve through 50 mm during 120° rotation of the cam;

b) To keep the valve fully raised through next 30°;

c) To lower the valve during next 60°; and

d) To keep the valve closed during rest of the revolution i.e. 150°;

The diameter of the roller is 20 mm and the diameter of the cam shaft is 25 mm.

Draw the profile of the cam when the line of the stroke is offset 15 mm from the axis of the cam shaft. The displacement of the valve, while being raised and lowered, is to take place with simple harmonic motion. Determine the maximum acceleration of the valve rod when the cam shaft rotates at 100 r.p.m.

OR

Q4) a) Explain the jump phenomenon in cam system. Derive the expression for minimum speed of cam to avoid jump. **[8]**

b) The following data relates to symmetrical circular arc cam operating a flat faced follower. **[8]**

Least radius of cam is 30mm, total lift is 12.5 mm, angle of lift is 55°, nose radius = 3mm, speed of cam = 600 rpm.

Find: Distance between cam center and nose radius.

Radius of circular flank.

Q5) a) Determine condition of stability of two wheel vehicle moving in a curved Path. **[8]**

b) An aero plane makes a complete half circle of 50m radius, towards left when flying at 200 km/hr. The rotating engine and the propeller of the plane have a mass 400 kg with a radius of gyration of 40 cm. The engine runs at 2400 rpm clockwise when viewed from rear. Find gyroscopic couple on the plane and state its effect on it. **[8]**

OR

Q6) a) Explain following terms of Governor. **[8]**

i) Sensitiveness.

ii) Insensitiveness

iii) Stability.

iv) Isochronism.

b) A Hartnell governor having a central sleeve spring and two right- angled bell crank levers moves between 290 r.p.m. and 310 r.p.m. for a sleeve lift of 15 mm. The sleeve arms and the ball arms are 80 mm and120 mm respectively. The levers are pivoted at 120 mm from the governor axis and mass of each ball is 2.5kg. The ball arms are parallel to the governor axis at the lowest equilibrium speed. **[8]**

Determine:

i) Loads on the spring at the lowest and the highest equilibrium speeds,

ii) Stiffness of the spring.

SECTION - II

Q7) a) Derive an expression for minimum number of teeth on a gear wheel when it is in mesh with a pinion for Involute tooth profile. **[6]**

b) Two 20° involute gears in mesh have a gear ratio of 2 and 20 teeth on the pinion. The module is 10 mm and the speed of pinion is 250 rpm. If the addendum of each is such that the path of approach and path of recess on each side are half of the maximum possible length each, find **[12]**

i) The addendum of pinion and gear.

ii) The length of contact.

iii) The maximum velocity of sliding during approach and recess.

OR

Q8) a) What do you mean by interference and undercutting? **[6]**

b) Prove that the change in center distance within limits of involute gears will not affect the velocity ratio. **[4]**

c) Two 20° pressure angle involute gears in mesh have a module of 10 mm. The addendum is one module. The gear and the pinion have 50 and 13 teeth's respectively. **[8]**

i) Does interference occur?

ii) If it occurs, to what value should be the pressure angle changed to avoid interference?

Q9) a) Two Helical gears having speed reduction of 3:1 and normal module 6mm with normal pressure angle 20° and helix angle 30°. If the center distance is approximately 600mm apart, determine the number of teeth on each gear and the exact center distance. **[8]**

b) Derive an expression for maximum efficiency in case of spiral gears in terms of spiral angle and angle of friction. **[8]**

OR

Q10)a) A two start worm rotatingat 900 rpmdriving a twenty teeth worm gear. The worm has a pitch diameter of 60 mm and pitch of 18 mm. Coefficient of friction is 0.08. Determine. **[10]**

i) Helix angle of worm.

ii) Speed of gear.

iii) Center distance.

iv) Lead angle for maximum efficiency.

v) Efficiency and maximum efficiency.

b) Derive expressions for pitchcone angles of bevel gears. **[6]**

Q11)a) Derive an expression of speed reduction for epicyclic arrangement of sun, planet and arm by using tabulation method. **[6]**

b) In the epicyclic gear train shown in Fig. 1, the driving wheel A has 14 teeth and the fixed annular wheel C (internal) has 100 teeth. The number of teeth on wheels E and D are 96 and 40 respectively. The wheels are of the same pitch. Wheel A rotates at 1200 rpm,find the speed and direction of wheel C, F is the arm. **[10]**

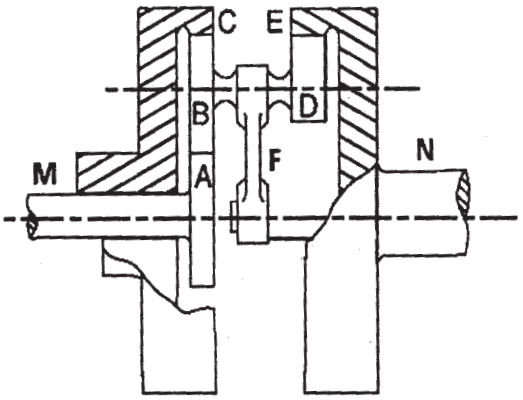

Fig. 1

OR

Q12) In the gear drive shown in the Fig. 2, the driving shaft A rotates at 300 rpm in the clock wise direction, when seen from the left hand side. The shaft B is the driven shaft. The casing C is held stationary. The wheels E and H are keyed to the central vertical spindle and wheel F can rotate freely on this spindle. The wheels K and L are rigidly fixed to each other and rotate together freely on a pin fitted on the underside of F. The wheel L meshes with internal teeth on the casing C. The number of teeth on the different gears is indicated within the bracket. Determine the number of teeth on gear C and speed and direction of rotation of shaft B. **[16]**

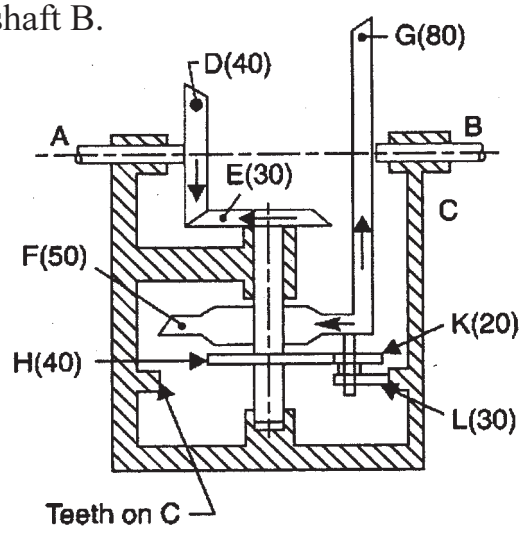

Fig. 2

Total No. of Questions :12]

SEAT No. :

P1662

[Total No. of Pages :4

[5058]-140

T.E. (Petrochemical Engg.)

PROCESS EQUIPMENT DESIGN & DRAWING

(2008 Course) (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) How factors on which selection of material depends are important for equipment design? **[7]**

b) Discuss the factors on which magnitude of factor of safety depends. **[7]**

c) Discuss the steps involved in design activity. **[4]**

OR

Q2) a) Name organizations which create Code and Standards along with their application in specific field. What problems may be faced if codes and standards are not used for design of equipment? **[8]**

b) How Factor of Safety (FOS) is important in design? What is general limit of FOS taken in designing various types of equipment? **[4]**

c) Differentiate between Process Design and Equipment design? **[6]**

Q3) An open belt 100 mm wide connects two pulleys mounted on parallel shafts with their centers 2.4 m apart. The diameter of the larger pulley is 450 mm and that of the smaller pulley 300 mm. The coefficient of friction between the belt and the pulley is 0.3 and the maximum stress in the belt is limited to 14 N/mm width. If the larger pulley rotates at 120 r.p.m, find the maximum power that can be transmitted. **[16]**

OR

P.T.O.

Q4) Design a cast-iron protective type flange coupling to connect shafts in order to transmit 15 hp at 500 rpm. The following permissible stresses may be used. **[16]**

Shear stress for shaft, bolt & key material = 400 KgF/Cm^2

Crushing stress for bolt and key = 800 KgF/cm^2

Shear stress for cast iron = 80 KgF/cm^2

Q5) Discuss the procedure for design of Pressure vessels along with design for various head. Discuss the procedure for area method for nozzle compensation. **[16]**

OR

Q6) A pressure vessel having outer diameter 1.3 m and height 3.8 m is subjected to an internal pressure of 12 kg/cm^2. If the vessel is fabricated as class B vessel joint efficiency is 85%, if the vessel is fabricated as class C vessel, with welded joint efficiency is 70% and 50%; if the vessel is provided with a strip all along the longitudinal joint, joint efficiency is 100%. Calculate the vessel thickness under these conditions and find out how much is the % material saving by welding a strip along the longitudinal joint. Allowable stress of the material = 1020 kg/cm^2. Corrosion allowance is 1 mm. **[16]**

SECTION-II

Q7) 1-2 Shell and tube heat exchanger has the following specifications. **[16]**

Shell = 740 mm internal diameter; Shell cover = 840 mm internal diameter.

Tubes = 526; Tube have 19 mm inside diameter and 2 mm wall thickness.

Tube length is 4.88 m; Tubes are arranged on 25 mm square pitch.

Corrosion allowance = 3.0 mm; the shell is provided with a floating head.

Cover having crown radius 480 mm; Shell side pressure is 9.4 kg/cm^2.

Tube side pressure is 3.4 kg/cm^2; Shell side Temparature is 60^{o}C.

Tube side temperature is 40^{o}C.

Bolt circle diameter=0.87 m; number of bolts = 28, diameter of bolt-120mm.

Permissible stress for tube material = 960 kg/cm^2.

Permissible stress for the bolt material = 1080 kg/cm^2.

Permissible stress for remaining other components = 1380 kg/cm^2.

Welded joint efficiency = 95%; Mean gasket diameter = 0.78 m.

Suggest a suitable mechanical design for the heat exchanger.

OR

Q8) a) What are the different causes of fouling in heat exchangers? How to minimize the fouling? **[8]**

b) Discuss in detailed about Functions of Baffles and Tie rods in Shell and tube heat exchanger. Draw its neat sketch. **[8]**

Q9) a) Explain the detailed process along with equations and diagrams for design of storage tank shell along with the formulas. **[10]**

b) Draw neat sketch of different types of floating roof along with accessories used for the sealing in storage of volatile liquids. What are the criteria for use fo these different floating roofs. **[6]**

OR

Q10) Shell, Bottom plate of Circular Cylindrical Tank for storage of crude oil with conical roof. **[16]**

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, 5600 mm × 1100 mm).

Q11) 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. **[18]**

OR

Q12) Write Short Notes on (Any four): **[18]**

a) Types of losses in storage of volatile liquids.

b) Procedure for design of storage tanks shell and head.

c) Pipeline color codes for different pipe lines.

d) IS Code for design of equipment.

e) Types of floating roofs.

f) Wind girders and its application in storage tanks.

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Total No. of Questions : 12]

SEAT No. :

P2194

[Total No. of Pages : 3

[5058]-141

T.E. (Polymer Engineering)

MASS TRANSFER AND REACTION ENGINEERING

(2008 Course) (Semester-I) (309365)

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

Instructions to the candidates:

1) ***Answers to the two sections should be written in separate books.***
2) ***Draw neat diagrams wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data, if necessary.***
5) ***Use of logarithmic table, electronic pocket calculators is allowed.***

SECTION-I

Q1) a) Write a note on Analogies between Heat and Mass Transfer. **[9]**

b) Derive the expression for Steady State diffusion of gas A through nondiffusing gas B. **[9]**

OR

Q2) a) Oxygen (A) is diffusing through Carbon monoxide (B) under steady state condition, with the Carbon monoxide as non-diffusing. The total pressure is 1×10^5 N/m^2 and temperature 0 °C. The partial pressure of Oxygen at two planes 2 mm apart is 13000 N/m^2 and 6500 N/m^2 respectively. The diffusivity for the mixture is $(D_{A-B}) = 1.87 \times 10^{-5}$ m^2/sec. Find the rate of diffusion of oxygen through each square meter of the two planes. **[12]**

b) Explain the term mass transfer and give any two examples of mass transfer and explain Fick's Law of Diffusion. **[6]**

Q3) a) Derive Rayleigh Equation for Simple Distillation. **[8]**

b) Which are the factors to be considered for the choice of solvent in gas absorption. **[8]**

OR

P.T.O.

Q4) a) Differentiate between Tray tower and Packed tower. **[6]**

b) Explain Raoults and Henry's law. Write a note on minimum liquid to gas ratio for gas absorber. **[10]**

Q5) a) Explain psychometric chart and explain the term Dry bulb temperature and wet bulb temperature. **[8]**

b) Explain rate of drying curve. **[8]**

OR

Q6) a) Discuss the following terms: Absolute Humidity, Relative Humidity, Saturation Humidity, Percentage Humidity. **[8]**

b) Explain the purpose of drying operation and explain the methods of expressing moisture content. **[8]**

SECTION-II

Q7) a) Explain in short factors affecting rate of reaction. Explain Elementary and Non-Elementary reaction with example. **[10]**

b) A certain reaction has a rate given by $-r_A = 0.005\ C_A^2$, (mol/cm^3. min). If the concentration is expressed in mol/lit and time in hours, what will be the value and units of rate constant? **[8]**

OR

Q8) a) Explain temperature dependency from Collision, Transition and Arrhenius theory. **[10]**

b) On doubling the concentration of reactant, the rate of reaction triples. Find the reaction order. **[8]**

Q9) 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. **[10]**

b) The half life period for a certain first order reaction is $2.5 * 10^3$ second. How long will it take for $1/4^{th}$ of reactant to be left behind? **[6]**

OR

Q10)a) Explain half life period for first and second order reaction. **[8]**

b) Define ideal batch reactor and derive performance equation for ideal batch reactor. **[8]**

Q11)a) What is the performance equation of PER in series? **[6]**

b) Discuss performance equation for batch reactor and what are the advantages and disadvantages of batch reactor. **[10]**

OR

Q12)a) Explain term space time and space velocity. **[6]**

b) Write a short note on design of polymer reactors. **[10]**

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Total No. of Questions :12]

SEAT No. :

P2961

[Total No. of Pages :2

[5058] - 142

T.E. (Polymer Engineering)

POLYMER CHEMISTRY - I

(2008 Course) (Semester - I)

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

Instructions to candidates:

1) ***All questions are compulsory.***
2) ***Answer to the two sections should be written in separate books.***
3) ***Figures to the right indicate full marks.***

SECTION - I

Q1) a) Define functionality. Give three examples each of addition and condensation monomers with functionality of two and more. **[8]**

b) Explain weight average molecular weight. Discuss any one method to determine the same. **[8]**

OR

Q2) a) What is cryoscopy? Explain the technique to determine MW. **[8]**

b) Explain end group analysis method to determine MW. **[8]**

Q3) a) Write a note on addition polymerization without initiator with suitable reactions. **[8]**

b) What is chain transfer reaction? Explain its effects on polymer properties. **[8]**

OR

Q4) a) Differentiate between inhibitors and retarders with supporting information. **[8]**

b) What are protonic acids? Explain their role in polymerization. **[8]**

P.T.O.

Q5) a) Discuss melt polymerization in detail. **[9]**

b) Discuss kinetics of condensation polymerization. **[9]**

OR

Q6) a) Explain polymerization of P-xylene. **[9]**

b) Explain the mechanism of polyaddition reaction. **[9]**

SECTION - II

Q7) a) Derive copolymer composition equation. **[8]**

b) What is Q-e scheme? Explain its importance. **[8]**

OR

Q8) a) Write a note on copolymerization behavior. **[8]**

b) With reference to the properties explain how copolymerization leads to the improvement in polymer applications. **[8]**

Q9) a) Explain chlorination process. **[8]**

b) Write a note on polymer recycling. **[8]**

OR

Q10)a) Write a note on ultrasonic degradation. **[8]**

b) Explain synthesis of any one biodegradable polymer. **[8]**

Q11)a) Write a note on constitutional isomerism in polymers and its effect on properties. **[9]**

b) Draw threodiisotactic polymer structure and explain how it is different from erythrodiisotactic. **[9]**

OR

Q12)a) Write a note on use of OMC in coordination polymerization. **[9]**

b) Explain monometallic mechanism in detail. **[9]**

Total No. of Questions :12]

SEAT No. :

P2962

[Total No. of Pages :3

[5058] - 143

T.E. (Polymer)

POLYMER MATERIALS-I

(2008 Course) (Semester-I)

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

Instructions to candidates:

1) ***Answer 3 questions from Section - I. Answer 3 questions from Section - II.***
2) ***Answer 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 Commodity, Engineering & High performance polymers. **[6]**

b) Give Industrial manufacturing processes, properties, applications, and brief idea about processing for HDPE. **[12]**

OR

Q2) 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 LLDPE. **[12]**

Q3) a) Give Industrial manufacturing processes, applications, and brief idea about processing for HIPS. **[12]**

b) Give properties and applications of PVDF. **[4]**

OR

P.T.O.

Q4) a) Give Industrial manufacturing processes in brief for Acrylics. **[12]**

b) Give properties and applications of PTFE. **[4]**

Q5) a) Give Industrial manufacturing processes, properties and brief idea about compounding & processing for ABS. **[12]**

b) Give properties and applications of Acrylics. **[4]**

OR

Q6) a) Give Industrial manufacturing processes in brief for Polycarbonate. **[8]**

b) Write short note on types of adhesives. **[8]**

SECTION - II

Q7) a) Give basic principles and functional uses for Adhesives, paints & coatings. **[9]**

b) Explain terminology like paints, varnish, lacquer and primer. **[9]**

OR

Q8) a) Write the functions performed by Solvents, fillers, plasticizers, hardeners, primers, thickening agents used in adhesives. **[9]**

b) Give properties and applications of Polycarbonate. **[9]**

Q9) a) Give fundamentals of rubbers and explain how it is crosslinked. **[8]**

b) Explain the Molecular requirements for a material to function as an elastomer. **[8]**

OR

Q10)a) Explain the process used for mastication and compounding of an elastomer with its significance. **[8]**

b) Give Industrial manufacturing processes, properties, applications, for polybutadiene rubber. **[8]**

Q11)a) Give Industrial manufacturing processes, properties, applications, for butyl rubber. **[8]**

b) Explain role of different additives required by an elastomer during compounding. **[8]**

OR

Q12)a) Give Industrial manufacturing processes, properties, applications, for SBR. **[8]**

b) Give Industrial manufacturing processes, properties, applications, for Thermoplastic Elastomers. **[8]**

Total No. of Questions : 12]

SEAT No. :

P2963

[Total No. of Pages : 3

[5058]-144

T.E. (Polymer)

POLYMER STRUCTURE & PROPERTY RELATIONSHIP

(2008 Course) (Semester - I) (309363)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) Give effect of chemical composition on mechanical properties. **[6]**

b) What are different types of additives and its role on end properties. **[6]**

c) What is the effect of tracticity on properties. Explain why PP has high melting point than other olefins. **[4]**

OR

Q2) a) Give effect of chemical composition on chemical and electrical properties. **[6]**

b) Explain the types of bonds in polymer structure & their effect on various properties. **[6]**

c) What makes Nylon hygroscopic in nature. **[4]**

Q3) a) Explain what is weight average, number average and MWD and their effect on polymer mechanical properties. **[6]**

b) Give the effect of molecular weight distribution on thermal conductivity and coefficient of thermal expansion. **[6]**

c) What is the effect of incorporation of plasticizer on Tg. **[4]**

OR

P.T.O.

Q4) a) Explain any one processing technique in which we can witness conversion from low to high molecular weight. **[6]**

b) Give the effect of molecular weight distribution on chemical and optical properties. **[6]**

c) Give applications of narroe molecular weight polyethylene and broad molecular weight polyethylene. **[4]**

Q5) a) What leads to molecular flexibility & freedom of rotation of bonds? Explain with examples. **[6]**

b) List the effect of copolymer & blends on polymer properties. **[6]**

c) Explain what leads to intermolecular order and also what is 1st and 2nd order transition. **[6]**

OR

Q6) a) With examples explain the structural restriction to rotation & thus its effect on properties like mechanical, electrical, optical etc. **[6]**

b) What is the significance of super cooled state and its role during processing. Also explain fringed micelle theory. **[6]**

c) What are spherulites? How does their growth affect various properties? Explain with diagram. **[6]**

SECTION - II

Q7) a) Explain what make a polymer amorphous or semicrystalline. Give examples. Also can one say that semicrystalline polymers have better mechanical strength than amorphous polymers. Justify. **[6]**

b) Explain thermodynamic OR kinetic factors affecting rate of crystallization. **[6]**

c) Explain why Methylacetylene has less freedom of rotation than Neopentane. **[4]**

OR

Q8) a) Give factors leading to crystallinity & its effect on various properties like processing, mechanical, thermal etc. **[6]**

b) Give the similarity and difference between crystallization & orientation. Also give the effect of orientation on various polymer properties like mechanical, chemical, thermal, electrical, optical etc. **[6]**

c) Explain why Tg of PMA less than PMMA. **[4]**

Q9) a) What are Intermolecular bonding forces? Explain induced & permanent Dipole and effect of these forces on structure & properties like solubility, melting, CED, permeability etc. **[6]**

b) Explain Ionic bonding with example. **[6]**

c) Explain role of Cohesive Energy Density and method used to find CED. **[4]**

OR

Q10)a) Write a note on London Dispersion Forces and factors affecting them. **[6]**

b) Give the effect of cross linking and polarity on polymer properties like mechanical, chemical, thermal, electrical, optical etc. **[6]**

c) What makes a polymer polar in nature and how does polarity affect properties. **[4]**

Q11)a) Explain what is the meaning of the term multiple phases with any on eg. **[7]**

b) What are the different types of foams. Explain in detail. **[7]**

c) Where is temporary hetrogenity is required for processing. **[4]**

OR

Q12)a) Explain what is the meaning of the term macrostructure and its effect on properties with any one example. **[7]**

b) Explain with eg. How with size and shape the properties are influenced. **[7]**

c) What are plastisols and give few of its applications. **[4]**

Total No. of Questions :12]

SEAT No. :

P2964

[Total No. of Pages :3

[5058]-145
T.E. (Polymer)
DESIGN OF EQUIPMENTS AND MACHINE ELEMENTS
(2008 Course) (Semester - I) (309364)

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

Instructions to the candidates:

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

SECTION-I

Q1) a) The normal stresses on 2 planes at right angles to each other are 80MPa tensile and 70 MPa compressive with 30MPa shear stress. Find the maximum and minimum principal stresses and maximum shear stress using Mohr circle diagram. **[10]**

b) Discuss aluminum and its alloys. Give BIS designation system for it. **[8]**

OR

Q2) a) Discuss BIS classification of tool steel with BIS designation system. **[10]**

b) Give Mohr circle representation for pure shear loading and pure normal stress loading. **[8]**

Q3) a) Derive an expression for flat cross belt drive. **[8]**

b) Obtain an equation for diameters of a hollow shaft and solid shaft subjected to bending moment only from bending equation. **[8]**

OR

P.T.O.

Q4) a) State advantages of V belt over flat belt drives. **[8]**

b) A hollow shaft is supported at the ends in bearings. The ratio of internal to external diameter is 0.5. Shaft transmits 5 kW at 20^0 rpm through a straight tooth spur gear exactly at the mid span of bearings. Find diameter of the shaft. **[8]**

Given:

i) Pressure angle of gear: 20^o

ii) Allowable shear stress for shaft material: 45 MPa

iii) Pitch circle diameter of gear: 150 mm

iv) Distance between the bearings : 400 mm.

Q5) a) The rolling contact ball bearings are to be selected to support a overhang countershaft. The shaft speed is 750 rpm. The bearings are to have 99% reliability corresponding to a life of 20,000 hrs. The bearing is subjected to an equivalent radial load of 2.5 kN. Consider life adjustment factors for operating conditions and material as 0.9 and 0.85 respectively. Find out basic dynamic load rating of the bearing at 90% reliability. **[8]**

b) With neat sketches, explain any two types of radial ball bearings. **[8]**

OR

Q6) a) Write in short about various commonly used materials for sliding contact bearings. **[8]**

b) With neat sketch discuss different types of radial ball bearings. **[8]**

SECTION-II

Q7) a) For a two pump unloading circuit, explain the functioning of the circuit for low pressure and high pressure operation. **[8]**

b) Explain the functioning of pressure compensated restrictor type flow control valve. **[8]**

OR

Q8) a) Explain basic hydraulic circuit for carrying out rotary motion. **[8]**

b) With a neat sketch, explain functioning of balanced vane pump. **[8]**

Q9) a) In case of toggle type of machines, explain following terms with neat sketches **[8]**

i) Maximum Daylight

ii) Mould opening stroke

b) Explain the merits of 'Lock and Block type of locking system used in injection moulding machines. With neat sketch, explain how locking is achieved. **[8]**

OR

Q10)a) Write in short about mechanical advantage gained in toggle system. **[8]**

b) Why pressure intensifiers are usually required for tonnage development in direct locking hydraulic machines? **[8]**

Q11)a) Indicate the various stresses induced in a pressure vessel subjected to combined loading. State the method for thickness calculation of such vessel. **[9]**

b) Write a note on torispherical and hemispherical head. **[9]**

OR

Q12)a) Write short notes on the following: **[9]**

i) Nozzle reinforcement procedure.

ii) Supports for pressure vessel.

b) Write in details about gaskets and supports used in pressure vessels.**[9]**

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Total No. of Questions : 12]

SEAT No. :

P2965

[Total No. of Pages : 6

[5058]-146

T.E. (Polymer Engg.)

MATHEMATICAL METHODS FOR POLYMER ENGINEERS

(2008 Course) (Semester - II)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) Show that $\mu = \frac{2+\Delta}{2\sqrt{1+\Delta}}$. **[3]**

b) From the following data, find y at $x = 43$ and at $x = 84$. **[8]**

x :	40	50	60	70	80	90
y :	184	204	226	250	276	304

c) From the following table, find the area pounded by the curve and the x-axis from $x = 7.47$ to $x = 7.52$, using Trapezoidal rule. **[6]**

x :	7.47	7.48	7.49	7.50	7.51	7.52
y :	1.93	1.95	1.98	2.01	2.03	2.06

OR

Q2) a) A function $f(x)$ is described by the following data: **[6]**

x	1	1.1	1.2	1.4	1.6	1.9	2.2
$f(x)$	3.123	4.247	5.635	9.299	14.307	24.759	39.319

Find numerical integration of the function in the limits from 1 to 2.2 using Simpson's $1/3^{rd}$ rule.

P.T.O.

b) Using Lagrange's formula of interpolation find $y(9.5)$ given: **[6]**

x	7	8	9	10
y	3	1	1	9

c) Find the first and second derivative of the function given below: **[5]**

x :	1.5	2.0	2.5	3.0	3.5	4.0
$f(x)$:	3.375	7.0	13.625	24.0	38.875	59.0

Q3) a) Solve for a positive root of $x^3 - 4x + 1 = 0$ by Regula Falsi method. **[6]**

b) Using Gauss-Elimination solve the following system: **[5]**

$$4.12x - 9.68y + 2.01z = 4.93$$

$$1.88x - 4.62y + 5.50z = 3.11$$

$$1.10x - 0.96y + 2.72z = 4.02$$

c) By method of least squares fit a straight line to the following data: **[6]**

x :	0	5	10	15	20
y :	7	11	16	20	26

OR

Q4) a) Fit a curve of the form $y = ax^2 + bx + c$ given the table: **[5]**

x :	10	20	30	40	50	60
y :	157	179	210	252	302	361

b) Solve $x^3 = 2x + 5$ for positive root by iteration method. **[6]**

c) Solve by Gauss-Seidel method, the following system: **[6]**

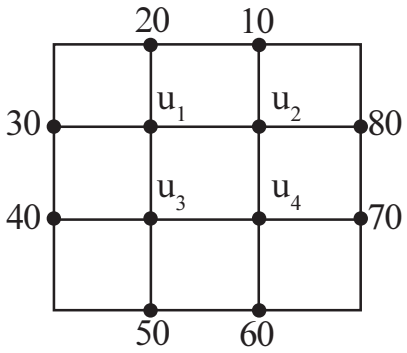
$$28x + 4y - z = 32$$

$$2x + 17y + 4z = 35$$

$$x + 3y + 10z = 24$$

Q5) a) Compute y at $x = 0.25$, by modified Euler's method given $\frac{dy}{dx}=2xy, y(0)=1$. **[8]**

b) Solve the equation $\frac{\partial^2 u}{\partial x^2}+\frac{\partial^2 u}{\partial y^2}=0$ for the following boundary values as given in the figure. **[8]**



OR

Q6) a) Compute y at 0.2 given $\frac{dy}{dx}+y+xy^2=0 \;\; y(0)=1$ by taking $h = 0.1$ by Runge-Kutta method of fourth order. **[8]**

b) Solve $\frac{\partial^2 u}{\partial x^2}+\frac{\partial^2 u}{\partial y^2}=-10(x^2+y^2+10)$ over the square mesh with sides $x = 0, y = 0, \; x = 3, y = 3$ with $u = 0$ on the boundary and mesh length 1 unit. **[8]**

SECTION - II

Q7) a) Maximize: $Z = 3x_1 + 2x_2 + 5x_3$

Subject to: $x_1 + 2x_2 + x_3 \leq 430$

$3x_1 + 2x_3 \leq 460$

$x_1 + 4x_2 \leq 420$

$x_1, x_2, x_3 \geq 0$

Use Simplex Technique. **[10]**

b) Write the dual of the following: **[6]**

Maximize: $Z = 2x_1 + 3x_2$

Subject to: $x_1 - 3x_2 \leq 3$

$3x_1 - x_2 \leq 10$

$x_1 + 4x_2 \leq 20$

$x_2 \leq 6$

with $x_1, x_2 \geq 0$

OR

Q8) a) Use Simplex technique to solve following LPP **[10]**

Maximize: $Z = 3x_1 + 2x_2$

Subject to: $x_1 + x_2 \leq 4$

$x_1 - x_2 \leq 2$

and $x_1, x_2 \geq 0$

b) Write dual of the following: **[6]**

Maximize: $Z = x_1 + 2x_2 + 3x_3$

Subject to: $x_1 + 2x_2 + 3x_3 \leq 15$

$2x_1 + x_2 + 5x_3 \leq 20$

$x_1 + 2x_2 + x_3 \leq 10$

with $x_1, x_2, x_3 \geq 0$

Q9) a) If $\Sigma f = 27, \Sigma fx = 91, \Sigma fx^2 = 359, \Sigma fx^3 = 1567, \Sigma fx^4 = 7343$, find first four moments about origin. Find A.M., S.D., μ_3 and μ_4, β_1 and β_2. **[6]**

b) Obtain regression lines for the following data: **[6]**

x	6	2	10	4	8
y	9	11	5	8	7

c) Mean and variance of Binomial distribution are 6 and 2 respectively find $p(r \geq 3)$. **[5]**

OR

Q10)a) If $p(r = 1) = 2p(r = 2)$ use Poisson distribution to find $p(r = 3)$ **[5]**

b) Probability of man aged 60 years will live for 70 years is $\frac{1}{10}$. Find the probability of out of 10 men selected at random. **[6]**

i) 2 will live for 70 years.

ii) at least 2 will live for 70 years.

c) Find coefficient of correlation for the following data: **[6]**

x	20	22	23	25	25	28	29	30	30	34
y	18	20	22	24	21	26	26	25	27	29

Q11)a) Define symmetric and skew symmetric tensors. Show that every tensor can be expressed as the sum of two tensors, one of which is symmetric and the other skew symmetric in a pair of covariant or contravariant indices. **[6]**

b) Determine the conjugate metric tensor in **[6]**

i) cylindrical and

ii) spherical polar coordinates.

c) Show that **[5]**

$[pq, r] = [qp, r]$; $\left\{ {}^{s}_{pq} \right\} = \left\{ {}^{s}_{qp} \right\}$.

OR

Q12)a) Determine whether each of the following quantities is a tensor. If so, state whether it is contravariant or covariant and give its rank. **[6]**

i) dx^k,

ii) $\frac{\partial \phi\left(x^1, x^2 \ldots x^N\right)}{\partial x^k}$.

b) Show that $\frac{\partial Ap}{\partial x^q}$ is not a tensor even though Ap is a covariant tensor of rank one. **[5]**

c) Prove that **[6]**

i) $[pq, r] = g_{rs} \left\{ {s \atop pq} \right\}$

ii) $\frac{\partial g_{pq}}{\partial x^m} = [pm, q] + [qm, p]$

Total No. of Questions : 12]

SEAT No. :

P2966

[Total No. of Pages : 2

[5058]-147
T.E. (Polymer Engineering)
POLYMER CHEMISTRY - II
(2008 Course) (Semester - II) (309367)

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 books.***
3) ***Figures to the right indicate full marks.***

SECTION - I

Q1) a) Write a note on curing reactions of UF and MF. Enlist their applications. **[8]**

b) Explain the commercial formulation of PF resin in detail. **[8]**

OR

Q2) a) Explain why silicone polymers are used in specialty applications. Describe their outstanding properties. **[8]**

b) Explain synthesis of UF and MF resin. **[8]**

Q3) a) Give the synthesis of vinyl ester resins and enlist its properties. **[8]**

b) Give the properties and applications of polyester resins. **[8]**

OR

Q4) a) Explain crosslinking reactions of unsaturated polyester resins and summaries the properties of cured product. **[8]**

b) Discuss the preparation of alkyds in detail. **[8]**

Q5) a) Write a note on synthesis of epoxy polymers. What is epoxy equivalent? **[9]**

b) Write a note on polyurethanes and their applications. **[9]**

OR

P.T.O.

Q6) a) Write a note on formulation of PU resin manufacture. **[9]**

b) Explain catalysts and hardeners for epoxy resin. Give reactions involved in curing. **[9]**

SECTION - II

Q7) a) Give synthesis and crosslinking of polymides. **[8]**

b) Explain how and why aliphatic and aromatic polyamides differ in terms of their properties. **[8]**

OR

Q8) a) Explain how polyamides are different from polyimides. Give structures based on various types of monomers. **[8]**

b) Give the properties and applications of polyimides. **[8]**

Q9) a) Give the synthesis, properties and applications of PPS. **[8]**

b) Based on the structure discuss the properties and applications of PPO. **[8]**

OR

Q10)a) Elaborate on membrane applications and required properties for polysulphone. **[8]**

b) Differentiate poly (ether-ketones) and poly (ether-ether-ketones). **[8]**

Q11)a) Draw and discuss smectic, nematic and cholesteric phases. **[9]**

b) Explain the synthesis of polyaniline. Explain why does it shows conductivity? **[9]**

OR

Q12)a) What do you understand by controlled release drug delivery? Explain its mechanism. **[9]**

b) Write a note on polymers in biomedical applications. **[9]**

Total No. of Questions : 12]

SEAT No. :

P2195

[Total No. of Pages : 3

[5058]-148

T.E. (Polymer Engineering)

INSTRUMENTATION AND PROCESS CONTROL

(2008 Course) (Semester-II) (309368)

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

Instructions to the candidates:

1) ***Answers to the two sections should be written in separate books.***
2) ***Draw neat diagrams wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data, if necessary.***
5) ***Use of logarithmic table, electronic pocket calculators is allowed.***

SECTION-I

Q1) a) Explain in detail Static and Dynamic Characteristics of Instruments. **[12]**

b) A temperature transducer has a span of 20-250°C. A measurement results in a value of 55°C for the temperature. Specify the error if the accuracy is- **[6]**

i) $\pm$ 0.5% full scale division,

ii) 0.75% of span and

iii) 0.8% of reading.

What is the possible temperature in each case?

OR

Q2) a) Explain the term Signal conditioning with at least one example in detail. **[6]**

b) Explain the following: **[12]**

Dynamic error, Environmental error, Observation error, Instrumental error, Minimization of error.

Q3) Explain with neat diagram any two Pressure Measurement Instruments. **[16]**

OR

P.T.O.

Q4) a) Explain the principle of Thermocouple, RTD, and Bimetallic thermometer. **[4]**

b) Describe in detail Pyrometers. **[12]**

Q5) Explain the importance of density and viscosity measurement in polymer industry and suggest one suitable method for each parameter. **[16]**

OR

Q6) Draw the diagram and explain principle, construction, working, advantages and disadvantages of venturimeter. **[16]**

SECTION-II

Q7) a) Explain significance of Process control and Differentiate between First Order system and second order system. **[10]**

b) Find out the response of same at time = 10, 15, 20, 25, 30 min. A thermometer which is observed to exhibit the first order dynamics with time constant of 15 sec, which is placed in bath at temperature of 50°C and after reaching steady state, temperature of bath linearly increases with time at 3°C/min. **[8]**

OR

Q8) a) A second order system is observed to exhibit an Under damped response giving the Ultimate Value = 20 and Minimum Value of the response = 10. Find the overshoot and Maximum Value of the response for damping coefficient ξ = 0.8, 0.4, 0.2, 0.1, 0.05. **[9]**

b) A thermometer which is observed to exhibit the first order dynamics with time constant of 10 sec, which is placed in bath at temperature of 50°C and after reaching steady state, it is suddenly placed into hot water at 75°C. Find the response of the thermometer at time = 5, 10, 15, 20, 25, 30 sec. **[9]**

Q9) a) Describe standard block diagram and standard symbols used for closed loop transfer function. **[6]**

b) Derive the necessary expression for overall transfer function for change in set point and change in load. **[10]**

OR

Q10)a) Explain Proportional and Derivative Control action. **[8]**

b) If the Characteristics equation for given feedback loop control system is given by $s^3 + 3s^2 (1 + Kc) s + Kc = 0$. Determine the value of Gain which causes just Instability and also determine the location of pair of the roots for given control system. **[8]**

Q11)Explain the following: **[16]**

a) Cascade Control of Liquid Level in a Tank.

b) Digital Control System.

c) Control Tuning.

OR

Q12)Write a note on: **[16]**

a) Control of Polymer Processing,

b) Programmable Logic Control.

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Total No. of Questions : 12]

SEAT No. :

P2967

[Total No. of Pages : 2

[5058]-149
T.E. (Polymer)
POLYMER PROCESSING OPERATION - I
(2008 Pattern) (Semester - II)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) Explain extrusion process along with the basic operation and applications. **[9]**

b) Explain the general features of a barrier screw and explain the constructional features of barrier section. Also give the advantages of a barrier screw over regular single screw. **[9]**

OR

Q2) a) Explain the effect of channel depth and helix angle in case of single screw extruder. **[9]**

b) Explain extruder die characteristics with a neat sketch. **[9]**

Q3) a) With neat sketches, explain offset dies used for pipe extrusion. **[8]**

b) With a neat sketch, explain the caterpillar haul off system. **[8]**

OR

Q4) a) Explain with any example the effect of processing parameters and their effect on product quality. **[8]**

b) Explain PVT diagram and injection moulding cycle. **[8]**

Q5) a) Give trouble shooting in injection molding and their remedies. **[8]**

b) Explain Orientation and its importance during injection moulding and its effects. How is this orientation different than the extrusion of blown film. **[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) Explain down stream equipment used for cast film extrusion. **[8]**

P.T.O.

SECTION - II

Q7) a) Explain Gas assist injection moulding and its advantages over conventional injection molding. **[9]**

b) Explain injection moulding of thermosets with advantages and disadvantages it offers. **[9]**

OR

Q8) a) Explain dip coating, slush moulding and polymer casting process in short. **[9]**

b) Explain injection moulding of elastomers. **[9]**

Q9) a) Explain with neat sketches coil and cut off unit for coiled extrusions. **[8]**

b) Give the down stream equipments for foamed products. **[8]**

OR

Q10)a) Explain extrusion process of hollow core panel and sandwich panel. **[8]**

b) Explain extrusion of cellular/foamed plastic products. **[8]**

Q11)a) Give the effect of bulk factor, Flow properties, Cure time, temperature and pressure on compression moulding cycle. **[8]**

b) Write a note on DMC and SMC giving some examples. **[8]**

OR

Q12)a) Explain compression molding process and its types. **[8]**

b) Explain Basic principle and working of transfer molding with advantages & limitation of the process. **[8]**

Total No. of Questions :12]

SEAT No. :

P1599

[Total No. of Pages :3

[5058] - 15

T.E. (Mechanical)

INDUSTRIAL ENGINEERING AND TECHNOLOGY MANAGEMENT

(2008 Course) (Semester - I)

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

Instructions to candidates:

1) ***Answer any 03 questions from each section.***
2) ***Answer 03 questions from Section I and 03 questions from Section II.***
3) ***Answers to the two sections should be written in separate books.***
4) ***Neat diagram must be drawn wherever necessary.***
5) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
6) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) What is meant by scientific management? Explain in brief various functions of management. **[8]**

b) Explain the role of material handling principles in improving the productivity of a firm. **[8]**

OR

Q2) a) Define the plant layout & plant location. What are various factors Involved in Selection of site for good plant? **[8]**

b) Briefly discuss various leadership styles adopted in industry. **[8]**

Q3) a) Explain the concept of industrial engineering and its importance. **[8]**

b) Discuss the two handed process chart in industrial engineering. **[4]**

c) What are therbligs? Give any six therbligs with symbols. **[4]**

OR

P.T.O.

Q4) a) Define work study. Explain the procedure for work study. **[8]**

b) Explain productivity improvement methods for organization. **[4]**

c) Write a note on PMTS. **[4]**

Q5) a) A manufacturing company requires 7500 units per year. Ordering cost is Rs. 125 per order and carrying cost is 20%. Purchase price per unit is Rs. 35. **[6]**

Determine:

i) EOQ

ii) Optimum number of orders

iii) Total cost including acquisition of material

b) What do you understand by Break-even analysis? Explain. **[6]**

c) Explain the purpose of inventory control. **[6]**

OR

Q6) Write notes on (Any Three): **[18]**

a) ABC Analysis.

b) SIMO Chart.

c) Aggregate Planning.

d) Job evaluation merit rating.

SECTION - II

Q7) a) Explain 'Technology Management' and its significance. **[8]**

b) Explain the role of Government in the development of Technology. **[8]**

OR

Q8) a) Differentiate between 'Product Technology' and 'Process Technology'. **[5]**

b) Write a short note on Forms of Technology. **[5]**

c) Discuss the various important steps in product development. **[6]**

Q9) a) What do you mean by Technological Forecasting? Explain various techniques used in Technology Forecasting. **[8]**

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

i) Growth cures

ii) Technology Monitoring

OR

Q10)a) Explain the following in brief **[10]**

i) Technological Leadership

ii) Mission flow diagram

b) What do you mean by Foreign Direct Investment (FDI). **[6]**

Q11)a) Explain the steps involved in formulating technology planning. **[6]**

b) Explain the various key principles for developing technology strategy. **[6]**

c) Explain the concept of S-Shaped curve of Technology Adoption. **[6]**

OR

Q12)Write short notes on the following: (any three) **[18]**

a) Technology diffusion

b) Technology transfer and its categories

c) Status of IPR Activities in India

d) Technology assessment

Total No. of Questions :12]

P2968

SEAT No. :

[Total No. of Pages :2

[5058]-150
T.E.(Polymer)
POLYMER RHEOLOGY
(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) ***Anwer 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 to calculator is allowed.***
6) ***Assume suitable data if necessary***

SECTION-I

Q1) a) Explain different types of fluids with atleast one example of each. **[10]**

b) Explain normal stresses with any 2 examples. **[8]**

OR

Q2) a) Explain and derive voigt model with diagram. **[9]**

b) Give an example to explain stress and strain tensor. **[9]**

Q3) a) Explain maxwell model with proper diagram. **[8]**

b) Derive and explain continuity equation. **[8]**

OR

Q4) a) Explain stress relaxation, relaxation modulus and creep compliance. **[8]**

b) Explain the effect of copolymerization, fillers and plasticizer on viscosity. **[8]**

Q5) a) Explain the effect of pressure, crystallinity and molecular weight on viscosity. **[8]**

b) Explain WLF equation and what information can be obtained from it. **[8]**

OR

Q6) a) Explain the effect of crosslinking, temperature 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) When does turbulent flow arise and how can it be determined.Also explain what is turbulence dumpling with an eg. **[9]**

OR

Q8) a) Explain cone and plate Rheometer and what information can be obtained from this rheometer. **[9]**

b) Explain the swelling due to shear stresses and swelling due to tensille stresses. What are the factors that influence this effect and what are the effects due to swelling. **[9]**

Q9) a) Explain Ryan Johnson criterion with significance. **[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 Rheology in regards compression and transfer moulding. **[8]**

OR

Q12 a) What is the significance of extrusion process and explain the rheology during extrusion of film and sheet. **[8]**

b) Explain how flow equation are applicable for any extrusion process.What are the parameters that have effect on flow properties. **[8]**

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Total No. of Questions :12]

SEAT No. :

P1663

[Total No. of Pages :4

[5058] - 151

T.E. (Computer)

DATABASE MANAGEMENT SYSTEMS

(2008 Pattern) (Semester - I) (310241)

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.***
4) ***Answers to the two sections should be written in separate answer books.***
5) ***Answer any three questions from each section.***

SECTION - I

Q1) a) Explain database languages. **[4]**

b) Explain the difference between the two-tier and three-tier client server architecture. **[4]**

c) With the help of neat diagram, explain database system structure and describe its various components. **[10]**

OR

Q2) a) Explain significant difference between File Processing and DBMS. **[8]**

b) Explain in detail the different levels of abstraction. **[4]**

c) What is difference between specialization and generalization? **[6]**

Q3) a) Write short note on Dynamic and Embedded SQL. **[8]**

b) Explain the need for following: **[4]**

i) View

ii) Foreign key

P.T.O.

c) Consider following database: **[4]**

Student (Roll_no, Name, Address)

Subject (Sub_code, Sub_name)

Marks (Roll_no, Sub_code, marks)

Write following queries in SQL:

i) Find average marks of each student, along with the name of student.

ii) Find how many students have failed in the subject "DBMS".

OR

Q4) a) Write short note on Stored procedures and triggers. **[6]**

b) Explain insert, update and delete operations with respect to views. **[4]**

c) Consider the relational database **[6]**

dept (dept_no, dname, loc, mgrcode)

emp (emp_no, ename, designation)

project (proj_no, proj_name, status)

dept. and emp. are related as 1 to many.

Project and emp are related as 1 to many.

Write queries for the following:

i) Give the names of employees who are working on 'Blood Bank' project.

ii) Give the name of managers from 'MARKETING' department.

iii) Give all the employees working under status 'INCOMPLETE' projects.

Q5) a) Specify Armstrong's axioms. Use Armstrong's axioms to prove the soundness of decomposition rule. **[8]**

b) Explain why 4NF is more desirable then BCNF. Rewrite the definition of 4NF and BCNF using the notions of domain constraints. **[8]**

OR

Q6) a) Describe the concept of transitive dependency and explain how this concept is used to define 3NF. **[8]**

b) Write short note on Normalization. **[8]**

SECTION - II

Q7) a) Explain in detail, the use of B-tree as an indexing technique. Compare B tree and B^+ (B plus) tree. **[8]**

b) Explain equivalence rules for query optimization. **[8]**

OR

Q8) a) What are the steps involved in query processing? Explain each in brief. **[10]**

b) Define and explain **[6]**

i) Dense index

ii) Multilevel index

Q9) a) Explain the concept of transaction. Describe ACID properties for transaction. **[8]**

b) When do deadlock happen? How to prevent them and how to recover if deadlock takes place. **[8]**

OR

Q10)a) Explain shadow paging recovery scheme. **[8]**

b) Explain two phase locking protocol. How does it insure serializability? **[8]**

Q11)a) What is data mining? Why it is required? Explain with example. **[6]**

b) Explain different pointer swizzling techniques. **[8]**

c) Explain: Object identity and pointers. **[4]**

OR

Q12)a) Write a short note on any two: **[12]**

i) Data ware house

ii) Need of backup and replication.

iii) Persistent programming language

b) Explain advantages and disadvantages of Distributed Database Systems. **[6]**

Total No. of Questions : 12]

SEAT No. :

P1664

[Total No. of Pages :2

[5058] - 152
T.E. (Computer Engg.)
DATA COMMUNICATION
(2008 Pattern) (Semester-I) (310242)

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

Instructions to the candidates:

1) ***Solve Q1 or 2Q, 3Q or 4Q, 5Q or Q6 from section I and Q7 or Q8, Q9 or Q10, Q11 orQ12 from section II.***
2) ***Draw diagram wherever necessary.***
3) ***Solve section on separate answersheet.***
4) ***Assume suitable data, wherever necessary.***

SECTION -I

Q1) a) Explain QAM analog modulation technique with constellation diagram. **[6]**

b) Explain statistical TDM with diagram. What are issues in TDM? **[6]**

c) Explain simplified communication system and mention various parts of communication system. **[6]**

OR

Q2) a) Explain FSK, PSK and ASK technique. **[10]**

b) Explain WDM and CDMA multiplexing technique. **[8]**

Q3) a) Explain with block diagram PCM Encoder and decoder. **[8]**

b) Describe adaptive quantization with forward estimation and backward estimation. **[8]**

OR

Q4) a) Explain effect of Gaussian noise on digital transmission. **[8]**

b) What is uniform quantization? What is the drawback in it.How to overcome this drawback? **[8]**

Q5) a) Write short note on linear block codes. **[8]**

b) Describe Shannon's theorem on channel capacity. Explain with suitable example. **[8]**

OR

P.T.O.

Q6) a) What is ARQ? Explain in short go-back-n and selective repeat methods. **[8]**

b) Write short note on CRC. Explain why error detection and correction is required. **[8]**

SECTION - II

Q7) a) Explain OSI Model of communication. **[6]**

b) Explain with suitable diagram PSTN. **[6]**

c) Describe in brief SONET. **[6]**

OR

Q8) a) Write short note on (any 2) **[6]**

i) Ethernet

ii) Wireless LAN

iii) Virtual LAN

b) Explain with suitable example network topologies? **[6]**

c) Explain ATM in detail. **[6]**

Q9) a) Explain Twisted Pair. Coaxial and Fiber-optic cables. **[8]**

b) Differentiate between Packet switching and circuit switching. **[8]**

OR

Q10)a) Explain the following hardware components: **[8]**

i) Repeaters,

ii) hubs,

iii) NICs,

iv) Bridges and Switches

b) Explain wireless transmission media with suitable example. **[8]**

Q11)a) Explain various Data link layer design issues. **[8]**

b) Explain stop and wait protocol. **[4]**

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

OR

Q12)a) Explain Sliding Window protocol with suitable diagram **[8]**

b) Explain ALOHA. **[8]**

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Total No. of Questions : 12]

SEAT No. :

P1665

[Total No. of Pages : 3

[5058]-153

T.E. (Computer Engineering)

MICROPROCESSORS AND MICROCONTROLLERS

(2008 Course) (Semester-I) (310243)

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

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 from section I and Q7 or Q8, Q9 or Q10, Q11 or Q12 from section II.***
2) ***Answers to the two sections should be written in separate answer books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right side indicate full marks.***
5) ***Assume suitable data if necessary.***

SECTION-I

Q1) a) Explain the functions of the following pins of Pentium Processor: **[10]**

i) RESET ii) BE7-BE0

iii) INIT iv) KEN

v) FERR

b) With the help of neat block diagram explain architecture of Pentium processor. **[8]**

OR

Q2) a) Compare 80386, 80486 & Pentium based on architectural features. **[10]**

b) Explain the following terms of Pentium when operating in real mode: **[8]**

i) Addressable Space

ii) Segmentation

iii) Registers supported

iv) New instructions (give any two)

Q3) a) What is significance of contents of EAX, EDX, EIP & CS on reset? **[8]**

b) Describe different 4 addressing modes of Pentium with suitable examples. **[8]**

OR

P.T.O.

Q4) a) Describe following instructions: **[8]**

i) XADD ii) SWAPB

iii) BTC iv) WBINVD

b) With the help of neat diagram explain non-pipelined read bus cycle in Pentium. **[8]**

Q5) a) What are privileged instructions? Give two examples. **[8]**

b) Describe PDE & PTE format. **[8]**

OR

Q6) a) Describe call gate mechanism in detail. Draw the related descriptor format. **[8]**

b) Differentiate between IVT & IDT. **[8]**

SECTION-II

Q7) a) Difference between virtual mode and protected mode. **[8]**

b) What is the task? Explain TSS in detail. **[8]**

OR

Q8) a) What is multitasking? Which registers & descriptors are involved to support this features in Pentium. **[8]**

b) i) What are the different types of exceptions? Explain by giving example of each.

ii) What are error codes? Their use?

[8]

Q9) a) What is Program Status Mode (PSW)? Describe its format. **[8]**

b) Draw and explain architecture of 8051 microcontroller. **[10]**

OR

Q10)a) What is the function of EA, ALE, ES, PSEN TOT, XTAL, INT1, TXD and RXD pins? **[10]**

b) Explain features of 8051 Microcontroller. **[8]**

Q11)a) Draw & explain format of SCON & SBUF also explain serial port programming of 8051 microcontroller. **[8]**

b) List and explain operating modes of Timer of 8051. **[8]**

OR

Q12)a) Draw and explain architecture of 8096 microcontroller. **[8]**

b) Explain the following instructions in 8051: **[8]**

i) MOV A, Rn

ii) DIV AB

iii) SWAP A

iv) MOV DPTR, #2550H

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Total No. of Questions : 12]

SEAT No. :

P1666

[Total No. of Pages : 4

[5058]-154
T.E. (Computer)
DIGITAL SIGNAL PROCESSING
(2008 Course) (Semester - I)

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

Instructions to the candidates:

1) ***Answers to the two sections should be written in separate answer-books.***
2) ***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) Define and calculate nyquist rate for an analog signal, **[6]**

$x_a(t) = 3\cos 50\pi t + 10 \sin 300 \pi t - \cos 100\pi t$.

b) Define linear convolution. Explain different properties of convolution with example. **[10]**

OR

Q2) a) Obtain a linear convolution of DT signal **[8]**

$x(n) = h(n) = \{\underset{\uparrow}{1}, 2, -1\}$.

b) State static, dynamic system properties of a DT system and test it for

i) $y(n) = x(2n)$

ii) $y(n) = x^2(n)$

[8]

Q3) a) Find the Fourier transform of the following: **[8]**

i) $\partial(n-1)+\partial(n+1)$

ii) $\partial(n+2)-\partial(n-2)$

b) Compare DFT with DTFT. State and prove linearity property of DFT. **[8]**

OR

P.T.O.

Q4) a) Obtain 2-point and 4-point DFT for a sequence $x(n)=2\,\partial(n)-\frac{3}{2}\partial(n-1)$. **[8]**

b) Obtain DTFT of left handed exponential signal $x(n)=a^{-n}u(-n-1)$. **[8]**

Q5) a) Define ROC of Z transform. State significance of ROC. Derive the relationship between Z transform and fourier transform. **[8]**

b) Compare DIF FFT algorithm with DIT FFT algorithm. Draw basic butterfly structure for both. **[10]**

OR

Q6) a) Obtain the inverse z transform using residue method where

$$X(z)=\frac{1}{(z-1)(z-3)}.$$ **[8]**

b) Determine the Z-transform of the following: **[10]**

i) $x(n)=n(-1)^n u(n)$

ii) $x(n)=n^2u(n)$

SECTION - II

Q7) a) Find the difference equation satisfying the input and output of an LTI system. **[8]**

$$H(z)=\frac{(1+z^{-1})^2}{\left(1-\frac{1}{2}z^{-1}\right)\left(1+\frac{3}{4}z^{-1}\right)}.$$

b) Determine impulse response of a system:

$$y(n)=-3y(n-1)-2y(n-2)+2x(n)+x(n-1)$$ **[8]**

OR

Q8) a) Explain the method of simple geometric interpretation to obtain the frequency response of DT system. **[8]**

b) Determine H(z) and draw a pole zero plot for a system. **[8]**

$$y(n)+\frac{3}{4}y(n-1)+\frac{1}{8}y(n-2)=x(n)+x(n-1)$$

Q9) a) Explain Gibb's phenomenon associated with FIR filter design. What are the desirable features of window function to improve the frequency response? **[10]**

b) Explain the design steps of FIR filter using rectangular window. State the advantages of windowing method. **[8]**

OR

Q10)a) What are the different methods to design IIR filters? How stable analog filter is converted into stable digital filter? Explain the concept of frequency warping and prewarping? **[10]**

b) Design the digital IIR filter with a 3 dB bandwidth of 0.2π by using BLT method. The transfer function of $H(s)=\frac{\Omega c}{s+\Omega}$ where Ω_c is the 3 dB bandwidth of analog filter. **[8]**

Q11)a) Explain the cascade form structure of FIR filter and realize the following system function for the same. **[10]**

$$H(z)=\left(1+\frac{1}{2}z^{-1}+z^{-2}\right)\left(1+\frac{1}{4}z^{-1}+z^{-2}\right).$$

b) Compare DSP processor and general purpose processors. **[6]**

OR

Q12)a) The transfer function of discrete time causal system is given by **[10]**

$$H(z)=\frac{1-z^{-1}}{(1-0.5z^{-1})(1+0.3z^{-1})}$$

Draw cascade and parallel realization of IIR filter.

b) Draw a direct form - I IIR filter structure for: **[6]**

$$H(z)=3+\frac{4z}{(z-0.5)}-\frac{2}{(z-0.25)}.$$

Total No. of Questions :12]

SEAT No. :

P1667

[Total No. of Pages :5

[5058] - 155

T.E. (Computer Engg.)

THEORY OF COMPUTATION

(2008 Pattern) (Semester - I)

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

Instructions to the candidates:

1) ***Attempt Q.1 or 2, Q.3 or 4, Q.5 or 6, Q.7 or 8, Q.9 or 10, Q.11 or 12.***
2) ***Answer to the two sections should be written is 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) Design a DFA accepting language. **[8]**

L = {w | w is of the form x01 y for some strings x and y consisting of 0's and 1's only}

b) Design a Mealy machine that accepts strings endings with '00' and '11'. **[8]**

c) Define following terms with example. **[2]**

i) Symbol

ii) Alphabet

OR

Q2) a) Define following terms with examples. **[8]**

i) DFA

ii) NFA

iii) Moore Machine

iv) Mealy Machine

P.T.O.

b) Consider the following NFA with ∈ transitions. Convert this NFA to DFA. **[8]**

	∈	a	b	c
p	-	p	q	r
q	P	q	r	-
r	P	r	-	p

c) Prove that $(a + b)^* = (a + b)^* \cdot (a + b)^*$ **[2]**

Q3) a) Find Regular Expressions for the given sets: **[8]**

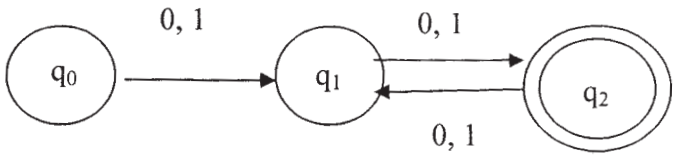
i) The set of all strings over {a, b} which end in ab.

ii) The set of all strings over {a, b} which start with ab and end with ba.

iii) The set of all strings over {0, 1} which contains 100 as substring.

iv) If L (r) = {a, c, ab, cb, abb, cbb, abbb,.....} what is r?

b) Consider the following transition diagram and convert it to its equivalent regular expression. **[8]**



OR

Q4) a) Construct a DFA for the given Regular Expression. **[8]**

$(11 + 0)^* (00 + 1)^*$

b) Write a short note on Applications of Regular Expressions. **[4]**

c) For the following regular expression, draw an FA recognizing the corresponding language. r = (1 + 10)*0 **[4]**

Q5) a) Describe the language generated by grammars. **[8]**

i) $S \rightarrow aA/\ bC/\ b$

$A \rightarrow aS/\ bB$

$B \rightarrow aC/\ bA\ /a$

$C \rightarrow aB\ /\ bS$

ii) $S \rightarrow bS/\ aA\ / \in$

$A \rightarrow aA/\ bB\ /b$

$B \rightarrow bS$

b) What do you mean by ambiguous grammar? **[8]**

Let G be a grammar:

$S \rightarrow aB|bA$

$A \rightarrow a\ |\ aS|bAA$

$B \rightarrow b\ |\ bS|aBB$

For the string "aaabbabbba" find:

Leftmost and Rightmost derivations.

Also draw derivation trees.

OR

Q6) a) Find Right Linear Grammar for given Left Linear Grammar. **[8]**

$S \rightarrow B1|\ A0|C0$

$A \rightarrow C0\ |\ A1|B1|0$

$A \rightarrow B1|1$

$C \rightarrow A0$

b) Consider the grammar G with productions. Find an equivalent grammar in CNF. **[8]**

$S \rightarrow aB/bA$

$A \rightarrow a/aS/bAA$

$B \rightarrow b/bS/aBB$

SECTION - II

Q7) a) Define following: **[10]**

i) ID of PDA.

ii) PDA by empty stack.

iii) DPDA V/S NPDA.

iv) Two stack PDA with diagram.

v) PDA by final state.

b) Design a PDA to accept the language S + S * S. Simulate the working of above PDA for String. 4 + 4*4. **[8]**

OR

Q8) a) Design a PDA to check the well formedness of paranthesis. **[6]**

b) Construct PDA by null store for following grammar G. **[6]**

$S \rightarrow CS1/A$

$A \rightarrow 1AC/S/\varepsilon$

c) Give grammar for following PDA operations. **[6]**

$\delta(q_0, o, Z) = (q_0, AZ)$

$\delta(q_0, 1, A) = (q_0, AA)$

$\delta(q_0, o, A) = (q_1, \varepsilon)$

Q9) a) Design a TM to accept the string which ends in 'abb' where L(M) = $\{W \in \{a, b\}^* / W \text{ ends in abb}\}$. Simulate with example. **[8]**

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

i) Solvability.

ii) Semisolvability.

iii) Unsolvability.

iv) Formal difinition of T.M.

OR

Q10)a) Design a post machine for $L(M)=\{a^n b^{2n} / n>,0\}$ **[4]**

b) Explain following: **[8]**

i) Programming techniques to TM.

ii) Extension to T.M.

c) Design a T.M. to accept the language $L(M)=\{a^n b^n / n \geq 1\}$ **[4]**

Q11)a) Write short note on following: **[8]**

i) Post correspondence problem.

ii) Universal Turing machine

b) State the following: **[8]**

i) Reduction with example.

ii) Totality problem with example.

OR

Q12)a) Write short note on following: **[8]**

i) Modified PCP problem.

ii) Recursive and recursively Enumerable language.

b) State the halting problem. Prove that halting problem of T.M. is undecidable with the help of example. **[8]**

Total No. of Questions : 12]

SEAT No. :

P1668

[Total No. of Pages : 2

[5058]-156
T.E.(Computer)
PRINCIPLES OF PROGRAMMING LANGUAGES
(2008 Pattern) (Semester-II)

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

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 from Section I and Q.7 or Q.8,Q.9 or Q.10, Q.11 or Q.12 from Section II.***
2) ***Answer to the two sections should be written in separate answer books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right side indicate full marks.***
5) ***Assume Suitable data if necessary.***

SECTION-I

Q1) a) What are characteristics of good programming language? **[8]**

b) Explain parallel programming and concurrent programming paradigms. **[8]**

OR

Q2) a) Explain the control flow statements in C. **[8]**

b) Describe with examples implementation and storage representation of data types. **[8]**

Q3) a) Explain the basic elements of PASCAL programming language. **[8]**

b) Describe desirable and undesirable characteristics of procedural programming. **[8]**

OR

Q4) a) Which are the different parameter passing technique in PASCAL? **[8]**

b) Compare and differentiate C and PASCAL. **[8]**

Q5) a) Explain the socket programming in Java. **[8]**

b) Explain the multithreading with using Thread class and Runnable interface. **[10]**

OR

Q6) a) Explain the method overloading, overriding, dynamic method dispatching. **[4]**

b) Explain the exception handling in java.

c) Write short note on JDBC. **[6]**

P.T.O.

SECTION-II

Q7) a) Describe the structure of C# program. **[8]**

b) Explain the various components of . NET framework. **[8]**

OR

Q8) a) Explain with example delegates & event handlers. **[8]**

b) Explain multithreading in C#. **[8]**

Q9) a) Explain resolution and unification in Prolog. **[6]**

b) How goal is resolved in Prolog. **[6]**

c) What is cut operator in PROLOG? **[4]**

OR

Q10)a) Explain the facilities and deficiencies of Prolog. **[8]**

b) What are different searching techniques supported by logic programming? **[8]**

Q11)a) Explain free and bound variables, reductions in functional programming. **[10]**

b) What are different applications of Functional Programming? **[8]**

OR

Q12)a) Explain the expression evaluation in functional programming. **[10]**

b) Explain the carcdr, nthcdr, map, cons, append, reverse. **[8]**

✓ ✓ ✓

Total No. of Questions :12]

SEAT No. :

P1669

[Total No. of Pages :3

[5058] - 157

T.E. (Computer Engineering)

COMPUTER NETWORKS

(2008 Course) (Semester - II) (310250)

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

Instructions to the candidates:

1) ***Answer 03 questions from Section I and 03 questions from Section II.***
2) ***Answers to the two sections should be 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) List advantages and disadvantages of having international standards for network protocols? **[8]**

b) Why does ATM use small, fixed length cells? **[8]**

OR

Q2) a) Discuss Domain Name system. **[8]**

b) Write a note on TELNET. **[8]**

Q3) a) What is congestion? How it can be tackled using various algorithms. Discuss. **[6]**

b) Discuss TCP header. How TCP/IP model is different than ISO-OSI model. **[6]**

c) Explain transactional TCP. How it is different from stream control transmission protocol. **[6]**

OR

P.T.O.

Q4) a) Why does the maximum packet lifetime, 'T', have to be large enough. Explain. **[4]**

b) Discuss advantages and disadvantages of credits versus sliding window protocol. **[6]**

c) Discuss TCP connection management modelling in detail. Discuss advantages and disadvantages of Nagle's algorithm in case of congestion. **[8]**

Q5) a) Discuss QoS in network management? How the QoS can be maintained. **[8]**

b) What is scheduling? Discuss any two scheduling techniques in detail. **[8]**

OR

Q6) a) Discuss integrated services in detail. **[8]**

b) Discuss Token - bucket algorithm. How it is better than leaky bucket? **[8]**

SECTION - II

Q7) a) What is concatenated virtual circuit? Explain with suitable example? **[8]**

b) Discuss Tunneling as a part of connecting different Networks. **[8]**

OR

Q8) a) A network on the internet has a subnet mask of 255.255.240.0. What is the maximum number of hosts it can handle? Justify. **[4]**

b) What are the different ways with which the network can differ? **[6]**

c) Discuss Classless Inter Domain Routing (CIDR). **[6]**

Q9) a) What are the major classes of Routing algorithms? Discuss in detail. **[6]**

b) Discuss shortest path routing. **[6]**

c) Discuss Border Gateway Protocol (BGP). **[6]**

OR

Q10)a) Elaborate Multiple Access with Collision Avoidance (MACA) and MACAW. **[8]**

b) Discuss and compare distance vector Algorithm with link state routing. **[4]**

c) Explain IPV_6 internet protocol. **[6]**

Q11)a) Explain **[8]**

i) MPLS

ii) ATM

b) Write short note on PPP protocols. **[8]**

OR

Q12)a) Explain High-level Data link control protocol with its frame format. **[8]**

b) What do you mean by networking devices? What are they? Enlist and explain. **[8]**

Total No. of Questions : 12]

SEAT No. :

P1670

[Total No. of Pages : 3

[5058]-158

T.E. (Computer Engineering)

SYSTEMS PROGRAMMING AND OPERATING SYSTEMS

(2008 Course) (Theory) (Semester - II)

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) Draw flow chart for single pass macro processor to handle definitions inside definitions. **[10]**

b) Differentiate between literal and immediate operand. **[6]**

OR

Q2) a) Explain the data structures required for 2 Pass Assembler. **[10]**

b) Define Macro. What are the advantages of macro facility? How they are different from functions? **[6]**

Q3) a) Explain in brief compile and go scheme. What are advantages and disadvantages of it. **[10]**

b) What is the need of DLL? How dynamic linking can be done with or without import? **[6]**

OR

Q4) a) Explain following terms: **[8]**

i) Subroutine Linkage.

ii) Relocation.

iii) Callback function.

iv) Overlay.

b) With the help of diagram explain the general loader scheme. **[8]**

P.T.O.

Q5) a) Describe the various features of UNIX OS. **[6]**

b) List out different structures of operating system? Describe each of them. **[12]**

OR

Q6) a) Explain different scheduling methods of processor. **[12]**

b) What are system calls? Enlist major category of system calls. **[6]**

SECTION - II

Q7) a) Implement a solution to bounded buffer producer/consumer problem using Monitor. **[8]**

b) Explain the necessary conditions for occurrence of deadlock. **[4]**

c) What is critical region? Explain in detail. **[6]**

OR

Q8) a) Explain message passing mechanism for synchronization. **[6]**

b) Explain how mutual exclusion is achieved with hardware support using special machine instructions. State the advantages and disadvantages of using special machine instruction approach. **[8]**

c) What is Roll back? List the difficulties that may arise when a process is rolled back as a result of deadlock. **[4]**

Q9) a) Consider the following address register with 100 bytes page.

0100, 0432, 0101, 0612, 0102, 0103, 0104, 0451, 0256, 0611, 0102, 0103, 0104, 0610, 0103, 0234, 0104, 0321, 0613.

Calculate page faults:

i) LRU

ii) FIFO

iii) Optimal Frame size is 3.

Specify which algorithm is better? **[10]**

b) State and explain different memory management requirements. **[6]**

OR

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

i) Lazy swapper.

ii) Thrashing.

iii) Working set model.

iv) Compaction.

b) Compare the different memory management techniques on their strengths and weaknesses. **[8]**

Q11)a) Explain concept of I/O buffer. **[8]**

b) Describe the 3 methods of record blocking with the help of neat diagrams. **[8]**

OR

Q12)a) Describe any four types of file organizations. **[8]**

b) The requested tracks in the order received are 55, 58, 39, 18,90, 160, 150, 38, 184. Starting track is 100. Perform the computation for the following disk scheduling algorithm: **[8]**

i) SSTF

ii) FCFS

iii) C-SCAN

Total No. of Questions : 12]

SEAT No. :

P1671

[Total No. of Pages : 2

[5058]-159

T.E. Computer Engg.

FINANCE AND MANAGEMENT INFORMATION SYSTEM

(2008 Course) (Theory) (310251) (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) ***Assume suitable data, if necessary.***

SECTION-I

Q1) a) Explain the term MIS and different approaches to management process. **[10]**

b) Explain the evolution of management thoughts with suitable examples. **[8]**

OR

Q2) a) Define Quality with suitable example and explain concept of quality management . **[10]**

b) Explain different skills required by managers at different levels of management. **[8]**

Q3) a) Explain uses of different financial analysis and ratio analysis in detail. **[8]**

b) What are benefits and losses of different types of takeovers, explain in brief. **[8]**

OR

Q4) a) Explain benefits and challenges with private and public limited companies. **[8]**

b) What are significance of Time value of money and Corporate Security? **[8]**

Q5) a) What is meant by knowledge management system? What are uses of it? **[8]**

b) Explain applications of various information systems for business operations. **[8]**

OR

P.T.O.

Q6) a) What is Management Information System (MIS)? Explain the design process of MIS? **[8]**

b) What is meant by decision making? Explain the steps involved in decision making. **[8]**

SECTION-II

Q7) a) Explain the process of payment making in E-Commerce system in detail. **[8]**

b) Describe Enterprise portal in detail with suitable example. **[8]**

OR

Q8) a) Explain E-business, its characteristics and drawbacks in detail. **[8]**

b) Explain Security policy and goals of security in e-business. **[8]**

Q9) a) Explain the functions of Business Process Outsourcing, with example? **[8**

b) What is ERP? How ERP helps organization to be ahead of its competitors? **[8]**

OR

Q10)a) Explain the cultural and political challenges involved in global IT management. **[8]**

b) What are objectives and benefits of CRM? Also explain drawbacks fo CRM. **[8]**

Q11)a) How encryption is used as a tool for security management? Explain with example. **[10]**

b) What is Right to informaton act? Explain in detail. **[8]**

OR

Q12)a) What are different Cyber crimes in an organization? Explain with suitable examples. **[10]**

b) What are challenges with right to information act (RTI)? Explain in brief. **[8]**

❖ ❖ ❖

Total No. of Questions : 12]

SEAT No :

P1600

[Total No. of Pages : 6

[5058]-16

T.E. (Mechanical Engineering)

MACHINE DESIGN - II

(2008 Course) (Semester - II) (302047)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) 10 KW, 720 r.p.m. electric motor is directly coupled to a shaft of 25 mm diameter, which is supported by two cylindrical roller bearings. The shaft transmits power to another line shaft through the flat pulley of 250 mm diameter which is placed mid-way between the two bearings. The coefficient of friction between the belt and pulley is 0.3, while angle of lap is 180°. The belt is vertical. The over load factor is 1.75. If the expected life of bearing is 76,000 hours, select the bearing from manufacturer's catalogue. **[12]**

Use the following data:

Bearing No.	NU 2205	NU 2305
Basic Dynamic Capacity 'C' kN	15.99	31.39

b) Discuss equivalent dynamic load and load life relationship for rolling contact bearings. **[4]**

OR

P.T.O.

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

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

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

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

Q3) The following data is given for a 360° hydrodynamic bearing: **[16]**

- Radial Load =3.2 kN
- Journal diameter =50 mm
- Bearing length =50 mm
- Journal speed =1490 r.p.m.
- Radial clearance =50 microns
- Viscosity of lubricant =25 cP
- Density of lubricant =860 kg/m^3
- Specific of lubricant =1.76 kJ/kg^{0}C

Assuming that the total heat generated in the bearing is carried by the total oil flow in the bearing. calculate:

a) the minimum oil-film thickness;
b) the coefficient of friction;
c) the power lost in friction;
d) the total flow rate of lubricant in *l* / min;
e) the side leakage; and
f) the temperature rise.

Dimensionless Parameters for Full Journal bearings

$\frac{l}{d}$	$\frac{h_0}{c}$	ε	S	$\left(\frac{r}{c}\right)f$	$\frac{Q}{r c n_s l}$	$\frac{Q_s}{Q}$	$\frac{P_{max}}{p}$	Φ
1	0.4	0.6	0.121	3.22	4.33	0.680	0.415	50.38

OR

Q4) The following data is given for 360° hydrodynamic bearing: **[16]**

- Journal diameter =100 mm
- Bearing length =50 mm
- Journal Speed =1500 r.p.m.
- Minimum oil-film thickness =15 microns
- Viscosity of lubricants =30 cP
- Specific gravity of lubricant =0.86
- Specific heat of lubricant =2.09 kJ/kg^{0}C
- Fit between the journal and bearing is normal running fit H_7e_7.

Calculate:

a) the load carrying capacity of bearing;

b) the coefficient of friction;

c) the power lost in friction;

d) the total flow rate of the lubricant;

e) the side leakage; and

f) the temperature rise.

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

Dimensionless Parameters for Full Journal bearings

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

Q5) A pulley is keyed to the shaft midway between two bearings. The shaft is made of cold drawn steel for which the UTS & YTS are 540 MPa & 400 MPa respectively. The bending moment at the pulley varies from 200 Nm to 600 Nm and the torque varies from 70 Nm to 200 Nm. The frequencies of variation of bending and torsional moments are equal to shaft speed. The corrected endurance strength of the shaft is 200 N/mm^2. Determine the diameter of the shaft using a factor of safety 2. **[18]**

OR

Q6) A machine component is subjected to a completely reversed bending stresses cycle consisting of following parts: **[18]**

±300 MPa for 30% of time

±275 MPa for 25% of time

±400 MPa for 10% of time

±325 MPa for 25% of time

No load for remaining cycle

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

SECTION - II

Q7) a) For a plate clutch having fixed outer radius of friction surface r_0, permissible intensity of pressure P_{max} coefficient of friction μ, and number of pairs of contacting surfaces N, show that the torque transmitting capacity is maximum when ratio (r_i/r_0) is equal to 0.577. **[10]**

b) How the following factors affect the performance of a clutch. **[6]**

i) Ratio of inner radius to outer radius of friction lining.

ii) Weight of the clutch and connecting parts.

iii) Clutch operating temperature.

OR

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

a) the energy absorbed by each brake.

b) the torque capacity of the brake.

Q9) A spur gear pair is to be used to transmit 20 KW power from an electric motor running at 1440 rpm to the machine tool expected to run exactly at 600 rpm. The pinion and gear are to be made of alloy steel (S_{ult} = 800 N/mm^2) and plain carbon steel (S_{ult} = 700 N/mm^2) respectively. The service factor and

factor of safety are 1.5 and 1.35 respectively. The face width is 12 times module for which load distribution factor is 1.4. The tooth system is 20° full depth involute. The gears are to be machined to meet the specifications of grade 7. The pinion and gear are to be case hardened to 400 BHN and 350 BHN respectively. Design the gear pair by using the velocity factor and Buckingham's equation for dynamic load. Use the following data: **[18]**

Velocity factor Kv = 6/6 +V

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

Lewis form factor Y = 0.484 – 2.87 / Z

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

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

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

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

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

Ftmax = Ka.Km.Ft

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

OR

Q10) A helical pinion having 14 teeth to be made of alloy steel (Sult = 800 N/mm^2) is to mesh with a gear made of plain carbon steel (Sult = 720 N/mm^2). The gear pair is required to transmit 30 KW power from an electric motor running at 720 rpm to a machine running at 225 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 ten times the normal module. The tooth system is 20° full depth involute, while the helix angle is 25°. The gear pair is machined to meet the specification of grade 7. The deformation factor for gear pair is 11000e N/mm. Design the gear pair by using the velocity factor and Buckingham's equation for dynamic load. Suggest the surface hardness for gear pair. Use the following data: **[18]**

Machining grade 7: e = 11.0 + 0.9 (m_n + 0.25 $\sqrt{d}$)

$$Pd = \frac{21V\left(bC\cos^2\psi + Ptmax\right)\cos\psi}{21V + \sqrt{bC\cos^2\psi + Ptmax}} \text{ N}$$

Y' = 0.484 – 2.87/z'

$C_v = 5.6/5.6 + \sqrt{V}$, K = 0.16(BHN / 100)^2

First preference module (mm) – 1,1.25,1.5,2.0,2.5,3,4,5,6,8,10,12,16,20

Q11) A straight bevel gear pair is to be used to transmit 25 KW power from an electric motor rotating at 1500 rpm to a machine required to rotate exactly at 600 rpm. The axes of the pinion and gear intersect at right angles. The pinion and gear are to be made of plain carbon steel 55C8 (S_{ut} = 720 N/mm^2). The service factor and factor of safety are 1.25 and 1.75 respectively. The tooth system is 20° full depth involute. The gears are to be manufactured to meet the specifications of grade 6. The pinion and gear are to be case hardened to 420 BHN and 400 BHN respectively. Design the gear pair by using the velocity factor, Kv = (6/6+V) and the Buckingham's equation for dynamic load. Take $Y_P' = 0.3166$. Machining grade 6 : $e = 8.0 + 0.63\ (m + 0.25\ \sqrt{2rm}\ )$

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

[16]

OR

Q12) A double start worm made of case hardened alloy steel (S_{ut} = 700 N/mm^2) is to mesh with worm gear to be made of phosphor bronze (S_{ut} = 240 N/mm^2). The gear pair is required to transmit 5 kW power from an electric motor running at 1500 rpm to a machine running at 75 rpm. The service factor is 1.25, While the factor of safety required is 2. The face width of the worm gear is 0.73 times the pitch circle diameter of worm. The worm gear wear factor is 0.685 N/mm^2, while the diametral quotient is 10. 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.

Lewis form factor Y = 0.39 – 2.15/Z, velocity factor, Kv = 6/(6+V)

External surface area of the housing (A) = 1.14X 10^{-4} X $a^{1.7}$, m^2 **[16]**

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Total No. of Questions :12]

SEAT No. :

P1672

[Total No. of Pages :3

[5058]-160
T.E. (Computer Engineering)
SOFTWARE ENGINEERING
(2008 Course) (Semester-II) (310253)

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

Instructions to the candidates:

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

SECTION-I

Q1) a) Define software engineering. Compare the characteristics of software and hardware engineering. **[8]**

b) Explain the activities and advantages of an evolutionary process model. **[6]**

c) What is legacy software? **[4]**

OR

Q2) a) Describe the activities of incremental model. **[8]**

b) Explain an agile process model. **[6]**

c) What do you mean by formal method model? **[4]**

Q3) a) Explain the scenario based requirements modeling with use cases. **[8]**

b) Create the DFDs up to level one for an online product ordering system. **[8]**

OR

P.T.O.

Q4) a) Explain the flow of a home security system with an activity diagram. **[8]**

b) How do you model the behavior of an event driven system? Explain with an example. **[8]**

Q5) a) How the concepts of modularity and inheritance helps in the design of a software system. **[8]**

b) Explain the user interface design rules. **[8]**

OR

Q6) a) Explain the user interface design process. **[8]**

b) Explain any two architectural styles. **[8]**

SECTION-II

Q7) a) Explain the integration testing approaches. **[8]**

b) What is debugging? Explain the process of debugging. **[10]**

OR

Q8) a) Explain acceptance testing and performance testing. **[8]**

b) What is unit testing? Describe the loop testing and control structure testing. **[10]**

Q9) a) Explain COCOMO II project estimation method. **[8]**

b) Describe the factors influencing the project management? **[8]**

OR

Q10) a) Explain the quality factors of a software product. **[8]**

b) How Function Point is calculated in FP estimation method? **[8]**

Q11)a) Describe the methods used in project tracking. **[8]**

b) Explain the change management process. **[8]**

OR

Q12) a) Why the risk analysis is needed? Explain the risk analysis activities. **[8]**

b) What is SCM? Explain SCM repository. **[8]**

EEE

Total No. of Questions :12]

SEAT No. :

P1673

[Total No. of Pages :3

[5058] - 161

T.E. (IT)

DATABASE MANAGEMENT SYSTEMS

(2008 Course) (Semester - I)

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) Specify codd's norms to be satisfied by RDBMS? **[6]**

b) Explain the role of Database Administrator. **[6]**

c) Explain the advantages of using an enterprise database. **[6]**

OR

Q2) a) Explain specialization, generalization and aggregation with example. **[8]**

b) Consider the following database: **[4]**

faculty (name, address, city)

works (name, class_name, city)

class (class_name, city)

Manager (name, manager _ name)

Draw an ER diagram for above database.

c) What is layered architecture of DBMS system? How does it achieve logical, physical independence? **[6]**

P.T.O.

Q3) Consider the following relations: **[8]**

Person (Id-no, name, street, city, Bloodgr, Rh)

Donated (Id-no, donate-date)

Write SQL statements for each of the following:

a) Get names & address of persons with blood group B Rh -ve who have donated blood more than once.

b) Get number of persons with blood group AB Rh + ve.

c) Explain with example the concept of trigger and assertion. **[8]**

OR

Q4) a) Explain the Natural Join operation & Division operation in relational algebra with example. **[8]**

b) Explain views with suitable example. **[8]**

Q5) a) List advantages & disadvantages of each of the following strategies. **[8]**

i) Store each relation in one file

ii) Store multiple relations in one file.

b) Compare Normalization & Denormalization. **[8]**

OR

Q6) a) Define minimal cover. Write an algorithm to obtain minimal cover. **[8]**

b) State and prove Armstrong's axioms for functional dependencies. **[8]**

SECTION - II

Q7) a) Explain the cost estimates of the following selection algorithms with appropriate example: **[10]**

i) Linear search.

ii) Primary B^+ tree index equality on key.

b) Explain pipelining & its benefits with suitable example. **[8]**

OR

Q8) a) Construct a B^+ tree for the following set of key values (2, 3, 5, 11, 17, 19, 23, 29, 31). Assume order to be 4. **[8]**

b) Explain the techniques for improving speed of access blocks. **[6]**

c) Explain Query Optimization. **[4]**

Q9) a) Explain deadlock prevention & recovery techniques. **[8]**

b) Explain shadow paging with diagram. **[8]**

OR

Q10)a) State & explain Thomas write Rule with suitable example. **[8]**

b) Define transaction. State & explain ACID properties. **[8]**

Q11)a) Explain how a persistent pointer is implemented? Compare this implementation with that of pointers as they exist in general purpose language such as C. **[8]**

b) Explain 2 and 3 tier architecture of databases. **[8]**

OR

Q12)Write short notes on (any 4): **[16]**

a) Centralized & client server architecture.

b) Data warehouse.

c) Need of Back up & replication.

d) Data fragmentation techniques.

e) OODBMS.

Total No. of Questions : 12]

SEAT No. :

P1674

[Total No. of Pages : 2

[5058]-162
T.E.(IT)
SOFTWARE ENGINEERING
(2008 Course) (Semester - I) (310253)

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

Instructions to the candidates:

1) ***Answers to the two sections should be written in separate answer books.***
2) ***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 Q12.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***

SECTION-I

Q1) a) Define software engineering. What are the software characteristics? What are the various categories of software? **[10]**

b) State and explain customer's myths. **[4]**

c) Explain in detail software crises. **[4]**

OR

Q2) a) What is software process model? Explain the incremental process model. **[8]**

b) Explain in detail process pattern. **[6]**

c) What are the management myths? **[4]**

Q3) a) Explain the scenario based elements of analysis model in detail. **[8]**

b) Explain in detail requirement engineering task. **[8]**

OR

Q4) a) What are the characteristics that requirement must meet? **[6]**

b) Draw and explain the traceability table for requirement management. **[6]**

c) Describe two real time situation in which the customer and the end user is same. Describe two situation in which they are different. **[4]**

Q5) a) What are the design quality guidelines? **[8]**

b) What are the elements in data design? What are the guidelines for the data design? **[8]**

OR

Q6) a) Explain the Web Application Architecture. **[8]**

b) What are the interface design principles and guidelines? **[8]**

P.T.O.

SECTION-II

Q7) a) What is importance of testing practices? What are the principles of testing practices?. **[8]**

b) Explain in detail:

i) Top-down integration testing.

ii) Bottom-up testing. **[8]**

OR

Q8) a) What is cyclomatic complexity? How is it determined for a flow graph? Illustrate with example. **[8]**

b) Explain following testing types **[8]**

i) Validation testing.

ii) Acceptance testing.

iii) Somke testing.

Q9) a) What are the categories of stakeholders? What are the characteristics of effective project manager? **[8]**

b) What are the attributes of effective software metrics? Explain in detail Defect Removal Efficiency. **[8]**

OR

Q10)a) How do you measure software quality in terms of maintainability and integrity? **[6]**

b) What is Object Oriented metric? **[6]**

c) Explain size oriented metric? What data should we collect to derive size oriented metrics? **[4]**

Q11)a) What are the software quality factors? Explain any four. **[12]**

b) What are the types of risks? Explain in brief. **[6]**

OR

Q12)a) What is configuration audit? What is status reporting? **[8]**

b) Write Short note on:

i) RMMM

ii) Change control process **[10]**

✓ ✓ ✓

Total No. of Questions : 12]

SEAT No. :

P1675

[Total No. of Pages : 3

[5058]-163

T.E. (Information Technology)

COMPUTER NETWORK TECHNOLOGY

(2008 Course) (Semester-I) (314443)

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

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 from section I and Q7 or Q8, Q9 or Q10, Q11 or Q12 from section II.***
2) ***Answers to the two sections should be written in separate 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 is routing? State different types of routing? Write properties of routing algorithm. **[8]**

b) What is flow control mechanism? What is the role of timer in the flow control. **[8]**

OR

Q2) a) Compare virtual circuit subnet and datagram subnet. **[8]**

b) Explain in detail Link State routing algorithm with example. **[8]**

Q3) a) What is fragmentation? Explain types of fragmentation with example. **[8]**

b) Explain in detail BGP. **[8]**

OR

Q4) a) Is fragmentation supported by IPv4 and IPv6? Explain. **[6]**

b) Consider any class-C network with default subnet mask. **[10]**

How many actual hosts can be connected in that network? Divide that network into 8 equal subnets?

P.T.O.

What is the new subnet mask?

What is the starting address of the 6th Subnet?

What is the last address of the 6th Subnet?

How many hosts can be connected in each subnet? (Give all details).

Q5) a) What is a Socket? Explain various socket primitives used in client-server interaction. **[8]**

b) Explain all the fields of TCP header. **[10]**

OR

Q6) a) Explain the three way handshake algorithm for TCP connection establishment. **[10]**

b) What do you mean by flow control in transport layer? What are the different methods to achieve it? **[8]**

SECTION-II

Q7) a) List the similarities and differences between POP3 and IMAP. **[8]**

b) Explain persistent and non-persistent HTTP Connection. **[8]**

OR

Q8) a) List and describe seven message types in SNMP. **[8]**

b) Where and when FTP is used? Explain the importance of two ports in FTP? **[8]**

Q9) a) Explain Round Robin and Weighted Fair Queuing algorithm for scheduling. **[8]**

b) Explain the RTSP protocol. Why this protocol is needed. **[8]**

OR

Q10)a) What do you mean by integrated services? Explain with suitable example. **[8]**

b) What is the need of scheduling and policing techniques in multimedia networking. **[8]**

Q11)a) Discuss various layers used in ATM architecture. **[9]**

b) Explain Bluetooth architecture with diagram. **[9]**

OR

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

a) Limitations of Bluetooth.

b) ATM Protocol Stack.

c) Hidden Station problem.

●●●●●

Total No. of Questions : 12]

SEAT No. :

P2969

[Total No. of Pages : 3

[5058]-164
T.E. (Information Technology)
OPERATING SYSTEMS
(2008 Course) (Semester - I) (314441)

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

Instructions to the candidates:

1) ***Answer THREE questions from each section.***
2) ***Answer to the Two sections should be written in SEPARATE answer books.***
3) ***Figure to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Describe with the help of neat diagram the interaction of operating system with hardware. **[8]**

b) Draw and explain the architecture of windows 2000. **[8]**

OR

Q2) a) State in brief the four key features of each of the following types of OS: **[8]**

i) Batch

ii) Distributed

iii) Multithreading

iv) Time-sharing

b) Explain modern UNIX kernel with a neat diagram. **[8]**

Q3) a) Consider the following set of processes, with the length of processes given in milliseconds. Solve the problem using FCFS & Round Robin scheduling (Assume time quantum equal to 1). **[12]**

Process	Arrival time	Burst time
P1	0	6
P2	2	2
P3	4	3
P4	6	4
P5	8	5

P.T.O.

i) Draw Gantt chart illustrating the execution of these processes.

ii) Calculate waiting time and turnaround time for each process.

iii) Calculate the average waiting time and turnaround time for all the processes.

b) Explain UNIX Multi-level feedback queue scheduling. **[6]**

OR

Q4) a) What is the difference between Process and Thread? What are the contents of Thread Control Block (TCB). State the advantages and disadvantages of user level threads. **[12]**

b) What is System call? Explain fork () System call. **[6]**

Q5) a) Consider the following state of the system. Check Whether System is in Deadlock State or not. **[8]**

	Allocation matrix				Max matrix				Available vector			
	A	B	C	D	A	B	C	D	A	B	C	D
P0	0	0	1	2	0	0	1	2	2	1	0	0
P1	2	0	0	0	2	7	5	0				
P2	0	0	3	4	6	6	5	6				
P3	2	3	5	4	4	3	5	6				
P4	0	3	3	2	0	6	5	2				

b) Explain the conditions for the occurrence of Deadlock? **[8]**

OR

Q6) a) Implement the Producer Consumer problem using Semaphores and discuss how the critical section requirements are fulfilled. **[8]**

b) What is Inter Process Communication? Explain different methods of IPC. **[8]**

SECTION - II

Q7) a) A process references pages in the following order. **[12]**

3 4 5 6 3 4 7 4 5 6 7 8

Use FIFO, LRU and Optimal page replacement algorithms to find out the number of page faults for the above reference string using 3 page frame.

b) Explain different ways to remove External Fragmentation. **[6]**

OR

Q8) a) Why a translation look aside buffer is used by virtual memory scheme? Describe how translation look aside buffer works with the help of diagram. **[10]**

b) Describe Following memory allocation Strategies. **[8]**

i) First Fit

ii) Best Fit

iii) Worst Fit

Q9) a) Describe any four types of File Organizations. **[8]**

b) Describe Methods of record Blocking with the help of neat diagrams. **[8]**

OR

Q10) a) Explain with Neat diagram Windows 2000 file system. **[8]**

b) Define the following with respect to Disk Scheduling: **[8]**

i) Seek time

ii) Rotational Latency

iii) Bandwidth

Q11) a) How password protection is implemented in UNIX OS? **[8]**

b) State and Explain Different methods for user authentication for security. **[8]**

OR

Q12) Write short note on: **[16]**

a) Virus.

b) Worms.

c) Trojan Horse.

d) Biometric Authentication.

Total No. of Questions :12]

SEAT No. :

P1676

[Total No. of Pages :4

[5058] - 165

T.E. (IT)

THEORY OF COMPUTATION

(2008 Course) (Semester - I)

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

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, 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 accept only those strings which ending with "abb" over input = {*a, b*} **[8]**

b) Define and explain: **[6]**

i) Alphabet and Strings.

ii) Formal Language.

iii) Regular expression.

c) Show that (0 +1)* = (0* 1*)* **[4]**

OR

Q2) a) Design a finite automata which perform addition of two Binary number. **[8]**

b) Give RE for following language over = {0, 1} **[6]**

i) The language of all strings containing exactly two 0's.

ii) The language of all strings containing at least two 0's.

iii) The language of all strings not containing the substring 00.

c) Define Finite State Machine. Explain its properties and limitations. **[4]**

P.T.O.

Q3) a) Design a Mealy machine to check divisibility of decimal number by 4. **[8]**

b) Construct DFA for regular expression (0 + 1)*, (00 + 11). **[8]**

OR

Q4) a) Construct a NFA and its equivalent DFA for accepting a language defined over input = {0, 1} such that each string has two consecutive zeros followed by 1. **[8]**

b) Construct NFA with epislon move for the following regular expression. **[8]**

i) (00 +1)* (10)*

ii) 10 + (0 + 11) 0* 1

Q5) a) Consider the following grammar **[6]**

S->aB | bA,

A->a | aS | bAA,

B-> b | bS | aBB

Derive the string aaabbb using

i) Leftmost derivation.

ii) Rightmost derivation.

b) Convert the following grammar to Chomsky Normal Form (CNF) **[6]**

S->AACD

A->aAb | ε

C-> aC | a

D-> aDa | bDb | ε

c) Construct context free grammar corresponding to regular expression. **[4]**

(0 + 1) 1* (1 + (01)*)

OR

Q6) a) Write a CFG grammer to generate the language. **[6]**

i) $L = \{a^{2n} b^n | n>0\}$

ii) Palindrome strings of a' s and b's.

b) Convert the given grammar CFG to GNF. **[6]**

S-> ABA | AB |BA | AA| A| B

A-> aA |a, B-> bB|b

c) Define ambiguous grammar. Is the following grammar ambiguous? **[4]**

S-> aAS|a, A->SbA | SS | ba

SECTION - II

Q7) a) Prove that $L = \{a^n b^n | n>= 1|$ is not regular using pumping lemma theorem. **[6]**

b) State and Explain closure properties of regular expression with example. **[6]**

c) Let G = ({A0, A1}, {a, b}, P, A0) **[6]**

Where P = {A0-> A1a, A1-> A1b, A1->a, A1->A0b}

Convert given grammar Left linear grammar to equivalent Right linear grammar.

OR

Q8) a) Explain Chomsky hierarchy with an example. **[6]**

b) Let G = ({S, B, A, C}, {0, 1}, P, S) where **[6]**

P = {S-> B1 |A0 |C0

B->B1 | 1

A-> A1 | B1 | C0 | 0

C-> A0

}

Construct a FA equivalent to given grammar.

c) Construct a regular grammar G generating the regular set represented by

P = 0* 1 (0 + 1)* **[6]**

Q9) a) Construct PDA which accepts the language generated by the following CFG for arithmetic operations S-> S+S |S*S| 4 **[8]**

b) Define post machines. Compare PDA and post machine. **[4]**

c) Write a short note on closure properties of CFLs. **[4]**

OR

Q10)a) Construct equivalent CFG for given PDA. **[8]**

M = ($\{q_0, q_1\}$, {0, 1}, $\{z_0, x\}$, δ, q_0, z_0, Φ)

$$\delta(q_0, 1, z_0) = (q_0, xz_0)$$

$$\delta(q_0, 1, x) = (q_0, xx)$$

$$\delta(q_0, 0, x) = (q_1, x)$$

$$\delta(q_0, \wedge, z_0) = (q_0, \wedge)$$

$$\delta(q_1, 1, x) = (q_1, \wedge)$$

$$\delta(q_1, 0, z_0) = (q_0, z_0)$$

b) Design PDA to accept the language L = $\{a^n b^{2n} \mid n > 1\}$ by a final state. **[8]**

Q11)a) Write short notes on: **[8]**

i) Nondeterministic Turing Machine.

ii) Halting Problem of Turing Machine.

b) Design a Turing machine to compute 2's complement of given binary number. **[8]**

OR

Q12)a) Design a Turing machine to add two unary numbers. **[8]**

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

i) Limitations of TM.

ii) Universal Turing Machine.

Total No. of Questions : 12]

SEAT No. :

P1677

[Total No. of Pages : 2

[5058]-166

T.E (Information Technology)

SYSTEM SOFTWARE PROGRAMMING

(2008 Course) (Semester II)

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

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 from Section I and Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12 from section II.***
2) ***Answer to the two sections should be written in separate answer books.***
3) ***Neat diagrams must be drawn whenever necessary.***
4) ***Figures to the right side indicate full marks.***
5) ***Assume suitable data if necessary.***

SECTION-I

Q1) a) Describe assembler directives LTORG, ORIGIN, EQU, END with respect to Pass I of two Pass assembler. **[8]**

b) What is System software? Explain examples of system software. .**[8]**

OR

Q2) a) Describe Pass I Algorithm with example and show the contents of symbol table, Literal Table, Pool table and intermediate code form. **[12]**

b) Explain the term back-patching. **[4]**

Q3) a) What is Macro? Explain Macro call and Macro Expansion in Macro processor with suitable example? **[6]**

b) Explain the actual arguments and dummy arguments with examples. **[8]**

c) Enlist different data structures required during Pass I and Pass II of two pass Macro Processor. **[4]**

OR

Q4) a) Explain following term with macro. **[12]**

i) Expansion time variable.

ii) Keyword and positional parameters.

b) Differentiate between subroutine and macro. **[6]**

Q5) a) Describe Shift Reduce Parser with suitable examples. **[8]**

b) Differentiate between compiler and Interpreter. **[2]**

c) Write short note on problems with top down parsing. **[6]**

OR

P.T.O.

Q6) a) Explain following. **[10]**

i) Lexical Analyzer

ii) Bottom up parsing

b) Explain Ambiguous grammar in Compilers. Explain with example. **[6]**

SECTION-II

Q7) a) What is the purpose behind code optimization? What are the criteria for code optimization? **[8]**

b) Describe any two intermediate code formats with example. **[8]**

OR

Q8) a) What are the issues in code generation? **[8]**

b) Generate intermediate code for the statement given below in the format of **[8]**

S = (a+b) / (c-d)

i) Postfix notation

ii) Parse tree

iii) Quadruple

iv) Triple

Q9) a) Compare: Dynamic loading and Dynamic linking. **[6]**

b) What is loader? Enlist the basic functions of a loader? **[6]**

c) Explain **[6]**

i) Overlay structure,

ii) Linkage editor

OR

*Q10)*a) Draw the flow chart for Pass II of direct linking loader. **[12]**

b) Explain with flow chart, design of absolute loader. **[6]**

*Q11)*a) Explain the following language processor tools. **[8]**

i) LEX

ii) YACC

b) Write a short note on Debug Monitor. **[4]**

c) Defferentiate between Line and Screen Editor. **[4]**

OR

*Q12)*a) With the help of diagram, Explain user interface and its use in software applications. **[6]**

b) Describe various types of editor? Explain with the help of block diagram of typical editor structure. **[10]**

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Total No. of Questions :12]

SEAT No. :

P1678

[Total No. of Pages :3

[5058] - 167

T.E. (Information Technology)

PROGRAMMING PARADIGMS

(2008 Course) (314450) (Semester - II)

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) What are the attributes of Good Programming Language? **[8]**

OR

Q2) a) Define the term "Binding" with different binding types suitable example. **[8]**

b) Explain in detail procedural and functional programming paradigms? **[8]**

Q3) a) Explain in detail **[10]**

i) Static scope rule.

ii) Dynamic scope rule.

b) Explain co-routines and its implementation. **[8]**

OR

Q4) a) Explain following terms with suitable examples. **[10]**

i) Exception and Exception handler.

ii) Build in Exception.

b) State and explain referencing environment with suitable example. **[8]**

P.T.O.

Q5) a) Explain concept of inheritance with respect to JAVA and C++ in details. **[8]**

b) Explain Applet life cycle. **[8]**

OR

Q6) a) Explain the concept of multithreading with suitable example. **[8]**

b) Differentiate Procedure Oriented Programming Language and Object Orientated Programming Language. **[8]**

SECTION - II

Q7) a) i) Explain life cycle of applet with proper example. **[4]**

ii) Differentiate Applet and Application. **[4]**

iii) Differentiate AWT and SWING. **[4]**

b) What do you mean by function languages? What are the applications of function languages? **[6]**

OR

Q8) a) What are the applications of logic programming? Explain facility and deficiencies provided by PROLOG. **[10]**

b) Compare: Unification and Backtracking. **[8]**

Q9) a) Explain message passing and shared address space. **[8]**

b) Explain different classification of Computer Architecture. **[8]**

OR

Q10)a) What is the role of compilers in parallel programming? **[8]**

b) Explain the concepts of mapping with their types. **[8]**

Q11)a) Explain concept of data definition language and data manipulation language. **[8]**

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

i) Windows Programming using Visual Basic.

ii) Socket Programming using JAVA.

OR

Q12)a) Write short notes on: **[8]**

i) Links in HTML.

ii) Components of URL.

b) Explain Database Programming design principles. **[8]**

Total No. of Questions :11]

SEAT No. :

P1679

[Total No. of Pages :3

[5058]-168

T.E. (Information Technology)

HUMAN COMPUTER INTERACTION AND USABILITY

(2008 Pattern)

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 and Q11.***
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? Discuss importance of human factors in human-computer interaction design. **[8]**

b) What are models of interaction? Explain any one model in details. **[8]**

OR

Q2) a) Differentiate between human short-term memory and long-term memory. **[8]**

b) What is interaction design? What are goals of interaction design? **[8]**

Q3) a) What are different paradigms of interactions? Explain any one of the following in details. **[10]**

i) pervasive computing

ii) invisible computing

iii) weavable computing

b) Discuss the practical issues in interaction design process. **[8]**

OR

P.T.O.

Q4) a) Describe briefly four different interaction styles used to accommodate the dialog between user and computer. Specify advantages and disadvantages of each interaction style. **[10]**

b) What is WIMP interface? Discuss is advantages and disadvantages. **[8]**

Q5) a) With respect to Human Diversity how to accommodate user with disabilities and elderly users while designing user interfaces. **[8]**

b) Evaluate microsoft power point interface on the basis of the 'Eight golden rules of interface design'. **[8]**

OR

Q6) a) What is usability Engineering? Explain principles that support usability. **[8]**

b) Why is context important in selecting and applying guidelines and principles for interface design? Illustrate your answers with examples. **[8]**

SECTION-II

Q7) a) What is DECIDE? List and explain unique phases of DECIDE framework. **[8]**

b) Compare: Formative verus Summative Evaluation of user interfaces. **[8]**

OR

Q8) a) What is Web-usability? What are benifits of web-usability? Discuss the guiding principles of web-usability. **[8]**

b) Explain any two evaluation paradigms for UI design. **[8]**

Q9) a) What is the purpose or aims of Task Analysis? Explain knowledge based task analysis. **[8]**

b) Explain GOMS model by taking appropriate task. Also discuss the issue of closure in terms of your GOMS description. **[8]**

OR

Q10) a) Explain any one cognitive model of goal or task hierarchy. **[8]**

b) Give any two digrammatic or taxtual notations used to design dialogs in effective user interface. Justify your notations with examples. **[8]**

Q11) Write short notes on ANY THREE of following: **[18]**

a) Augmented Reality.

b) Groupware systems.

c) Ubiquitous computing.

d) Information and data visualization.

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Total No. of Questions : 12]

SEAT No. :

P1680

[Total No. of Pages : 2

[5058]-169
T.E. (I.T.)
MANAGEMENT INFORMATION SYSTEM
(2008 Course) (Semester-II) (314449)

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

Instructions to the candidates:

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

SECTION-I

Q1) a) What are different types of information system? Explain with example. **[8]**

b) Define role and impact of Management Information System on politics. **[8]**

OR

Q2) a) What is strategic? How it is useful to run a profitable business? **[8]**

b) How the strategies are useful to define the goal and objectives of any business? **[8]**

Q3) a) What are the different characteristics of group decision support system? Explain. **[9]**

b) What is the different programming languages used for the Group Decision support system? Explain with example. **[9]**

OR

Q4) a) Define the role of Knowledge base in software development. **[9]**

b) What is AI? Explain the different AI tools with example. **[9]**

Q5) a) What is the role of E-Commerce with respect to payment gateway in mobile business in India? **[8]**

b) What is E-Governance? Explain how E-governance is useful to increase the efficiency of the government. **[8]**

OR

Q6) a) What are the different challenges in SRM development? **[8]**

b) "The growth of Indian Economy is depends on E-Commerce business". True or False Justify. **[8]**

P.T.O.

SECTION-II

Q7) a) Define application of MIS in HR and Marketing Management. **[9]**

b) What is TPS? Explain advantages and disadvantages of it. **[9]**

OR

Q8) a) Define application of MIS in Hotel and Material Management. **[9]**

b) What is cross functional system? Explain advantages and disadvantages of it. **[9]**

Q9) a) What is the role of EMS in business growth? Explain with example. **[8]**

b) Explain the challenges and limitations of ERP in India. **[8]**

OR

Q10)a) What are the different objectives of ITES? Explain. **[8]**

b) "Voice BPO is required for growth of any business".Justify. **[8]**

Q11)a) Define the terms **[8]**

i) Software piracy

ii) Patent

iii) Cyber security

b) What are the different mechanisms to avoid cyber crime? Explain. **[8]**

OR

Q12)a) Define contingency management . In what respect it is useful for our country. **[8]**

b) "Geo- Economical platform plays vital role in border issues".Justify. **[8]**

❖ ❖ ❖

Total No. of Questions : 12]

SEAT No. :

P2937

[Total No. of Pages : 4

[5058]-17
T.E. (Mech. / Mech. S/W)
TURBO MACHINES
(2008 Course) (Semester - II) (302049)

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

SECTION - I

Q1) a) A jet of water having a velocity 40 m/s impinges without shock on a series of vanes moving at 12 m/s. The jet is making an angle of 20º with the direction of motion of the vane. Relative velocity at outlet is 0.9 times the relative velocity at the inlet and absolute velocity of water at the exit is normal to the direction of motion of the vane. **[12]**
Find:

i) Vane angles at inlet and outlet

ii) Work done on the vane per kg of water

iii) Efficiency

b) Sketch a Pelton wheel bucket and explain the effect of its size, shape and number on its function. **[6]**

OR

Q2) a) Show that when a jet of water impinges on a series of curved vanes, maximum efficiency is obtained when the vane is semicircular in section and the velocity of the vane is half of that at the jet. **[8]**

b) Pelton wheel works under a head of 300 m and is supplied with water at the rate of 200 liters/second. If the bucket deflects jet through an angle of 165º, find the power and efficiency of the turbine. Assume suitable data. **[10]**

P.T.O.

Q3) a) State the purpose of draft tube and sketch some typical draft tubes. Also show that pressure at the runner exit drops below atmospheric pressure, if the draft tube is of diverging section and suction head H_s is positive. **[6]**

b) A propeller turbine runner has an outer diameter of 5 m and inner diameter of 2.2 m and develops 25 MW, when running at 150 rpm under a head of 20 m. Hydraulic efficiency is 95% and overall efficiency is 85%. Find the discharge through the runner, the guide blade angle at inlet and runner outlet angle. Assume zero whirl at the runner exit. **[10]**

OR

Q4) a) Explain difference between propeller turbine and Kaplan turbine. **[4]**

b) Design a Francis turbine runner with the following data. Net head = 68 m, speed 750 rpm, Power output = 300 kW, Hydraulic efficiency 94%, Overall efficiency = 85%, flow ratio = 0.15 Ratio of breadth to diameter 0.1, inner diameter of runner is 1/2 of the outer diameter of the runner, 6% of the circumferential area of the runner is occupied by the thickness of the vanes. Assume the velocity of flow remains constant and the flow is radial at exit. **[12]**

Q5) a) Define the following terms for a turbine: **[6]**

i) Carry over coefficient

ii) Stage efficiency

iii) Blade efficiency

b) In a Parsons stage, the steam inlet velocity is 200 m/s at an angle of 18° to the plane of the rotor. The rotor diameter is 0.75 m and the speed is 3000 rpm. Calculate the blade angle and specific work. **[10]**

OR

Q6) a) What is reaction turbine? Why the blade passages are made converging type? Explain with neat sketch the variation of pressure and velocity in a stage of reaction turbine. **[10]**

b) Explain the method of throttle governing with the help of neat sketch. What are its advantages and disadvantages? **[6]**

SECTION - II

Q7) a) What are the different methods used to improve efficiency of the gas turbine? Explain any one method with a neat sketch. **[6]**

b) A gas turbine power plant operates between the temperature limits of 300 K and 1200 K. Determine the following: **[10]**

i) The optimum pressure ratio for the cycle if the plant is to operate for maximum power output.

ii) Turbine work, compressor work, shaft work and work ratio.

iii) Power output if the mass flow rate of air is 20 kg/s.

Assume, $\gamma = 1.4$, $C_p = 1.005$ kJ/kg.

OR

Q8) a) Explain the effect of below mentioned operating variables on the thermal efficiency of an actual open cycle gas turbine power plant. **[8]**

i) Pressure ratio

ii) Turbine inlet temperature

iii) Turbine efficiency

iv) Compressor efficiency

b) Explain the working of Ramjet Engine by means of a sketch. What are its advantages, disadvantages and applications? **[8]**

Q9) a) What do you mean by manometeric head, manometeric efficiency, mechanical efficiency and overall efficiency of a centrifugal pump? **[8]**

b) A centrifugal pump has an impeller diameter of 30 cm and runs at 1080 rpm. The vanes are radial at exit and 75 mm wide. The radial velocity of flow through the impeller is 3.5 m/s. The velocity in delivery pipe is 2.5 m/s. Neglecting frictional losses, calculate: **[8]**

i) Height through which water is lifted.

ii) Theoretical power required.

OR

Q10)a) The following observations were recorded during a test on a centrifugal pump dealing with water. **[12]**

Vacuum gauge reading on the suction side	= 400 mm of Hg
Pressure gauge reading on the delivery side	= 2.3 bar
Vertical distance between the gauges	= 40 cm
Output of electric motor	= 31.6 kW
Diameter of suction pipe	= 20 cm
Diameter of delivery pipe	= 15 cm
Size of sump	= 10 m × 6 m × 2.5 m
Time required to empty the sump	= 30 minutes

Evaluate the overall efficiency of the pump.

b) Draw and explain operating characteristics of centrifugal pump. **[4]**

Q11)a) A compressor draws air from atmosphere at 1 bar and 290 K at a velocity of 70 m/s. The isentropic efficiency of the compressor is 72%. The stagnation pressure is 3. Find the stagnation pressure at the exit and the power of the driving motor if mechanical efficiency is 95% for a flow rate of 30 kg/min. **[10]**

b) What are the three main types of centrifugal compressor impellers? Draw the exit velocity diagrams for these three types. **[8]**

OR

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

a) Slip factor and pressure coefficient.

b) Surging and choking of compressor.

c) Degree of reaction in case of axial flow compressor.

d) Pre-whirl of centrifugal compressor.

Total No. of Questions :12]

SEAT No. :

P1681

[Total No. of Pages :3

[5058] - 170

T.E. (IT)

DESIGN AND ANALYSIS OF ALGORITHMS

(2008 Course) (314455) (Semester - II)

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) Name any three proof techniques. Discuss any one in detail. You may take an example. **[8]**

b) What is worst case time complexity of the following: **[8]**

$100n^2$, 2^n, $5.6n^3$, 7n!, 1000n, 519, $n^2 \log n$, n^4.

OR

Q2) a) Arrange the following in the ascending order according to their time complexity: **[8]**

$10n^5$, 3^n, n^3, n!, 1000n, 519, $n^2 \log n$, 2^n.

b) Write an algorithm to search an element in an array of size n. Calculate complexity of this algorithm. **[8]**

Q3) a) What is divide and conquer strategy? Write general steps. **[8]**

b) Explain Prim's algorithm. Comment on its complexity. **[8]**

OR

Q4) a) What is greedy method? Write characteristics of greedy method. **[8]**

b) Write Kruskal's algorithm. Comment on its complexity. **[8]**

P.T.O.

Q5) a) What is Dynamic Programming technique? **[9]**

b) Explain with suitable example Warshall's algorithm. **[9]**

OR

Q6) a) Compare dynamic programming and divide and conquer. What are the advantages and disadvantages of both techniques. **[9]**

b) Explain knapsack problem. State its recurrence relation. **[9]**

SECTION - II

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

Live nodes, expanding nodes, bounding function and solution space.

b) Explain 4 queens problem using backtracking. **[8]**

OR

Q8) What is backtracking? What kind of problems does it solve? Solve the following knapsack problem using backtracking. **[16]**

i	p_i	w_i
1	24	15
2	15	10
3	25	18

For n = 3 and m = 20.

Q9) a) Explain the terms:

Branch and Bound , LC, LIFO and Bounding function. How are LIFO and LC techniques different? **[9]**

b) Differentiate between Backtracking and Branch and Bound. **[9]**

OR

Q10)a) Explain dynamic reduction technique for Travelling Sales Person. **[9]**

b) Explain the terms: state space, live node, static trees and dynamic trees. **[9]**

Q11)a) What is a deterministic and non-deterministic algorithm? Write a non - deterministic algorithm for searching an element. **[8]**

b) Prove that: A clique problem is NP-complete. **[8]**

OR

Q12)a) What is satisfiability problem? Explain DNF and CNF. **[8]**

b) Explain NP-Complete and NP-Hard. Give examples. Are all NP-Complete problems NP-Hard or vice versa? Justify. **[8]**

Total No. of Questions : 11]

SEAT No. :

P2970

[Total No. of Pages : 2

[5058]-171
T.E.(Biotechnology)
GENETIC ENGINEERING
(2008 Course) (Semester - I)

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

Instructions to the candidates:

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

SECTION-I

Q1) Explain the process of DNA sequencing and its applications in Genetic Engineering **[16]**

OR

Q2) Explain the method of micro arrays in details. **[16]**

Q3) What do you mean by cloning vectors? Write short note on Phagemids as a cloning vector. **[16]**

OR

Q4) Write short Notes: **[16]**

a) Plasmids

b) Cosmid

Q5) What are the steps involved in forming a C-DNA library? **[18]**

OR

Q6) What are various methods of synthesizing Genomic library? **[18]**

P.T.O.

SECTION-II

Q7) Why is it important to synthesize DNA artificially? Explain methods of DNA Synthesis indetails. **[16]**

OR

Q8) Give an account of sequencing methods in library constructions **[16]**

Q9) Answer in Brief: **[16]**

a) Conjugation
b) Live vaccines

OR

Q10) What is Humulin? Explain role of genetic engineering in development of Humulin. **[16]**

Q11) Write notes on: (Any Two) **[18]**

a) Humulin
b) Golden Rice
c) Factor VIII
d) RFLP

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Total No. of Questions :12]

SEAT No. :

P2971

[Total No. of Pages :2

[5058] - 172

T.E. (Biotechnology)

FERMENTATION TECHNOLOGY - I

(2008 Course) (Semester - I) (315464)

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

Instructions to the candidates:

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

SECTION - I

Q1) Explain concept of Upstream Processing with the following points: **[16]**

a) Screening and isolation of microbes.

b) Preserving industrially important microbes.

c) Inoculum Preparation.

OR

Q2) What is Monod kinetics? Explain the Monod equation for bacterial and fungal growth. Which fermentation metabolites are produced during exponential and stationary phase? Enlist them. **[16]**

Q3) a) What is the importance of medium preparation in Fermentation Technology? Explain it with the case example. **[8]**

b) Enlist the methods of medium optimization. Explain any one of the method in detail. **[8]**

OR

Q4) Why sterilization is important in fermentation technology? Discuss *in situ* sterilisation and HTST sterilisation in brief. **[16]**

P.T.O.

Q5) Which medium component affects most on production of citric acid. Explain the effect with metabolic pathway of citric acid production. Describe the general production process of citric acid in detail. **[18]**

OR

Q6) Explain the industrial production, recovery and applications of any alcoholic beverage in detail. **[18]**

SECTION - II

Q7) Explain antifungal antibiotics. Explain production, recovery and applications of any two antifungal antibiotics in detail. **[16]**

OR

Q8) Explain Single Cell Protein. Explain production, recovery and applications of SCP in detail. **[16]**

Q9) What is solid state and liquid state fermentation? How are they different from each other? Enlist the products of solid and liquid state fermentation. **[16]**

OR

Q10) Draw neat labeled diagram of all the different types of fermenters used in industries. State their applications in detail. **[16]**

Q11) Explain the concept of scale up with the help of following points. **[18]**

a) Principles.

b) Theoretical considerations.

c) Techniques used.

OR

Q12) Why economics of any fermentation process is important? Explain the concept with one case example. **[18]**

Total No. of Questions :12]

SEAT No. :

P2972

[Total No. of Pages :3

[5058] - 173

T.E.

BIOTECHNOLOGY

Heat Transfer

(2008 Course) (Semester-I)

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

Instructions to the candidates:

1) ***Answer Any three from section I and any three from section II.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume Suitable data if necessary.***
5) ***Use of logarithmic tables, slide-rule,Mollier charts, electronic pocket calculator and steam table is allowed.***

SECTION - I

Q1) a) Give importance of dimensional analysis with few examples. **[4]**

b) Explain in detail different modes of heat transfer with one example. **[12]**

OR

Q2) a) What are types of convection? Explain it with one example. **[6]**

b) Based on Fourier's law of hear conduction derive an expression for temperature variation in case of Hollow Sphere. **[10]**

Q3) a) What is critical radius of insulation? How optimum radius of insulation is decided based on the economy. **[8]**

b) Write a short note on Heat losses through pipe. **[8]**

OR

Q4) a) What is the purpose of extended surfaces in heat exchange equipments? Derive an equation for calculating effectiveness and efficiency of pin fin. **[8]**

b) Give comparison between electrical analogy and conduction process. **[8]**

P.T.O.

Q5) a) Explain in detail concept of maximum heat flux and critical temperature drop. **[9]**

b) Write a short note on 'Thermal Boundary layer and its significance. **[9]**

OR

Q6) a) By using Rayleigh's method of dimensional analysis derive an expression for forced convection heat transfer. **[9]**

b) Give comparison between dropwise condensation and film condensation. **[9]**

SECTION - II

Q7) a) Write a short note on Kirchoff's Law & Stefan Boltzman law. **[8]**

b) Explain in detail Wein's law and derive an expression $\lambda_{max} T = 0.0029$ mk **[8]**

OR

Q8) a) Define the following: **[10]**

i) Absorptivity

ii) Grey body

iii) Shape factor

iv) Emissivity

v) Reflectivity

b) Give importance of heat transfer phenomenon in the field of Biotechnology with some applications. **[6]**

Q9) a) Derive an expression for the mean film temperature difference in a counter current flow heat exchanger in which inlet and exit temperature on the hot side are T_{hi} and T_{he} and on the cold side are T_{ci} and T_{ce}, respectively. **[8]**

b) Write a short note on fouling factor and give expression for unclean surfaces. **[8]**

OR

Q10)a) Draw & explain shell and Tube type of heat Exchanger. **[8]**

b) What is a concept of log mean temperature difference (LMTD). Derive an expression for parallel flow using LMTD method. **[8]**

Q11)a) Write a short note on boiling point Elevation. **[9]**

b) Draw and explain feed forward and feed backward feeding method in multiple effect evaporator. **[9]**

OR

Q12)a) What is heat of bariation? Derive an expression neglecting heat of bariation. **[12]**

b) Write mass balance and energy balance equations along the evaporator. **[6]**

Total No. of Questions : 12]

SEAT No. :

P2973

[Total No. of Pages : 3

[5058]-174
T.E.
BIOTECHNOLOGY
Computational Techniques and Biostatistics
(2008 Course) (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, 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

b) Determine the constants a and b by the least squares method such that $y = a + bx$ fits the following data: **[9]**

X	1	2	3	4	6	8
Y	2.4	3	3.6	4	5	6

OR

Q2) a) The population of a town in decennial census was as under. Estimate the population for the year 1955 using Newton's interpolation formula. **[9]**

Year	1921	1931	1941	1951	1961
Population (in Thousands)	46	66	81	93	101

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) Given the table of values: **[10]**

X	50	52	54	56
$\sqrt[3]{X}$	3.684	3.732	3.779	3.825

Use Lagrange's formula to find x when $\sqrt[3]{X} = 3.756$.

b) Prepare a forward difference table for $x^3 - 2x + 5$. Find out $\Delta^6 y$ if $h = 1$. **[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) Simpson'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) Using Regula-Falsi method find the real root of the equation $x^3 - 5x + 3 = 0$. **[16]**

OR

Q8) Find a real root of the equation $x + \log x - 2 = 0$ using Newton-Raphson Method. **[16]**

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) Give merits and limitations of probability sampling. **[8]**

Q11)a) Discuss importance of weighted and harmonic mean over simple arithmetic mean. Give one example of each. **[9]**

b) Give in a flow chart of various sampling methods. **[9]**

OR

Q12)Evaluate

$$I = \int_0^1 \frac{1}{1+x}\,dx$$

Correct to three decimal places. Solve this example by both the trapezoidal and Simpson's rule with h = 0.5, 0.25 and 0.125 respectively. Compare the results in each case and test the accuracy for both methods.. **[18]**

Total No. of Questions :12]

SEAT No. :

P2974

[Total No. of Pages :3

[5058]-175
T.E. (Biotechnology)
MASS TRANSFER
(2008 Course) (Semester - I)

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

Instructions to the candidates:

1) ***Answers 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) Give Fick's law and Maxwell's of diffusion.. Describe equation with all quantities and dimensions. **[8]**

b) Explain Whitman's Two Film Theory. **[8]**

OR

Q2) What is mass transfer co-efficient? How it plays an important role in fermentation process? What is local and overall mass transfer co-efficient? Give its application and importance. **[16]**

Q3) a) Write short notes on Distillation column internals. **[8]**

b) A mixture containing hexane and heptane with 35 mole% Hexane and 65 mole % Heptane is to be separated in a fractionating column. The concentration of Hexane is distillate is 93 mole% and 96 mole % of all Hexane in distillate. The feed is half vapour and reflux ratio is 4:1 and relative volatility $\alpha_{AB} = 2.5$. Find out the no. of equilibrium stages required in each section of the column. What could be the minimum reflux ratio for such operation? **[8]**

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

i) Bubble cap Tray

ii) Sieve tray

iii) Downcomer & weir

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

i) Flash distillation

ii) Total reflux ratio

iii) Optimum reflux ratio

OR

Q6) a) Explain Mc Cabe - Thiele Method and give limitations of it over Lewis-Sorel Method. **[9]**

b) What is feed plate and feed line and how thermal conditions of the feed are introduced based on q-value? (explain with the help of graph) **[9]**

SECTION-II

Q7) a) Write a material balance equation for simple countercurrent absorption column and derive equation in terms of L/G ratio. **[9]**

b) A mixture of acetone vapour-air containing 5% by volume of acetone is to be freed of its acetone content by scrubbing it with water in a packed bed tower. The flow rate of the gas mixture is 700 m^3/hr of acetone free air measured at NTP and that of water is 1500 kg/hr. The tower operates at an average temperature of 20°C and a pressure of 101 kPa. The scrubber absorbs 98% acetone. The equilibrium relation for acetone vapour-water is given by: $Y^* = 1.7\ X$, where Y=k mole Acetone/k mole Air and X=k mole Acetone/k mole water. **[9]**

Calculate:

i) Mean driving force for absorption.

ii) Mass transfer area if the overall mass transfer co-efficient is k_G = 0.6 kmole Acetone/m^2.hr.

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 Spray dryer. **[8]**

OR

Q10)a) Define following terms: **[8]**

i) Constant rate period

ii) Falling rate period

iii) Relative humidity

iv) Humidity

b) Write a short note on Lyophilizer. **[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 batch of 500 kg of KCl is dissolved in water to make a saturated solution at 350 K where the solubility is 30% by weight KCl in water. The solution is cooled to 293 K at which solubility is 25.4% by weight. Determine the quantity of crystals obtained if 3.5% of the original water evaporates on cooling. Also determine the capacity of the vessel in which this solution is cooled if it is 1.2 times the volume of the solution. Take density of solution as 1200 kg/m^3.**[16]**

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Total No. of Questions :12]

SEAT No. :

P2975

[Total No. of Pages :2

[5058]-176
T.E.(Biotechnology)
REACTION ENGINEERING
(2008 Pattern) (Sememster-II) (315466)

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

Instructions to the candidates:

1) ***Answers to the two sections should be written in separate answer books.***
2) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 from section I and Q7 or Q8, Q9 or Q10, Q11or Q12 from section II.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right side indicate full marks.***
5) ***Use of calculator is allowed.***
6) ***Assume suitable data if necessary.***

SECTION-I

Q1) a) Describe in detail significance of Activation energy? **[8]**

b) Explain the kinetic model for non-elementary reaction. **[8]**

OR

Q2) a) A human of 55 Kgs consumes about 4000 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 second?

b) Comments on rate controlling step. **[8]**

Q3) a) A certain reaction has a rate given by $-r_A = 0.009\, C_A * C_B$ 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 constant? **[9]**

b) Derive the performance equation for plug flow reactor. **[9]**

OR

Q4) a) Define:

i) Residence time

ii) Space velocity and

iii) Space time **[9]**

b) Assuming a stoichiometry A $\rightarrow$ R for a first order reaction, the volume of plug flow reactor for 90% conversion of pure A is calculated to be 4 lit. In fact, however the reaction stoichiometry is A $\rightarrow$ 3R. With this corrected stoichiometry, What is the required volume of a reactor? **[9]**

P.T.O.

Q5) a) Derive the expression for calculating E- curve and their significance. **[8]**

b) Discuss on segregated flow model. **[8]**

OR

Q6) a) Discuss about tank in series model, dispersion model. **[8]**

b) Discuss about the degree of segregation influence conversion and product distribution in plug flow reactor**.** **[8]**

SECTION-II

Q7) a) Explain in detail on chemical reaction controls. **[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 57% converted and 3 mm particles are 67% 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 **[9]**

$$A_{(1)} + B_{(s)} \rightarrow R_{(1)}$$

Dilute A diffuses through a stagnant liquid film onto a plane surface consisting of B, react to produce R which diffuses back into a main stream. Develop overall rate expression for liquid reaction.

Q9) a) Determine the amount of catalyst required in packed bed reactor for 99% conversion of 999 mol/min if C_{A0} = 20 mol/m^3 of feed. **[10]**

b) Discuss in detail about slurry reactor. **[6]**

OR

Q10)a) Give detail note on packed bed catalytic reactor with sketch. **[8]**

b) Explain the concept effectiveness factor. **[8]**

Q11)a) Write a short note on substrate limiting microbial fermentation. **[8]**

b) Comments on Enzyme deactivation kinetics. **[8]**

OR

Q12)a) Discuss about microbial and enzyme fermentation. **[8]**

b) Discuss about Michaelis-Menten kinetics. **[8]**

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Total No. of Questions : 12]

SEAT No. :

P2976

[Total No. of Pages : 2

[5058]-177
T.E. (Biotechnology)
FERMENTATION TECHNOLOGY - II
(2008 Course) (Semester - II)

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

Instructions to the candidates:

1) ***Answer Any three from section I and any three from section II.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume Suitable data if necessary.***
5) ***Use graph sheets wherever required.***

SECTION - I

Q1) a) Describe with the help of mass transfer theory how mixing takes place? **[8]**

b) What is critical concentration (C_{crit}) on DO concentration curve and how it affects growth of microorganisms? **[8]**

OR

Q2) Write Short notes on: **[16]**

a) Hollow Fiber Reactor

b) Perfusion Reactor

Q3) a) Explain in detail oxygen balance technique in order to determine mass transfer co-efficients in a fermenter. **[8]**

b) What are different types of spargers? Draw neat diagrams and explain. **[8]**

OR

Q4) What are different types of adsorption isotherms? Explain it in detail. **[16]**

Q5) a) Derive equation describing the rate of filtration for rotary filters. **[9]**

b) Write a short note on construction and working of plate and frame filters. List out its applications. **[9]**

OR

P.T.O.

Q6) A volume of $5m^3$ contains a mixture of air and ammonia vapour. The temperature is 25 ºC and the total pressure is 10^5 N/m^2. If the relative saturation of the air by ammonia vapour is 40%, determine the quantity of activated carbon that must be added to the space for reducing the relative saturation to 15% at 25ºC. If 2.5 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) What is membrane fouling? Explain factors which decrease the flux through a membrane. How it can be prevented? **[18]**

OR

Q8) Write detail notes with a neat diagram on: **[18]**

a) Tangential flow filtration.

b) Cross flow Filtration.

Q9) Explain graphical representation of the following equilibrium conditions in adsorption. **[16]**

a) Solids in overflow, variable underflow.

b) No solids in overflow, constant underflow.

OR

Q10)How to choose solvent for extraction? What are factors affecting solvent extraction? How these factors are correlated with efficiency of extraction?**[16]**

Q11)a) Write a short note on ternary liquid equilibria? Explain it with one example. **[8]**

b) Derive the operating line equation for a single phase extractor and show graphical representation of the same. **[8]**

OR

Q12)Explain in detail pervaporation and give parameters which are used to assess pervaporation process. **[16]**

Total No. of Questions : 10]

SEAT No. :

P2977

[Total No. of Pages : 2

[5058]-178
T.E. (Biotechnology)
BIOSEPARATION-I
(2008 Course) (Semester- I)

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

Instructions to the candidates:

1) ***Answers to the two sections should be written in separate answer books.***
2) ***Answer any three questions from each section.***
3) ***Neat deagrams 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) Give introduction to Bioseparation techniques. Write advantages anddisadvantages of Bioseparation Techniques. **[16]**

OR

Q2) Describe following mechanical cell disruption technique in details. **[16]**

a) Homogenization

b) Bead Mill

Q3) a) Write in details theory of chromatography with concept of plates. **[8]**

b) Differentiate between Column versus paper chromatography. **[8]**

OR

Q4) What is chromatography? Write about column dynamics in details. **[16]**

Q5) Write short notes on:(Any 2). **[18]**

a) Ultracentrifugation

b) Ultrafiltration

c) Unit operation: Filtration

d) Reverse Osmosis

P.T.O.

SECTION-II

Q6) Write short notes on: (Any 2) **[16]**

a) Solvent Extraction

b) Lyophilzation

c) Aqueous two phase separation

d) Drying

Q7) "Scope of Bioseparations from Research to Industry". Explain. **[16]**

OR

Q8) Write importance of Bioseparations in Biotechnology and write notes on Economics of Bioseparation Process. **[16]**

Q9) Elaborate on recent industrial advances in Bioseparation processes with example of secondary metabolite product like Antibiotics. **[18]**

OR

Q10) Elaborate on recent industrial advances in Bioseparation processes with example of secondary metabolite product like Steroids. **[18]**

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Total No. of Questions : 10]

SEAT No. :

P2978

[Total No. of Pages : 2

[5058]-179
T.E. (Biotechnology)
IMMUNOLOGY AND DIAGNOSTICS
(2008 Course) (315469) (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) Write a notes on (ANY THREE) **[18]**

a) Thymus.
b) Inflammation.
c) NK cells.
d) Innate immunity.

OR

Q2) Name the cells involved in immune response. Summarize their development, identification and functions in IR. **[18]**

Q3) Write short notes on (Any 2) **[16]**

a) Immuniglobulin Diversity.
b) Ig G.
c) RIA.
d) RID.

OR

Q4) What are monoclonal antibodies? Describe in detail applications of monoclonal antibodies. **[16]**

Q5) Compare and contrast five immunoglobulin classes. **[16]**

OR

Q6) Write notes on ANY TWO **[16]**

a) Hamagglutination.
b) MHC.
c) Graft rejection.
d) Antigen.

P.T.O.

SECTION - II

Q7) Name different classes of hypersensitivity and describe Type I allergy in detail. **[16]**

OR

Q8) Attempt ANY TWO: **[16]**

a) MAC.
b) Arthus reaction.
c) Mast cells.

Q9) Write short notes on any two: **[16]**

a) Passive immunization.
b) Attenuated vaccines.
c) Toxoid.

OR

Q10) Write notes on any TWO of following: **[18]**

a) Autoimmunity.
b) Structure of IgG.
c) IR in HIV.
d) Tumor antigens.

Total No. of Questions : 12]

SEAT No. :

P1601

[Total No. of Pages : 4

[5058]- 18
T.E. (Mechanical)
MECHATRONICS
(2008 Course) (Semester - II) (302050)

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, and electronic pocket calculator and steam tables are allowed.***
6) ***Assume suitable data, if necessary.***

SECTION - I

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

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

i) Response time
ii) Rise time
iii) Settling time.

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

OR

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

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

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

P.T.O.

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

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

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

OR

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

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

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

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

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

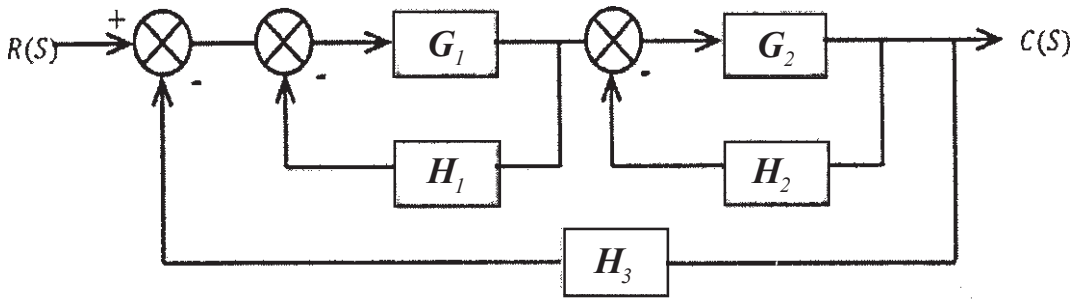


Figure Q 5 (b)

OR

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

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

c) Describe in brief mathematical model of translational Mechanical System. **[6]**

SECTION - II

Q7) a) Explain terms **[4]**

i) Process load

ii) Dead Time

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

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

OR

Q8) a) Explain the terms: **[4]**

i) Process Variable

ii) Process Error

b) Give an example of the following: **[6]**

i) Feed forward control system.

ii) Feedback control system.

iii) Regulator control system.

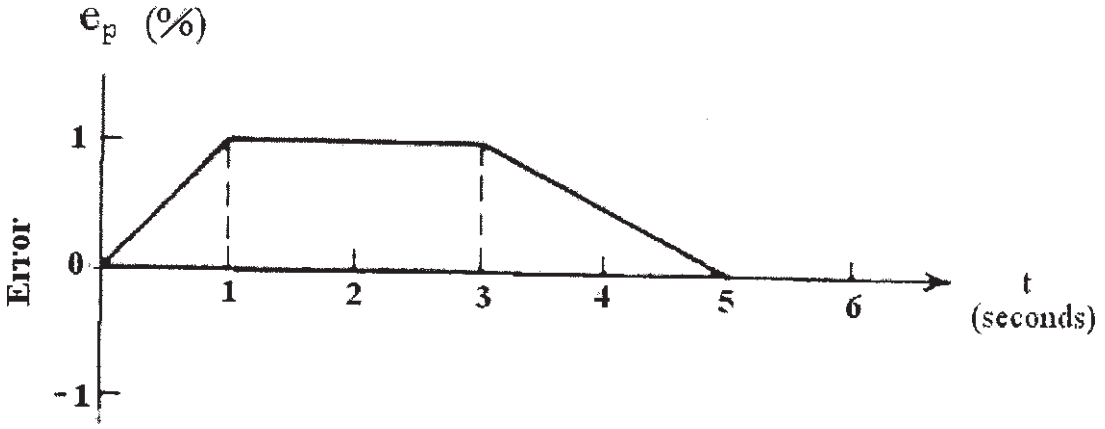
c) In a certain system, an electric heating element was found to increase the temperature of a piece of metal 10^{o} for each ampere of current. The metal expands 0.001 inch/deg and pushes on a load sensor which outputs 1 V/0.005 inch of compression. **[6]**

i) Find the transfer functions of the three components and draw the block diagram.

ii) Calculate the overall transfer function of this system.

Q9) a) What are the major disadvantages of two position controller? **[4]**

b) Figure Q 9 (b) shows an error time graph. Sketch the PD controller output w.r.t time K_P = 5%/%, K_D = 0.5%/s and m(0) = 30%. **[8]**



c) Write down the advantages and limitation of proportional control system. **[4]**

OR

Q10)a) Write note on Proportional, Integral and Derivative control Actions and its effect on error and response time. **[8]**

b) Explain PID controller in detail. **[8]**

Q11)a) Explain the Timers and Counters used in PLC programming. **[8]**

b) Construct the ladder logic diagrams for **[10]**

i) OR gate

ii) AND gate

iii) NAND gate

Also develop a truth table for all three logics.

OR

Q12)a) Write a short note on concept and purpose of a Programmable Logic Controller (PLD). Explain the basic instructions used in a PLC program. **[8]**

b) Draw ladder diagram for a simple traffic light controller for the following sequence of operations as below: **[10]**

Step 1 : Turn Green ON for 35 seconds,

Step 2 : Turn Yellow ON for 5 seconds,

Step 3 : Turn Red ON for 40 seconds,

Step 4 : Repeat the sequence i.e. Step 1 - Step 2- Step 3.

Total No. of Questions :12]

SEAT No. :

P2979

[Total No. of Pages :2

[5058]-180
T.E.(Biotechnology)
BIOINFORMATICS AND MANAGEMENT
(2008 Pattern) (Semester-II)

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

Instructions to the candidates:

1) ***Answer 3 questions from section I and 3 questions from section II.***
2) ***Answers to the two sections should be written in separate 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) What is a database management system? Describe NCBI as a database of databases. **[18]**

OR

Q2) Give an overview of various biological databases, and the importance of having a database. How does it help in advancing of scientific research? **[18]**

Q3) Write in brief on specialized genomic resources. **[16]**

a) Saccharomyces Genome Database (SGD), and
b) Unigene.

OR

Q4) What is sequence Retrieval System (SRS)? Compare and contrast between SRS and Entrez. **[16]**

Q5) Write short note on. **[16]**

a) SWISS -PROT and
b) PIR-PSD

OR

Q6) How is the protein structure used as a basis for the database organization? What are the problems associated with that strategy? **[16]**

P.T.O.

SECTION-II

Q7) Explain and compare between Pairwise and Multiple sequence alignment. **[18]**

OR

Q8) Describe the use of the tool BLAST. How is it significant? What results are obtained? Describe in brief its variants. **[18]**

Q9) What is Phylogeny? How does phylogenetic analysis of microorganisms aid in drug discovery research? **[16]**

OR

Q10) What are homologs, orthologs and paralogs ? What are the steps involved in the algorithm while constructing a phylogenetic tree? **[16]**

Q11) Explain how Management as a concept is applied towards the efficient functioning of the biotechnology company? **[16]**

OR

Q12) Explain SWOT analysis in detail with the help of a case study. **[16]**

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Total No. of Questions : 12]

SEAT No. :

P1602

[Total No. of Pages :3

[5058]-19
T.E. (Mech./Auto.)
MECHANICAL
Metrology & Quality Control
(2008 Pattern) (Semester - II)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) Describe the following term: **[8]**

i) Line standard and End standard

ii) Accuracy and precision

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

OR

Q2) a) Explain following terms **[8]**

i) Sine bar and sine center.

ii) Angle Dekkor

b) Explain Solax pneumatic comparator with neat sketch. **[8]**

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

b) What is Taylor's principle? Determine the dimensions and tolerances of shaft and hole having size of 25H8 h7 fit. **[10]**

(IT7 = 16i, IT8 = 25i, D is in a step 18-30 mm)

OR

P.T.O.

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

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

i) Tomlinson's surface meter

ii) Gear tooth vernier caliper

Q5) a) Derive the relation for width W and depth H by constant chord method. Calculate chord length and its distance below tooth tip for a gear of module 4 mm and pressure angle 20 degree. **[8]**

b) Derive an expression for best wire size for measuring effective diameter. Calculate diameter of best size of wire for M25 × 2.5 screw. **[8]**

OR

Q6) Write Short notes on : **[16]**

a) Recent trends in metrology.

b) Co-ordinate measuring machine.

c) Pitch errors in screw threads.

d) Lasers in metrology.

SECTION - II

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

i) Quality Policy and Quality Assurance.

ii) Quality of conformance and Quality of performance.

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

OR

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

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

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

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

i) ISO 9000

ii) Five 'S'

OR

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

a) Kanban

b) FMECA

c) DMAIC

d) Process capability

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

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

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

i) Probability of acceptance of 0.6% defective in a lot is 0.525

ii) Lot size = 10,000 units

iii) Acceptance number = 1

iv) nP' = 1.5

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

OR

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

b) A component with specification limits 50±0.1 was inspected the components were taken sub group of 5 items 10 such sub groups were checked the X & R values were noted as follows **[10]**

Subgroup	1	2	3	4	5	6	7	8	9	10
X(mean)	44	43	41.8	43.4	44	43.8	43.8	45	40.8	43
R	10	7	3	5	4	12	2	5	4	9

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

Total No. of Questions :12]

P2178

SEAT No. :

[Total No. of Pages : 4

[5058]-2
T.E. (Civil)
ADVANECD SURVEYING
(2008 Pattern) (Semester-I)

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

Instructions to the candidates:

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

SECTION-I

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

b) Elevations of two triangulation stations A and B, 105 Km apart are 133 m and 435 m respectively. A peak C,78 Km from station A, has an elevation of 221.50 m. A is a ground station. Ascertain if it is visible from B or not. Also find the minimum height of scaffolding at B, so that the line of sight has a minimum 2.5 m clearance anywhere. **[8]**

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

OR

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

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

c) Elevations of two triangulation stations A and B, 100 Km apart are 123 m and 425 m respectively. A peak C, 72 Km from station A, has an elevation of 221.50 m. A is a ground station. Ascertain if it is visible from B or not. Also find the minimum height of scaffolding at B, so that the line of sight has a minimum 2.5 m clearance anywhere. **[8]**

P.T.O.

Q3) a) The angles from triangle ABC were recorded as follows. Calculate the corrected values of angles. Use method of correlates.

A = 77° 24' 22" Weight - 3 **[8]**

B = 49° 35' 31" Weight - 2

C = 53° 00' 53" Weight - 4

b) Describe laws of weights of an observation with help of suitable example. **[8]**

OR

Q4) a) Find the most probable values of the angles A and B from the following observations: **[8]**

A = 76° 42' 45" with weight 1 ;

B = 57° 53' 27" with weight 3 ;

A + B = 134° 36' 34" with weight 2 ;

Use method of correction.

b) Define the terms any four. **[8]**

i) MPV,

ii) True value,

iii) Residual error

iv) Weight of an observation

v) Independent quantity.

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

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

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

Horizontal distance between A and B = 6000 m

Angle of Elevation of B at A = 1° 07' 02"

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

Height of instrument at A = 1.40 m

Height of instrument at B = 1.55m

Height of signal at A = 7.00 m

Height of signal at B = 6.50 m

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

OR

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

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

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

SECTION-II

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

b) A pair of photograph is taken with a camera having focal length 15 cm.The scale of photography is 1 : 20,000 and photo base is 6.65 cm. The measured parallax of a vertical control point having an elevation 140 m is 87.28 mm. Compute the elevation of another point P whose measured parallax is 84.18 mm. **[9]**

OR

Q8) a) A section line AB appears to be 12.16 cm on a photograph for which the focal length is 15 cm. The corresponding line measures 2.54 cm on a map which is to a scale 1:50,000. The terrain has an avg. elevation of 120 m above Mean sea level.Calculate flying height of aircraft, above Mean sea level, when the photograph was taken. **[9]**

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

Q9) a) Explain use of remote sensing in Civil Engg. Also compare Aerial photograph with satellite images. **[8]**

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

OR

Q10)a) Write a note on

i) Atmospheric windows

ii) Active and Passive remote sensing. **[8]**

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

Q11) a) Define Tide and Enlist the different types of Tidal Gauges. **[5]**

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

c) What is meant by sounding? Enumerate different instruments required for sounding and explain echo sounding. **[6]**

OR

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

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

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

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Total No. of Questions :12]

P2181

SEAT No. :

[Total No. of Pages :5

[5058]-20
T.E. (Mechanical)
REFRIGERATION & AIR CONDITIONING
(2008 Course) (Semester-II) (302051)

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

Instructions to the candidates:

1) ***Answer any three questions from each section.***
2) ***Neat diagrams must be drawn whenever necessary.***
3) ***Use of calculator is allowed.***
4) ***Assume suitable data if necessary.***

SECTION-I

Q1) a) Explain reversed Carnot cycle and derive expression for COP of reversed Carnot cycle. **[8]**

b) In a refrigerator working on Bell-Coleman cycle , air is drawn into the compressor from the cold chamber at a pressure of 0.95 bar & temperature of - 5°C. After compression to 5 bar it is cooled at constant pressure to temperature of 15°C. The compression and expansion follows $PV^{1.3}$ =C. If air is expanded to 1 bar calculate COP & capacity if mass circulation of air is1.5 kg/min. **[8]**

OR

Q2) a) What is Peltier effect? With neat diagram explain thermoelectric refrigeration system. **[8]**

b) What are the limitations of Carnot cycle? Derive the practical VCC from Carnot cycle. **[8]**

Q3) a) A refrigeration Plant operates between the temperature limits of -15°C and 30°C. The machine circulates 4.5kg/min. There is no undercooling. Compressor discharge is at75° C. Determine: COP, refrigerant quantity entering compressor, and ice produces at 0° C in kg/h from water at 25°C. **[10]**

Assume: C_{pg}=2.82kJ/kgK, C_{pi} = 2.1 kJ/kgK, C_{pl}=4.18 kJ/kgK, & H_{fs}=336 kJ/kg.

P.T.O.

Use following properties:

Sat. temp,°C	h_f kJ/kg	h_g kJ/kg	s_f kJ/kgK	s_g kJ/kgK	V_f m³/kg	V_g m³/kg
-15	112.3	1426	0.457	5.549	0.00152	0.509
+30	323.1	1469	1.204	4.968	0.00158	0.111

b) Give the selection criteria of refrigerant absorbent pair in VARS. **[6]**

OR

Q4) a) Draw practical VCC on T-s and p-h diagram. Explain the various losses/ gains in practical VCC. **[8]**

b) Explain double effect Li-Br vapour absorption system. What are its benefits over single effect system? **[8]**

Q5) a) Exlain : ODP & GWP **[6]**

b) A two evaporator, single compressor and individual expansion valve arrangement is used in multistage vapour compression system using R134a. Sketch schematic arrangement and also cycle on p-h chart.

Determine overall COP, mass flow rate of refrigerant & cooling load on condenser. The exchanger details of system are as follows: **[12]**

i) Evaporator, E1 : - 30°C & 20TR capacity

ii) Evaporator, E2 : -5°C & 30TR capacity

iii) Condenser, C : 40°C & 10°C subcooling

OR

Q6) a) Write short note on "Alternative refrigerants". **[8]**

b) Why Cascade system is required ? Describe its working with neat diagram. Give its applications. **[10]**

SECTION-II

Q7) a) Moist air at 40°C & 80% RH passes through an air conditioning plant and attains the final condition 24°C & 60% RH. Assuming constant pressure of 100 kPa, determine capacity of cooling coil and rate of moisture removal in kg/h for mass flow rate of 2 kg/s. Show the process on psychrometric chart. **[8]**

b) Explain the heat balance of human body. What are the various factors affecting human comfort? **[8]**

OR

Q8) a) Explain : RSHF, GSHF and ESHF. **[6]**

b) A psychrometer records 30°C & 25°C WBT. Calculate- vapour pressure, relative humidity, specific humidity, DPT & degree of saturation. Barometer reads 95 kPa. Calculate all properties when barometer reads 101.325 kPa **[10]**

Q9) a) Explain the various types of compressors used in refrigeration systems. Discuss the working of screw compressor. **[8]**

b) What is variable air volume air conditioning system? What are the advantages of it over other types? **[8]**

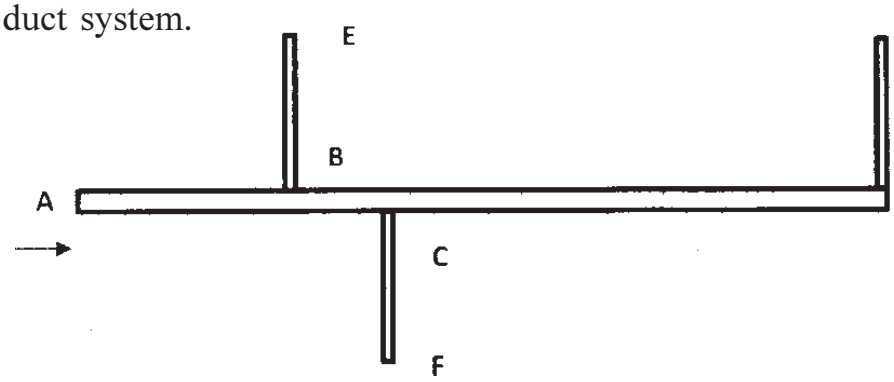
OR

Q10)a) With neat schematic explain the central air conditioning system. **[8]**

b) Explain the working of capillary tube. **[8]**

Q11)a) Explain the various types of food preservation techniques. **[8]**

b) Use equal friction method to find duct dimensions for the following air duct system. **[10]**



Length of ducts are :

AB = 30 m, BC = 15m, CD = 60 + 15 m after elbow, CF = 22.5 m, BE =30 m.

Air delivery :

At E = 60 cmm, At F = 180cmm, at D = 240 cmm

Assume free exit at each outlets (E,F,D).

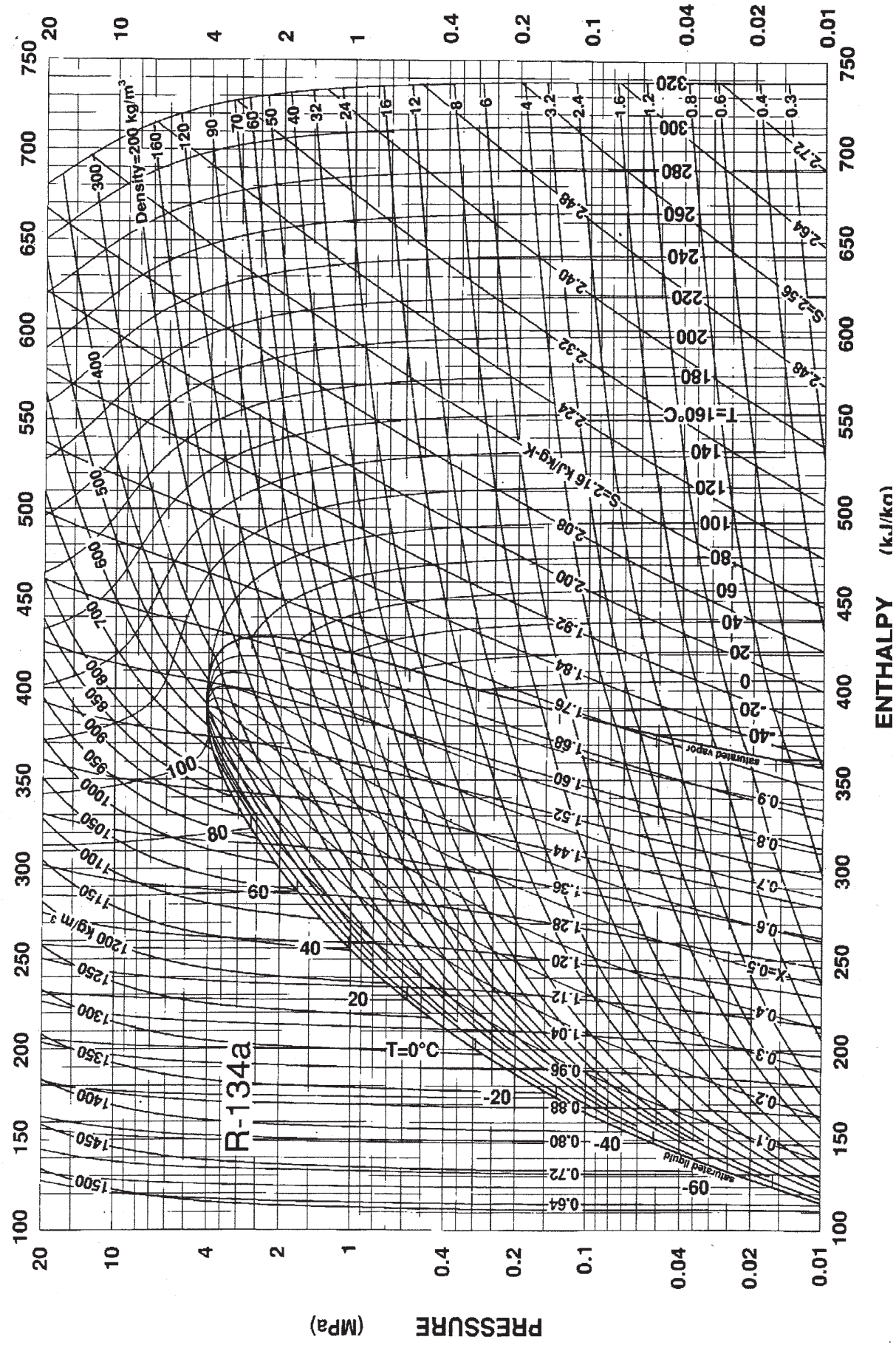
OR

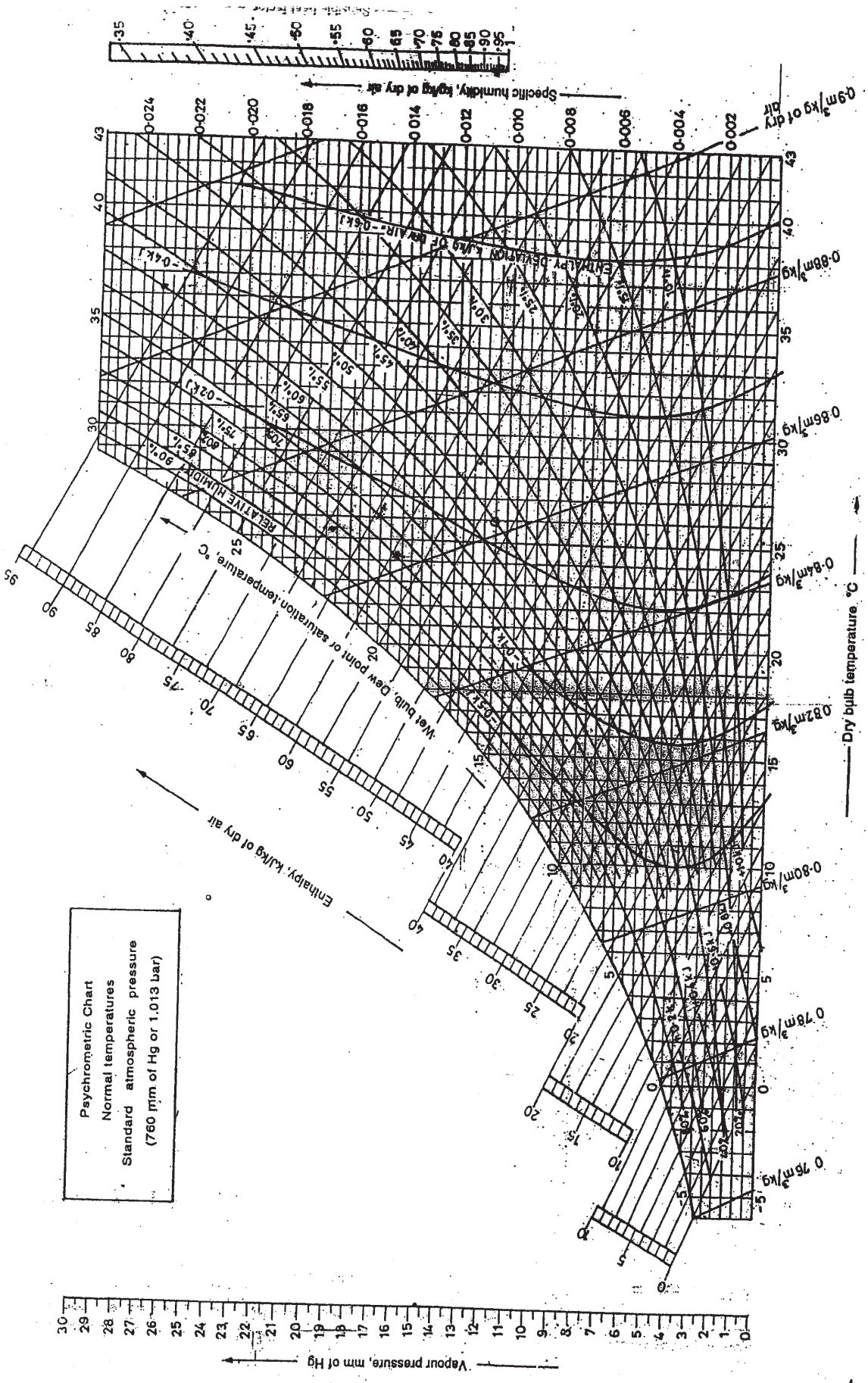
Q12)Write short note on : **[18]**

a) CAMA storage

b) Fan laws

c) Static regain method of duct design.


R-134a
PRESSURE (MPa)
ENTHALPY (kJ/kg)
Density=200 kg/m³
T=160°C
T=0°C
S=2.16 kJ/kg-K
X=0.5
Saturated vapor
Saturated liquid


Psychrometric Chart
Normal temperatures
Standard atmospheric pressure
(760 mm of Hg or 1.013 bar)
Enthalpy, kJ/kg of dry air
Wet bulb, Dew point or saturation temperature, °C
Dry bulb temperature, °C
Specific humidity, kg/kg of dry air
Vapour pressure, mm of Hg
RELATIVE HUMIDITY
ENTHALPY DEVIATION, kJ/kg OF DRY AIR
0.9m³/kg of dry air
0.88m³/kg
0.86m³/kg
0.84m³/kg
0.82m³/kg
0.80m³/kg
0.78m³/kg
0.76m³/kg

4

Total No. of Questions : 12]

SEAT No. :

P1603

[Total No. of Pages : 3

[5058]-21
T.E.(Automobile)
MACHINE DESIGN
(2008 Pattern)(Semester-I) (316481)

Time :4 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) ***Assume suitable data, if necessary.***
4) ***Use of calculator is allowed.***

SECTION-I

Q1) a) Differentiate between transmission shafts and machine shafts. **[4]**

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

c) A shaft running at 400 rpm transmits 10 kW. Find the diameter of shaft. Assume maximum torque is 20% more than actual torque. Take yield shear stress as 248 MPa, factor of safety as 4, $c_m = 1.5$ and $c_t = 1$. **[10]**

OR

Q2) a) Determine the required length of square key if key and shaft are made up of same material. **[4]**

b) Design a rigid flange coupling to transmit 40 kW at speed of 1000 rpm. Take shear stress for steel as 81 MPa, shear stress for cast iron as 36.52 MPa, crushing stress as 324 MPa and standard diameters in mm are 28,32,34. Assume square key. **[14]**

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

b) The lead screw of a lathe has single start ISO trapezoidal threads of 30 mm diameter and 6 mm pitch. It drives a tool carriage and exerts an axial load of 1.5 kN on a collar of 30 mm inside diameter and 50 mm outside diameter. If the lead screw rotates 40 rpm, find the power required to drive the screw and efficiency. Take $f = 0.14$ and $f_c = 0.09$. **[8]**

OR

P.T.O.

Q4) a) Explain the different forms of threads with sketches. **[8]**

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

Q5) a) Explain about modified Goodman diagram. **[6]**

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

OR

Q6) a) Derive Soderberg equation. **[8]**

b) A mass of 500kg is being lowered by means of steel wire rope having cross-sectional area 250 mm^2. The velocity of weight is 0.5 m/sec. When the length of extended rope is 20m, the sheave gets stuck up. Determine the stress induced in the rope due to sudden stoppage of sheave. Take E= 8×10^5 MPa. **[8]**

SECTION-II

Q7) a) Derive an expression for shear stress in helical springs. **[8]**

b) Explain Nipping in leaf springs with sketch. **[8]**

OR

Q8) a) How do you classify springs? Explain. **[6]**

b) Design a helical spring to carry a load of 500 N with deflection 25 mm. The spring index is 8. Permissible shear stress is 350 MPa. Modulus of rigidity is 84×10^3 MPa and a = 6.68 mm. **[10]**

Q9) a) How do you classify bearings? Explain. **[6]**

b) The following data is given for a hydrodynamic bearing. Radial load = 3.2kN, journal speed = 1490 rpm, journal diameter = 50 mm, bearing length = 50 mm, radial clearance = 0.05mm, viscosity of lubricant = 25cP. Assuming that the total heat generated in the bearing is carried by the total flow in the bearing. Calculate **[10]**

i) coefficient of friction

ii) power lost in friction

iii) minimum oil film thickness

iv) flow requirement in lit/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) Derive Petroff's equation for bearing. **[6]**

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

Q11)a) Derive an expression for formative number of teeth in helical gear. **[6]**

b) A motor shaft running at 1440 rpm to transmit 15kW of power to a low speed shaft with a speed reduction through helical gears having helix angle 25°, transmission ratio is 3:1. The teeth are 20° FDI system and the pinion have 25 teeth. σ_d = 193.2 MPa, BHN = 250 for pinion and σ_d = 138.3 MPa, BHN=180 for gear. Design gear set. **[12]**

$Y = \pi(0.154–0.912/Ze)$, $C_v = 6.1/6.1+ V$

OR

Q12)a) How do you classify gears? Explain. **[6]**

b) Design a spur gear set to transmit 20 kW at 900 rpm of pinion. The transmission ratio is 7/3 :1. Take 20° FDI, Z_1=18 , σ_d= 140MPa for pinion and σ_d = 55MPa for gear. The diameter of the pinion is 105 mm. **[12]**

Total No. of Questions : 12]

SEAT No. :

P1604

[Total No. of Pages : 5

[5058]-26
T.E. (Automobile)
AUTOMOTIVE ENGINE DESIGN
(2008 Course) (316483) (Semester - II)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) Derive an expression for thermal efficiency of the ideal Diesel Cycle. **[8]**

b) An oil engine works on ideal diesel cycle. The overall compression ratio is 18:1 and the constant pressure addition causes at 10% of the stroke. Intake conditions are 1 bar and 20 ºC. The engine uses 100 m^3 of air/hr. If $\gamma = 1.4$, determine: **[10]**

i) the maximum temperature and pressure in the cycle,

ii) the thermal efficiency of the engine and

iii) the ip of the engine.

OR

Q2) a) A six-cylinder four stroke petrol engine has a swept volume of 300 cm^2 per cylinder, a compression ratio of 10 and operates at a speed of 3500 rev/min. If the engine is required to develop on output of 75 kW at this speed, calculate the cycle efficiency, the necessary rate of heat addition, the mean effective pressure, and the maximum temperature of the cycle. Assume that engine operates on the otto cycle and that the pressure and temperature before isentropic compression are 1 bar and 150 ºC respectively. Take $C_V = 0.718$, $\gamma = 1.4$. **[10]**

b) If the above engine is a CI engine operating on the Diesel cycle and receiving heat at the same rate, calculate efficiency, the maximum temperature of the cycle, the efficiency, the power output, and the mean effective pressure. **[8]**

P.T.O.

Q3) a) Discuss the factors which affects the duration of ignition lag. **[8]**

b) The cylinder of a four stroke diesel engine has the following specifications:

Cylinder bore = 150 mm. Reboring allowance = 4 mm.

Maximum gas pressure = 3 MPa

Allowable Tensile Stress = 50 N/mm^2

Determine the thickness of cylinder wall. Also calculate the appearant and net circumferential and longitudinal stresses in cylinder wall. **[8]**

OR

Q4) a) What are the basic requirements of a good combustion chamber? Discuss. **[8]**

b) The cubic capacity of four stroke over square SI engine is 245 cc. The over square ratio is 1.1. The clearance volume is 27.2 cc. Calculate the bore, stroke and compression ratio of the engine. **[8]**

Q5) a) The air flow to a four cylinder four stroke oil engine is measured by means of a 5 cm diameter orifice, having a coefficient of discharge of 0.6. During a test on the engine the following data were recorded.

Bore = 10.5 cm, Stroke = 12.5 cm, engine speed = 1200 rpm, brake torque = 147 Nm, fuel consumption = 5.5 kg/hr, calorific value of fuel = 43100 kJ/hr, head across orifice = 5.7 cm of water, ambient temperature = 20 ºC, ambient pressure = 1.013 bar respectively: **[8]**

Calculate:

i) thermal efficiency on b.p. basis.

ii) the break mean effective pressure.

iii) the volumetric efficiency based on free air condition.

b) Discuss the important properties of lubricating oil related to engine operation. **[8]**

OR

Q6) a) Describe with neat sketch: **[8]**

i) Down - flow type radiator.

ii) Cross-flow type radiator.

b) A four stroke cycle petrol engine has six single acting cylinders of 7.5 cm bore and 9 cm stroke. The engine is coupled to a brake having a torque arm radius of 38 cm. At 3300 rpm, with all cylinders operating the net brake load is 324 N. When each cylinder in turn is rendered inoperative, the average net brake load produced at the same speed by the remaining five cylinders is 245 N. Estimate the indicated mean effective pressure of engine.

With all cylinders operating, the fuel consumption is 0.3 kg/min, fuel calorific value = 42000 kJ/kg. The jacket water flow rate and temperature rise are 65 kg/min and 12 ºC respectively. On test, the engine is enclosed in a thermally and acoustically insulated box, through which the output drive, water, fuel, air and exhaust connections pass. Ventilating air blown up through the box at the rate of 14 kg/min enters at 10 ºC, and leaves at 55 ºC. Draw up a heat account of the engine, stating the items as a percentage of the fuel. **[8]**

SECTION - II

Q7) a) The bore of a cylinder of the four stroke diesel engine is 120 mm. The maximum gas pressure inside the cylinder is limited to 4 MPa. The cylinder head is made of cast iron and allowable tensile stress is 40 N/mm^2. Determine the thickness of cylinder head, the studs, which are made of steel have allowable stress as 50 N/mm^2. Calculate number of studs, nominal diameter of studs, and pitch of studs. **[8]**

b) The following data is given for four stroke diesel engine cylinder bore = 100mm.

Length of stroke = 125 mm

Speed = 2000 rpm.

Brake mean effective pressure = 0.65 MPa

Maximum gas pressure = 5 MPa

Fuel consumption = 0.25 kg per BP per hr.

Higher calorific value of fuel = 42000 kJ/kg.

Assume that 5% of total heat developed in cylinder is transmitted by piston. The piston is made of grey cast iron and the permissible tensile stress is 37.5 N/mm^2. (K = 46.6 W/m/ºC). The temperature difference between the centre and edge of piston head is 220 ºC. **[10]**

i) Calculate the thickness of piston head by strength consideration.

ii) Calculate the thickness of piston head by thermal consideration.

iii) Which criteria decides thickness of piston head?

iv) State whether the ribs are required.

v) If so, calculate the number and thickness of piston ribs.

vi) State whether the ribs are required on top of piston head.

vii) If so, calculate the radius of cup.

OR

Q8) a) The following data is given for the cap and bolts of the big end of connecting rod. **[8]**

Engine speed = 1500 rpm.

Length of connecting rod = 320 mm.

Length of stroke = 140 mm.

Mass of reciprocating parts = 1.75 kg.

Length of crank pin = 38 mm.

Permissible tensile stress for bolts = 120 N/mm^2.

Permissible bending stress for cap = 120 N/mm^2.

Calculate the nominal diameter of bolts and thickness of cap for big end.

b) The following data is given for a piston of a four stroke diesel engine.

Cylinder bore = 100 mm

Material of piston rings = Grey Cast iron.

Allowable tensile stress = 90 N/mm^2.

Allowable radial pressure on cylinder wall = 0.035 MPa

Thickness of piston head = 16mm.

Number of piston rings = 4.

Calculate :

i) Radial width of piston rings.

ii) Axial thickness of piston rings.

iii) Gap between the free ends of piston rings before assembly.

iv) Gap between the free ends of piston rings after assembly.

v) Width of top land.

vi) Width of ring grooves.

vii) Thickness of piston barrel.

viii) Thickness of barrel at open end.

[10]

Q9) a) Write a short note on following: **[8]**

i) Dwell meter

ii) Cylinder Leakage Tester

b) Discuss with neat sketch cylinder Balance Test. **[8]**

OR

Q10)a) Discuss with neat sketch Exhaust Gas Analyzer. **[8]**

b) Discuss with neat sketch use of Cylinder Compression Tester. **[8]**

Q11)a) Describe two stroke VCR engine with neat sketch. **[8]**

b) Describe in detail variable Lift Electronic Control Engine. **[8]**

OR

Q12)a) Discuss the working principle of Wankel Rotary Combustion Engine. **[8]**

b) Describe with neat sketch Stratified Charge Engine. **[8]**

Total No. of Questions :12]

SEAT No. :

P1605

[Total No. of Pages : 2

[5058] - 27

T.E. (Automobile)

AUTOMOTIVE TRANSMISSION

(2008 Pattern) (Semester - VI)

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.***

SECTION-I

Q1) a) Give the classification of an Automobile in detail with example? **[9]**

b) Compare: Hotchkiss drive & torque tube drive. **[9]**

OR

Q2) a) With neat layout explain front engine front wheel drive arrangement? **[9]**

b) Compare: Rear wheel drive & front wheel drive layouts? **[9]**

Q3) a) Write working Principle, functions and general requirements of automotive clutches? **[8]**

b) With neat sketch explain the construction and working of Single Plate clutch? **[8]**

OR

Q4) a) List down the different clutch lining materials? What are its general requirements? **[8]**

b) With the help of neat sketch explain construction and working of Electromagnetic clutch. **[8]**

P.T.O.

Q5) a) Explain the construction and working of Constant Mesh gearbox with neat sketch. **[8]**

b) Write note on Lubrication of gear box. **[8]**

OR

Q6) a) Write note on two wheeler gearbox. **[8]**

b) Compare constant mesh gearbox with synchromesh gearbox. **[8]**

SECTION-II

Q7) a) Explain different types of final drives and need of differential. **[8]**

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

OR

Q8) a) What is need of differential? Explain differential in detail. **[8]**

b) Explain function of rear axle, Construction and types of loads acting on rear axle. **[8]**

Q9) a) Explain construction and working Fluid flywheel with its advantages and limitations. **[9]**

b) Explain Clutches and brakes in epicyclic gear train. **[9]**

OR

Q10)a) Explain Wilson Epicyclic gear train. **[9]**

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

Q11)a) Explain construction and working of continuous variable transmission. With its advantages and disadvantages. **[8]**

b) What is the Principle of semi-automatic & automatic transmission. **[8]**

OR

Q12)a) Explain any automatic transmission system used in modern car. **[8]**

b) Write a note on hydraulic transmission. **[8]**

●●●●●

Total No. of Questions : 12]

SEAT No. :

P1606

[Total No. of Pages : 2

[5058]- 28
T.E. (Automobile)
AUTOTRONICS
(2008 Pattern) (Semester - II) (316485)

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

Instructions to the candidates:

1) ***Answer any three questions from 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) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Write brief on static characteristics of instrument. **[6]**

b) List commonly used transduction systems in automobile. **[4]**

c) Explain principle of working of power window. **[6]**

OR

Q2) a) Define and explain stages of measurement. **[6]**

b) Discuss with application of piezoelectric transducer. **[4]**

c) List various temperature measurement sensors used in automotive system & explain one in details. **[6]**

Q3) a) Explain construction, working and application of throttle position sensor. **[8]**

b) Explain Manifold Absolute Pressure (MAP) sensors. **[8]**

OR

Q4) a) Explain construction and classification of combustion knock sensor. **[6]**

b) Explain working principle of Air flow measurement. **[4]**

c) Explain principle of working Electromagnetic sensor. **[6]**

Q5) a) Explain the Ladder diagram Programming with suitable example. **[8]**

b) Write in brief about sequential logic. **[6]**

c) What is timing diagrams? **[4]**

OR

P.T.O.

Q6) Write Short notes on following: **[18]**

a) D/A converters.

b) Input/output processing.

c) Logic functions used for switches in series and parallel.

SECTION - II

Q7) a) Explain group and sequential injection system. **[9]**

b) Discuss about Cold start engine system. **[9]**

OR

Q8) a) Discuss in detail about Engine management control system. **[6]**

b) Explain ECU and microcontroller. **[6]**

c) Explain open loop and closed loop system. **[6]**

Q9) a) What is the need of ABS system. **[6]**

b) List various components of Global Positioning Systems. **[6]**

c) Explain in brief about Radar Warning System. **[4]**

OR

Q10)a) Explain crash sensor in airbag system. **[6]**

b) Explain seat belt tightening and Web clamps. **[6]**

c) Write in brief about cruise control system. **[4]**

Q11)a) Explain operation of rollover mitigation system. **[8]**

b) Explain in brief about sensors used for sensing vehicle moments. **[8]**

OR

Q12)a) Explain operation of electronic stability system. **[8]**

b) Discuss any 2 vehicle safety systems in brief. **[8]**

Total No. of Questions : 8]

SEAT No. :

P1593

[Total No. of Pages : 3

[5058]-3
T.E. (Civil)
STRUCTURAL DESIGN - I
(2008 Course) (Semester - I)

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

Instructions to the candidates:

1) ***Answers 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 sketches must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Assume suitable data, if necessary.***
6) ***Use of electronic pocket calculator, IS 800-2007 and Steel Table are allowed.***
7) ***Use of cell phone is prohibited in the examination hall.***

SECTION - I

Q1) a) Explain in brief design philosophy of limit state design for strength and serviceability. **[10]**

b) Design a tension member using double equal angle sections back to back on opposite faces of 10 mm thick gusset plate if it carries an axial factored load of 400 kN using 20 mm black bolt. Assume Fe - 415 grade of steel. Draw the design sketch. **[15]**

OR

Q2) a) Differentiate between bolted and welded connection. **[7]**

b) Explain the classification of cross section and hence find class of ISMB 300@ 44.2 kg/m. **[8]**

c) A single angle ISA 80 × 80 × 8 mm@ 9.6 kg/m is connected to 8mm thick gusset plate at the ends with 4 Nos. of 16 mm bolts to transfer tension. Determine the design tensile strength of angle section. **[10]**

P.T.O.

Q3) a) Determine the load carrying capacity of a column consisting of ISMB 500@ 86.9 kg/m having a length of 5 m. One end of the column is fixed and other end is pinned. Assume f_y = 250 MPa. **[10]**

b) Design a built - up column 9 m long to carry a factored load of 1000 kN. The column is restrained in position but not in direction at both ends. Design the column by using two channels back to back and single lacing with bolted connection. Draw the design sketches. **[15]**

OR

Q4) a) Design a single angle strut connected to the gusset plate to carry an axial compression of 250kN. The length of the strut between centre to centre intersections is 3m. Design welded connection of the joint. **[10]**

b) Design a gusseted base for a built-up column ISHB 400 @ 82.2 kg/m with two plates 450 mm × 20 mm carrying an axial factored load of 3000 kN. The column is to be supported on concrete pedestal of M20 grade. Draw the design sketches. **[15]**

SECTION - II

Q5) a) A simply supported beam of effective span 4 m carries a factored uniformly distributed load 60 KN/m. The section is laterally supported throughout the span. Design suitable cross section using I - section.**[10]**

b) Design a column of building frame with an effective length 3.5 m subjected to a factored axial load 500kN and factored bending moment 50 kNm. Check for section strength only. **[15]**

OR

Q6) a) Design a suitable I-section for a simply supported beam of span 5m loaded with 20 kN/m dead load and 40 kN/m imposed load. The beam is laterally unsupported throughout the span. Take f_y = 250 Mpa. **[15]**

b) Design a moment resistance base for a ISHB 300 @ 58.8 kg/m column to carry a factored load of 700 kN and factored bending moment 50 kNm.**[10]**

Q7) Design Suitable cross section for welded plate girder for an effective span of 30 m and carrying uniformly distributed load w = 30 kN/m. It is also loaded with two concentrated load of 120 kN acting at 10m from either supports. The compression flange of the girder is laterally supported throughout the span. Also design load bearing stiffener, connection between flange and web plate and draw the design sketches. **[25]**

OR

Q8) A truss of span 20 m and pitch 4m is used for an industrial building situated in Pune. The truss is covered with GI sheet. The height of the truss at the eaves level is 10 m, the spacing between the trusses is 5 m. Assume suitable type of truss and Calculate panel point dead load, live load and wind load. Find the maximum force in bottom and top chord member and design it using suitable angle sections. Show design sketches. **[25]**

Total No. of Questions :12]

SEAT No. :

P1607

[Total No. of Pages :3

[5058] - 30

T.E. (Automobile)

VEHICLE BODY ENGINEERING

(2008 Pattern) (Semester - II) (316486)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) Explain Aerodynamic drag. Summaries various forces and moments. **[8]**

b) Write a short note on wind tunnel testing. **[8]**

OR

Q2) a) Explain pressure distribution around vehicle body and concept of down force. **[8]**

b) Explain the various optimization techniques for minimum drag? **[8]**

Q3) a) Write a short note on vehicle safety. **[8]**

b) Explain weight reduction in cars and space in car. **[8]**

OR

Q4) a) Write a short note on any 2 of following: **[8]**

i) Bonnet

ii) Material used in car body

iii) Saloon and hatchback cars.

b) Explain blind regions and methods to improve visibility of driver. **[8]**

P.T.O.

Q5) a) Write short note on: **[10]**

i) Entrance cum exit location.

ii) Engine location.

b) Write a short note on articulated bus. **[8]**

OR

Q6) a) Prepare layout of city bus having capacity of 32 seats considering all necessary features. Consider bus having 2 doors, sufficient space for passengers and separate driver cabin. Give necessary dimension. **[12]**

b) Explain conventional and integral type construction for bus. **[6]**

SECTION - II

Q7) Explain in brief: **[16]**

a) Tipper body

b) Tanker body

c) Flat platform vehicle

d) Drop side and fixed side

OR

Q8) a) Discuss light construction vehicle in brief. **[8]**

b) Draw and explain driver seat and controls for cars, HTV and LTV. **[8]**

Q9) a) Explain the symmetric & Asymmetric loading with neat sketch. **[8]**

b) Explain idealized structure of vehicle body. **[8]**

OR

Q10)a) Explain shear panel method of structure analysis. **[8]**

b) Write about analysis of bus body under bending and torsion stress. **[8]**

Q11) Write a short note on: **[18]**

a) Any 3 types of seats used in automobile.

b) Any 3 types of seat belts.

c) Any 2 energy absorbing systems.

OR

Q12) a) Write and explain safety devices which are in incorporated in the vehicle. **[5]**

b) Sketch the different seat used in automobile. **[5]**

c) 'Airbag is supplementary restrain system.' Prove the statement with correct reason. **[8]**

Total No. of Questions : 10]

SEAT No. :

P1608

[Total No. of Pages :2

[5058]-32
T.E. (Mechanical S/W)
PRODUCTION MANAGEMENT
(2008 Course) (302061A) (Elective - I) (Self Study) (Semester - I)

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

Instructions to the candidates:

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

SECTION -I

Q1) a) What are the types of organizations? Explain each type in brief. **[8]**

b) Explain difference between private and public limited company. **[8]**

OR

Q2) a) Explain in brief contributions of F.W. Taylor and Henry Fayol to Principles of management? **[8]**

b) What is Group dynamics? Explain any two types. **[8]**

Q3) a) What are different types of production systems? Explain each with their characteristics. **[8]**

b) Distinguish between product layout and process layout. **[8]**

OR

Q4) a) What are different measures of productivity? How total productivity of an organization is measured? **[8]**

b) Define Industrial engineering. Explain some of the contributions of various persons for development of industrial engineering. **[8]**

P.T.O.

Q5) Write short notes on Any three **[18]**

a) MTM 2

b) Performance rating & allowances in timestudy

c) Multiple Activity Chart.

d) Process charts & symbols.

e) Criticism of time study.

f) MOST.

SECTION - II

Q6) a) Define Quality. How quality is controlled by applying different techniques? **[8]**

b) Explain the theory of work sampling. **[8]**

OR

Q7) a) What are operrating characteristics curves? How conflicting interests of consumer and producer are handled? **[8]**

b) What are sampling plan and standard sampling tables? **[8]**

Q8) a) What is concurrent engineering? Explain with suitable example. **[8]**

b) What are the pillars of House of quality? **[8]**

OR

Q9) a) Explain the difference between Deming's PDCA and PDSA cycle for six sigma application. **[8]**

b) Explain seven quality control tools. What is Quality Function Deployment. **[8]**

Q10) Write short notes on any THREE: **[18]**

a) Reliability Engineering.

b) Design of Experiments.

c) Concept of Hypothesis testing.

d) F.M.E.A.

e) POKAYOKE.

f) QS and CMM standards.

Total No. of Questions : 8]

SEAT No. :

P2938

[Total No. of Pages : 2

[5058]-33
T.E. (Mech.) S/W
BEHAVIOURAL SCIENCE (Elective - I)
(2008 Pattern) (302061 B) (Self Study) (Semester - I)

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

Instructions to the candidates:

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

SECTION - I

Q1) Explain in detail, types and significant of each Industrial Organisation Sectors. **[16]**

Q2) a) What is motivation? What are diffferent theories of motivation? **[8]**

b) What is role of trade union? Elaborate it. **[8]**

Q3) a) Explain the authority under Industrial dispute act 1947, and what are it's objectives. **[8]**

b) Explain Bonus act 1975. **[8]**

Q4) Explain in detail various functional areas of management. **[18]**

SECTION - II

Q5) a) Explain the Homan's model of leadership. State the various leadership under this model. **[8]**

b) What is management grid? Give details. **[8]**

Q6) a) What is upword and downword communication. Explain any one in detail. **[8]**

b) Explain in detail effective listening. **[8]**

P.T.O.

Q7) Define conflict state and explain various types of conflict. How conflict can be minimized. **[16]**

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

a) Written communication and its limitation.

b) Free rein leadership style.

c) Transactional Analysis.

Total No. of Questions :12]

SEAT No. :

P2182

[Total No. of Pages : 2

[5058]-34
T.E. (Mechanical Sandwich)
WELDING TECHNOLOGY
(2008 Course)(Semester-I) (302061) (Self Stuedy)

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

Instructions to the candidates:

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

SECTION-I

Q1) a) What are the gas welding technique & applications. **[6]**

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

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

OR

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

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

c) Explain types of flames? **[6]**

Q3) a) What is Arc welding and explain its process? **[8]**

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

OR

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

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

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

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

OR

P.T.O.

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

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

SECTION-II

Q7) a) Explain solid state welding and list types? **[6]**

b) Advantages of solid state welding? **[6]**

c) What is cold welding process? **[6]**

OR

Q8) a) Explain ultrasonic welding? **[6]**

b) Write short note on Thermit welding? **[6]**

c) Explain forge welding. **[6]**

Q9) a) What is principle operation of Brazing and soldering? **[8]**

b) Advantages, Limitation and application of brazing welding? **[8]**

OR

Q10)a) Comparison of soldering, brazing and regular welding? **[8]**

b) Explain Adhesive Welding and its application? **[8]**

Q11)a) Explain defects in welding with neat sketch? **[8]**

b) Discontinues in welding and quality check of welding? **[8]**

OR

Q12)a) List different Factors involved in welding costing? **[8]**

b) What are Factors affecting welding cost. **[8]**

❄ ❄ ❄

Total No. of Questions : 12]

SEAT No. :

P1609

[Total No. of Pages : 6

[5058]-35

T.E. (Mechanical S/W)

THEORY OF MACHINES AND MACHINE DESIGN - II

(2008 Course) (Semester - II) (302064)

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 with the help of neat sketches, what is meant by 'function generation, and rigid body guidance'? **[4]**

b) A cam rotating at 150 r.p.m., operates a reciprocating roller follower of radius 2.5 cm. The follower axis is offset by 2.5 cm to the right. The least radius of the cam is 5 cm and the stroke of the follower is 5 cm. Ascent and descent both take place by uniform acceleration and retardation. Ascent takes place during 75° and descent during 90° of cam rotation. Dwell between ascent and descent is 60°. Draw the cam profile. **[12]**

OR

Q2) a) Derive relation for displacement, velocity and acceleration of follower which has cycloidal 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 52.5 mm long and $\theta_1 = 105°$ and $\phi_1 = 66°$. **[10]**

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

b) 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;

P.T.O.

i) the center distance,

ii) the axial thrust on the gear,

iii) the transverse pressure angle,

iv) normal tooth load. **[10]**

OR

Q4) a) Two mating gears have 20 and 40 involute teeth of module 10 mm and 20° pressure angle. The addendum on each wheel is to be made of such a length that the line of contacton each side of the pitch point has half the maximum possible length. Determine the addendum height for each gear wheel, length of the path of contact, arc of contact and contact ratio.**[6]**

b) An epicyclic gear consists of three gears A, B and C as shown in Fig. 1. The gear A has 72 internal teeth and gear C has 32 external teeth. The gear B meshes with both A and C and is carried on an arm EF which rotates about the centre of A at 18 r.p.m.. If the gear A is fixed, determine the speed of gears B and C. **[10]**

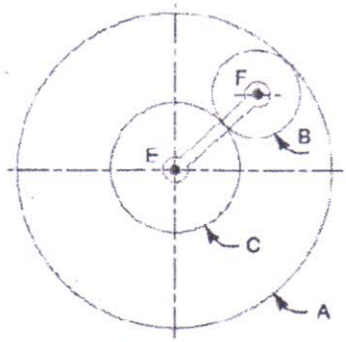


Figure 1

Q5) a) Derive an expression for tension ratio in case of band and block break in terms of coefficient of friction, block angle of contact and number of blocks in the shoe. **[8]**

b) The turbine rotor of a ship has a mass of 2000 kg and rotates at a speed of 3000 r.p.m. clockwise when looking from a stern. The radius of gyration of the rotor is 0.5 m. Determine the gyroscopic couple and its effects upon the ship when the ship is steering to the right in a curve of 100 m radius at a speed of 16.1 knots (1 knot = 1855 m/hr). Calculate also the torque and its effects when the ship is pitching in simple harmonic motion, the bow falling with its maximum velocity. The period of pitching is 50 seconds and the total angular displacement between the two extreme positions of pitching is 12°. Find the maximum acceleration during pitching motion. **[10]**

OR

Q6) a) Explain torsion dynamometer with neat sketch. **[4]**

Explain the following terms with neat sketch; **[6]**

i) Precession in Gyroscope,

ii) Reactive Gyroscopic couple,

iii) Axis of spin,

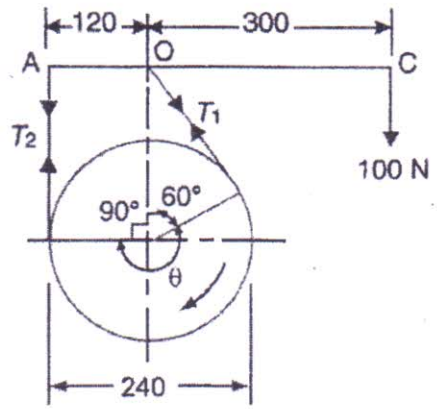
iv) Axis of couple.

b) 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:

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

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

iii) The time required to bring it to rest, from the moment of the application of the brake. **[8]**



All dimensions in mm.

Figure 2

SECTION - II

Q7) A spur gear pair is used to transmit 7.5 kW power from an electric motor running at 1440 rpm to a machine running at 360 rpm. The pinion and gear are made of plain carbon steel 55C8(S_{ut} = 720 N/mm^2 and E = 210 GPa). The tooth system is 200 full depth involute and number of teeth on pinion are as minimum as possible. The service factor and load concentration factor are 1.25 and 1.2 respectively. The face width is 12 times module. The gears are machined to meet the specification of grade 7. The factor of safety is 1.2. 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, $C_v = 3/(3+V)$

Deformation factor, $C = 0.111\ e\ [E_p \times E_g]/[E_p + E_g]$

For Grade 7, $e = 11.0 + 0.9\ (m + 0.25\ d^{1/2})$

Select the module under first choice. **[18]**

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:

i) Pitch circle diameter of worm = 48 mm

ii) Pitch circle diameter of worm gear = 192 mm

iii) Axial pitch of worm = 18.85 mm

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

v) Lead of worm = 18.85 mm

vi) Effective width of worm gear teeth = 36 mm

vii) Worm speed = 3500 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 $W/m^{2\circ}C$

xii) Overall heat transfer coefficient with fan = $15.2 + 8.25 \times 10^{-3} n_w$, $W/m^{2\circ}C$

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:

1) The dimensions of worm and worm gear

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

3) The temperature rise of lubricating oil with fan.

4) Is Fan necessary? Comment. **[14]**

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 cone clutch connects an electric motor running at 1440 rpm with a machine which is stationary. The machine is equivalent to a rotor of mass 250 kg and radius of gyration 300 mm. The machine has to brought to the full speed of 1440 rpm from a stationary condition in 40 seconds. The semi-cone angle is 12.5°. The mean radius of the friction surface is twice the face width. The coefficient of friction is 0.2, while the permissible normal intensity of pressure between the contacting surfaces is 0.1 N/mm^2. Assume the uniform wear condition, Determine:

i) the dimensions of friction surface

ii) the axial force required to engage the clutch; and

iii) the amount of heat generated during each engagement of clutch. **[12]**

OR

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

b) The following data is given for a belt drive:

Diameter of pulley = 250 mm

Shaft diameter = 20 mm

Power transmitted = 5 kW

Speed = 720 rpm

Ration of belt tensions = 3:1

Load factor = 3

Assume the pulley to be placed centrally with the belt tensions acting vertically downwards. The required reliability of the bearing is 95% with life of 10000 Hrs. Find the dynamic capacity of the bearings so that the bearings are selected from the manufacturer's catalogue, which list dynamic load carrying capacity at 90% reliability. **[12]**

*Q11)*a) Compare the Soderberg, Goodman and Gerber Approach for fatigue analysis. **[4]**

b) A transmission shaft supports a pulley midway between the two bearings. The bending moment at the mid point varies from 200 N-m to 600 N-m. The torque on the shaft varies from 70 N-m to 200 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 540 N/mm^2 and yield strength of 400 N/mm^2. The corrected endurance limit of the shaft is 200 N/mm^2. If the factor of safety is 2, determine the diameter of the shaft. **[12]**

OR

*Q12)*a) What is Goodman's criterion of failure? Develop an equation for the same. **[4]**

b) A solid circular shaft 15 mm 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]**

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Total No. of Questions : 12]

SEAT No. :

P2939

[Total No. of Pages : 4

[5058]-37
T.E. (Mechanical Engg. S/W)
MECHATRONICS (302065)
(2008 Course) (Semester- II)

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

Instructions to the candidates:

1) ***Answers to the two sections should be written in separate answer books.***
2) ***Answer Q.No.1 or Q.No2, 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) Classify, in details, the sensors used for measuring displacement (translational). **[6]**

b) Discuss, in brief, any three static characteristics of a level measurement sensor. **[6]**

c) Sensitivity of a thermocouple is 0.01 Volts /°C. Find the output voltage if the temperature is 200°C. Also find temperature for 3.5 Volts output. **[6]**

OR

Q2) a) Draw the block diagram of generalized mechatronic system and explain the function of each element. **[9]**

b) Draw a suitable circuit diagram and explain the application of bridge circuit in measurement of strain. **[9]**

Q3) a) Draw a suitbale diagram and explain the construction and working of the LVDT sensor. **[8]**

b) Draw a suitable diagram and explain the working of optical encoder and list any two applications where in such sensor is used. **[8]**

OR

P.T.O.

Q4) a) Draw a suitable diagram and explain the working of Potentiometer. Also, list two advantages and two dis-advantages of the Potentiometer. **[8]**

b) Draw a suitable diagram and explain the construction and working of the Inductive Proximity sensor. **[8]**

Q5) a) Draw suitable flowchart and explain the working of 4 bit Digital to Analog converter. **[10]**

b) A 4-bit DAC has a reference voltage of -10 to 10 Volts. The binary input is 0100. Find the equivalent analog output voltage. **[6]**

OR

Q6) a) Derive the transfer function:x(s)/F(s), for the system in Figure Q6 (a).**[8]**

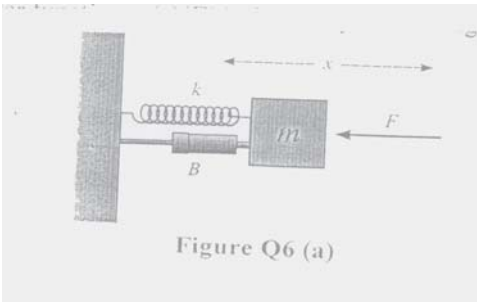

Figure Q6 (a)

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

SECTION-II

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

b) Figure Q7(b) shows a block diagram. Simplify and find the transfer function:Y(s)/R(s). **[8]**

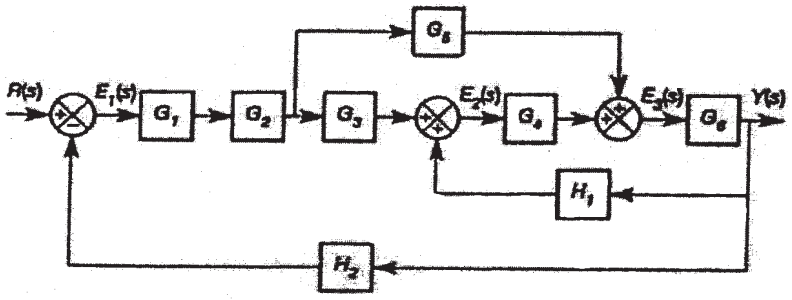

Figure Q7 (b)

OR

Q8) a) Discuss, in detail, following four terms: **[8]**

i) Process Load

ii) Process Lag

iii) Dead Time

iv) Control parameter Range

b) Figure Q8(b) shows a block diagram. Simplify and find the transfer function: C(s)/R(s). **[8]**

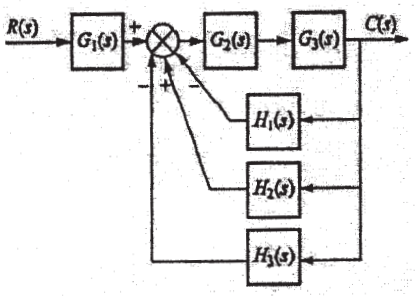

Figure Q8 (b)

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) Explain how the three elements of the PID control system work together to create a practical control system. **[6]**

OR

Q10)a) Derive the transfer function of the control signal for PID controller. **[8]**

b) Discuss the advantages and disadvantages of adding Integral as well as Derivative term to a Proportional controller. **[8]**

Q11)a) A simple pick- and-place robot picks up parts from one conveyer belt and places them on another belt, as shown in Figure Q11 (a). **[12]**

i) When a part moving along the lower conveyer belt activates Switch 1, a solenoid powered gripper clamps on the part and carries it toward the upper conveyer belt.

ii) When the gripper reaches Switch 2, it releases the part and moves back (empty) to receive the next part.

iii) When the gripper reaches switch 3, it halts and waits for the next part to start the cycle all over again.

Draw the relay logic ladder diagram to control this operation.

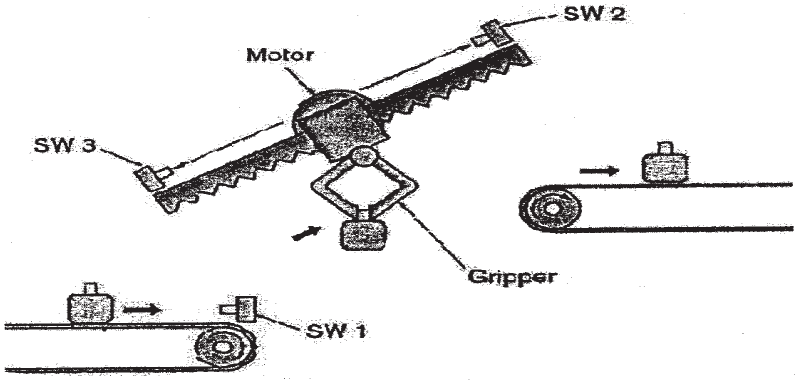

Figure Q11 (a)

b) Discuss any six advantages of the PLC, wrt Relay Logic. **[6]**

OR

Q12)a) Draw a suitable block diagram and explain the architecture of PLC.Also, list the applications of PLC. **[12]**

b) Discuss, in brief, any three criterions to be considered while selecting a PLC. **[6]**

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Total No. of Questions : 12]

SEAT No : ____

P1610

[Total No. of Pages : 3

[5058]-38
T.E.(Mechanical S/W)
TRIBOLOGY
(2008 Course) (302066) (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 is allowed.***
6) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Explain in detail use of Tribology in design? **[8]**

b) Discuss the various types of lubricants? **[8]**

OR

Q2) a) What is Lubrication? Write the basic modes of lubrication? **[8]**

b) Explain in detail types of sliding contact bearing? **[8]**

Q3) a) What are the various laws of friction and explain them in detail? **[8]**

b) Explain in detail friction measurement? **[8]**

OR

Q4) a) Define wear? Explain types of wear in detail? **[8]**

b) Derive the equation for volume of abrasive wear with usual notation? **[8]**

Q5) a) Write concept of temperature rise? **[8]**

b) Explain Raimondi & Boyd method used for the design & analysis of hydrodynamic journal bearing? **[10]**

OR

P.T.O.

Q6) a) A 360 degree hydrodynamic bearing operates under the following conditions : Radial load = 50kN, Journal diameter = 100mm, Journal speed = 1440rpm, Bearing length =100mm, Radial clearance = 0.12mm, Viscosity of lubrication = 8cP, Calculate: Minimum film thickness, Coefficient of friction, Power lost in friction. **[10]**

b) Why hydrodynamic journal bearing is called as self - acting bearing? **[8]**

SECTION - II

Q7) a) What is Hydrostatic lubrication? Write its advantages and limitations? **[8]**

b) Explain in detail viscous flow through rectangular slot? **[8]**

OR

Q8) a) Write in detail load carrying capacity of hydrostatic step bearing? **[8]**

b) The following data is given for hydrostatic step bearing of vertical turbo generator:

Thrust load = 400KN, shaft diameter = 300mm, recess diameter = 200mm, shaft speed =650rpm, Viscosity of lubricant = 20cp. Draw neat sketch showing effect of film thickness. Calculate optimum film thickness for minimum power loss. **[8]**

Q9) a) What is hydrostatic squeeze film? Write expression for pressure distribution, load carrying capacity and time of approach? **[8]**

b) Write notes on. **[8]**

i) Ring oil Lubrication

ii) Oil circulation system

OR

Q10)a) What is gas lubrication? Write its mertis, demerits and application? **[8]**

b) A plate of 40 mm length and infinite width is separated from the plane by an oil film 40 microns thickness and having viscosity of 0.08 N-s/m^2.If the normal load per unit width of 50 KN/m is applied on the plate, determine:

i) The time required to reduce the film thickness to 3.5 microns; and

ii) The maximum pressure. **[8]**

Q11)a) Write short notes on:

i) Hydrodynamic thrust bearing.

ii) Labyrinth Seals. **[10]**

b) What are Oil seals? Write in types in detail? **[8]**

OR

Q12)a) The Rayleigh step bearing has following details:

- Length of the bearing = 700mm
- Width of the bearing = 100mm
- Load on the bearing = 250KN
- Sum of surface roughness on contacting surfaces = 7 microns
- Minimum oil film thickness = 20 × Sum of surfaces roughness value
- Sliding velocity = 8.0 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 **[10]**

b) Define elastohydrodynamic lubrication? Write its principle and application? **[8]**

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Total No. of Questions : 12]

SEAT No. :

P1594

[Total No. of Pages :4

[5058]-4
T.E.(Civil)
FLUID MECHANICS- II
(2008Course)(Semester-I)(301004)

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

Instructions to the candidates:

1) ***Answer QNo.1 or 2, 3 or 4, 5 or 6 from section- I and QNo.7 or 8, 9 or 10 ,11 &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 electronic pocket calculator is allowed.***
6) ***Assume suitable data, if necessary.***

SECTION-I

Q1) a) Explain why water hammer occurs in pipe and its effects on the pipe. Explain the various factors influencing rise in pressure due water hammer **[6]**

b) A 600mm diameter steel pipe is 1.0 cm thick and 380m long. It is connected to the upstream end to a reservoir and downstream to a valve so that it has a head of 60m. If the valve is closed in 0.5 sec and 1.5 sec respectively, then find the rise in pressure in the pipe. Take modulus of elasticity for pipe material as $2.47\times10^{11}N/m^2$ and that for water $2\times10^{9}N/m^2$ **[8]**

c) Clearly distinguish between steady and unsteady flow. What are the practical conditions of occurrence of unsteady flow condition. Explain the criteria for classification of closure of pipe. **[4]**

OR

Q2) a) What are the reasons for development of drag and lift on a body? Does the magnitude of drag and lift depend on the shape and orientation of body. Explain **[6]**

b) Explain the variation of C_D with Reynold number for a 2 Dimensional circular cylinder. Explain the development of Karman vortex trail and what is Strouhl number? **[6]**

c) Wind moving at a speed of 85 kmph, blows over a stack 10m in height of a 60cm in diameter. Will a Bending moment develop, if so find the overturning moment produced. Take $C_D = 0.35$, specific weight of air = 11.8N/m, viscosity of air = 0.00015 poise. Also find the Reynold number so developed. **[6]**

P.T.O.

Q3) a) What is impulse force and give the reason for its development and give the impulse momentum equation. Show that the maximum efficiency for a jet striking a series of flat plate is 50% **[8]**

b) A jet of water moving at a speed of 15m/s strikes a flat plate that deflects the jet through 100° when stationary. If the vane moves at 8m/s, find the angle of jet so that there is no shock at inlet. Find the absolute velocity of jet at exit in magnitude and direction and work done per second per Newton of water, assuming concave and smooth vane. **[8]**

OR

Q4) a) Explain the role of turbine in the generation of power in a hydroelectric power plant. Explain the condition for the use of different type turbine.**[4]**

b) Draw the velocity triangle at inlet for **[6]**

i) $\alpha = \theta = 0$

ii) $\beta > 90°$

iii) $\theta > 90°$

c) Derive the equation for work done & efficiency of Pelton turbine. Explain why actual efficiency of turbine cannot be 100%. **[6]**

Q5) a) A turbine is to operate under ahead of 50m at 500rpm. If the discharge is $15m^3/s$ and works under an efficiency of 90%. Find **[8]**

i) Speed

ii) power generation

iii) type of turbine

iv) performance under a head of 35m

b) Explain the difference between reaction and impulse turbine. With a neat sketch explain the components of a Francis turbine. **[8]**

OR

Q6) a) Explain the classification of Centrifugal pump based on casing. What do you understand by priming and its necessity? Explain the different methods of priming. **[6]**

b) A centrifugal pump is to discharge 120litres per second of water at a speed of 1500rpm against a head of 20m. If the impellers diameter is 25 cm, width at outlet is 5cm, determine the vane angle at outer periphery of impeller. Take manometric efficiency 80%. **[6]**

c) Explain various troubles in pumps and their remedies. **[4]**

SECTION-II

Q7) a) What are the possible shapes of open channel and give the geometrical elements of each shape. **[6]**

b) Derive the relationship between Chezy's and Manning's rugosity coefficient. Derive the condition for best side slope of a trapezoidal channel section. **[6]**

c) Explain the following terms in context to uniform flow:

i) Normal depth

ii) Hydraulic exponent

iii) Section factor

A rectangular channel is to carry 1.8m^3/s of discharge under a slope of 0.0001 and Manning N=0.20. If the depth of flow is 0.8m, find the velocity and slope of channel to maintain this discharge. **[6]**

OR

Q8) a) Show that for a rest channel the specific force is given by $F = \frac{Q^2}{g^A} + A\bar{z}$ **[6]**

b) A discharge of 15m^3/s flows in a 8m wide rectangular channel. Find the depth and specific energy to satisfy this condition. Also find the critical slope for N=0.016 **[6]**

c) State the characteristics of critical flow and derive the equation for critical depth in a triangular channel. **[6]**

Q9) a) What are the channel transitions and different types of transition and where they used. **[4]**

b) Explain: **[8]**

i) Transition with reduction in width of channel section

ii) Rise in bed level

c) A 3.5m wide channel has a depth of flow of 1.0m and carries a 12m^3/s of discharge. Find the maximum height of hump to get critical depth over hump. **[4]**

OR

Q10)a) Differentiate between **[8]**

i) Alternate depth and sequent depth

ii) Specific energy and specific force diagram.

How are these diagrams useful in determining the loss energy in hydraulic jump?

b) Derive an expression for depth of flow after hydraulic jump in terms of depth of flow before jump. **[8]**

Q11)a) How does Gradually Varying flow differ from Rapidly Varying flow? Derive the equation for water surface slope with respect to horizontal for

i) when water surface falls in direction of flow

ii) when water surface rise in direction of flow **[8]**

b) What is

i) Drawdown

ii) Backwater curves?

List out all possible type of channel based on normal and critical depth and the possible type of surface profile in each type of channel. **[8]**

OR

Q12)a) What do you understand by length of GVF and the necessity to find the length of GVF. What are the practical utility of finding the length. **[4]**

b) Explain control section and its importance in GVF computation. **[4]**

c) A 6m wide rectangular channel carries water at a uniform depth of 1.5m on a bed slope of 1 in 8100. The channel ends in a drop. How far upstream or downstream the depth of flow will be 1.4m? Find the length of flow profile so developed by using 2 steps.

Take Manning N = 0.016 **[8]**

Total No. of Questions : 12]

SEAT No. :

P1611

[Total No. of Pages : 5

[5058]-41
T.E.(Production)
KINEMATICS OF MANUFACTURING MACHINES
(2008 Course)(Semester-I)(311082)

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

Instructions to the candidates:

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

SECTION-I

Q1) a) Explain with neat sketch, the kinematic analysis of bevel gear generator. **[8]**

b) In a slider crank mechanism, the crank AB=100 mm and connecting rod BC=400 mm. The line of stroke of slider is offset by perpendicular distance of 25mm. If the crank rotates at an angular velocity of 20 rad/sec angular acceleration of 12 rad/sec^2. Determine following when crank AB inclined at 30° **[8]**

i) Linear velocity and acceleration of the slider.

ii) Angular Velocity and angular acceleration of connecting rod.

OR

Q2) a) Explain C-13 and K-23 structures with suitable examples and comment on their selection. **[8]**

b) Synthesize a four bar mechanism by using three precision points to generate a function y=3x+3 for the range $0 \leq x \leq 4$. Assuming 30° starting position and 150° finishing position for input link and 40° starting position and 120° finishing position for the output link. Assume fixed link length is 100 mm. **[8]**

P.T.O.

Q3) a) State and prove law of gearing. **[8]**

b) In a reverted epicyclic train shown in fig-1, the arm F carries two wheels A and D and a compound wheel B-C. The wheel A meshes with wheel B and Wheel D meshes with wheel C. The number of teeth on wheel A,D,B and C are 80, 48, 40 and 72 respectively. Find the speed and direction of wheel D when wheel A is fixed and arm F makes 200 rpm clockwise. **[10]**

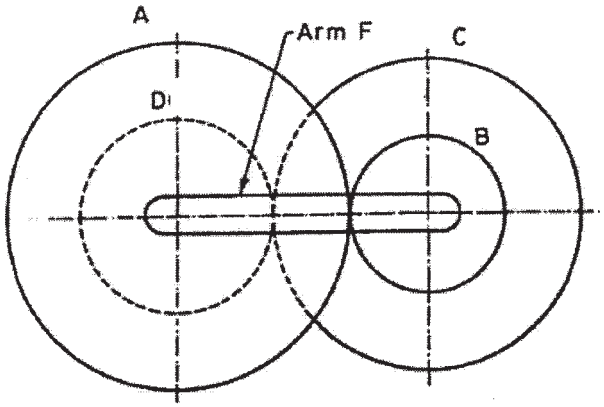


Figure: 1

OR

Q4) a) Explain different types of gear trains with neat sketches and give examples where each one is used in practice. **[8]**

b) Two mating gears with module of 6.5 mm have 19 and 47 teeth of 20° pressure angle and standard addenda. Pinion rotates at 1000rpm. Determine: **[10]**

i) The number of pair of teeth in contact.

ii) Angle turn by pinion and wheel.

iii) Maximum sliding velocity.

Q5) a) Explain applications of flywheel in various manufacturing machines. **[6]**

b) A machine is requried to punch 5 holes of 40 mm diameter in a plate of 30 mm thick per minute. The work required is 700Nm per square cm of sheared area. The punch has stroke of 10 cm. The maximum peripheral speed of the flywheel at its radius of gyration is 30 m/sec. Find the mass of flywheel such that the speed does not fall below 28 m/sec at its radius of gyration and calculate power of motor for punching operation. **[10]**

OR

Q6) a) Explain turning moment diagram for 4 stroke single cylinder IC engine. **[6]**

b) The cycle of operations performed by machine extended over 3 revolutions. The torque required has a constant value of 400 Nm for one revolution, zero for next revolution 550 Nm for the first half of third revolution and zero for rest of cycle. If driving torque is constant, the mean speed is 180 rpm, the flywheel has a mass of 500 kg and a radius of gyration of 0.5 meter, calculate **[10]**

i) Power required

ii) percentage fluctuation of speed.

SECTION-II

Q7) a) Give detail classification of cam and explain yoke cam and tangent cam. **[6]**

b) Acam is to be designed for knife edge follower with following data: **[10]**

i) Follower lift = 42 mm during 100° of cam rotation with simple harmonic Motion.

ii) Dwell for the next 50° of cam rotation.

iii) During next 90° of cam rotation, follower returns to its original position with uniform acceleration and retardation.

iv) Dwell during remaining 120° of cam rotation.

v) Follower line of stroke is offset 20 mm from cam axis.

The radius of base circle of cam is 45 mm. Draw cam profile.

OR

Q8) a) Explain following terms as applied to cam with neat sketches. **[6]**

i) Pitch curve

ii) Pitch point

iii) Prime circle

b) A cam operating roller follower with roller diameter 20 mm is rotating clockwise. The lift of follower is 40 mm and follower axis is offset to the right by distance of 20 mm. Follower completes lift with uniform velocity motion during 120° of cam rotation. The dwell at lift is 60° of cam rotation. Follwer returns to initial position with SHM during 120° of cam rotation. The rest is dwell after returns stoke. Minimum cam radius is 45mm. Draw cam profile. **[10]**

Q9) a) Explain in detail partial primary balancing of reciprocating masses in engine. **[8]**

b) Four masses m_1,m_2,m_3 and m_4 are 225kg, 325kg,265kg, and 285kg respectively. The corresponding radii of rotation are 0.3m, 0.25m, 0.35 m and 0.4m respectively and the angles between successive masses are 50°,80° and 140°. Find position and magnitude of balance mass required, if its radius of rotation is 0.3 m. **[8]**

OR

Q10)a) Explain direct and reverse crank method. **[6]**

b) A,B,C are D are four masses carried by rotating shaft at radii 100 mm, 125mm,200 mm and 150 mm respectively. The planes in which the masses revolve are spaced 600 mm apart and the mass of B,C and D are 10kg, 5kg and 4kg respectively. Find the required mass A and relative angular setttings of four masses so that the shaft shall be in complete balance. **[10]**

Q11)a) Explain significance of vibration isolation. What are vibration isolation materials? **[8]**

b) The disc of a torsional pendulum has a mass moment of inertia of 0.06 kgm^2. The brass shaft attached to it is of 100 mm diameter and 400 mm long. When the pendulum is vibrating the observed amplitude on the same side of the rest position for successive cycles are 9°, 6° and 4°. Assume modulus of rigidity as $4.4\times10^{10} N/m^2$ **[10]**

Find:

i) Logarithmic decrement

ii) Damping torque at unit velocity.

iii) Periodic time of vibration

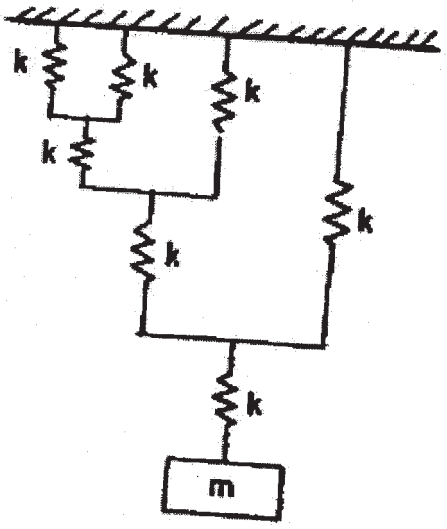
iv) What would be the frequency if disc is removed from fluid?

OR

Q12)a) Discuss briefly with neat sketches the longitudinal,, transverse and torsional free vibration. **[9]**

b) Find the natural frequency of vibration for the system shown in below give figure.

K= 2×10^5N/m,m = 20 kg **[9]**



Total No. of Questions :12]

P2183

SEAT No. :

[Total No. of Pages : 2

[5058]-42
T.E. (Production)
METROLOGY AND MECHANICAL MEASUREMENTS
(2008 Course) (311081)(Semester -I)

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

Instructions to the candidates:

1) ***Solve any three questions from each section.***
2) ***Assume suitable data, wherever necessary.***

SECTION-I

Q1) a) State and explain Abb's principle. **[6]**

b) State & explain working principle of angle detector. **[10]**

OR

Q2) a) Explain the procedure of sine bar. **[6]**

b) Explain different alignment test for radia drilling machine. **[10]**

Q3) a) State tailors principle of gauge design. **[8]**

b) Design & make a drawing of general purpose GO & NO GO plug gauge for inspecting $90H_8\ F_9$. F.D. for shaft = - 5.5 $D^{0.41}$. **[10]**

OR

Q4) a) Explain optical flat for flatness testing. **[8]**

b) Design a workshop type GO & NO GO rim gauge for inspection of 30 F_8 shaft. F.D. = - 5.5 $D^{0.41}$ **[10]**

Q5) a) Prove that db= P/2 sec(θ/2). **[10]**

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

OR

Q6) a) Sketch & explain gear tooth vernier caliper method. **[8]**

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

i) Tool makers microscope.

ii) Floating carriage micrometer.

P.T.O.

SECTION-II

Q7) a) What is function of transducer? Explain its types. **[10]**

b) Explain different measurements method. **[8]**

OR

Q8) a) Explain the importance of mechanical measurements system. **[10]**

b) Explain piezoelectric transducer. **[8]**

Q9) a) Explain Bourdon tube pressure gauge. **[8]**

b) What is thermistor? Give characteristic. **[8]**

OR

Q10)a) Explain with neat sketch construction & working of Mcleod gauge. **[8]**

b) Explain with neat sketch pitot tube. **[8]**

Q11)a) Explain the importance of liquid level measurements. **[8]**

b) Explain the with example of different types of maintenance for measuring equipments. **[8]**

OR

Q12)a) Discuss the basic methods of force measurements. **[8]**

b) State & explain Wheatstone bridge. **[8]**

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Total No. of Questions : 12]

SEAT No. :

P1612

[Total No. of Pages : 4

[5058]-43
T.E. (Production Engineering)
PRODUCTION MANAGEMENT
(2008 Pattern) (Semester - I) (311084)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) What are the different types of Production Systems? Compare these systems with respect to any six parameters. **[9]**

b) Explain the relationship of production department with sales and marketing. Purchasing and maintenance department. **[9]**

OR

Q2) a) Define Productivity. Explain current strategies of Indian manufacturers when they are competing on cost. **[9]**

b) List chronological history of Production and Operations management. **[9]**

Q3) a) Explain the concpet of Product Design and Product Cost giving suitable example. **[8]**

b) What are the aspects considered at the time of developing new product. Explain Marketing aspect with example. **[8]**

OR

Q4) a) With the help of a product explain stages in Life Cycle of the selected product. **[8]**

b) With the help of flow chart explain the objectives of PPC. **[8]**

P.T.O.

Q5) a) Explain Computerized Relationship Layout Planning (CORELAP) in brief. **[8]**

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	----	10
2	1	6
3	1	14
4	1	10
5	1	12
6	3,7	6
7	2	8
8	4,5	12
9	6	24
10	7,8,9	18

i) Draw the precedence diagram.

ii) What is the desired cycle time?

iii) What is the theoretical number of work stations?

iv) What is the efficiency and balance delay of the solution obtained?

OR

Q6) a) Define Plant Layout. Explain the objectives of good plant layout. **[8]**

b) Explain types of material handling equipments with diagram. **[8]**

SECTION - II

Q7) a) Define sales forecasting. Explain judgmental techniques of forecasting. **[9]**

b) The demand for a product is given below. The forecast for the August was 450 units.

Forecast the demand for the month of November taking the value of $\alpha = 0.4$. **[9]**

Month	August	September	October
Demand	410	470	520

OR

Q8) a) Explain with the help of figure various demand patterns used in Sales. Forecasting. **[9]**

b) Find the coefficient of correlation between cost of production and the sales price for which data is as: **[9]**

Period	1	2	3	4	5	6	7	8	9
Cost	100	118	130	142	160	175	165	180	186

Calculate the demand for 9 the month using simple Moving Average Method for the moving average period of 3 months and 5 months.

Calculate MFE (Mean Forecast Error) for 3 months moving average.

Q9) a) Define the following: **[8]**

i) Forward and Backward Scheduling.

ii) Finite Loading.

iii) Critical Ratio Scheduling.

b) There are seven jobs, each of which has to go through the machines A, B and C in the order of BCA. Processing times in hours are given as:**[8]**

Job	1	2	3	4	5	6
Machine C	2	7	6	7	8	5
Machine B	7	8	10	7	5	10
Machine A	9	11	11	10	13	8

Find the total elapsed time and idle time.

OR

Q10)a) What are the different priority rules? Give suitable example for each. **[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	--	16
B	--	24
C	--	32
D	C	16
E	A,B	32
F	E,D	16
G	D	12
H	F,G	12

Q11)Write short note on: **[16]**

a) Just - In - Time.

b) Concept of World Class Manufacturing.

OR

Q12)Write short note on: **[16]**

a) Lean Manufacturing.

b) Computerized Production Management.

Total No. of Questions : 12]

P2184

SEAT No. :

[Total No. of Pages : 3

[5058]-44

T.E.(Production Engineering)

CUTTING TOOL ENGINEERING

(2008 Course) (Semester-I) (311085)

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

Instructions to the candidates:

1) *Solve Q.1 or Q.2 Q.3 or Q.4 Q.5 or Q.6 Q.7 or Q.8 Q.9 or Q.10 Q.11 or Q.12*
2) *Neat diagrams must be drawn whenever necessary.*
3) *Figures to the right side indicates full marks.*
4) *Assume suitable data if necessary.*
5) *Use of electronic pocket calculator is allowed.*

SECTION-I

Q1) a) Draw merchant force circle diagram and explain different force relation in them. **[10]**

b) A tool with 12 degree rake angle is used at a speed 25 m/min, feed 0.50 mm/rev, chip thickness ratio 0.50 cutting force is 1200N and feed force 500N, 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 35 mm diameter is turned on lathe with a cutting tool having rake angle 18 degree and with a cutting speed of 30 m/min. If the cutting force is 600 kg, feed force is 180 kg, feed given to tool is 0.20 mm/rev. and length of chip in one revolution=80 mm. determine the following:

P.T.O.

i) shear angle

ii) Chip thickness

iii) Velocity of the chip along the tool face.

iv) coefficient of friction

v) normal force on shear plane. **[10]**

b) Explain different velocities in cutting a metal and their relation. **[10]**

Q3) a) Explain ASA system for representing tool angles on single point cutting tool. **[8]**

b) What is the use of chip breakers? Sketch various types of chip breakers. **[7]**

OR

Q4) a) Explain with suitable sketch the nomenclature of broach tool. **[7]**

b) Explain different grades and class of tools. **[8]**

Q5) a) Explain different factors affecting on machinability. **[10]**

b) What is tool life? Write modified taylor tool life equation. **[5]**

OR

Q6) a) Write note on economics of tooling. **[7]**

b) Explain different factors affecting of crater and flank tool wear. **[8]**

SECTION-II

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 Also draw the tool geometry of the tool by assuming angles. **[8]**

b) Explain the various design aspect of drill tool **[7]**

OR

Q8) a) Explain the various design aspect of reamer tool **[8]**

b) Explain the various design aspect for flat form tool. **[7]**

Q9) a) Write note on foolproof locating principle. **[8]**

b) List the different criteria's for selection of locating devices. **[7]**

OR

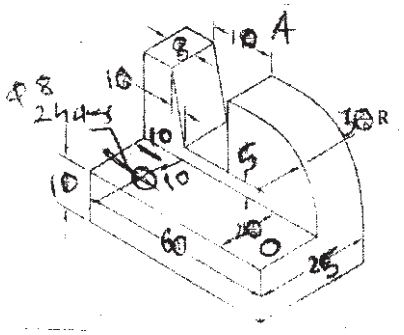
Q10)a) Explain any one indexing mechanism for job indexing in jig design. **[7]**

b) With neat sketch explain any two clamping devices. **[8]**

Q11)Design a jig for drilling Φ 08 mm 2 holes for a component shown in fig. no 1**[20]**

OR

Q12)Design a milling fixture for cutting a slot of 10mm at location "A" as shown in fig. no1 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]**



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Total No. of Questions :12]

P2185

SEAT No. :

[Total No. of Pages :2

[5058]-45
T.E. (Production)
MATERIAL FORMING
(2008 Course) (311083)

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 whenever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Assume suitable data if necessary.***
6) ***Use of electronic pocket calculator is allowed.***

SECTION-I

Q1) a) Explain and differentiate between hot forming and cold forming. **[8]**

b) Explain direct compression process **[8]**

OR

Q2) a) Explain indirect compression process. **[8]**

b) Explain cam plastometer with neat sketch. **[8]**

Q3) a) Explain single acting and double acting steam hammer with neat sketch . **[8]**

b) Explain briefly the following with neat sketch. **[10]**

i) Friction screw press.

ii) Board drop hammer.

OR

Q4) Write short note

a) Cold heading. **[6]**

b) Forging advantages over casting. **[6]**

c) Open die forging. **[6]**

P.T.O.

Q5) Derive an equation for the drawing stress (σ_d) in wire drawing operation considering friction at die land. **[16]**

OR

Q6) a) Explain with neat sketch the various zones of wire drawing die. State the die material **[8]**

b) Explain construction and working of Stepped cone wire drawing machine. Also state its advantages and limitations. **[8]**

SECTION-II

Q7) a) Explain two high (reversible & non-reversible) rolling mills with neat sketch. State the advantages and limitations. **[8]**

b) Explain Cluster rolling mills with neat sketch. State the advantages. **[8]**

OR

Q8) a) Explain the breakdown pass in rolling with its principal series[sequence]. **[8]**

b) Explain AGC. Discuss the methods of AGC. **[8]**

Q9) a) Explain Direct extrusion process with neat sketch. State the advantages and limitations. **[8]**

b) Explain Impact extrusion. **[8]**

OR

Q10)a) Explain Indirect extrusion process with neat sketch.State the advantages and limitations. **[8]**

b) Explain the following. **[8]**

i) Extrusion ratio.

ii) CCD

iii) Shape factor.

iv) Flow patterns in extrusion.

Q11)a) Explain explosive forming with neat sketch. **[9]**

b) Explain electro-magnetic forming with neat sketch. **[9]**

OR

Q12)a) Explain metal spinning with neat sketch. **[9]**

b) Explain electro-hydraulic forming with neat sketch. **[9]**

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Total No. of Questions :12]

P2186

SEAT No. :

[Total No. of Pages :3

[5058]-46
T.E. (Production)
TOOL DESIGN
(2008 Course) (311088)

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

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. **[2]**

c) Find cutting force and press tonnage. **[8]**

Give : Strip length = 2440mm, Thickness of strip= 2 mm, Percent penetration=70%, Shear strength of the material = 300MPa.

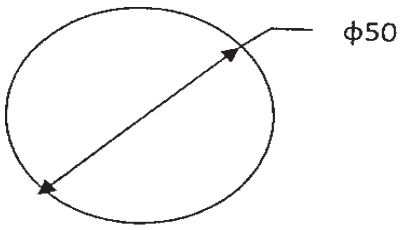


Figure 1

OR

P.T.O.

Q2) a) Explain and differentiate mechanical press and hydraulic press with neat sketch. **[8]**

b) Classify and explain various types of strip layouts. **[8]**

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 dimensions. **[3]**

d) Determine press capacity. **[3]**

(Assume stock thickness=1 mm, yield strength of material =427 N/mm^2)

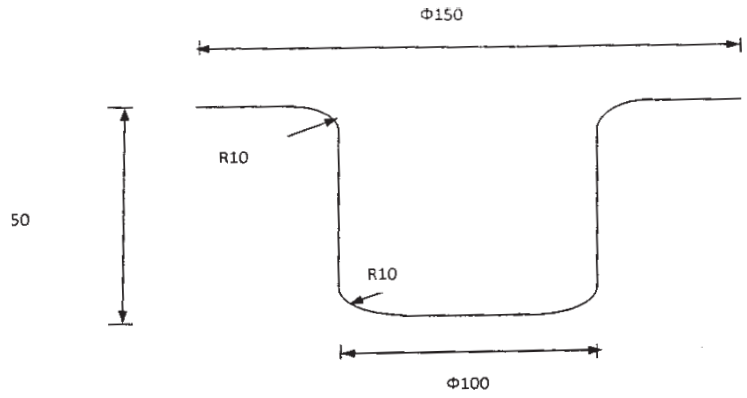


Figure 2

OR

Q4) a) Calculate blank size required to form a cup (figure 2) using graphical method. **[8]**

b) Explain defects occur in drawing. State causes and remedies. **[8]**

Q5) Design a complete progressive die for a component having square blank of 50 mm× 50mm with central square hole 10mm×10mm. (Assume strip length=2440mm, Thickness of strip =2 mm, Percent penetration=70%, Shear strength of meterial=300 MPa). **[18]**

OR

Q6) Design a compound die for the a component having circular blank of diameter 70mm with central circular hole ϕ 20mm.(Assume strip length=2440mm×1220mm, Thickness of strip=2 mm, Percent penetration=70%, Shear strength of material =300MPa). **[18]**

SECTION-II

Q7) a) Explain single and double acting steam hammer with neat sketch. **[8]**

b) In forging, 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 improve the surface finish of forged component after forging. **[8]**

Q9) a) Explain various types of bolsters used in injection mold. **[8]**

b) Explain blow molding process with terminology with neat sketch. **[8]**

OR

Q10)a) Explain various types of cores and cavity inserts. **[8]**

b) Explain the process to manufacture plastic bottles with neat sketch. **[8]**

Q11)a) Explain feed system of injection mold. **[9]**

b) Explain the procedure to design cooling system. **[9]**

OR

Q12) Design a plastic mold for rectangular tiffin box.
(Assume suitable dimensions, material data) **[18]**

❄ ❄ ❄

Total No. of Questions :11]

SEAT No. :

P1613

[Total No. of Pages :4

[5058] - 47

T.E. (Production &Industrial Engg.)

INDUSTRIAL ENGINEERING AND QUALITY ASSURANCE

(2008 Pattern) (Semester - II) (311089)

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

Instructions:

1) ***All questions are compulsory.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the rigth indicate full marks.***
4) ***Assume suitable data if necessary.***

SECTION - I

Q1) a) Define basic work content. Explain various factors which increase the basic work content. **[8]**

b) What are the different tools and techniques of Industrial engineering which helps to improve the productivity? **[8]**

OR

Q2) a) Explain in detail the factors affecting productivity. **[8]**

b) Explain in detail role of Industrial Engineering in service sector. **[8]**

Q3) a) What are the reasons excess work content? Explain in detail. **[8]**

b) Explain in detail the techniques to reduce work content. **[8]**

OR

Q4) a) What are the different aspects to be considered for selection of the job for Method study. **[8]**

b) Explain with neat sketch Flow diagram and String diagram in Method study. **[8]**

P.T.O.

Q5) a) What are the steps involved in Time study? Explain in detail. **[10]**

b) What are the different time study equipments? Explain in detail. **[8]**

OR

Q6) Write short notes on following. **[18]**

a) Allowances in the study

b) PMTS

c) Synthetic data method in work measurement

SECTION - II

Q7) a) What is the meaning of quality of conformance? Explain the factors which influence the quality to conformance? **[4]**

b) Define the term quality and state the various factors which affect the product quality. **[4]**

c) Following table shows averages and ranges of spindle diameters in mm for 30 subgroup of 5 items each.

$\bar{\bar{X}}$	R	$\bar{\bar{X}}$	R	$\bar{\bar{X}}$	R
45.02	0.375	45.60	0.275	45.26	0.150
44.95	0.450	45.02	0.175	45.65	0.200
45.48	0.450	45.32	0.200	45.62	0.400
45.32	0.150	45.56	0.425	45.48	0.225
45.28	0.200	45.14	0.250	45.38	0.125
45.82	0.250	45.62	0.375	45.66	0.350
45.58	0.275	45.80	0.475	45.46	0.225
45.40	0.475	45.50	0.200	45.64	0.375
45.66	0.475	45.78	0.275	45.39	0.650
45.68	0.275	45.64	0.225	45.29	0.350

For the first 20 samples set up a $\bar{\bar{X}}$ and R chart. Plot next 10 samples on these charts to see if the process continues "Under Control" both as to average and range. Also find the process capability. **[8]**

OR

Q8) a) Define the term quality control and explain its objectives. **[4]**

b) Explain term quality of performance and state the factors which control them. **[4]**

c) In a factory producing spark plug the number of defectives found in inspection of 20 lots of 100 each given below:

Lot no.	No. of defectives	Lot no.	No of defectives
1	5	11	4
2	10	12	7
3	12	13	8
4	8	14	3
5	6	15	3
6	4	16	4
7	6	17	5
8	3	18	8
9	3	19	6
10	5	20	10

i) Construct appropriate control chart and state whether the process is in statistical control.

ii) Determine the sample size when a quality limit not worse than 9% is desirable and 10% bad product will not be permitted more than 3 times in thousand. **[8]**

Q9) a) Discuss in brief, various Principal & Practices in Total Quality Management? **[10]**

b) Explain the importance of reliability in manufacturing context. **[6]**

OR

Q10) a) Describe the following in connection with Total Quality Management? **[8]**

i) People involvement

ii) JIT manufacturing

iii) Workers attitude

iv) Zero defect concept

b) Explain Operating Characteristics Curve (OC). **[8]**

Q11) Write short not on (**Any 3**): **[18]**

a) Quality & Reliability

b) Quality Assurance and Quality control

c) Process Capability & Process Capability Index

d) Design of experiments (DOE)

e) Pareto Analysis & Quality circle

Total No. of Questions :12]

P2187

SEAT No. :

[Total No. of Pages :3

[5058]-48
T.E. Production
MACHINE TOOL ENGINEERING
(2008 Pattern) (311087) (Semester -II)

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

Instructions to the candidates:

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

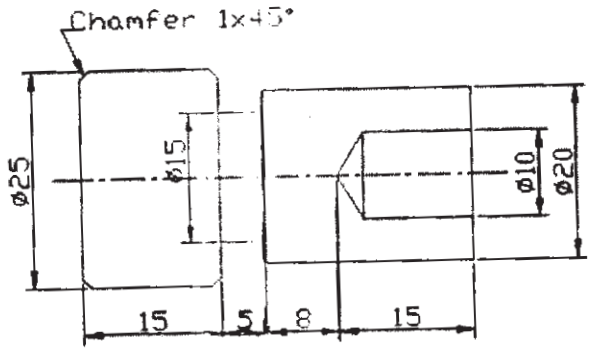
Q1) Design and draw cam profile for the component shown in figure below. Also work out the following requirements. **[18]**

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	0.2mm/rev
Groving	12M/min	0.1mm/rev
Drilling	20M/min	0.1mm/rev

P.T.O.



OR

Q2) a) Describe types of cut taken on turret lathe. What are the rules for laying out the sequence of operations necessary to produce a work piece.? **[9]**

b) Describe a typical single spindle automatic bar machine. **[9]**

Q3) a) What do you understand by axis designation in NC m/c? Describe motion direction on a 3 axis milling machine? **[8]**

b) Explain with neat sketch open and closed loop control system and also explain advantages of closed loop system over open loop system? **[8]**

OR

Q4) a) Write short note on interpolations in CNC. **[8]**

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

i) Machining centre.

ii) Turning centre.

Q5) a) State the principles of material handling system. **[8]**

b) Write short note on Automated storage and Retrieval system. **[8]**

OR

Q6) a) What is AGV? Explain principle and working. **[8]**

b) Explain with neat sketches any one type of machine vision system. What are its advantages? **[8]**

Q7) a) Explain with graph the effect of following parameters on MRR in USM- Work/Tool hardness, Abrasive concentration, and viscosity. **[6]**

b) Explain RC circuit used in EDM machine. **[6]**

c) Discuss with block diagram wire cut EDM. **[6]**

OR

Q8) a) Explain the principle of working of AJM process in comparison to WJM. **[6]**

b) Explain with neat sketch LBM. **[6]**

c) What are the different elements of ECM process? If iron is being machined using NaC1 solution, Explain different chemical reaction those will take place on anode and cathode. **[6]**

Q9) a) Discuss various factors to be considered during selection of cutting fluid. **[8]**

b) Write note on maintenance of CNC lathe. **[8]**

OR

Q10)a) How vibrations can be minimized by proper installation of machine tool control? Which material is used for damper? **[8]**

b) What is reliability of machine tool? Explain its various components. **[8]**

Q11)a) Write note on classification of gear manufacturing processes. **[8]**

b) Discuss any two gear finishing processes. **[8]**

OR

Q12)a) Write note on Gear Hobbing. **[8]**

b) Explain the method of gear cutting by Milling. **[8]**

❄ ❄ ❄

Total No. of Questions : 12]

SEAT No. :

P1614

[Total No. of Pages :4

[5058]-49

T.E. (Prod. Engg./Prod.Engg. S/W)

NUMERICAL TECHNIQUES AND DATABASE

(2008 Course) (311090) (Semester - II)

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) ***Use of electronic pocket calculator is allowed.***
6) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Draw a neat line diagram for organization of a database and explain? **[6]**

b) What are the functions of a database administrator? **[6]**

c) Explain the entity-relationship model with a suitable example? **[6]**

OR

Q2) a) Write the correct SQL syntax for modifying the structure of tables under the following cases: **[6]**

i) Adding new columns

ii) Modifying existing columns

b) Compare DBMS and file processing system with an example on the following points **[8]**

i) Redundancy

ii) Access control

c) What are the different types of data types used in SQL? **[4]**

Q3) a) Explain with an example the primary key and foreign key concepts in databases? **[5]**

P.T.O.

b) Create a table 'sales_order_details' in SQL with the following constraints on the table: **[3]**

Column Name	Data type	Size	Attributes
S_order_no	Varchar 2	6	Primary Key
Product_no	Varchar 2	6	Primary Key
Qty_ordered	Number	8	Not null
Qty_disp	Number	8	--
Product_rate	Number	8,2	Not null

c) Give an expression/s in SQL for each of the following queries from the table sales_order_details: **[8]**

i) List the names of products whose name starts with letter 'p'.

ii) Insert any three records of your choice using INSERT command.

iii) Update any one record using UPDATE query.

iv) Delete specified number of records.

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]**

Q5) a) Define electronic commerce. List the consumer's benefits of electronic commerce? **[6]**

b) What is electronic fund transfer? How does it work? **[6]**

c) Explain the difference between conventional and artificial intelligent computing? **[4]**

OR

Q6) a) What is ERP? Explain ERP with respect to production and operations management? **[8]**

b) What do you understand by EDI? Why EDI important in e-commerce? Explain? **[8]**

SECTION - II

Q7) a) Write an algorithm for solving a numerical problem by using Newton Raphson method. **[6]**

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]**

$$4x_1 - 2x_2 + x_3 = 4$$

$$x_1 + 2x_2 + x_3 = 0.75$$

$$3x_1 - 3x_2 + 5x_3 = 5.5$$

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) From the data given below, find the value of x when $y = 13.5$ using Lagrange's interpolation method **[8]**

x :	93.00	96.20	100.00	104.20	108.70
y :	11.38	12.80	14.70	17.07	19.91

OR

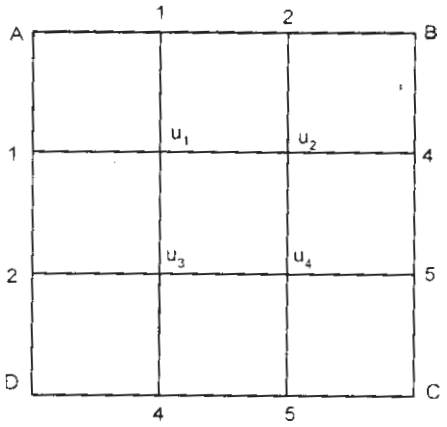
Q10)a) Write an algorithm for solving the interpolation using Newton forward difference method? **[8]**

b) Compute $f(27)$ from the following data using Lagrange's interpolation formula:

x :	14	17	31	35
$f(x)$:	68.7	64.0	44.0	39.1

[8]

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. :

P2934

[Total No. of Pages :4

[5058]-5
T.E. (Civil)
INFRASTRUCTURE ENGINEERING AND CONSTRUCTION TECHNIQUES
(2008 Course) (Semester - I)

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

Instructions to the candidates:

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

SECTION-I

Q1) a) State comparison between Railways and Highways. **[1×6=6]**

b) Draw a typical cross section of a Permanent way Explain briefly the functions of various components of the Railway Track. **[2+2=4]**

c) What are the different types of railway sleepers? Explain any one in brief. **[2+4=6]**

OR

Q2) a) Define formation. What remedial measures you will suggest to prevent failure of formations. **[2+4=6]**

b) Discuss in brief Flat Footed rail and Bull headed Rail. **[2+2=4]**

c) Explain with a neat sketch Tilting of Rails and Coning of wheels. **[3+3=6]**

P.T.O.

Q3) a) Define the following terms: **[3×2=6]**

i) Ruling Gradient

ii) Pusher Gradient

iii) Momentum Gradient and

b) Define Super elevation. Derive an equation of super elevation. Also State the meaning of each term used. **[1+4+1=6]**

c) Distinguish between Directed Track Maintenance and Routine maintenance. **[2+2=4]**

OR

Q4) a) What is Super elevation why is it necessary to provide super elevation on the curves of railway Track. Also explain the concept of Negative super elevation. **[2+2+2=6]**

b) Discuss in brief the importance of Points and Crossings in railway track. **[3+3=6]**

c) Write a short note on Metro Rail and Monorail. **[2+2=4]**

Q5) a) Explain in brief classification of harbours based upon location. **[6]**

b) Describe the factors which influence the shape and size of tunnel. **[1×6=6]**

c) Classify the tunnels on the basis of their use. Explain their suitability for particular purpose. **[3+3=6]**

OR

Q6) a) What is Mucking? State the various methods of Mucking and explain any one in brief. **[1+2+3=6]**

b) What are the various points to be considered while selecting a site for Port? **[1×6=6]**

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

SECTION-II

Q7) a) Explain in brief the role of construction industry in economic development of any country. **[6]**

b) What do you mean by High Rise structures? What is the construction techniques used for the construction of High Rise structures? **[2+4=6]**

c) Write a short note on quality control in construction of Prefabricated components. **[4]**

OR

Q8) a) Differentiate between labour oriented work and Equipment oriented work. **[3+3=6]**

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

c) Write down the advantages & disadvantages of precast construction. **[3+3=6]**

Q9) a) What do you mean by depreciation of equipment? Explain any one method in brief. **[2+4=6]**

b) Write a short note on loader dozer with suitable sketch. What are the types of blades of dozer? **[3+3=6]**

c) Explain in brief the following: **[3+3=6]**

i) Equipment working rates

ii) Record keeping

OR

Q10)a) What is work cycle? Explain the work cycle of dumper. **[2+4=6]**

b) Explain in brief the types & use of dumber. **[2+4=6]**

c) Explain in brief the following: **[3×2=6]**

i) Repair cost

ii) Economic life

iii) Labour cost

Q11)a) What is dredging? What are the different techniques used for dredging? **[2+4=6]**

b) Differentiate between Guniting and Shotcreting. **[3+3=6]**

c) Write a short note on Slip from Technology. **[4]**

OR

Q12)a) What is well point system of dewatering? Explain with suitable sketch. **[2+4=6]**

b) Explain with a neat sketch working of RMC plant. **[6]**

c) Write a short note on methods of dredging. **[4]**

EEE

Total No. of Questions :12]

SEAT No. :

P2940

[Total No. of Pages :3

[5058]-50

T.E.(Production Engg S./W)

PRODUCTION METALLURGY

Common to Production

(2008 Course) (Semester-II) (311091)

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

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3, or Q4, Q5 or Q6 from section I and Q7 or Q8, Q9 or Q10, Q11 or Q12 from sescion* II.**
2) ***Answers to the two sections should be written in separate books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right side indicate full marks.***

SECTION-I

Q1) a) Explain resolving power, total magnification, numerical aperture and bright field illumination. **[6]**

b) Explain in brief the classification of steels with examples. **[6]**

c) Compare macroscopy with microscopy. **[6]**

OR

Q2) a) Draw a neat Fe-Fe_3 C equilibrium diagram and explain eutectoid reaction only. **[6]**

b) Draw microstructures:

i) Mild steel

ii) 0.6%C steel

iii) 1.2%C steel. **[6]**

c) Explain with composition - FeE270, AISI050, 60C10, En31, 80T11 and T85W6Mo5Cr4V2. **[6]**

Q3) a) What is hardenability? Explain the factors influencing hardenability? **[8]**

b) Write shortnotes :

i) Isothermal Annealing

ii) Spherodise Annealing. **[8]**

OR

P.T.O.

Q4) a) Show different types of Annealing and Normalising on Iron-Carbon equilibrium diagram and compare Annealing with Normalising. **[8]**

b) Explain Austempering and Ausforming with neat diagrams. **[8]**

Q5) a) Distinguish between

i) Nitriding and carbonitriding

ii) Induction hardening and Flame hardening. **[8]**

b) Draw and explain the microstructure of Bainite. Why Bainite is not present in CCT diagram? **[8]**

OR

Q6) a) What is carburizing ? Why is it done? Are post carburizing treatments necessary? **[8]**

b) Explain patenting and time quench processes with neat diagrams. **[8]**

SECTION-II

Q7) a) What are the effects chromium (Cr), Tungsten (W), Vanadium (V) and Manganese(Mn) on properties of steel. **[8]**

b) Write shortnotes:

i) Silal and Nicrosilal

ii) Chilled cast iron **[10]**

OR

Q8) a) Explain heat treatment of HSS. **[8]**

b) Write shortnote on Grey cast Iron and white cast iron. **[8]**

Q9) a) Give typical composition and uses for the following: **[8]**

i) Babbits

ii) Invar

ii) Y alloy

iv) Cartridge brass

b) What are the requirements of bearing materials? How they are fulfilled? **[8]**

OR

Q10)a) Write shortnotes on:

i) Dezincification

ii) season cracking of brasses. **[8]**

b) Draw labeled microstructures:

i) Cartridge Brass

ii) Tin Bronze

iii) Babbits

iv) Aluminium Broze. **[8]**

Q11)a) Explain hand lay-up and filament winding process. **[8]**

b) Write a short note on Nanomaterials and Sports materials. **[8]**

OR

Q12)a) Describe isostress and isostrain conditions with neat diagrams. **[8]**

b) What is an implant? Give any two examples of implant materials with their properties and applications. **[8]**

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Total No. of Questions :6]

SEAT No. :

P2941

[Total No. of Pages :2

[5058] - 51

T.E. (Production S/W)

MANUFACTURING TECHNOLOGY (Self Study)

(2008 Course) (Semester - I) (311122)

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) Compare various non-conventional machining processes with respect to working principle, setups, process parameters, applications etc. **[16]**

OR

Q1) Draw only sketch for. **[16]**

a) Ultrasonic Machining

b) Electrochemical Machining

Q2) For plastic processing explain (Any two) **[16]**

a) Types of plastics

b) Elastomers

c) Materials

OR

Q2) For plastic processing explain **[16]**

a) Thermoforming

b) Laminating and Reinforcing

Q3) Explain MEMS in detail in terms of products, processes and applications. **[18]**

OR

P.T.O.

Q3) Explain: Printed Circuit Boards, Nano Fabrication and Film Deposition. **[18]**

SECTION - II

Q4) Compare different types of comparators. **[16]**

OR

Q4) For light wave interference, explain **[16]**

a) Optical Flats

b) Fringe Patterns

Q5) Draw Measurement set up for various measuring parameters. **[16]**

OR

Q5) Explain working principle of Autocollimator. **[16]**

Q6) For fundamentals of estimating; explain objectives and function of cost estimating, factors in estimating and estimating procedures. **[18]**

OR

Q6) Write short notes on following. **[18]**

a) Estimation of weights and materials

b) Replacement Techniques

c) Need and Provision for scrap

Total No. of Questions : 12]

SEAT No :

P1615

[Total No. of Pages : 6

[5058]-52
T.E. (Prod S/W)
KINEMATICS DESIGN OF MACHINE
(2008 Course) (Semester - I)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) Explain following methods of synthesis of mechanism with figure:

i) Three position synthesis by Chebychev spacing.

ii) Overlay method. **[8]**

b) Explain with neat sketch, the kinematic analysis of bevel gear generator. **[8]**

OR

Q2) a) Explain the following kinematics chain representation with figure. **[8]**

i) E - 11 ii) E - 22

iii) C - 12 iv) C - 13

b) What do you understand by the synthesis of mechanism? Explain. **[8]**

i) Type synthesis

ii) Number synthesis

iii) Dimensional synthesis

P.T.O.

Q3) a) A work cycle of a mechanical element is subjected to complete reverse bending stresses as follows:

i) ± 300MPa for 30% of time

ii) ± 275MPa for 25% of time

iii) ± 400MPa for 10% of time

iv) ± 325MPa for 25% of time

v) No load for remaining time

The material has an ultimate tensile strength of 1200MPa. Take surface finish factor as 0.8, size factor as 0.85, reliability factor 0.897 for 90% reliability. The operating temperature is 400°C and temperature factor may be taken as 0.5. Assume the fatigue stress factor at the most stressed section as 0.7. Determine the life of the component. **[12]**

b) Draw Modified Goodman diagram for axial and bending stresses & show following:

i) Static failure line

ii) Goodman line

iii) θ_L

iv) θ **[4]**

OR

Q4) a) A cantilever beam of circular cross section made of cold drawn steel having an ultimate tensile strength of 500 N/mm^2 & yield strength of 350N/mm^2 is fixed on one end as shown in figure. Determine the diameter of cantilever beam, if the factor of safety is 1.5. Use following data:**[10]**

Stress concentration factor = 1.42

Notch sensitivity = 0.8

Surface finish factor = 0.85

Size factor = 0.855

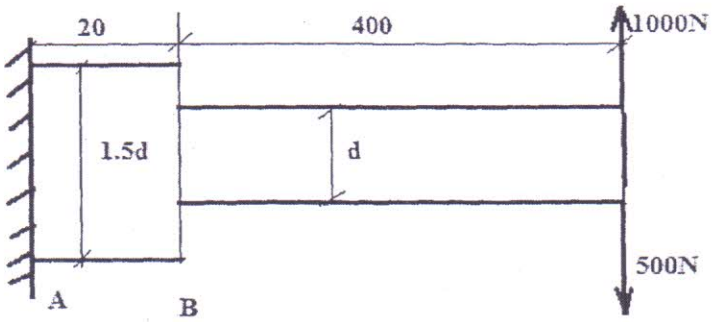

Figure Q4(a)

b) Define the following terms:

i) Endurance Strength

ii) Fatigue

iii) Notch Sensitivity **[6]**

Q5) a) Following data is given for pair of spur gear made of steel. **[14]**

Pinion Speed	=720 rpm
Speed ratio	=2
Centre distance	=285
Face width	=10m
Tooth System	=20° full depth involute
Pressure angle	=20°
No. of teeth on gear	=76
Ultimate tensile strength	=450MPa
Surface hardness	=300BHN
Factor of safety	=1.5
Service factor	=1.25

Calculate:

i) Beam strength

ii) Wear strength

iii) Dynamic load by Spott's equation

iv) Static load

v) Power transmitting capacities

Use Following Data:

$$Kv = \frac{6}{6+V},\ For\ Grade\ 8,\ e = 16.0 + 1.25\left[m + 0.25\sqrt{d}\right],$$

$$Y = 0.484 - \frac{2.87}{Z}$$

b) Define the terms

i) Barth factor

ii) Dynamic Load **[4]**

OR

Q6) a) Design a pair of helical gears for transmitting 10KW power. The speed of drive gear is 1500rpm and that of driven gear is 500rpm. The helix angle is 30° and profile is corresponding to 20° full depth involute system. The driver gear has 18 teeth. Both gears are made of cast steel with allowable static stress on 50MPa. Face width is 10 times normal module & starting torque is 120% of running torque.

The gears are required to be designed only against bending failure of teeth under dynamic conditions.

Use Following Data:

For Grade 7 $\rightarrow$ $e = 11.0 + 0.9\left[m_n + 0.25\sqrt{d}\right]$, and $Y' = 0.484 - \frac{2.87}{Z'}$;

$$Kv = \frac{5.6}{5.6 + \sqrt{V}},\quad Fd = \frac{e.np.Zp.b.rp.rg}{3785\sqrt{rp2 + rg2}}\cos\phi n\cos\psi,\quad Z' = \frac{Z}{\cos 3\psi}$$ **[14]**

b) Explain formative number of teeth and state its significance. **[4]**

SECTION - II

Q7) a) Explain the following terms.

i) Bearing characteristic number

ii) Bearing modulus

iii) Bondability

iv) Conformability

v) Embeddability **[10]**

b) How you will select bearing from manufacturer's catalogue, explain in detailed? **[8]**

OR

Q8) a) A single row deep groove ball bearing operates with the following work cycle

Ele. No.	Ele. Time%	Radial Load 'Fr' KN	Thrust Load 'Fa' KN	Radial Factor 'X'	Thrust Factor 'Y'	Race Rotating	Service Factor	Speed in rpm
1	40	4	1	0.56	1.4	inner	1.5	800
2	25	3	1	0.56	1.6	outer	2.0	1500
3	35	No Load	No Load	-	-	outer	-	720

If the expected life of the bearing is 10,000Hrs. with reliability of 95% calculate the basic dynamic load rating of the bearing so that it can be selected from manufacturer's catalogue based on 90% reliability.

If there are six such bearings in the system, what is the probability that all bearings will survive for 10,000Hrs. **[12]**

b) What are additives? Explain the different types of additives used in lubricating oils. **[6]**

Q9) A two stroke gas engine develops 37.5KW at a mean speed of 1200rpm. The resisting load torque is constant throughout the cycle. The coefficient of fluctuation of engine is 0.27 A rimmed flywheel made of gray cast iron FG260 (ρ =7150Kg/m^3) is used to limit the coefficient of fluctuation of speed to 0.02. The linear rim speed at mean radius is limited to 30m/s. The rim has a rectangular cross section with width to thickness ratio of 2.0. If the rim provides the 90% of the flywheel effect, determine

a) Mass of the flywheel rim

b) Dimensions of the flywheel rim **[16]**

OR

Q10)a) Derive expression & show that tensile stress in the rim of the flywheel due to the centrifugal force is given by

$\sigma t = \rho R^2 \omega^2 = \rho v^2$

(Notations have usual meaning) **[8]**

b) Write short note on 'Construction of Flywheel'. **[8]**

Q11)a) What is the importance of the reliability in the modern engineering design? How does it is differ from the factor of safety? **[8]**

b) What is the adequate design and optimum design? Explain with suitable examples. **[4]**

c) What do you understand by incompatible specification? **[4]**

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	H_7		e_8	
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

[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]**

x x x

Total No. of Questions : 12]

SEAT No. :

P2942

[Total No. of Pages : 3

[5058]-53

T.E. (Production Sandwich Engineering)
MATERIAL FORMING AND MOULD DESIGN
(2008 Course) (Semester - II) (Theory) (311125)

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

Instructions to the candidates:

1) ***Answers to the two sections should be written in separate answer books.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
5) ***Assume suitable data if necessary.***
6) ***Solve Q.1 or Q2, 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.***

SECTION - I

Q1) a) Explain material forming & classify material forming processes on the basis of applied load with neat sketch. **[8]**

b) A material is tested under a state of stress $\sigma_1 = 3\sigma_2 = -2\sigma_3$ where σ_1, σ_2 & σ_3 are principal stresses and yielding is observed when $\sigma_2 = 140$ Mpa. What is yield stress in simple tension according to Tresca & Von Mises criteria? **[8]**

OR

Q2) a) A block is subjected to following principal stresses at yeild point, σ_1=80 Mpa, $\sigma_2 = 30$ Mpa & $\sigma_3 = -40$ Mpa. Find the yield strength of material in tension according to Tresca & Von Mises criteria. **[8]**

b) Explain influence of following on forming limit diagram. **[8]**

i) Gride size

ii) Planer anisotropy

iii) Sheet thickness

P.T.O.

Q3) a) Define extrusion & Explain forward extrusion & backward extrusion with neat sketch. **[8]**

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

i) Liquid Metal Forging

ii) Powder Metallurgy Forging

OR

Q4) a) Calculate work done in extruding an aluminum billet 780 mm diameter and 1500 mm long to five square bars of 25 mm side. Flow stress of aluminum is 60 Mpa, coefficient of friction between billet and container is 0.25. Also determine power required if the process is completed in 10 minutes. **[8]**

b) Explain various Forging & forgability tests. **[8]**

Q5) a) Explain Various Zones wire drawing die with neat sketch. **[8]**

b) Explain Electromagnetic forming in detail with neat sketch. **[10]**

OR

Q6) a) Calculate the drawing load required to achieve 30% reduction in area of 40 mm × 10 mm annealed mild strip using straight tapered die having semi-die angle 26.5°, coefficient of friction is 0.1, yield stress of material is 300 N/mm^2. **[10]**

b) Explain Explosive forming in detail with neat sketch. **[8]**

SECTION - II

Q7) a) Explain various rolling arrangement with neat sketch. **[8]**

b) Explain Automatic Gauge Control in rolling. **[8]**

OR

Q8) a) A 0.1% carbon steel strip is 50 mm wide and 5 mm thick was rolled in one pass to 3.5 mm at 1060 ºC. When the homogeneous yield stress was 1.05 KN/mm^2. The roll diameter was 340 mm. Find magnitude of rolling load, taking into account roll flattening, if rolls were made up of CI. Assume young's modulus (E) = 1.005 MN/mm^2 and Poissons ratio (r) = 0.35 **[8]**

b) Calculate the rolling load to reduce steel 600 mm wide and 30 mm thick by 20%. Roll diameter is 800 mm & flow stress of steel is 150 N/mm^2. Assume coefficient of friction as 0.15. What would be rolling load if.**[8]**

i) Sliding friction occurs.

ii) Sticking friction occurs.

Q9) a) What is chovornov's rule? Explain its importance in design of casting.**[8]**

b) Explain following with neat sketch: **[8]**

i) Hot chamber die casting.

ii) Cold chamber die casting.

OR

Q10)a) Explain various points to be considered while designing riser. **[8]**

b) Explain cooling consideration in die casting. **[8]**

Q11)a) Explain how die block dimensions are determined in forging die design. **[10]**

b) Explain importance of positioning of gate in injection moulding with suitable sketch. **[8]**

OR

Q12)a) Calculate gate dimensions for rectangular gate used in moulding polythene blocks having length 150 mm, width 130 mm, height 50 mm & thickness 1.3 mm. Take density of material as 0.9 gms/cm^3 also find runner dimensions. Assume length of gate as 0.5 mm, length of runner as 50 mm. Take material constant (n) as 0.6. **[8]**

b) Explain how die block dimensions are determined in forging die design.**[5]**

c) Explain stripper plate ejection technique used in injection moulding with suitable sketch. **[5]**

Total No. of Questions : 12]

SEAT No. :

P2188

[Total No. of Pages : 3

[5058]-54

T.E. (Production Sandwich Engineering)

PRODUCTION & INDUSTRIAL MANAGEMENT-II

(2008 Course) (Semester-II)

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

Instructions to the candidates:

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

SECTION-I

Q1) a) Explain the functions of Marketing Management. **[8]**

b) What is Market research? **[6]**

c) Explain Law of Supply. **[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) What are the different forms of Money? **[4]**

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) Discuss the important points regarding coordination of process engineering department with tool engineering department. **[8]**

P.T.O.

Q5) a) Discuss Standard tooling and Special tooling. **[8]**

b) Explain Dimensional analysis. **[8]**

OR

Q6) a) What is the Purpose and utilization of Tolerance chart? **[8]**

b) Explain Six Point location system. **[8]**

SECTION-II

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) In terms of acceptance sampling terminology define Critical, Major and Minor defects and discuss their influence. **[8]**

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]**

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) What is the meaning of terms conformity and non-conformity in context with ISO 9001? **[8]**

b) State the elements of Quality System. **[8]**

c) What is "continual improvement? **[2]**

●●●●●

Total No. of Questions : 8]

SEAT No :

P1595

[Total No. of Pages : 2

[5058]-6

T.E. (Civil)

HYDROLOGY AND WATER RESOURCE ENGINEERING

(2008 Pattern) (Semester - II)

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

Instructions to the candidates:

1) ***Answer 3 questions from each section.***
2) ***Number to right indicate full marks.***

SECTION - I

Q1) a) Explain in detail various form of precipitation. **[8]**

b) Explain different methods of determining average rainfall over catchment. **[9]**

Q2) a) Determine ϕ index from the following data of 8cm precipitation that resulted in direct run-off of 44 cm. **[9]**

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

b) Explain applications of hydrology in various fields of civil engineering. **[8]**

Q3) a) Explain factors governing run-off. **[8]**

b) Explain with a neat sketch Unit hydrograph with its advantages and disadvantages. **[9]**

Q4) a) Explain various methods of estimating flood peak discharge. **[8]**

b) What is 'S' hydrograph? Explain its use. **[8]**

P.T.O.

SECTION - II

Q5) a) What is Duty and Delta. Derive relationship between them. **[9]**

b) What are different crop patterns in India. How are they classified as per season. **[8]**

Q6) a) Explain in detail 'Siltation of Reservoir'. **[8]**

b) Explain National water policy 2012. **[9]**

Q7) a) Explain with sketch – confined aquifer, unconfined aquifer, perched aquifer, Artesian well. **[8]**

b) Explain various methods of application of water to crop. **[9]**

Q8) a) Derive the equation of discharge at unconfined aquifer. **[8]**

b) Explain with a neat sketch 'Sprinkler Irrigation'. State advantages and disadvantages. **[8]**

x x x

Total No. of Questions : 12]

SEAT No. :

P1616

[Total No. of Pages : 2

[5058]-61
T.E.(Electrical)
MICROCONTROLLER AND APPLICATION
(2008 Course)(Semester-I)

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

Instructions to the candidates:

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

SECTION-I

Q1) a) Describe the functions of pins: PSEN, RESET, INT1 INT0 **[9]**

b) Explain function of PSW in 8051 and its importance. **[9]**

OR

Q2) a) Explain all ports and latches in 8051 with neat sketch. **[9]**

b) Draw and explain 8051 internal RAM structure. Explain SFR **[9]**

Q3) a) Using DPTR transfer the codes from 1000H & 1001H to 7Eh and 7Fh. **[8]**

b) Explain four major differences in microprocessor and microcontroller. **[8]**

OR

Q4) a) Using the DPTR transfer the codes from 1000H and 1001H to the external memory address 1000H & 1001H. **[8]**

b) Explain ports that used for external memory address. **[8]**

Q5) a) Assuming that XTAL=11.0592MHZ. Write a program to generate a square wave of 1KHZ frequency on pin 1.2 **[8]**

b) Complement the lower nibble of RAM location 2Ah. **[8]**

OR

Q6) a) Which port has no alternate function? Enumerate multifunctional port pins. **[8]**

b) Explain TCON register and function of each bit. Also comment on use of TMOD. **[8]**

P.T.O.

SECTION-II

Q7) a) Draw and explain interfacing of 8KB ROM and 4KB RAM. Show memory mapping **[10]**

b) Write a note on use of cross assembler and simulator. **[8]**

OR

Q8) a) Explain serial communication of 8051 with PC using RS232 communication protocol. **[10]**

b) Explain interfacing of 8051 with 8255. **[8]**

Q9) a) Explain with suitable diagram, measurement of temperature using 8051. **[8]**

b) Draw the interfacing diagram of ADC with 8051 and explain the interfacing process. **[8]**

OR

Q10) a) Draw interfacing a stepper motor with 8051 and write ALP to rotate the stepper motor **[8]**

b) Write a note on measurement of level measurement using 8051. **[8]**

Q11)a) Explain the interfacing of 4X4 matrix keyboard with 8051. Draw the suitable diagram. **[8]**

b) Explain the procedure for voltage measurement using 8051. Draw the relevant diagram. **[8]**

OR

Q12)a) Write a note on "AC motor control using 8051". **[8]**

b) Explain the interfacing of 16×2 LCD with 8051. Draw the suitable diagram. **[8]**

Total No. of Questions :12]

SEAT No. :

P1617

[Total No. of Pages :3

[5058] - 62

T.E. (Electrical)

ELECTRICAL MACHINES - II

(2008 Course) (Semester - I)

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

Instructions to the candidates:

1) ***Answer 03 questions from Section I and 03 questions from Section II.***
2) ***Answers to the two sections should be 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) What is armature reaction? Explain the effect of armature reaction on synchronous machine at different power factors. **[8]**

b) Compare salient pole & non salient pole synchronous machines. **[4]**

c) The 3 phase star connected, 16 poles alternator has 192 slots with 8 conductors per slot. The actual coil span is 160° electrical. The alternator is driven at 375 rpm having flux per pole 55 mWb. Calculate line value of emf induced. **[6]**

OR

Q2) a) A 2400 kVA, 8000 $\sqrt{3}$ volts, 3 phase star connected alternater has synchronous impedance of 1.5 + j 30 Ω per phase. Calculate the full load % regulation at. **[8]**

i) 0.866 lag pf &

ii) 0.866 lead pf

b) Define short circuit Ratio in case of alternator. State its significance. **[4]**

c) Explain emf method for finding out voltage regulation & 3 ϕ alternator. **[6]**

P.T.O.

Q3) a) State the conditions for parallel operation of 3 phase alternators. Explain 2 bright & 1 dark lamp method. **[8]**

b) A 3 phase star connected, 6.6 kV synchronous motor takes 72 Amp at 0.8pf leading. Resistance & reactance per phase of the motor are 0.1Ω & 0.9Ω respectively. Calculate induced emf & total power input. **[8]**

OR

Q4) a) A 5 kVA, 200V, 3 phase star connected salient pole alternator has direct axis & quanderature axis reactance of 12Ω & 7Ω respectively. Calculate the excitation voltage & full load volt regulation at unity power factor. Neglect resistance. **[8]**

b) What do you mean by V curve & inverted V curve & synchronous motor. Give experimental set-up for the same & describe in detail. **[8]**

Q5) a) With neat diagram explain construction & working of 3 phase synchronous Induction motor. **[8]**

b) Explain v/f method of speed control of 3 phase Induction motor. Why the ratio v/f is to be kept construct. **[8]**

OR

Q6) a) Explain operation of 3 phase Induction generator. State its advantages & applications. **[8]**

b) Write a short note on 3 phase Induction voltage regulator. **[8]**

Q7) a) Discuss in detail the problems associated with DC series motor when it is connected to AC supply. **[8]**

b) Draw and explain the exact phasor diagram of AC series motor. **[8]**

OR

Q8) a) An AC series motor is wound with 960 armature conductors with 2 poles. It draws a current of 4.6 Amp while running at 5000 rpm. The motor is connected to 100 volt ac supply and the input power is 300 watt. The armature winding resistance is 3.5 Ω. Find out-. **[8]**

i) Effective armature reactance

ii) Useful flux per pole

b) What modifications are made in DC series motor so that it can work satisfactorily on AC supply? **[8]**

Q9) a) Explain construction and working of brushless DC motor with suitable diagrams. State its applications. **[8]**

b) What is meant by slot harmonics in case of induction motor? What are its effect on performance of induction motor? How these are mitigated? **[8]**

OR

Q10)a) Explain construction and working of linear induction motor with suitable diagrams. State its applications. **[8]**

b) Explain the concept of time and space harmonics. **[8]**

Q11)a) Explain crossfied theory in detail for single phase induction motor. **[9]**

b) With suitable diagram explain construction and working of capacitor star capacitor run motor. Draw its speed torque characteristics. State applications of this motor. **[9]**

OR

Q12)a) Draw equivalent circuit of single phase induction motor. Explain each parameter involved in the equivalent circuit. **[9]**

b) With suitable diagram explain construction and working of shaded pole motor. Draw its speed torque characteristics. State applications of this motor. **[9]**

Total No. of Questions :12]

SEAT No. :

P2943

[Total No. of Pages :3

[5058] - 63

T.E. (Electrical)

POWER ELECTRONICS

(2008 Course) (Semester - I)

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

Instructions to the candidates:

1) ***Answers to the two sections should be written in separate answer books.***
2) ***Answer three questions from section I with Q1 or Q2, Q3 or Q4 and Q5 or Q6. and Q7 or Q8. Q9 or Q10, Q11 or Q12 from section II.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right side indicate full marks.***
5) ***Use of Calculator is allowed.***
6) ***Assume Suitable data if necessary.***

SECTION - I

Q1) a) Compare the characteristics of an Ideal switch with Practical switch characteristics. **[8]**

b) Define the following terms in SCR **[8]**

i) Forward break over voltage

ii) Latching current

iii) Holding current

iv) I^2t rating

OR

Q2) a) Explain latching of SCR using two transistor analogy. How duration of gate pulse is decided? **[8]**

b) Explain R & RC triggering circuit of Thyristor with neat circuit diagram and waveforms. **[8]**

Q3) a) Describe working of single phase two pulse SCR full controlled bridge converter with RL load through the waveforms of Source voltage, load voltage, load current and voltage across SCR Derive output voltage equation. **[10]**

b) Explain the operation of single phase semi controlled converter with inductive load with associated waveforms. **[6]**

OR

P.T.O.

Q4) a) Describe concept of overlap angle. Derive expression for voltage drop due to overlap angle in three phase full bridge converter. **[8]**

b) Explain working of three phase full converter feeding highly inductive load with a firing angle of 60º & obtain expression for phase voltage & Line voltage. **[8]**

Q5) a) Explain single phase ac regulator used as light dimmer. Derive expression for rms load voltage. Draw output voltage waveform. **[9]**

b) Describe the operation of tap changer sequence control of a.c. voltage regulator with suitable diagram and waveforms. **[9]**

OR

Q6) a) Draw neat diagram and explain how TRIAC can be used in all 4 quadrants. Draw VI characteristics. **[9]**

b) Account for the switching loss in a Practical switch. Explain its dependence on frequency. How snubber can reduce switching loss? **[9]**

SECTION - II

Q7) a) Draw and explain the operation and characteristics of GTO in comparison with SCR. What is turn off gain? **[8]**

b) With the help of neat structural diagram and suitable waveforms, explain the operation of MOSFET. **[8]**

OR

Q8) a) Discuss the switching characteristics of the IGBT with the help of neat circuit diagrams and waveforms. **[8]**

b) Compare MOSFET and IGBT based on characteristics and applications. **[8]**

Q9) a) Draw the schematics of step-up chopper and derive an expression for output voltage in terms of duty -cycle for a step-up chopper. **[8]**

b) What are the control parameters of chopper? Explain the TRC and CLC control strategies used for chopper. **[8]**

OR

Q10)a) Draw the circuit of a Class E chopper and explain its working using waveforms. **[8]**

b) A d.c chopper circuit connected to a 100 V d.c source supplies an inductive load having 40mH in series with a resistance of 5 Ω. A freewheeling diode is placed across the load. When operated with 60% duty cycle and 500 Hz switching frequency, calculate Output Voltage, Load current mini and maxi value and % Ripple current. **[8]**

Q11)a) With the help of neat circuit diagram and associated waveforms, explain the operation of single phase full bridge IGBT based voltage source inverter with inductive load. **[9]**

b) With the help of neat circuit diagram and waveforms, explain briefly the operation of three phase bridge inverter with star connected resistive load in 120^0 conduction mode. **[9]**

OR

Q12)a) With the help of neat circuit diagram and associated waveforms, explain the operation of single phase Sinusoidal PWM voltage source inverter with resistive load. **[9]**

b) Why voltage control is needed in inverter circuits? State the various methods of voltage control in inverter circuits and explain each of them briefly.

[9]

Total No. of Questions :12]

SEAT No. :

P1618

[Total No. of Pages :3

[5058] - 64

T.E. (Electrical)

ELECTRICAL INSTALLATION MAINTENANCE & TESTING

(2008 Course) (303144) (Semester - V)

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 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 side indicate full marks.***
4) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Compare 3 phase 3 wire O/H system with 3 phase 4 wire O/H system for the volume of conductor material required. Clearly state the assumptions made. **[8]**

b) What are radial system, ring main system and interconnected system? Explain in brief with line diagram. **[10]**

OR

Q2) a) State and explain Kelvins Law and also state its limitations. **[8]**

b) Differentiate between **[10]**

i) Feeder & Distributor

ii) Overhead Line & Underground line.

Q3) a) Explain the following terms with their equivalent circuit **[8]**

i) Touch potential

ii) Step potential

b) Explain in detail function of equipment used in substation. **[8]**

OR

P.T.O.

Q4) a) Explain the necessity and types of earthing system. **[8]**

b) Explain in detail the design of earthing grid of substation w.r.t. IEEE standard 80 - 2000. **[8]**

Q5) a) Explain the different maintenance strategies in details. **[8]**

b) Explain the planned & preventive maintenance of transformers. **[8]**

OR

Q6) a) Define and explain w.r.t condition monitoring. **[8]**

i) Polarization Index.

ii) Dielectric Absorption Ratio.

b) Explain the planned & preventive maintenance of generators. **[8]**

SECTION - II

Q7) a) Explain different failure modes of transformer. **[8]**

b) Write a short note on Partial Discharge measurement. Define Degree of Polymerization. **[8]**

OR

Q8) a) How testing of transformer bushing and oil is done as per IS specifications? **[8]**

b) Explain in detail condition monitoring of transformer. **[8]**

Q9) a) Explain '$\tan\delta$' measurement for condition monitoring of insulation. **[8]**

b) State and explain different causes of cable failure. **[8]**

OR

Q10)a) What is Signature analysis? Explain its role in condition monitoring of induction motor. **[8]**

b) Define thermography. Draw the block diagram and explain its role in condition monitoring of electrical equipment. **[8]**

Q11) Explain working, troubleshooting & maintenance of ANY TWO of the following appliances: **[18]**

a) Electric Fan.

b) Electric mixer.

c) Refrigerator.

OR

Q12) Explain working, troubleshooting & maintenance of ANY TWO of the following appliances: **[18]**

a) Water pump.

b) Micro wave oven.

c) Electric fan.

Total No. of Questions :12]

SEAT No. :

P1619

[Total No. of Pages :3

[5058] - 65

T.E. (Electrical Engg.)

ENGINEERING ECONOMICS & MANAGEMENT

(2008 Pattern) (Semester - I) (Theory) (311121)

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) Explain various types of Business organisations ownership with suitable examples of each. **[16]**

OR

Q2) a) Write a brief note on Elasticity of Demand and Elasticity of supply. **[8]**

b) Explain the role of Government in macro economics in Indian context. **[8]**

UNIT - II

Q3) a) Differentiate between Administration & Management. **[8]**

b) Explain F.W. Taylor's contribution in management. **[8]**

OR

Q4) a) Explain various types of Plant Layouts. **[8]**

b) Explain various types of Inventory. **[8]**

P.T.O.

UNIT - III

Q5) a) Explain functions of marketing. **[9]**

b) Explain the meaning & Importance of online marketing with suitable examples of online marketing organisations. **[9]**

OR

Q6) a) Define Financial management. Explain functions of financial manager. **[9]**

b) Explain the concept of Merger & Aquisition. **[9]**

SECTION - II

UNIT - IV

Q7) a) Define motivation. Explain 'X' & 'Y' theory of motivation. **[8]**

b) Explain the concept of Group Dynamics. **[8]**

OR

Q8) a) Define Leadership. Explain qualities of Good leader. **[8]**

b) Explain various traits & qualities of Entrepreneur. **[8]**

UNIT - V

Q9) Explain various functions of Human Resource Manager of an organisation in detail. **[16]**

OR

Q10) Write brief note on following. **[16]**

a) Time management

b) Stress management

c) Job satisfaction.

d) Business Ethics

UNIT - VI

Q11)a) Explain Disaster management. Explain Types of Disasters with examples. **[9]**

b) Write a brief note on use of GIS & GPS for Disaster Management. **[9]**

OR

Q12)Prepare a detailed Disaster Management plan for Floods of River. **[18]**

Total No. of Questions : 11]

SEAT No :

P1620

[Total No. of Pages : 2

[5058]-66
T.E. (Electrical)
ENERGY AUDIT AND MANAGEMENT
(2008 Course) (303146) (Semester - II)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) Explain adverse effect of uncontrolled use of fossile fuels on environment. **[8]**

b) Explain features of Energy Conservation Act 2011. **[8]**

OR

Q2) a) Explain Indian energy scenario in context to primary and secondary energy production and consumption. **[8]**

b) What is energy intensity? Where India stand in list? Is this index can be useful to understand energy future in what way? **[8]**

Q3) a) Explain wave shaping tools for implementation of DSM. **[8]**

b) Explain the structure of energy management division in a process industry. **[8]**

OR

Q4) a) What is Energy Policy? Explain importance of energy policy and also explain format of the same. **[8]**

b) Explain avenues available under SSM. **[8]**

Q5) a) With reference to energy audit explain various methods used for data analysis. Also mentioned key data required for energy audit. **[10]**

b) What is Executive Summary? What information we can get from it? Draw any one process flow diagram. **[8]**

OR

P.T.O.

Q6) a) Explain various instruments with function of each used to carry out energy audit. **[10]**

b) Compare preliminary audit with detailed energy audit. **[8]**

SECTION - II

Q7) a) Explain various tariff structures suitable for energy management. **[8]**

b) Explain Net present value method and time value of money. **[8]**

OR

Q8) a) An investment of Rs. Five Lakh is made for a variable speed drive at the beginning of the year, which is also the date of first operation. Savings expected over four years are Rs. 50000, Rs. 80000, Rs. 120000, Rs. 150000 and Rs. 180000 respectively. Find out the net present value, if the discount rate is 15%. Would you invest in this measure? Explain your decision. **[8]**

b) Explain payback period and its mathematical formulation for energy analysis in electrical systems. **[8]**

Q9) a) What is Cogeneration? Explain Topping and Bottoming cycle with neat diagrams. **[8]**

b) Enlist energy conservation opportunities in HVAC systems. **[8]**

OR

Q10) a) Enlist energy conservation opportunities in fans and blowers. **[8]**

b) Enlist energy conservation opportunities in boilers. **[8]**

Q11) Write notes on Energy conservation case studies (solve any three of the following.)

a) Cement Industry **[18]**

b) Sugar Industry

c) Petrochemical

d) Paper and Pulp

e) Electrical Utility Systems

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Total No. of Questions :12]

SEAT No. :

P1621

[Total No. of Pages : 3

[5058] - 67

T.E. (Electrical)

POWER SYSTEM-II

(2008 Pattern) (Semester - II)

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

Instructions to the candidates:

1) ***Answer any three questions from each section.***
2) ***Answer to the two sections should be written in separate answer books.***
3) ***Neat diagram must be drawn whenever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Use of logarithmic tables, slide rule, electronic pocket calculator is allowed.***

SECTION-I

Q1) a) A 275 kV, three phase line has the following line parameters: **[8]**

$A = 0.93 < 1.5°$, $B = 115 < 77°$ if the receiving end voltage is 275 kV determine:

i) Sending end voltage required if a load 250 MW at 0.85 p.f. (lagging) is being delivered at receiving end.

ii) The Maximum power that can be delivered if the sending end voltage is held at 295 kV.

b) Derive expression for active and reactive power flow in the transmission line. **[8]**

OR

Q2) a) What is surge impedance loading? Explain different methods used to improve surge impedance loading. **[8]**

b) Explain the procedure of drawing the receiving end circle diagram. **[8]**

Q3) a) Explain advantages & disadvantages of EHVAC transmission. **[8]**

b) Explain phenomenon of corona and explain Critical disruptive voltage & visual critical voltage of corona. **[8]**

OR

P.T.O.

Q4) a) What are different factors and conditions affecting the corona? Explain briefly. **[8]**

b) Find the Critical disruptive voltage and the Visual critical voltage for local and general corona on a three phase overhead transmission line consisting of three stranded copper conductors spaced 2.5 m apart at the corners of an equilateral triangle. Air temperature and pressure are 21°C and 73.6 cm of Hg respectively. The conductor diameter irregularity factor and surface factors are 10.4 mm, 0.85, 0.7 and 0.8 respectively. **[8]**

Q5) a) What do you mean by p.u. system? Prove that the single phase and three phase values are same in p.u. **[9]**

b) Explain the concept of sub transient, transient and steady state current and impedances in detail with proper diagrams. **[9]**

OR

Q6) a) Write a short note on selection of circuit breaker and current limiting reactors and their location in power system. **[9]**

b) Generators A and B are identical and rated 13.8kV, 21,000 kVA and have a transient reactance of 30% at own kVA base. The transformers are also identical and are rated 13.8/66 kV, 7000 kVA and have a reactance of 8.4% to their own kVA base. The tie line is 50 km long; each conductor has a reactance of 0.848 ohm/km. The three phase fault is assumed at F, 20 km from station A. Find short circuit current. **[9]**

SECTION-II

Q7) a) Show that fault current $I_f = \frac{3E}{z_1 + z_2 + z_0}$ when L-G fault occurs at the terminals of solidly grounded star connected alternator. **[9]**

b) Show that power in three phase circuit can be computed from symmetrical components of voltages and currents. **[9]**

OR

Q8) a) Draw the equivalent circuit for zero sequence reactance of three phase transformer, for different combinations of connections. **[9]**

b) Two 25MVA, 11kV synchronous generators are connected through bus-bar to a feeder. The star point of one generator is grounded through a resistance of 1.0Ω and other generator has isolated neutral. Determine the fault current for single line to ground (L-G) fault at the end of feeder. The parameters of generators and feeder are: **[9]**

i) Generators: $X_1 = 20\%$, $X_2 = 18\%$, $X_0 = 8\%$.

ii) Feeder: $X_1 = X_2 = 30\%$, $X_0 = 75\%$

(on base of 25 MVA, 11 kV).

Q9) a) Explain the direct method of formation of Y bus matrix. **[8]**

b) Give classification of various types of buses in power system for load flow studies. What is the significance of reference bus? **[8]**

OR

Q10)a) Explain Guess Seidal method of load flow analysis along with flowchart. **[8]**

b) Derive static load flow equations for n bus system. **[8]**

Q11)a) What are recent advancements in the HVDC system? State different HVDC systems in India with their type and specifications. **[8]**

b) Give the detail classification of HVDC transmission system. **[8]**

OR

Q12)a) Explain components of HVDC transmission system with single line diagram. **[8]**

b) Explain constant current control method of HVDC system. **[8]**

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Total No. of Questions : 12]

SEAT No. :

P1622

[Total No. of Pages :3

[5058]-68
T.E. (Electrical)
DESIGN OF ELECTRICAL MACHINES
(2008 Course) (303148) (Semester - II)

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

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 from section - I and Q7 or Q8, Q9 or Q10, Q11 or Q12 from section - II.***
2) ***Answers to the two sections should be written in separate 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 principle components of leakage flux for polyphase machines. **[8]**

b) Explain rotating hysteresis and pulsation losses in electrical machines. **[8]**

OR

Q2) a) Explain Carter's fringe curves and air gap flux distribution factor in detail. **[8]**

b) Define **[8]**

i) Leakage coefficient

ii) Window space factor

iii) Stacking Factor

iv) Real Flux density

Q3) a) Derive output equation of three phase transformer. **[8]**

b) Calculate the specific iron loss in a specimen of alloy steel for a maximum flux density on 3.2 Wb/m^2 and frequency of 50 Hz, using 0.5 mm thick sheets. The resistivity of alloy steel is 0.3×10^{-6} Ω–m. The density is 7.8×10^3 kg/m^2. Hysteresis loss in each cycle is 400 J/m^3. **[8]**

OR

P.T.O.

Q4) a) Explain specifications of transformer as per IS 2026. **[8]**

b) Draw heating curve and cooling curve. Define the heating time constant, cooling time constant and discuss the concept of final steady termperature rise. **[8]**

Q5) a) Explain why the distribution transformers are designed for high all day efficiency. **[6]**

b) Determine the main dimensions of core, yoke, number of turns of primary and secondary windings and the cross section of the conductors for a 5kVA, 11000/400v, 50Hz, single phase core type transformer, the net conductor area in the window is 0.5 times the net cross section of iron in the core. Assume square cross section for the core with following parameters: Maximum flux density = 1.2T, widow space factor = 0.2, current density = 1.2A/mm^2, stacking factor 0.9. The height of window is 3 times width of window. **[12]**

OR

Q6) a) Explain the process of design of cooling tubes of a transformer. **[8]**

b) Explain the procedure to estimate active and reactive components of no load current of single phase core type transformer. **[10]**

SECTION - II

Q7) a) Explain the fractional slot winding used for stator of three phase induction motor. What are the advantages of fractional slot winding? **[9]**

b) Draw developed diagram of stator winding of a three phase, 4 pole synchronous machine. The winding is of lap type and with double layer with a phase spread of 600. The winding is short pitched by one slot; there are three slots per pole phase on the stator. **[9]**

OR

Q8) a) Discuss factor which govern the choice of electrical loading and specific magnetic loading. **[8]**

b) Determine the main dimensions, number of radial ventilating ducts, number of stator slots and the number turns per phase of a 3.7kW, 400V, 3-phase, 4-pole, 50Hz, squirrel cage induction motor to be started by a star - delta starter. Work out the winding details. Assume : Average flux density in the gap = 0.45 Wb/m^2, ampere conductors per meter = 23,000, efficiency = 0.85 and p.f. = 0.84. Machines rated at 3.7 kW, 4-pole is sold at a competitive price and therefore choose the main dimensions to give the cheap design. Assume: Winding factor = 0.955, Stacking factor = 0.9 and slots per pole per phase = 3. Assume, $L/\tau = 1.5$ for cheap design. **[10]**

Q9) a) Discuss harmonic induction torques and harmonic synchronous torques produced by harmonic fields in three phase induction motor. **[8]**

b) Give step by step procedure to design squirrel cage rotor of star connected three phase induction motor. **[8]**

OR

Q10)a) Discuss the importance of suitable combinations of stator and rotor slots in case of three phase induction motor. **[8]**

b) Derive the equation for end ring current for the rotor of squirrel cage induction motor. **[8]**

Q11)a) Explain effect of saturation of performance of three phase induction motor. **[5]**

b) Explain the method of calculation of magnetizing current of three phase induction motor considering. **[11]**

i) MMF for air gap

ii) MMF for stator teeth

iii) MMF for rotor teeth

iv) MMF for stator core

OR

Q12)a) Draw a neat sketch of a magnetic circuit of three phase four pole induction motor. Clearly indicate: **[8]**

i) Rotor core

ii) Rotor teeth

iii) Air gap

iv) Stator core and teeth

b) Discuss various losses in case of three phase induction motor. **[8]**

Total No. of Questions : 12]

SEAT No. :

P1623

[Total No. of Pages :4

[5058]- 69
T.E. (Electrical)
CONTROL SYSTEM - I
(2008 Pattern) (Semester - II)

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) Explain the terminology of SFG. Also explain Mason's Gain Formula. **[6]**

b) Obtain the transfer function using Block Diagram Reduction Technique. **[10]**

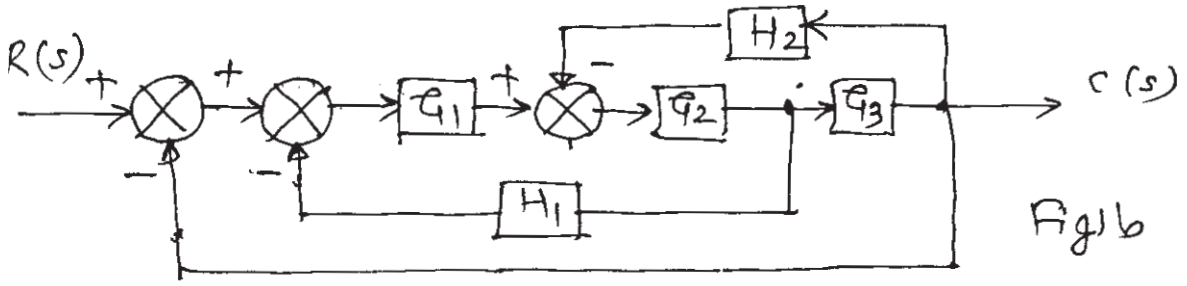

Fig 1b

OR

Q2) a) For the mechanical system as shown in fig 2a, write balance equation and derive the Equivalent Electrical system using Force - Voltage analogy. **[8]**

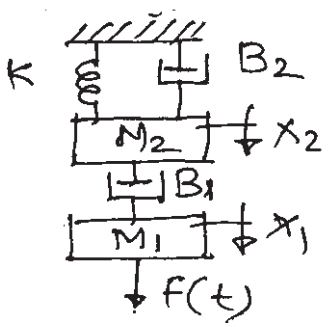

Fig 2a

P.T.O.

b) State and explain the rules of Block diagram algebra used for block diagram reduction. **[8]**

Q3) a) Sketch the time response output of a second order system for various values of damping ratio. System excited with Step input. **[8]**

b) For a unity feedback system with open loop transfer function

$G(s)=\frac{K(s+2)}{s(s^2+7s+12)}$, determine static error constants and steady state error for parabolic input: $r(t) = t^2$. **[8]**

OR

Q4) a) For the unity feedback system

$$G(s)H(s)=\frac{25}{s(s+8)}$$

determine damping ratio, peak time, peak overshoot, settling time and damped natural frequency. **[8]**

b) For a second order, under damped system with step input, explain all the time response specifications. **[8]**

Q5) a) Investigate the type of stability depending upon location of poles **[6]**

i) Real Poles

ii) Repeated Poles

iii) Complex Poles

b) A unity feedback system has

$G(s)H(s)=\frac{K}{s^2(s+4)}$, Draw root locus plot and determine stability. **[12]**

OR

Q6) a) Explain necessary and sufficient conditions for Routh's Stability criteria. **[5]**

b) The characteristic equation of a third order system is given by:

$s^3 + 7s^2 + 25\ s + 39 = 0$

Check whether the roots of the characteristic equation are more negative than - 1. **[8]**

c) What are the effects on root locus due to addition of poles and zeros? **[5]**

SECTION - II

Q7) a) Explain the relation between time domain specifications and frequency domain specifications of a second order system. **[6]**

b) Draw the Bode plot for a system $G(s)H(s)=\frac{100}{s(s+1)(s+2)}$ and determine stability. **[12]**

OR

Q8) a) State and explain Nyquist stability criteria. **[8]**

b) Draw polar plot for type "0" and type "1" system. **[10]**

Q9) a) In the state space representation, define : State, State Vector, State space and State Equation. **[6]**

b) Consider the electrical circuit as shown in fig 9b. Obtain the state model of the system with zero initial condition. **[10]**

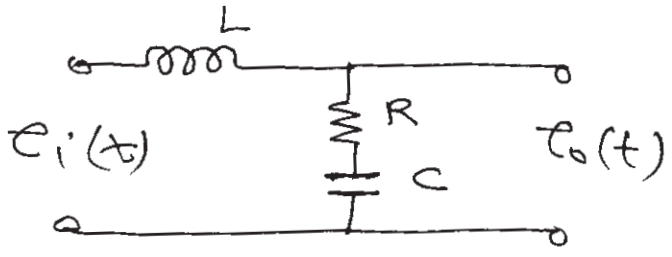

fig 9b.

OR

Q10)a) For the following transfer function of a system.

$\frac{Y(s)}{U(s)} = \frac{K(s+2)}{s(s^2+7s+12)}$, obtain its state space representation. **[8]**

b) Explain various decomposition methods to obtain state model. **[8]**

Q11)Write note on

a) AC Servomotor. **[6]**

b) LEAD Compensator. **[6]**

c) AC Tachometer. **[4]**

OR

Q12)a) Derive transfer function of Lead - Lag Compensator. **[8]**

b) Write a note on DC Servomotor. Derive its transfer function. **[8]**

Total No. of Questions :12]

P2179

SEAT No. :

[Total No. of Pages : 3

[5058]-7
T.E. (Civil)
FOUNDATION ENGINEERING
(2008 Course) (Semester-II) (301010)

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

Instructions to the candidates:

1) ***Answer three questions from Seciton I and three questions from Section II.***
2) ***Answer to the two sections should be written in separate answer books.***
3) ***Neat diagrams must be drawn whenever necessary.***
4) ***Use of logrithmic tables slide rule, eletronic calculator is allowed***
5) ***Assume suitable data if necessary.***

SECTION-I

Q1) a) Explain the purpose of subsoil exploration. **[6]**

b) How will you decide the depth of exploration and the number of borings ? Discuss the guide rules. **[6]**

c) Discuss Pressure meter test. **[6]**

OR

Q2) a) Explain the following: **[6]**

i) Area Ratio ii) Inside clearance iii) Chunk sampling.

b) Enlist the different geophysical methods and describe any one in detail. **[6]**

c) Write a note on Standard Penetration Test. **[6]**

Q3) a) Compare General & Local modes of shear failures. **[6]**

b) Explain Housels Perimerter shear concept. **[6]**

c) Write a note on effect of eccentricity of loading on bearing capacity. **[4]**

OR

P.T.O.

Q4) a) Explain Plate load test in detail. **[6]**

b) Explain effect of water table on bearing capacity of soil. **[6]**

c) Write a note on floating foundation. **[4]**

Q5) a) Explain with sketches spring analogy method. **[6]**

b) What are the different types of foundation settlement? Explain in detail. **[6]**

c) A square footing on sand at 2 m depth shows an elastic settlement of 5.5 mm. Under a loading of 200 kN/m^2. How much a footing would settle if it has to carry a load of 150 kN/m^2? **[4]**

OR

Q6) a) Distinguish between consolidation and elastic settlement. Explain how they are determined? **[6]**

b) Explain Terzaghi's theory of one dimensional consolidation. **[6]**

c) Draw contact pressure distribution diagram for sandy and clayey soil. **[4]**

SECTION-II

Q7) a) Enlist the methods of determining pile capacity. Explain any two methods in short. **[6]**

b) Explain in detail the necessity of pile foundation. **[6]**

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

i) Negative skin friction.

ii) Feld's Rule.

OR

Q8) a) Write a short note on group capacity of pile. **[6]**

b) Explain the cyclic pile load test. **[6]**

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

Q9) a) What is Caisson? How Caissons are classified based on methods of construction? **[6]**

b) State the characteristics of BC soil and explain the role of 'Montmorillonite'. **[6]**

c) What is pier? Explain methods of installation of pier. **[4]**

OR

Q10) a) Sketch and describes the various components of well foundation, indicting functions of each component. **[6]**

b) Discuss the earth pressure distribution for cantilever sheet pile wall. **[6]**

c) Explain Differential free swell test. **[4]**

Q11) a) Explain with neat sketches various functions of geotextiles. **[8]**

b) Write a detail note with sketches on geosythetics application in civil engineering. **[8]**

OR

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

a) Types of earthquake

b) Surface rupture

c) Liquefaction

d) Reinforced earth wall.

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Total No. of Questions :12]

SEAT No. :

P1624

[Total No. of Pages :3

[5058] - 70

T.E. (Electrical Engineering)

UTILIZATION OF ELECTRICAL ENERGY

(2008 Pattern) (303147)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) State the applications of dielectric heating. **[6]**

b) With suitable diagram explain laser welding. **[6]**

c) Draw equivalant circuit of arc furnace. Explain it in brief. State the condition of maximum power output from arc furnace. **[6]**

OR

Q2) a) With suitable diagrams explain temperature control of heating furnace by - auto transformer, buck - boost transformer. **[6]**

b) A 30 kW, 3 phase, 400 volt oven uses nichrome strip of 0.254 mm thickness. The furnace is star connected. If wire temperature is to be 1100°C and that of charge is to be 700°C. Estimate suitable width of strip. Assume emissivity = 0.9, radiating efficiency = 0.5. Take specific resistance of nichrome as $101.6\times10^{-8}\,\Omega$m. **[6]**

c) With suitable diagram explain - spot welding, projection welding. State applications of each type. **[6]**

P.T.O.

Q3) a) With suitable diagram explain construction and working of pressure switch. **[8]**

b) What is meant by electrorefining of metals? With suitable diagram explain electrorefining of copper. **[8]**

OR

Q4) a) With suitable diagram explain construction and working of limit switch. **[8]**

b) Explain electrical circuit of water cooler. **[8]**

Q5) a) Define - Luminous efficiency, coefficient of utilization. **[4]**

b) Explain Law of inverse square for illumination. **[4]**

c) Explain the factors to be considered while designing illumination scheme for street lighting. **[8]**

OR

Q6) a) With suitable diagram explain construction and working of halogen lamp. State its applications. **[8]**

b) A room of size 20 m × 5m is illuminated by 20 number of lamps with power of 200 watt. The MSCP of each lamp is 250. Assume utilization factor of 0.6 and depreciation factor of 1.2. Find the average illumination produced on floor. **[8]**

SECTION - II

Q7) a) Compare - steam engine drive with diesel drive. **[6]**

b) State the advantages and disadvantages of electric drive. **[6]**

c) Explain kando system of track electrification. **[6]**

OR

Q8) a) With suitable diagrams explain following over head current collector systems - Pole collector, Bow collector. **[6]**

b) With suitable diagram explain compound catenary. **[6]**

c) Compare 25kV AC system with DC system of track electrification. **[6]**

Q9) a) An electric train has average speed of 42kmph on level track between stops 1400 m apart. It is accelerated at 1.7 kmphps and is braked at 3.3 kmphps. Determine maximum speed, acceleration, braking retardation and total time of run. **[8]**

b) Derive the expression for specific energy consumption with usual notations. **[8]**

OR

Q10)a) Draw and explain - Trapezoidal speed time curve. **[8]**

b) An electric train has maximum speed of 52 kmph and average speed of 42 kmph on a level track between stops 1400 meter apart. It is accelerated at 1.7 kmphps and braked at 3 kmphps with braking time of 15.8 second. Estimate the energy consumption at axles of the train per tonn - km. Take track resistance of 50 Nw/tonne and allow 10% for rotational inertia. **[8]**

Q11)a) With energy diagram (time - voltage diagram) explain series parallel control of two DC series motors. Also state the efficiency obtained by this method. **[8]**

b) Discuss suitability of DC series motor for traction work. **[8]**

OR

Q12)a) What is time interval signalling? State its limitations. **[4]**

b) With suitable diagram explain placement of different signals. **[6]**

c) Explain regenerative braking of DC series motor using exciter. **[6]**

Total No. of Questions : 12]

SEAT No. :

P1625

[Total No. of Pages : 3

[5058]-71
T.E.(Electronics)
FEEDBACK CONTROL SYSTEM
(2008 Course)(Semester-I)(304201)

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

Instructions to the candidates:

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

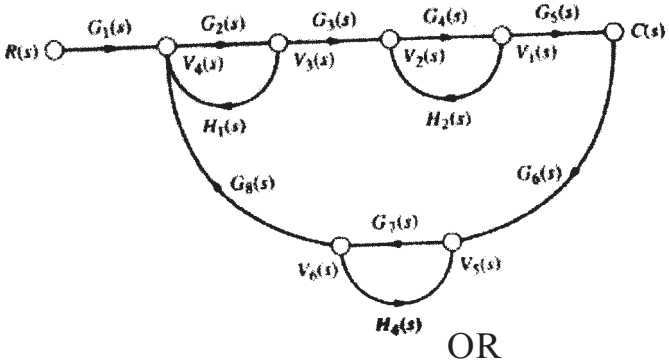
SECTION-I

Q1) a) Distinguish between: **[8]**

i) Block diagram method with signal flow method.

ii) Open loop and closed loop system.

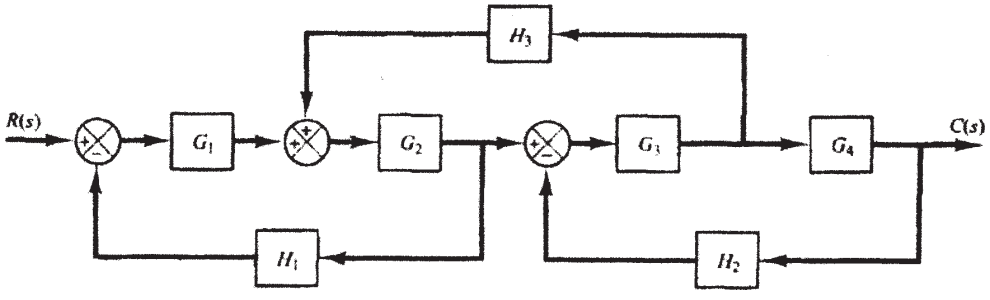
b) Find the transfer Function R(s)/C(s) using Manson's gain Formula. **[8]**



OR

Q2) a) Explain with neat diagram and waveform working principle of synchro error detector. **[6]**

b) Reduce the following block diagram into a single equivalent block using block diagram reduction technique. **[10]**



P.T.O.

Q3) a) An unity feedback system has a loop T.F $G(S)=\frac{40(s+2)}{s(s+1)(s+4)}$

Determine: Type of system, Error coefficients & Error for ramp input with magnitude 4. **[10]**

b) State Routh's criteria. A unity feedback control system has $F(s)= s(s^2+s+1)(s+4)+K$. Find the range of k for the stability of the system using Routh's criteria. **[6]**

OR

Q4) a) A system is given by $H(s)=\frac{25}{s^2+6s+25}$ Determine time domain specifications. **[10]**

b) Use Routh-Hurwitz criterion and determine: $s^4+2s^2+1=0$ **[6]**

i) Number of roots in left of s -plane

ii) Number of roots in right of s-plane

iii) Number of roots on imaginary axis.

Q5) a) A unity feedback control system has open loop transfer function as: $G(s)=\frac{100}{s(1+0.1s)(1+0.2s)}$. Sketch bode plot and determine from it:

i) Gain Crossover frequency

ii) Phase crossover frequency

iii) Gain margin

iv) Phase margin

v) Closed loop stability of a system. **[12]**

b) Write short note on Frequency Domain Specifications **[6]**

OR

Q6) a) Sketch the Nyquist plot and determine the stability of the following open loop transfer function of unity feedback control systems.

$$G.H(s)=\frac{K(s+2)}{s^2(s+4)}$$ **[12]**

b) Explain Nyquist stability criterion based on mapping theorem. **[6]**

SECTION-II

Q7) a) Obtain the state model of the system whose transfer function is given by

$$T(s)=\frac{5s^2+6s+8}{s^3+3s^2+7s+9}$$ **[8]**

b) Consider a control system with state model

$$\begin{bmatrix} X_1 \\ X_2 \end{bmatrix}=\begin{bmatrix} -2 & 0 \\ 1 & -1 \end{bmatrix}\begin{bmatrix} X_1 \\ X_2 \end{bmatrix}+\begin{bmatrix} 0 \\ 1 \end{bmatrix}u(t)$$ **[8]**

OR

Q8) a) Explain the following terms: **[8]**

i) State

ii) State variables

iii) State equations

iv) State transition matirx.

b) Obtain state model for system represented by

$(d^3y/dt^3)+6(d^2y/dt^2)+11(dy/dt)+ 10y = 3u(t)$ **[8]**

Q9) a) Draw a ladder diagram for an elevator system. **[10]**

b) Explain different types level meter. **[8]**

OR

Q10)a) What is PLC? Draw and explain architecture of PLC **[10]**

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

Q11)a) Explain with neat diagram the biological and artificial neuron models. **[8]**

b) Distiguish between feed forward neural network and recurrent neural network. **[8]**

OR

Q12)a) Explain how Fuzzy logic control scheme can be applied for temperature control of process. **[8]**

b) What is Fuzzy set and membership function? Explain with suitable example. **[8]**

Total No. of Questions : 12]

SEAT No. :

P 1626

[Total No. of Pages :3

[5058] - 72
T.E. (Electronics Engineering)
DATA COMMUNICATION
(2008 Course) (Semester - I) (304202)

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

Instructions to the candidates:

1) ***Answer and 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) ***Assume suitable data, if necessary.***
5) ***Neat diagrams must be drawn wherever necessary.***
6) ***Use of non programmable electronic pocket calculators is allowed.***

SECTION - I

Q1) a) With suitable example explain random process. What is ensemble average and time average? **[8]**

b) Define autocorrelation. State and explain any three properties of auto correlation. **[6]**

c) List various standard probability models with their PDF & CDF. **[4]**

OR

Q2) a) Explain the following terms. **[10]**

i) Wide sense stationary.

ii) Ergodic Process.

iii) Auto correlation function.

iv) Power spectral density.

v) Gaussian Process.

b) Show that impulse function of matched filter is time reverse and delayed version of input signal. **[8]**

Q3) a) What are desirable properties of various line codes? **[8]**

b) Explain Intersymbol interference and Eye diagram. **[8]**

OR

Q4) a) What is the need of bit synchronization in Digital Multiplexing? Explain bit synchronizer. **[8]**

b) Sketch PSD for Polar NRZ & Bipolar NRZ formats . **[8]**

P.T.O.

Q5) a) Consider a (7,4) linear block code whose generator matrix is given below **[8]**

$$G = \left(\begin{array}{cccc|ccc} 1 & 0 & 0 & 0 & 1 & 0 & 1 \\ 0 & 1 & 0 & 0 & 1 & 1 & 1 \\ 0 & 0 & 1 & 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 1 & 0 & 1 & 1 \end{array}\right)$$

Find all code vectors

Find parity check matrix of this code.

Find maximum weight of this code.

b) Explain the various methods of convolution codes. **[8]**

OR

Q6) a) Compare FEC and ARQ systems of error control. Compare different ARQ system on basis of their operation & performance. **[8]**

b) A rate 1/3 convolution encoder has generating vector as g1=(1,0,0) g2=(1,1,1), g3= (1,0,1)

sketch the encoder configuration

Draw the code tree, state transition and trellis diagram

If encoder message sequence is 10110, determine the output sequence of encoder. **[8]**

SECTION - II

Q7) a) State and explain all three Shannon's theorems of information theory. **[8]**

b) What is entropy? For discrete memory less source what is the upper bound on entropy. Show that. **[8]**

OR

Q8) a) What is mutual Information? How is the channel capacity related to mutual information? **[8]**

b) Explain various channels with their Models. **[8]**

Q9) a) Explain with block diagram and waveforms DPSK transmitter and receiver. **[8]**

b) Draw signal space representation for orthogonal and non-orthogonal BFSK. **[8]**

OR

Q10)a) Explain with block diagram 16 bit QAM transmitter and receiver mathematically. **[8]**

b) Compare error probabilities for ASK & BFSK. **[8]**

Q11)a) Write a short note on ALOHA & Slotted ALOHA. **[8]**

b) What are the properties of maximum length sequences? Give the graphical representation of auto correlation property of random data of PN sequence. Comment on the graphs. **[10]**

OR

Q12)a) Explain in detail the operation of CDMA and compare performance parameters of FDMA, TDMA and CDMA. **[8]**

b) Explain the working of DSSS transmitter and reciver. **[10]**

☆ ☆ ☆ ☆

Total No. of Questions : 12]

SEAT No. :

P1627

[Total No. of Pages : 5

[5058]-73

T.E. (Electronics Engineering)

NETWORK SYNTHESIS AND FILTER DESIGN

(2008 Course) (Semester - I)

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

Instructions to the candidates:

1) ***Attempt Q.No. 1 or Q.No. 2, Q.No.3 or Q.No.4, Q.No.5 or Q.No.6 from section I. And attempt Q.No.7 or Q.No.8, Q.No.9 or Q.No.10, Q.No.11 or Q.No.12 from section - II.***
2) ***Answer to the two sections should be written in separate answer books.***
3) ***Neat diagram must be drawn wherever necessary.***
4) ***Figures to the right indicates full marks.***
5) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) What is the difference between network analysis and network synthesis. Explain in detail. **[4]**

b) When the network is said to be causal? Explain. State the necessary and sufficient condition for an amplitude function to be causal. **[6]**

c) Test whether the given polynomial is Hurwitz. **[8]**

i) $G_1(s) = s^5 + 4s^4 + 7s^2 + 6s + 2$

ii) $G_2(s) = s^4 + s^3 + 4s^2 + 2s + 3$

OR

Q2) a) $F(s) = \frac{(s+a)}{(s^2+bs+c)}$. Find the restrictions on the values of a, b & c so that F(s) is positive real. **[6]**

b) Determine whether following functions are positive real or not. Justify the same with proper reasons. **[6]**

i) $F(s) = \frac{s^2+s+6}{s^2+s+1}$

ii) $F(s) = \frac{s^2+6s+5}{s^2+9s+14}$

P.T.O.

c) Find the voltage ratio transfer function G_{21} for the network shown in figure 1 below. **[6]**

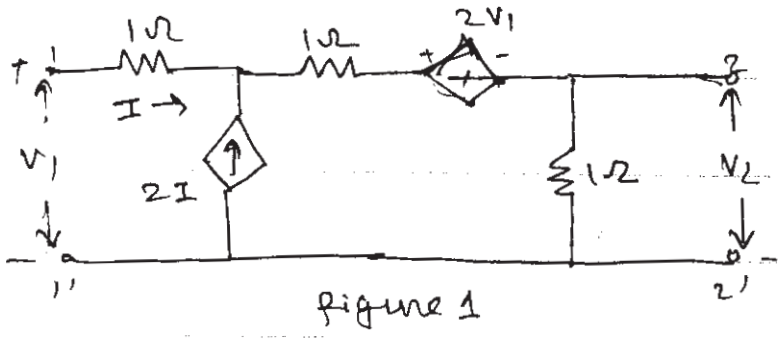


figure 1

Q3) a) State the properties of L-C impedance or admittance function. Also check the following functions for LC impedance and justify the answer with proper reason. **[8]**

i) $$Z(s) = \frac{2(s^2+1)(s^2+9)}{s(s^2+4)}$$

ii) $$Z(s) = \frac{s^5+4s^2+5s}{3s^4+6s^2}$$

b) A network function indicate an impedance function which has **[8]**

i) Simple pole at –2 and –6.

ii) Simple zeros at –3 and –7.

iii) $Z(0) = 20\Omega$

Write the function and synthesize it using Foster I form.

OR

Q4) a) Synthesize the following impedance function using Cauer I and Cauer II forms. **[8]**

$$Z(s) = \frac{s(s^2+2)(s^2+5)}{(s^2+1)(s^2+3)}$$

b) State the properties of RC driving point impedance function. Also draw the reactance curve and explain it. **[6]**

c) Identify the following impedance function $Z(s) = \frac{s(s+2)(s+4)}{(s+1)(s+3)}$ **[2]**

Q5) a) Explain the concept of zeros of transmission. How the driving point impedance of series on shunt arm elements helps to identify ZOT of ladder network. Explain with proper example find ZOT of following network shown in figure two below. **[8]**

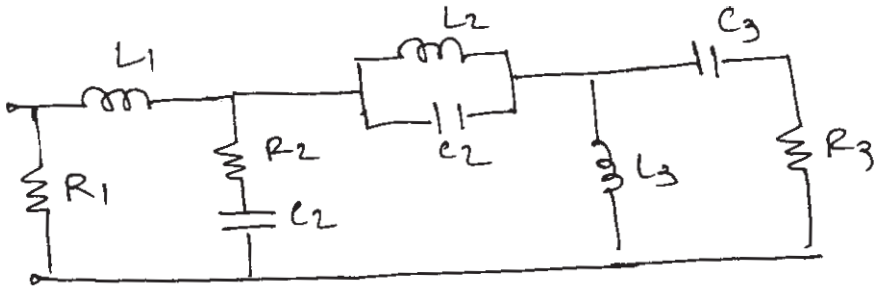


figure 2

b) In the network shown in following figure 3, find voltage ratio transfer function in term of Y. Hence Find Y. Then synthesize Y(s) using Foster II form. **[8]**

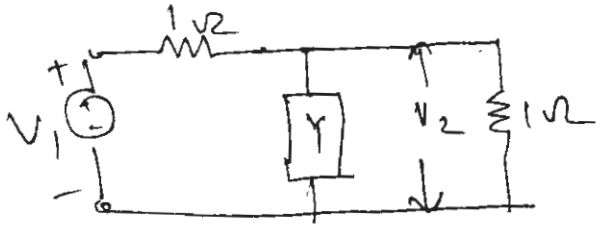


figure 3

OR

Q6) a) Synthesize the voltage ratio $\frac{V_2}{V_1}=\frac{s^2+1}{s^2+2s+1}$ as a constant resistance bridge - T network terminated in 1Ω resistance. **[8]**

b) Synthesize the given all pass function using constant resistance lattice network terminated in 1Ω. **[8]**

$$\frac{V_2}{V_1}=\frac{s^3-3s^2+4s-2}{s^3+3s^2+4s+2}$$

SECTION - II

Q7) a) Explain the procedure to find Chebyshev approximation in detail. **[6]**

b) State the properties of Butterworth approximation. **[4]**

c) Following are the specifications of Butterworth response of minimum order. **[8]**

i) The 3dB cut-off frequency is 1000 rad/sec.

ii) For the pass band extending from $\omega = 0$ to $\omega = 250$ rad/sec, attenuation should not exceed 0.1 dB.

iii) For the stop band extending from $\omega = 2000$ rad/sec, attenuation should not be less than 60dB.

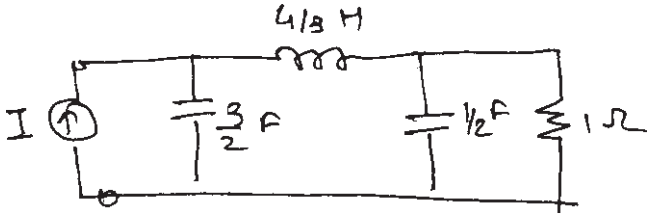
Draw the response and find the required order of the filter.

OR

Q8) a) Write a short note on frequency transformation. **[6]**

b) Compare Butterworth and Chebyshev approximation techniques. **[6]**

c) Normalize third order low pass filter is shown in figure 4 below. Design the corresponding High pass filter with its cut-off frequency $\omega_c = 10^6$ rad/sec. and impedance level of 500Ω. **[6]**



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

i) Impedance scaling.

ii) Frequency scaling.

b) Design a wide band pass filter having $f_L = 400$ Hz and $f_H = 2$kHz. Passband gain is of 4. Assume $C' = 0.01\mu$ F for LPF and $C = 0.05\mu$ F for HPF. Consider equal gain of both stage. **[8]**

OR

Q10)a) Write a short note on **[8]**

i) RC - CR transformation.

ii) Active and passive filter.

b) Synthesize a second order low pass Butterworth filter to have frequency of 159 kHz. Then by using RC - CR transformation realize the high pass filter with some cut-off frequency. **[8]**

Assume R = 1kΩ.

Q11)a) Explain the effect of any four op-amp characteristics on the performance of active filters. **[8]**

b) What is gain sensitivity? Explain briefly the factors affecting gain sensitivity. **[8]**

OR

Q12)a) The input to the inverter is a sine wave of an amplitude 5V. If slew rate of op-amp is 1V/μse, find the frequency at which slew rate limiting occurs. Refer figure.5. **[8]**

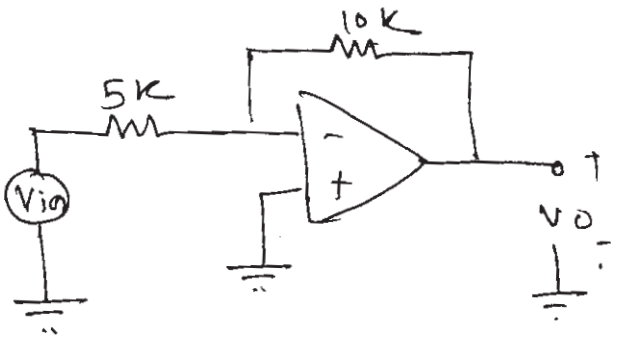


figure 5

b) What is multi element deviation? **[8]**

Define variability and write expression. Using definition of variability derive an expression for per unit change in parameter P due to simultaneous variation in all element.

Total No. of Questions : 12]

SEAT No. :

P1628

[Total No. of Pages : 2

[5058]-74

T.E. (Electronics Engineering)

MICROCONTROLLERS

(2008 Course) (Semester - I) (304204)

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 necessasry.***
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 8051, 8052 and 8031 Microcontroller. **[6]**

OR

Q2) a) Explain architecture of 8 bit microprocessor. **[10]**

b) Compare Harvard and Von Neumann Architecture. **[6]**

Q3) a) Draw & explain the Internal RAM organization of 8051 microcontroller. **[8]**

b) Assuming that ROM space starting at 250H Contain "University". write a program to transfer the bytes in to RAM location at 40H. **[8]**

OR

Q4) a) Draw and Explain the PSW Register and give the application difference between Carry and Overflow flag. **[6]**

b) Explain the following instructions: **[10]**

i) MOVC A, @ A+DPTR

ii) XCH A, Byte

iii) XCHD A,@Ri

iv) SWAP A

v) SUBB A, R0

P.T.O.

Q5) a) Write a program to generate a pulse train of 2 second period on pin P2.4. Use timer 1 in mode 1 and assume XTAL = 22MHz **[8]**

b) Draw an interfacing diagram of 16X2 LCD with 8051 microcontroller. Write an Assembly language program to displaying "INDIA" on first line first position. **[10]**

OR

Q6) a) Draw an interfacing diagram of DAC 0808 with 8051 microcontroller and write an ALP for generating SAW TOOTH wave continuously. **[9]**

b) Draw an interfacing diagram of 4X4 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 CAN bus in detail. **[9]**

b) Write a program for 8051 to transfer letter "B" 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 I2C communication protocol with timing diagram. **[9]**

Q9) a) Explain architecture of PIC 18FXX with suitable block diagram. **[10]**

b) Draw an interface diagram of LED with PORT B of PIC 18FXX and an embedded C program for flashing of LED. **[6]**

OR

Q10)a) Explain the architecture of ATMEGA 32. **[10]**

b) Draw and explain the working register (W) of PIC 18FXX with suitable example. **[6]**

Q11)Explain the Data acquisition system. What are the design consideration of DAS explain with suitable block diagram. **[16]**

OR

Q12)a) Design microcontroller based path follower. **[12]**

b) Explain the working principle of DC Motor. **[4]**

Total No. of Questions : 12]

SEAT No. :

P4951

[Total No. of Pages : 3

[5058]-75

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

POWER ELECTRONICS

(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) ***Figures to the right indicate full marks.***
3) ***Use of logarithmic tables and electronic non-programmable pocket calculator is allowed.***
4) ***Assume suitable data, if necessary***
5) ***Solve Q. 1 or 2, Q. 3 or 4, Q. 5 or 6 from Section I and Q. 7 or 8, Q. 9 or 10, Q. 11 or 12 from Section II***

SECTION - I

Q1) a) Explain working of 3 phase semi controlled converter with circuit diagram and waveforms for RL load. Comment on power factor. Derive equation for DC load voltage and Load current. **[10]**

b) Explain source and load inductance effect on the operation of single phase converter. Derive the equation of average output current 'I_{dc} and load voltage V_L. **[8]**

OR

Q2) a) Single phase dual converter is operated from a 120 V, 50Hz supply and R_L =20 ohms. The circulating inductance is Lc = 60 mH. Delay angles are α_1 = 60 and α_2 =120. Calculate the peak circulating current. **[8]**

b) What is need of triggering? Explain UJT or MSI triggering for three phase controlled converter with suitable diagram. Discuss necessity of isolation in triggering and converter circuit? **[10]**

Q3) a) Explain working of Buck-Boost converter with circuit diagram. Which factors decide buck-boost action, How? **[8]**

b) DC chopper is working at 40 KHz with battery voltage of 200 V. The minimum turn-on and turn-off time of the chopper are 2µsec and 4µSec respectively. Determine the min. and max. dc voltage that the chopper can deliver. **[8]**

P.T.O.

OR

Q4) a) Explain fly-back converter topology for SMPS with circuit diagram, waveform and mathematical analysis. **[8]**

b) Explain operation of four quadrant chopper with waveforms. How this is utilized in reversible drive? **[8]**

Q5) a) Explain operation of SLR half bridge DC/DC converter in low frequency (discontinuous conduction) mode **[8]**

b) Why cycloconverters are required? Explain operation of 6 pulse cycloconverters with diagram and waveforms. **[8]**

OR

Q6) a) What are resonant converters? Why zero current switching is preferred at high voltages? **[8]**

b) Compare Linear, Switched mode and resonant converter with merits and de-merits of each. **[8]**

SECTION - II

Q7) a) Explain working of 3 phase VSI with 180° conduction mode with purely resistive load. Draw circuit diagram and waveforms for load voltage and current **[10]**

b) Explain different voltage control methods in inverters **[8]**

OR

Q8) a) Transistorised inverters are better in performance than thyristorised one. Justify. **[8]**

b) Draw circuit diagram of a Three phase CSI and explain its operation with current waveforms. **[10]**

Q9) a) Compare and contrast different types of cooling techniques **[8]**

b) Why di/dt and dv/dt protection is required? List considerations and steps in designing these protection circuits. **[8]**

OR

Q10) a) Explain Electric welding process with its block diagram and operation **[8]**

b) What is HVDC transmission? List its merits over HVAC transmission. **[8]**

Q11) a) Compare phase angle control (PAC) and symmetric angle control (SAC) methods of controlling load voltages. **[8]**

b) Why energy audit is necessary? Explain the process in steps / flowchart. **[8]**

OR

Q12) a) Compare different power factor improvement schemes **[8]**

b) What are different power line disturbances? How to minimize them? **[8]**

Total No. of Questions : 12]

SEAT No :

P1629

[Total No. of Pages : 3

[5058]-76

T.E. (Electronics)

DRIVES AND CONTROLS

(2008 Course) (304207) (Semester - II)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) What are DC motor performance parameters? Explain in brief. **[6]**

b) Compare chopper fed and Converter fed DC drives? Also explain how to select a power electronics converter for a DC motors drive. **[6]**

c) Explain with circuit diagrams the operation of single phase dual converter fed drive for a separately excited DC motor. **[6]**

OR

Q2) a) Draw and explain the working of three phase full converter feeding a separately excited d.c. motor. Explain with typical waveforms, the operation in continuous and discontinuous armature current modes. **[8]**

b) Explain any two power factor improvement techniques for single phase converters. **[10]**

Q3) a) What is PLL? Explain in brief with block diagram PLL based speed control of a DC motor. Explain the advantages of this control. **[8]**

b) What are the advantages of Microprocessor based drives? With the help of a neat block diagram, explain the operation of Microcontroller based single phase dual converter fed DC drive. **[8]**

OR

P.T.O.

Q4) a) What is the need of braking? Explain in detail dynamic and regenerative braking for DC machines. **[8]**

b) Explain the operation of a closed loop DC motor drive. Also explain closed loop control of DC drives with Transfer function. **[8]**

Q5) a) With the help of neat diagram explain use of CSI for speed control of three phase induction motor. **[8]**

b) Explain Direct and Indirect Vector control of three phase induction motors? **[8]**

OR

Q6) a) Enlist different methods for speed control of induction motor. Explain variable frequency control of 3 phase induction motor using Cycloconverter. **[8]**

b) State and explain various schemes for induction motor speed control by voltage source inverters. **[8]**

SECTION - II

Q7) a) Compare Salient pole motor and Permanent magnet motor. **[4]**

b) Draw and explain block diagram of a self controlled synchronous motor fed from a three phase inverter. **[8]**

c) Draw and explain briefly the torque speed characteristics of synchronous reluctance motor at constant voltage and frequency. **[6]**

OR

Q8) Write Short note on **[18]**

a) Salient pole motor Drive.

b) Cylindrical rotor motor Drive.

c) Synchronous Reluctance motor drive.

Q9) a) With the help of a neat circuit diagram and waveforms explain the operation of 3 phase brushless dc motor drive. Also explain related waveforms. **[8]**

b) Explain the operation of Switched Reluctance motor. Also list the advantages of SRM used as adjustable speed drive. **[8]**

OR

*Q10)*a) What is a stepper motor? Explain various operating modes of stepper motor. Mention various types of stepper motors. Explain any one in details. **[8]**

b) Compare variable reluctance motor with permanent magnet stepper motor. **[4]**

c) Explain the operation of any one stepper motor driver circuit. **[4]**

*Q11)*a) What is Neuro Fuzzy system? Explain Adaptive network based Fuzzy Interface System. **[8]**

b) Explain the operation of Fuzzy logic based Induction motor drive. **[8]**

OR

*Q12)*Write Short notes on (any two) **[16]**

a) Neural network based PWM controller.

b) Application of neural network in drives and control.

c) Traction drives.

x x x

Total No. of Questions :12]

SEAT No. :

P1630

[Total No. of Pages :3

[5058] - 77

T.E. (Electronics)

SENSORS AND INTERFACES

(2008 Pattern) (Semester - II) (304208)

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

Instructions to the candidates:

1) ***Answer any 03 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) ***All questions carry equal marks.***
6) ***Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tobles is allowed.***
7) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Explain principle of flow measurement. Describe pitot tube used for flow measurement. **[8]**

b) Explain pH measurement with neat diagram. **[8]**

OR

Q2) a) Explain selection criterion for choosing a sensor/transducer. **[8]**

b) Explain incremental and absolute rotary encoders for angular velocity measurement. **[8]**

Q3) a) Explain with neat diagram I/P converter and P/I converter. **[8]**

b) Explain any one technique for level and humidity measurement. **[8]**

OR

P.T.O.

Q4) a) A sensor outputs a range of 10 to 200mv, as a variable varies over its range. Develop a signal conditioning circuit using 3 OP Amp instrumentation amplifier so that it becomes 0 to 5 V. **[8]**

b) Write a short note on SMART transmitter. **[8]**

Q5) a) Enlist the features of PIC microcontroller. Draw and explain interface of matrix keyboard with PIC 16 F 84. **[10]**

b) State the different types of ADC and state their specifications. **[8]**

OR

Q6) a) Enlist the features of 8051 series microcontroller. Draw and explain interfacing of following devices with 89C51 microcontroller. **[10]**

i) ADC

ii) Electromechanical relay.

b) Enlist different types of DAC and give performance parameters for selection of DAC. **[8]**

SECTION - II

Q7) a) Write short note on I^2C bus. **[8]**

b) Explain with block diagram computer based data logger. **[8]**

OR

Q8) a) Write short note on foundation field bus. **[8]**

b) Explain HART communication protocol along with its modes of operation. **[8]**

Q9) a) Explain lift system to move the load up and down using pneumatic actuators. **[8]**

b) Explain principle of operation of DC motor. State various types of D.C. motor. **[8]**

OR

Q10)a) Explain with neat diagram pressure control valves. **[8]**

b) Explain following types of valves with neat diagram. **[8]**

i) Spool valve

ii) Poppet valve.

Q11)a) Explain the PLC operating cycle. **[8]**

b) With suitable assumptions draw the block diagram of a bottle filling plant & develope a PLC ladder diagram for the automatic operation of bottle filling plant. **[10]**

OR

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

a) Selection of PLC.

b) Input and Output devices for PLC.

c) Analag input / output for PLC.

Total No. of Questions : 12]

SEAT No. :

P1631

[Total No. of Pages : 3

[5058]- 78

T.E. (Electronics Engineering)

MICROCOMPUTER BASED SYSTEM

(2008 Course) (Semester - II) (304209)

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

Instructions to the candidates:

1) ***Answers the 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 any three questions in 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 and explain 8086 processors architecture in detail. **[8]**

b) Explain different addressing modes in 8086 processors. **[8]**

OR

Q2) a) Draw and explain with suitable interface diagram, the maximum mode operation of 8086 system. **[8]**

b) Draw a flag structure of 8086 processor and explain operation of each flag. **[8]**

Q3) a) Explain following instructions with example **[8]**

i) AAD ii) CBW

iii) IDIV iv) JCXZ

b) Write a 8086 program to find out given string is palindrome or not? **[8]**

OR

Q4) a) Write a 8086 program to search a number in given string of 40 bytes at 8000H location. **[8]**

b) State difference between software and hardware interrupts. Explain the action taken by processor to service these interrupts with example. **[8]**

P.T.O.

Q5) a) Draw and explain the register set of 80386 and explain in brief a typical function of each of the registers. **[8]**

b) What is paging in 80386? How paging is controlled through control registers? **[10]**

OR

Q6) a) What do you mean by descriptor tables? Explain how physical address is calculated using descriptors in GDT and selectors? **[8]**

b) Write a short note on protected mode and virtual mode of 80386. **[10]**

SECTION - II

Q7) a) Draw interfacing diagram and explain communication between centronics printer and parallel port with the help of timing diagram. **[8]**

b) What is branch prediction? How it is implemented in Pentium processors? **[8]**

OR

Q8) a) Describe the interface between USB host and USB device. List the features of USB. **[8]**

b) Write in detail buses found on the Pentium motherboard. **[8]**

Q9) a) Describe the need of Thumb mode of ARM? How ARM and Thumb modes are switch. **[8]**

b) Explain the following instructions for ARM7: **[6]**

i) MLA R0, R1 , R2, R3

ii) ANDS r0, r1, r2,

iii) LDMIA R0!, {R1-R3}

c) What is the significance of PINSEL0 and PINSEL1 registers. **[4]**

OR

Q10)a) Draw and explain ARM Programmers model in detail. **[8]**

b) What are privileged and non-privileged modes of operation of ARM processor? **[6]**

c) What is significance of special purpose registers r13, r14, r15? **[4]**

Q11)Design 16 channel data Acquisition system using 8086 with following specifications **[16]**

a) Sensors temperature - PT 100.

b) LCD Display.

c) Limits Programmable using 4 × 4 keypad.

Draw complete interfacing diagram and flow chart. Explain important design steps required.

OR

Q12)Design an electronic weighing bridge system using 8086 processor: **[16]**

a) Design signal conditioning circuit.

b) Show complete interfacing diagram.

c) Write flowchart for the same.

Total No. of Questions : 12]

SEAT No. :

P1632

[Total No. of Pages : 2

[5058]- 79
T.E. (Electronics)
INDUSTRIAL MANAGEMENT
(2008 Course) (304210) (Semester - II)

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

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, from Section I and Q.7 or Q.8, Q.9 or Q.10, Q.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) ***Neat diagrams must be drawn wherever necessary.***

SECTION - I

Q1) a) Define Management and List out characteristics of management and explain them in detail. **[8]**

b) Explain the principles and levels of management. **[10]**

OR

Q2) a) What is meant by co-operative society? Compare it with partnership organization. **[10]**

b) What is the difference between administration and Management? **[8]**

Q3) a) Define strategy and Explain Mintzberg's 5P's strategy. **[8]**

b) What is the significance of ETOP of an organization? What are the steps to be followed in preparation of ETOP? **[8]**

OR

Q4) a) Explain Porter's Five Forces Model of competition. **[8]**

b) Discuss Generic Competitive Strategies in detail. **[8]**

Q5) a) Explain Juran's and Demings view of quality? Explain different quality management tools in brief. **[8]**

b) Explain TQM in detail. **[8]**

OR

P.T.O.

Q6) a) Explain 5s of house keeping. **[8]**

b) What is Pareto Chart? Explain in detail the significance of Pareto analysis. **[8]**

SECTION - II

Q7) a) Differentiate fixed capital and working capital? What are the factors to be kept in mind while determining capital structure of company. **[10]**

b) What is Cost Benefit Analysis? Discuss limitations and applications of Cost Benefit Analysis. **[8]**

OR

Q8) a) Write short note on CPM and PERT. **[10]**

b) Write short note on capital budgeting. **[8]**

Q9) a) Explain objectives and challenges of HRM. **[8]**

b) Explain human resource information system. **[8]**

OR

Q10)a) What do you mean by recruitment? Explain with different strategies of recruitment. **[8]**

b) Write short note on investment in training programme. **[8]**

Q11)a) Write detailed note on characteristics of information and types of information? **[8]**

b) Explain decision making model in detail. **[8]**

OR

Q12)a) State phases in E-commerce. Give main activities of Ecommerce. **[8]**

b) Describe B2B. State advantages of B2C model. **[8]**

Total No. of Questions : 12]

SEAT No. :

P3755

[Total No. of Pages : 3

[5058] - 8

T.E. (Civil)

ENVIRONMENTAL ENGINEERING - I

(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 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 book.***
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) Estimate forecast population at the end of the year 2041 by geometrical increase method with the help of following data. **[6]**

Year	1971	1981	1991	2001	2011
Population	42,000	54,000	61,000	75,000	89,000

b) Draw a component. Flow diagram of a public water supply scheme and explain each. **[6]**

c) Explain the factors affecting the rate of demand. **[6]**

OR

Q2) a) Explain with a neat sketch river intake and lake intake. **[6]**

b) Write down the Indian standards for the quality of potable water for **[6]**

i) pH ii) Hardness

iii) Sulphates iv) Iron

v) Turbidity vi) Colour

P.T.O.

c) Write a procedure for the determination of pH and alkalinity. **[6]**

Q3) a) A water treatment plant treats 300 m^3/hr of water. Work out the following with respect of flocculator: **[8]**

i) Dimensions of flocculator unit

ii) Power input.

iii) Size and number of paddles.

Assume water temperature = 25°C and $\mu = 0.89 \times 10^{-3}$ N.s/m^2

b) What is coagulation and flocculation? Draw a neat sketch of a flocculator. **[8]**

OR

Q4) a) Explain type I and type II settling. What are the various types of plain sedimentation basins? Explain any one basin type with a neat sketch. **[8]**

b) Write a note on aeration and explain cascade aerator with a neat sketch. **[8]**

Q5) a) Explain tube settling method with neat sketch. **[8]**

b) Define disinfection and list and different types of disinfectants used. State the factors affecting on chlorination. **[8]**

OR

Q6) a) Explain chlorine demand, residual chlorine, super chlorination, dechlorination, rechlorination and post chlorination. **[8]**

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

SECTION - II

Q7) a) Explain demineralization of water by Reverse osmosis method. **[9]**

b) State the principles, working. advantages and disadvantages of water softening by zeolite method. **[9]**

OR

Q8) a) Write a short note on fluoridation and defluoridation. **[9]**

b) State the principles, working, advantages and disadvantages of demineralization of water by ion exchange method. **[9]**

Q9) a) Write a note on Treatment of Water of Swimming Pool. **[8]**

b) Differentiate between continuous and intermittent system of water supply. **[8]**

OR

Q10) a) What do you mean by rain water harvesting? Write a necessity of rain water harvesting system. Draw a sketch of Roof Top Rain. Water Harvesting System for a bungalow. **[8]**

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

Q11) a) Explain working principle of fabric filter with a neat sketch. **[8]**

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

OR

Q12) a) Define : Sound intensity level, Sound power level, Speed of sound and sound intensity. **[8]**

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

Total No. of Questions :12]

SEAT No. :

P1633

[Total No. of Pages :4

[5058] - 80

T.E. (Electronics) (Engineering)

DISCRETE TIME SIGNAL PROCESSING

(2008 Pattern) (Semester - II)

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

Instructions to the candidates:

1) ***Attempt Q.No. 1, or Q. No.2, Q.No.3 or Q.No.4, Q.No.5 or Q.No.6, Q.No.7 or Q.No.8 Q. No. 9 or Q.No. 10, Q.No.11 or Q.No.12.***
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) ***Use of electronic pocket calculator is allowed.***
6) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) i) Define & explain sampling theorm & also explain alising effect. **[4]**

ii) Obtain linear convolution of following sequences. **[4]**

$x(n)=\{3\,4\,2\,1\}$ Corigin is at 4)

$h(n)=\{3\,4\,2\}$ Corigin is at 3)

b) Define impulse response. Explain importance of impulse response. What is stability & causality criteria for LTI or LST systems in terms of unit impulse response. **[8]**

OR

Q2) a) An analog signal $x(t) = \sin(480\pi t) + 3\sin(720\pi t)$ is sampled at 600 times per second. **[8]**

i) What are the frequencies in radians in the resulting DT signal $x(n)$

ii) If $x(n)$ is passed through on ideal DAC, what is reconstructed signal $y(t)$.

b) Determine the homogeneous solution of the system described by **[8]**

$$y(n)-3y(n-1)-4y(n-2)=x(n)$$

P.T.O.

Q3) a) Perform the circular convolution of following two sequences using graphical method. **[8]**

$x_1(n)=\{1 \quad 2 \quad 2 \quad 1\}$

$x_2(n)=\{2 \quad 1 \quad 1 \quad 2\}$

b) Given $x(n)=2^n$ & N = 8. Find X (K) using DIT FFT algorithm. **[10]**

OR

Q4) a) Derive the equation for Energy Density of aperiodic signal. **[6]**

b) Draw butterfly structures of 8 point DIT FFT & 8 point DIF FFT. **[6]**

c) Find the sequence *x* (*n*) for which IDFT X (K) is given by **[6]**

X (K) = $\{3 \quad 2+j \quad 1 \quad 2-j\}$

Q5) a) Compute the inverse z transform of the following **[8]**

i) $x(z)=\dfrac{z^2}{(z-1)(z-0.2)}$

ii) $x(z)=\dfrac{z^{-1}}{1-3z^{-1}}$ .....ROC $|z| < 3$.

b) Prove the following properties of *z* transform . **[8]**

i) Differentiation in *z* domain

ii) Convolution in time domain

OR

Q6) a) A system has unit sample response *h* (*n*) given by **[8]**

$$h(n)=-\frac{1}{4}\delta(n+1)+\frac{1}{2}\delta(n)-\frac{1}{4}\delta(n-1)$$

i) Is the system BIBO stable?

ii) Is the filter causal

iii) Compute the frequency response

b) Find convolution of the signals using *z* transform. **[8]**

$x_1(n)=(0.25)^n u(n-1)$

$x_2(n)=\left[1+0.5^n\right] u(n)$

SECTION - II

Q7) a) Explain in detail frequency sampling method of designing FIR filter. **[8]**

b) Design a low pass digital filter with cut off frequency $w_c = \pi / 2$ using frequency sampling technique for N = 17. **[10]**

OR

Q8) a) Using Bilinear transformation, design a butterworth filter which satisfies the following conditions **[10]**

$$0.8 \le \left|H\left(e^{j\omega}\right)\right| \le 1 \ldots\ldots\ldots\ldots\ldots 0 \le \omega \le 0.2\pi$$

$$\left|H\left(e^{j\omega}\right)\right| \le 0.2 \ldots\ldots\ldots\ldots\ldots 0.6\pi \le \omega \le \pi \ \& \ TS = 1$$

b) Explain Impulse invariance transformation. What is drawback of this transformation & how BLT Overcomes it. Show graphical representation. Explain concept of frequency pre-wrapping. **[8]**

Q9) a) Implement a two stage decimator for the following specifications. **[12]**

Sampling rate of input signal = 20000 Hz

D = 100 Consider $D_1 = 25$ & $D_2 = 4$

Passband = 0 to 40 Hz

Transition band = 40 to 50 Hz

Passband ripple = 0.02

Stopband ripple = 0.002

b) What do you mean by multirate signal processing? What are its applications. **[4]**

OR

Q10)a) Explain the methods of sample rate reduction & increase. **[6]**

b) Design 2 stage interpolator for following system. Consider one of the interpolator factor $I_1 = 2$. **[10]**

Baseband 0 - 20 KHz

I/P sampling frequency 44.1 KHz

O/P sampling frequency 176.4 KHz

Stopband attenuation 50 dB

Passband ripple 0.5 dB

Transition width 2 KHz

Stopband edge frequency 22.05 KHz

Q11)a) Explain the architecture of TMS320C6X in detail. **[8]**

b) Differentiate between general purpose microprocessor & DSP processor. **[8]**

OR

Q12)a) With the help of block schematic explain working of speech recognition system. **[8]**

b) Explain any four addressing modes of DSP process or in detail. **[8]**

Total No. of Questions : 12]

SEAT No. :

P2944

[Total No. of Pages : 3

[5058]-81

T.E (Electronics and Telecommunication)

CONTROL SYSTEMS

(2008 Course) (Semester - I)

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

Instructions to the candidates:

1) *Answer Three 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) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and stem tables is allowed.*
6) *Assume suitable data, if necessary.*

SECTION-I

Q1) a) Explain open loop and closed loop control systems with the help of real life examples **[8]**

b) Obtain the transfer function Y(s)/R(s) using block diagram reduction rules for the system shown in figure No.1 **[8]**

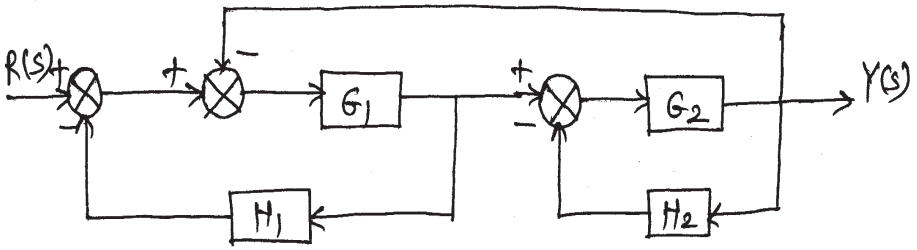


Figure No.1

OR

Q2) a) Obtain F-V and F-I analogy between mechanical and electrical systems. **[8]**

b) Determine the transfer function Y(s)/R(s) using Mason's gain formula for the system shown in figure No.2 **[8]**

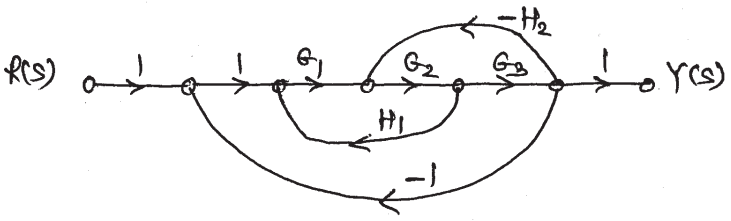


Figure No.2

P.T.O.

Q3) a) Sketch the step response of second order underdamped system and define all time domain specifications **[6]**

b) Draw the root locus of system with open loop transfer function **[10]**

$$G(s)=\frac{K}{s(s+2)(s+5)}, \text{take } H(s)=1$$

OR

Q4) a) for a second order system with closed loop transfer function **[8]**

$$G(s)=\frac{25}{s^2+6s+25}, \text{determine } \xi, w_n, w_d, t_d, t_r, t_p, m_p, t_s.$$

b) Open loop transfer function of unity feedback system is, **[8]**

$$G(s)=\frac{K}{s(s+2)(s^2+s+1)}$$

Determine the range of K for system stability. Also determine the value of K at which the system is marginally stable and the frequency of oscillations at marginal stability

Q5) a) List and define frequency domain specifications **[6]**

b) Sketch the bode plot of the system with open loop transfer function

$G(s)=\frac{10}{s(s+2)(s+5)}$ and determine gain crossover frequency, Phase cross over frequency, gain margin and phase margin. Also comment on stability. **[12]**

OR

Q6) a) Explain how stability is investigated using bode plots. Show the cases of stable, unstable and marginally stable systems. **[6]**

b) Sketch the Nyquist plot of system with open loop transfer function $G(s)=\frac{10}{s(s+2)(s+5)}$. Comment on stability. **[12]**

SECTION-II

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

i) State

ii) State Varibles

iii) State Vector

iv) State space

and list the advantages of state space analysis over classical methods.

b) Determine the state transition matrix for **[8]**

$$A=\begin{bmatrix}0 & 1\\ -2 & -3\end{bmatrix}$$

OR

Q8) a) Investigate for complete state controllability and complete state observability for the system with state space model matrices **[8]**

$$A=\begin{bmatrix}0 & 1 & 0\\ 0 & 0 & 1\\ -6 & -11 & -6\end{bmatrix},B=\begin{bmatrix}0\\ 0\\ 1\end{bmatrix},C=\begin{bmatrix}2 & 5 & 3\end{bmatrix}$$

b) obtain the state model of the system with transfer function $G(S)=\frac{s^2+4s+7}{s^3+5s^2+2s+3}$ in controllable canonical and observable canonical form. **[8]**

Q9) a) Draw the architecture of PLC and explain the function of each block. **[8]**

b) Explain PI and PD controllers with their equations, block diagrams and features. **[8]**

OR

Q10)a) Draw the ladder diagram for bottle filling plant. Consider that the conditions for bottle presence and bottle filled are sensed by using sensors. Also explain the complete operation. **[8]**

b) Write the equations for P,PI and PID controllers and sketch their step responses. **[8]**

Q11)a) Explain model reference adaptive control with the help of block diagram. **[8]**

b) Explain any two applications of control system in process control. **[10]**

OR

Q12)a) Explain the position control system with its block diagram. **[8]**

b) Explain the need of adaptive control. Draw the blok diagram of self tuning regulator and explain its operation. **[10]**

✓ ✓ ✓

Total No. of Questions :12]

SEAT No. :

P1634

[Total No. of Pages :3

[5058] - 82
T.E. (E & TC)
DIGITAL COMMUNICATION
(2008 Course) (Semester - I)

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

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 from Section - I and Q7 or Q8, Q9 or Q10, Q11 or Q12 from section - II.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***

SECTION - I

Q1) a) Draw and explain block diagram of DPCM (Differential PCM), transmitter and receiver. Compare DPCM and DM. **[10]**

b) A multifrequency signal is to be converted to digital form using PCM. The frequencies contained in the signal are 2 kHz, 5 kHz, 8 kHz and 10 kHz. Find the minimum sampling rate. Also find the bandwidth for PCM transmission if the number of bits are 8 per sample. **[8]**

OR

Q2) a) If a TV signal of 4.5 MHz bandwidth is to be transmitted using 8 - bit binary PCM.

Determine: **[10]**

i) Maximum signal to Q-zation noise ratio

ii) The minimum bit rate

iii) Minimum transmission bandwidth needed. State advantages of PCM.

b) With the help of neat block schematic, explain Linear Predictive coding. **[8]**

Q3) a) With the help of block diagram, explain PCM-TDM system. **[8]**

b) With suitable example, explain scrambling and descrambling operation. **[8]**

OR

P.T.O.

Q4) a) For the given data stream 1100101, draw various line codes such as NRZ, RZ, AMI and Manchester. **[8]**

b) Derive power spectral density of NRZ-unipolar signal. **[8]**

Q5) a) What is Bandpass Random process? Derive and sketch PSD of quadrature components of Bandpass Random process. **[8]**

b) If X (t) = A Cos ($\omega_c t + \phi$) is a random process where ϕ is a random variable which is uniformly distributed over $(0, 2\pi)$. Determine Mean and auto correlation function for the same. **[8]**

OR

Q6) a) State and explain properties of auto correlation function. Prove these properties for a random process. **[8]**

b) Explain Gaussian Random Process. Show that mean of a stationary random process is a constant. **[8]**

SECTION - II

Q7) a) Draw the basic block diagram of DPSK system. Draw necessary waveforms for the same. **[10]**

b) For an FSK system, the following data are observed.

Transmitted binary data rate = 2.5×10^6 bits/sec.

Power spectral density of noise = 10^{-20} W/Hz

Amplitude of received signal = 1μ V.

Determine the average probability of symbol error assuming coherent detection. **[8]**

OR

Q8) a) Draw and explain block diagram of GMSK modulation. Compare MSK with FSK. **[10]**

b) Considering the data stream 11100 draw waveforms for QPSK modulation system. **[8]**

Q9) a) With the help of diagram explain Integrator and dump filter. **[8]**

b) For a binary baseband data the optimal receiver -5 mV for 0 and +5 mV for 1, corrupted with white Noise of PSD 10^{-9} W/Hz. With optimum decision threshold what is the probability of error in reception if data rate is 9600 bits/sec? **[8]**

OR

Q10)a) Derive an expression of signal to Noise ratio of Matched filter. **[8]**

b) Explain the working of correlation receiver with neat diagram. **[8]**

Q11)a) Draw and explain with the help of waveforms a fast hopping spread spectrum system. **[8]**

b) In a DSSS CDMA system the data rate fb = 6kbps and the chip rate fc = 12 Mb/s. What is the Jamming margin of an output SNR of 10 dB is required for a Pe = 10^{-5}? Assume a system loss of 1.5 dB. **[8]**

OR

Q12)a) Design a hypothetical experiment to measure path loss Ls at frequencies f_1 = 30 MHz and f_2 = 60 MHz when the distance between the transmitter and receiver is 100 km. Find the effective area of the receiving antenna and calculate the path loss in decibels for each case. **[8]**

b) Explain the terms. **[8]**

i) Cell

ii) Frequency Reuse

iii) Duplexing

iv) Cell splitting

Total No. of Questions : 12]

SEAT No. :

P1635

[Total No. of Pages : 4

[5058]-83

T.E. (Electronics & Telecomm.)

NETWORK SYNTHESIS & FILTER DESIGN

(2008 Course) (Semester - I)

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

Instructions to the candidates:

1) ***Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6 from Section - I and Q7 or Q8, Q9 or Q10, Q11 or Q12 from Section - II.***
2) ***Figures to the right indicate full marks.***

SECTION - I

Q1) a) Define all the network functions and list properties of transfer function. **[6]**

b) For the network shown in figure.1, find the driving point impedance function Z(s). **[6]**

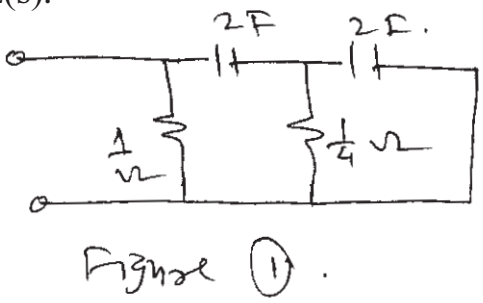


Figure (1).

c) Test whether $F(s)=\frac{s^2+4s+3}{s^2+6s+8}$ is positive real. **[6]**

OR

Q2) a) Explain the effect of location of poles and zeros on time domain behaviour of network. **[6]**

b) Test whether $F(s) = 2s^6 + s^5 + 13s^4 + 6s^3 + 56s^2 + 25s + 25$ is Hurwitz polynomial. **[6]**

c) Find $\frac{V_2(s)}{V_1(s)}$ for the network shown in Fig.2 **[6]**

Figure .2

P.T.O.

Q3) a) List properties of LC driving point impedance function. **[4]**

b) Realize the following driving point functions into Foster I and Cauer I form. **[12]**

i) $$Z(s)=\frac{(s+1)(s+4)}{s(s+2)}$$

ii) $$Z(s)=\frac{(s+1)(s+3)}{(s+2)(s+4)}$$

OR

Q4) a) Identify whether following driving point functions are LC, RC or RL type? Justify answer. **[6]**

i) $$Y(s)=\frac{s(s^2+4)}{(s^2+1)(s^2+5)}$$

ii) $$Z(s)=\frac{s(s+7)}{(s+2)(s+10)}$$

iii) $$Y(s)=\frac{s(s+3)}{(s+2)(s+5)}$$

b) Relize the LC driving point function into both Cauer forms. **[10]**

$$Y(s)=\frac{s(s^2+4)}{4(s^2+1)(s^2+9)}$$

Q5) a) Explain zeros of transmission with suitable example. **[8]**

b) Synthesize the transfer admittance function $Y_{21}(s)=\frac{s^2}{s^3+3s^2+4s+2}$ as a ladder terminated by 1Ω. **[8]**

OR

Q6) a) Realize the voltage ratio function into a constant resistance lattice network terminted in 1Ω **[8]**

$$\frac{V_2}{V_1}=\frac{s^2-s+1}{s^2+s+1}$$

b) Synthesize $\frac{V_2}{V_1}=\frac{s^2+1}{s^2+2s+1}$ using constant resistance bridge T network. **[8]**

SECTION - II

Q7) a) Derive the transfer function of third order low pass Butterworth filter and realize it as a transfer impedance function with cut off frequency 1 rad/s and termination 1Ω. **[10]**

b) Explain frequency and magnitude normalization as applied to filters. **[6]**

OR

Q8) a) Obtain a transfer function H(s) that exhibits the Chebyshev response with not more than 1 dB ripple in pass band and attenuation of 20 dB at ω = 2 rad/sec. **[10]**

b) Convert a following low pass filter into high pass with $\omega_c = 10^6$ rad/sec and $R_L = 500\Omega$. **[6]**

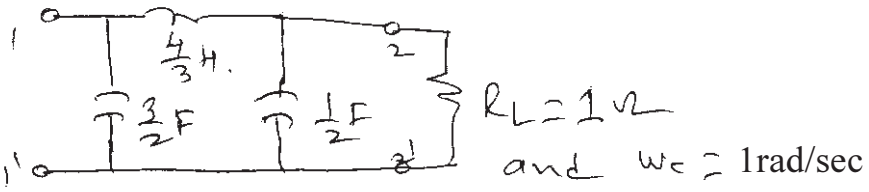


Figure (3).

Q9) a) Synthesize the transfer function with the practical component values in the circuit shown in Fig.4. $T(s)=\frac{20000}{s^2+100s+10000}$ **[8]**

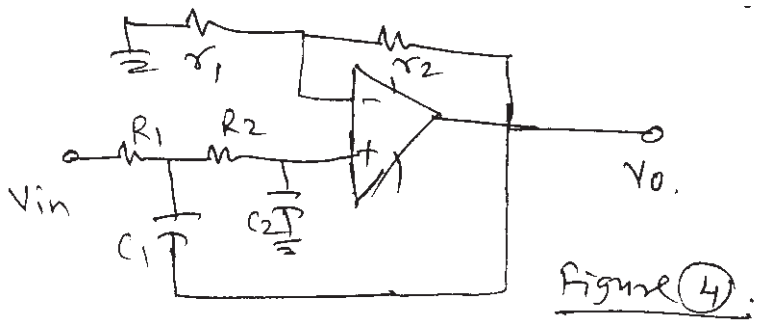


Figure (4).

b) Explain the different biquad topologies used in active filter design and list its advantages. **[8]**

OR

Q10)a) Synthesize a second order low pass Butterworth filter to have a cut - off frequency 159.15 Hz. **[8]**

b) Write short note on FDNR and Gyrator. **[8]**

Q11)a) Define sensitivity and verify the properties.

i) $S_x^{y+c} = \frac{y}{y+c} S_x^y$

ii) $S_x^{p^n} = n S_x^p$ **[8]**

b) Discuss the effect of op-amp parameters: slew rate and dynamic range limiting on filter response. **[6]**

c) Define CMRR of op-amp and its significance in active filters. **[4]**

OR

Q12)a) For the circuit shown in figure.5, find the transfer function and also find sensitivities of K, ω_P, Q_P, ω_2 and Q_2 in terms of components. **[10]**

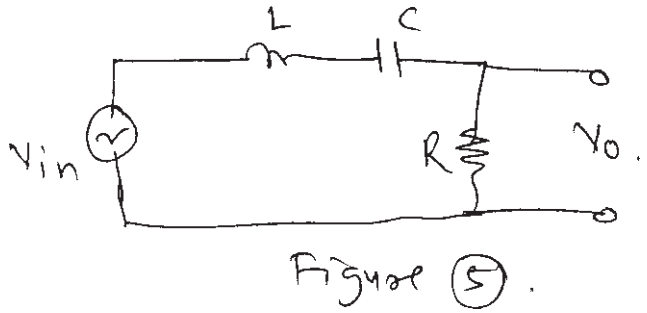


Figure (5).

b) Define gain sensitivity and explain the factors affecting gain sensitivity. **[8]**

Total No. of Questions :12]

SEAT No. :

P1636

[Total No. of Pages :4

[5058] - 84

T.E. (E & Tc)

DIGITAL SIGNAL PROCESSING

(2008 Course) (Semester - I) (304185)

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) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) What are the advantages of DSP over ASP. **[4]**

b) Consider the analog signal $X_a(t) = 3\cos 2000\Pi t + 5\sin 6000\ \Pi t + 10\cos 12000\Pi t$. **[4]**

i) What is the Nyquist rate for this signal?

ii) If Sampling rate F_s = 5000 samples/s. What is the discrete - time signal obtained after sampling?

c) Comment on stability and causality of linear Time-Invariant Systems. **[10]**

OR

Q2) a) Determine the impulse and the unit step response of the systems described by the difference equation. **[8]**

$$x(n) = 0.6y(n-1) - 0.08y(n-2) + x(n)$$

b) State and prove the sampling theorem. **[6]**

c) Determine the cross correlation of the following sequence **[4]**

$$x(n) = \underset{\uparrow}{\{1,\ 2,\ 1,\ 1\}}, y(n) = \underset{\uparrow}{\{1,\ 1,\ 2,\ 1\}}$$

P.T.O.

Q3) a) State and prove any six properties of DFT **[6]**

b) Compute 4 point DFT of the following sequence **[6]**

$$x(n)=\underset{\uparrow}{\{0,\quad 2,\quad 4,\quad 6\}}$$

c) State the relationship between DFT and Z transform. **[4]**

OR

Q4) a) How many complex additions and complex multiplications are required for direct Computation of N point DFT **[4]**

b) Compute inverse DFT (IDFT) of the following sequence. **[4]**

$$X(K)=\underset{\uparrow}{\{3,\quad 2+J,\quad 1,\quad 2-J\}}$$

c) Determine X (K) by using DIT FFT algorithm for N = 8. **[8]**

$$x(n)=\underset{\uparrow}{\{1\,2\,3\,4\,4\,3\,2\,1\}}$$

Q5) a) State and prove any Four properties of Z transform. **[4]**

b) Determine the Z transform and draw ROC of the following sequences. **[6]**

i) $x(n)=a^{n}u(n)$

ii) $x(n)=-b^{n}u(-n-1)$

c) Determine the pole zero plot for the system describe by difference equation **[6]**

$$y(n)-3/4\,y(n-1)+1/8\,y(n-2)=x(n)-x(n-1)$$

OR

Q6) a) State any four important properties of ROC. **[4]**

b) Determine the convolution of the following sequences by using Z transform **[8]**

i) $x(n) = \{2, 1, 0, 0.5\}$ and $h(n) = \{2, 2, 1, 1\}$

ii) $x(n) = \{4, -2, 1\}$ and $h(n) = \{1, 1, 1, 1, 1\}$

c) By using partial fraction method find the Inverse Z transform of **[4]**

$$X(z) = \frac{z^3}{(z+1)(z-1)^2}$$

SECTION - II

Q7) a) A IIR low pass filter is required to the following specifications: **[10]**

Pass band ripple: $\leq$ 1dB

Pass band edge: 1.2 kHz

Stop band attenuation: $\geq$ 40 dB

Stop band edge: 2.5 kHz

Sample rate: 8 kHz

The filter is to be designed using bilinear transformation. Find the order, cut off frequency and pole locations in case of Butterworth filter.

b) Compare FIR filter with IIR filter. **[6]**

OR

Q8) a) A digital filter has specifications as: **[6]**

Passband frequency = $w_p = 0.2\ \Pi$, Stopband frequency = $w_s = 0.3\ \Pi$

What are the corresponding specifications for pass band and stop frequencies in analog domain if

i) Impulse Invariance Technique is used for designing.

ii) Bilinear Transformation Method is used for designing.

b) Explain the Gibb's Phenomenon **[5]**

c) Show that FIR filters are inherently stable. **[5]**

Q9) a) Explain the process of Upsampling with example. Derive the expression for interpolated output. **[8]**

b) Explain application of DAC in compact Hi - Fi system. **[8]**

OR

Q10)a) Explain the sampling rate conversion by non-integer factors. **[8]**

b) Draw and explain polyphase structure of an interpolator. **[8]**

Q11)a) Explain the necessity of **[8]**

i) MAC unit

ii) Barrel shifter in Digital Signal Processors.

b) Draw the architectural block diagram and explain the desirable features of TMS 320C67XX series DSP processor. **[10]**

OR

Q12)a) Explain the application of DSP processors in speech processing. **[8]**

b) Compare DSP processor with conventional microprocessor. What is use of DAG1 and DAG2? **[10]**

Total No. of Questions :12]

SEAT No. :

P1637

[Total No. of Pages :3

[5058] - 85

T.E. (E & TC)

MICROCONTROLLERS AND APPLICATIONS

(2008 Pattern) (Semester - I)

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

Instructions to candidates:

1) ***Answer Q.1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10, 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) ***Assume suitable data if required.***

SECTION - I

Q1) a) Explain criteria for choosing a microcontroller for particular system design with example. **[4]**

b) Differentiate Harvard and Van - Neumann architecture. **[8]**

c) Elaborate how performance of any microcontroller is evaluated. **[4]**

OR

Q2) a) Compare CISC and RISC. **[8]**

b) Explain following with short notes (any two) **[8]**

i) Watch dog timer

ii) Family members of 8051

iii) Resources of 8051 series microcontrollers

Q3) a) For 16 k byte of External EEPROM interfacing to 8051 microcontroller find out address range. After calculations draw interfacing diagram with proper explainations. **[8]**

b) Explain internal RAM structure of 8051. **[8]**

OR

P.T.O.

Q4) a) Explain mode 0 and mode 1 of timer in 8051 How modes are selected for timers. **[8]**

b) To Transmit letter 'y' to serial port of 8051 at '9600' baud rate write program with justifications. Assume crystal frequency of 11.0592 MHz. **[8]**

Q5) a) Explain how instructions are classified with proper examples for 8051 microcontrollers. **[10]**

b) Write ALP for addition of 'N' numbers, and finding out average for 8051 microcontrollers. **[8]**

OR

Q6) a) Explain the following terms: **[8]**

i) Emulator

ii) Logic Analyser

b) State and explain various addressing modes for 8051 with examples. **[8]**

c) Explain any one instruction. **[2]**

i) DJNZ

ii) MOVC

SECTION - II

Q7) a) Explain the operation of I^2C bus with start, stop conditions. **[8]**

b) For 4*4 hex keypad, write ALP for reading key and storing ASCII value into RAM. **[8]**

OR

Q8) a) Explain the operation of SPI bus. **[8]**

b) Draw interfacing diagram of Interfacing LCD to 8051. Write ALP for displaying "UNIVERSE" on 2^{nd} line and 3^{rd} column. **[8]**

Q9) a) For PIC 18F, family write a program to toggle all bits of port A continiously, with 240 ms delay. **[8]**

b) Explain status registor of PIC 18F458. Explain all features of PIC 18F458. **[8]**

OR

Q10)a) Draw and explain concept of pipeline employed in PIC microcontroller. What are advantages of pipelining. Also explain 'BOR' concept for PIC. **[8]**

b) Draw and explain the memory organisation for PIC. **[8]**

Q11) With algorithm and flow chart design a general Data Acquisition system using 8051 or PIC 18 for parameters like temperature, pressure, humidity. Design appropriate signal conditioning circuits. Display the output parameters on appropriate output devices. Draw complete block diagram, and write program. **[18]**

OR

Q12) Design a system with ROBOTIC movements in clockwise directions and anticlockwise directions. The ROBOTIC movements should be clockwise when temperature of the selected channel is below threshold. If the temperature increases set point the ROBOTIC movements should be anticlockwise. Draw complete block diagram flow chart and also write program. **[18]**

Total No. of Questions : 12]

SEAT No. :

P1638

[Total No. of Pages : 3

[5058]-86

T.E.(Electronics & Telecommunication)

SIGNAL CODING & ESTIMATION THEORY

(2008 Course) (304187) (Semester -II)

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

Instructions to the candidates:

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

SECTION-I

Q1) a) A discrete memoryless source has five symbols x_1,x_2,x_3,x_4 and x_5 with probabilities $p(x_1)=0.4$, $p(x_2)=0.19$, $p(x_3)=0.16$, $p(x_4)=0.15$ and $p(x_5)=0.1$. Construct the Shannon-fano code and calculate the code efficiency. **[8]**

b) Show that mutual information is always positive. Also calculate H(X), H(Y), H(X,Y), H(X/Y), H(Y/X) and I(X,Y) for a channel and channel matrix is p(x,y). **[10]**

$$P[X,Y] = \begin{bmatrix} 0.2 & 0.1 & 0 \\ 0.2 & 0 & 0.3 \\ 0 & 0.1 & 0.1 \end{bmatrix}$$

OR

Q2) a) Determine the Lempel ziv code for the following bit stream.
01111001111100001010110
Recover the original sequence from the encoded stream. **[8]**

b) A DMS has three symbols x_1,x_2,x_3 with probabilities 0.8,0.1,0.1 respectively. Determine the Huffman code for second order extension. Calculate average codeword length & efficiency of code. **[10]**

Q3) a) Explain Discrete cosine transform and its application. **[8]**

b) For a systematic linear block code, the three parity check bits C_4,C_5,C_6 are given by

$C_4=d_1 \oplus d_2 \oplus d_4$

$C_5=d_1 \oplus d_2 \oplus d_3$

$C_6=d_1 \oplus d_3 \oplus d_4$

\

P.T.O.

i) Calculate dmin.
ii) Justify this code is perfect or not.
iii) Calculate transmitted codevector for message bit 0101.
iv) Calculate syndrome for received codevector 1101110. **[8]**

OR

Q4) a) An ideal communication system with average power limitation and WGN has the bandwidth of 10MHz and S/N ratio of 15.

i) Determine channel capacity

ii) If S/N ratio dropped to 10 what bandwidth is required for the same capacity? **[8]**

b) Write short notes on any two of the following.

i) Golay code.

ii) JPEG.

iii) Shannon's Third Theorem. **[8]**

Q5) a) Determine the code tree and trellis diagram for the convolution encoder as shown in figure given below (Fig.1) **[8]**

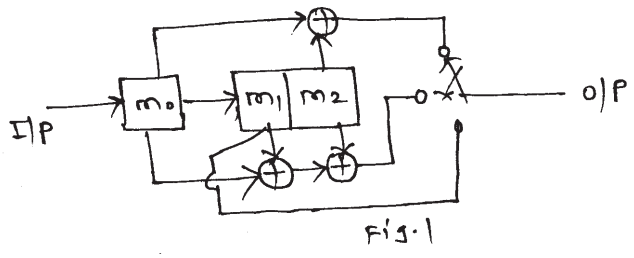


Fig.1

b) Explain Trellis coded Modulation in detail. **[8]**

OR

Q6) a) For the convolution shown in fig 2. Use viterbi algorithm to decode the encoded sequence 00, 01, 00, 10, 00, 00. **[8]**

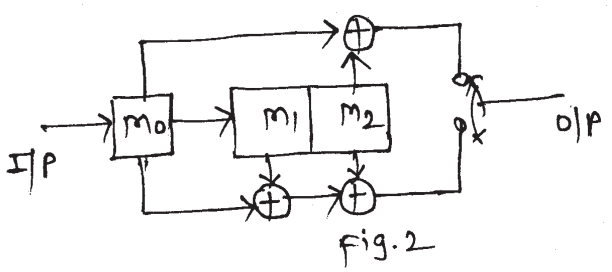


Fig.2

b) Explain FEC and ARQ system. **[8]**

SECTION-II

Q7) a) For the (31,21) Reed-Soloman code **[8]**

i) How many bits are there in a symbol of the code?

ii) What is block lenght in bits?

iii) What is minimum distance of the code?

iv) How many symbols in error can the code correct

b) Consider the BCH (15,5) triple error correcting code with the generator polynomial $g(x)=x^{10}+x^8+x^5+x^4+x^2+x+1$. Find the error using Gorenstein Zierler algorithm in received Polynomial x^4+x^2. **[10]**

OR

Q8) a) Design a (15,9) RS code. Find systematic code whose message polynomial is given as $\alpha^2 x^2+1$ **[10]**

b) Explain RSA algorithm with example take two prime numbers 3&11. **[8]**

Q9) a) Write short note on minimum variable unbiased estimator. **[8]**

b) Find maximum likelihood estimator of power of WGN with variance σ^2 unknown with hypothesis H_0 and H_1 with k no. of samples producing zero and m output respectively. **[8]**

OR

Q10)a) Let {y[0], y[1], y[2],.....y[N-1]} be a random sample of exponential random variable y with unknown parameter λ. Assume that λ is itself to exponential random variable with parameter α. Find Bayes estimator of λ. **[8]**

b) Explain least square estimation & kalman filters. **[8]**

Q11)a) Explain M-ary hypothesis testing. **[8]**

b) For a binary decision problem the PDFs are given as $p(y/H_0)=1/2\ e^{-|y|}$ and $p(y/H_1)=e^{-|2y|}$. The costs associated with decision are $C_{00}=C_{11}=0$ and$C_{01}=1$, $C_{10}=2$ and $P(H_1)=0.75$. Determine the Bayes decision rule. **[8]**

OR

Q12)a) Explain Generalized Likelihood Ratio Tests (GLRTs) and its one application in detail. **[8]**

b) Give MAP criteria and explain multiple hypothesis for three regions H0, H1, H2. Hence give the Criterion to select the hypothesis. **[8]**

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Total No. of Questions : 12]

SEAT No. :

P1639

[Total No. of Pages :2

[5058] - 87
T.E. (E & T C)
SYSTEM PROGRAMMING & OPERATING SYSTEM
(2008 Course) (304188) (Semester - II)

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

Instructions to the candidates :

1) ***Answers to the two sections should be written in separate answer-books.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume suitable data if necessary.***
4) ***Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10, Q11 or Q12.***

SECTION - I

Q1) a) Define the term Language Processor and explain various language processing activities. **[8]**

b) Enlist the different types of errors that are handled by PASS-I and PASS-II of two pass assembler. **[6]**

c) Explain ORIGIN and EQU statement. **[4]**

OR

Q2) a) What is assembler? Explain two pass assembler with data structure. **[8]**

b) Explain Syntax analysis, Lexical analysis and semantic Analysis with example. **[6]**

c) Explain Allocation data structure used in language processing. **[4]**

Q3) a) Explain design of two pass macro processor. **[8]**

b) What are the differences between macros and functions. **[4]**

c) Compare Interpreter and Compiler. **[4]**

OR

Q4) a) Enlist different types of MACRO parameters. Explain them with suitable example. **[8]**

b) Explain phases of compiler with example. **[8]**

P.T.O.

Q5) a) Explain implementation of MS DOS linker in detail. **[8]**

b) List down the components of a programming environment. Explain any two components in detail. **[8]**

OR

Q6) a) What are loaders? List the different types of loader schemes. Explain Compile and GO-loader scheme. **[8]**

b) Explain different software tools used for program development. **[8]**

SECTION - II

Q7) a) Explain any 2 process scheduling algorithms with examples, advantages and disadvantages of each of them. **[10]**

b) List and explain in brief the system calls. **[8]**

OR

Q8) a) Explain deadlock prevention and avoidance. Explain the Bankers algo for deadlock avoidance. **[10]**

b) Define process. Draw and explain the process state diagram. **[8]**

Q9) a) Why is page replacement required? List and explain any 1 Page replacement algorithm . **[8]**

b) Explain internal and external fragmentation. Explain the techniques used to reduce them. **[8]**

OR

Q10)a) Explain paging, segmentation and demand paging in brief. **[8]**

b) Consider the following page reference string. **[8]**
1,2,3,4,1,5,6,3,2,3,1,4,5,6,4.
The number of page frames =4. Calculate page faults and the hit ratio for first in first out page replacement algorithm.

Q11)a) Draw and explain file structures. Explain types of file access. **[8]**

b) Explain how the interrupt processing is done for input and output. **[8]**

OR

Q12)a) Explain in brief storage devices DVD and RAID disk. **[8]**

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

i) Disc space management

ii) Power management

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Total No. of Questions : 12]

SEAT No. :

P1640

[Total No. of Pages : 2

[5058]-88
T.E. (E & TC)
COMPUTER ORGANISATION AND ARCHITECTURE
(2008 Pattern) (Semester - II)

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

Instructions to the candidates:

1) ***Answers to the two Sections should be written in separate 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 2, Q. 3 or 4, Q. 5 or Q.6 from Section I and Q.7 or 8, Q 9 or Q.10, Q11 or 12 from Section II.***

SECTION - I

Q1) a) Using Booth's algorithm multiply the following multiplicand = +22, multiplier = –5. **[10]**

b) Draw and explain advanced structure of Von Neumann machine. **[8]**

OR

Q2) a) Draw flowchart for Booth's algorithm for 2's compliment multiplication and explain it. **[10]**

b) Draw and explain the structure of basis sequential ALU. **[8]**

Q3) a) Explain sequence of control signals for memory read operation. **[8]**

b) Compare Hardwired and micro programmed control. **[8]**

OR

Q4) a) Explain sequence of control signal for memory write operation. **[8]**

b) Explain the concept of micro programmed control unit. State its advantages and disadvantages. **[8]**

Q5) a) Draw and explain structure of memory mapped I/O and I/O mapped I/O. **[8]**

b) Compare associative and set associative cache mapping. **[8]**

OR

P.T.O.

Q6) a) Explain interrupt driven I/O in detail. **[8]**

b) Explain memory hierarchy in detail. **[8]**

SECTION - II

Q7) a) State the features of 8086 processor. **[8]**

b) State the function of all registers of 8086 microprocessor. **[10]**

OR

Q8) a) Explain the function of following pins of 8086 microprocessor. **[8]**

i) M / IO

ii) LOCK

iii) DT / R

iv) INTR

b) Explain instruction Queue of 8086. Explain pipelining and state its advantages. **[10]**

Q9) a) What is pipelining of 80386? Explain how physical address is generated using paging. **[8]**

b) What do you mean by privilege levels in 80386? Explain how privilege levels are changed? **[8]**

OR

Q10)a) Draw and explain in detail the flag register format of 80386. **[8]**

b) Explain global, interrupt and local description tables. **[8]**

Q11)a) Explain Flynn's classification. **[8]**

b) Write short note on Arbitration Technique. **[8]**

OR

Q12)a) Write short note on parallel processing. **[8]**

b) Draw format of program status register of ARM processor and explain the significance of each bit in it. **[8]**

Total No. of Questions :12]

SEAT No. :

P1641

[Total No. of Pages :3

[5058]-89
T.E. (E&TC)
INDUSTRIAL MANAGEMENT
(2008 Course) (304190) (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.***

SECTION-I

Q1) a) Elaborate the contributions of F.W. Taylor towards scientific management. **[8]**

b) Correlate between management levels and managerial skills with suitable examples. **[8]**

OR

Q2) a) What are the contributions of Elton Mayo in developing new management principles? **[8]**

b) Compare between a traditional organizaion and a modern organization. **[8]**

Q3) a) What is meant by Environmental Threat and Opportunity Profile (ETOP)? Explain with an example. **[8]**

b) Explain Porter's five forces model of competition. **[8]**

OR

Q4) a) Prepare the SWOT analysis matrix for a hypothetical organization. **[8]**

b) Sketch the GE nine cell matrix and explain the three different zones. **[8]**

P.T.O.

Q5) a) Explain PDCA cycle in quality management. **[8]**

b) Explain the importance of ISO 27001:2005 information security management system standards in detail with suitable example on application of the same. **[10]**

OR

Q6) a) Explain Pareto analysis in quality management. **[8]**

b) What are six sigma and 5s quality management standards? Explain. **[10]**

SECTION-II

Q7) a) What is CVP graph? Where it is used? Explain. **[8]**

b) What is CPM? How it is different from PERT? **[8]**

OR

Q8) a) What is a project network? Explain the terms Dummy activities and Concurrent activities with respect to the same. **[8]**

b) Explain the different techniques for capital budgeting. **[8]**

Q9) a) Explain EOQ model and EOQ model with discounts. Give suitable example. **[8]**

b) What is Kamban? Where it is used? **[8]**

OR

Q10) a) Explain the concept of supply chain management wih suitable example. **[8]**

b) What is Inventory management? Explain various costs associated with Inventory. **[8]**

Q11)a) What is information system? Differentiate between information system and MIS. **[8]**

b) What are the components of a DSS? Explain the function of each one. **[10]**

OR

Q12) a) What is meant by e-commerce? What are its different types? Explain any one in detail. **[8]**

b) Explain various sales and accounting activities supported by MIS. **[10]**

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Total No. of Questions : 8]

SEAT No. :

P2935

[Total No. of Pages : 7

[5058]-9
T.E. (Civil Engineering)
STRUCTURAL DESIGN - II
(2008 Course) (301008) (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 calculator is allowed.***
7) ***Mere reproduction from IS code as answer, will not be given full credit.***
8) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Draw strain and stress distribution diagrams with all parameters for the design of RCC section of flexural member using LSM. **[5]**

b) Draw stress strain curves for concrete in LSM and explain stress and strain values associated with the curves. **[5]**

c) A rectangular beam section, 230 mm wide and effective depth 415mm is reinforced with 4 bars of 20mm diameter in the tensile zone and 2 bars of 20mm in the compression zone. The effective span of the beam is 5m. Determine moment of resistance of the section and max. load that the beam can carry in addition to its self weight. Use WSM. Use M20 grade of concrete and Fe 415 grade of steel. **[15]**

OR

Q2) a) Design a cantilever slab for effective span of 1.5m subjected to floor finish of $2kN/m^2$ and live load $3kN/m^2$. use Concrete of grade M20 and Fe 500 reinforcement. Draw details of reinforcement. (Use LSM) **[8]**

b) Explain the terms bond stress and development length. Calculate development length for 16mm diameter bar in compression and tension by both methods (WSM and LSM). Use M30 concrete and Fe 500 steel. **[7]**

P.T.O.

c) A Calculate the moment of resistance by LSM for flanged beam section detailed as below **[10]**

i) Width of rib = 230 mm

ii) Effective flange width = 1600mm

iii) Thickness of flange = 125mm

iv) Effective depth = 565 mm

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

vi) Use M20 grade of concrete and Fe 500 grade of steel.

Q3) Design floor slabs S7 and S8 only for flexure and torsion. Refer the centerline structural plan given in Figure 1. Width of all beams is 230 mm. Consider live load = 4kN/m^2, Floor finish = 1.5 kN/m^2. **[25]**

Use M25 grade of concrete and Fe 500 grade of steel. Draw neat sketches showing details of main reinforcement and torsional reinforcement in two way slab.

OR

Q4) Design flight I and II of open well staircase for following data: **[25]**

Floor to floor height : 3.325m

Riser = 175 mm, Tread = 250 mm,

No. of risers:

Flight I : 7 nos.

Flight II: 5 nos.

Flight III: 7 nos.

Material M20 & Fe 500.

Refer the centerline structural plan given in Figure 1, Width of all beams is 230mm. Draw the reinforcement details in sectional elevation for both flights.

SECTION - II

Q5) Design a continuous beam ABCD for flexure and shear using IS Code coefficients. AB = BC = CD = 4.2m. The beam supports 120mm slab on both sides. The beam carries dead load of 20 kN/m (including its self-weight) and live load of 10 kN/m. Take material M30 and Fe500. Show the reinforcement detail in longitudinal section and cross-section at continuous support and at mid span. **[25]**

OR

Q6) A continuous R.C.C. floor beam B3 - B4 (Refer Fig.1) is simply supported at end supports and continuous through column C9. Consider live load on slab 2kN/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 all exterior beams. Floor to floor height is 3.23m. 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 M25, Fe 500 reinforcement.

Q7) A centerline plan of a G + 2 building is shown in figure 1. Design an axially loaded short column C10 for ground floor only. Also design isolated footing for column C10. Use following details: **[25]**

a) Floor to Floor height = 3.5m

b) Height of column below plinth = 2.1m

c) Live load on all slabs = 3 kN/m^2

d) Floor Finish Load = 1.2 kN/m^2

e) Water Proofing Load on roof slab = 1.5 kN/m^2

f) Wall thickness = 120 mm (Internal)

g) Slab thickness = 125 mm

h) Size of beams = 230 × 450 mm

i) Safe bearing capacity of soil = 230 kN/m^2

Material M 25 and Fe 415 used. Show detailed load and design calculations.

OR

Q8) Design a bi-axial short column by limit state method with material M20 and Fe 500 to carry a working load of 1050 kN. Working moment of 80 kN-m about major axis bisecting the depth of column and 25 kN-m about minor axis bisecting the width of column. The unsupported length of column is 4.2m. The column is fixed at both ends. Also design the footing for this column considering axial load and moment about major axis only. Take SBC = 280 kN/m^2. Show detailed design calculations and reinforcement details in plan and sectional elevation. **[25]**

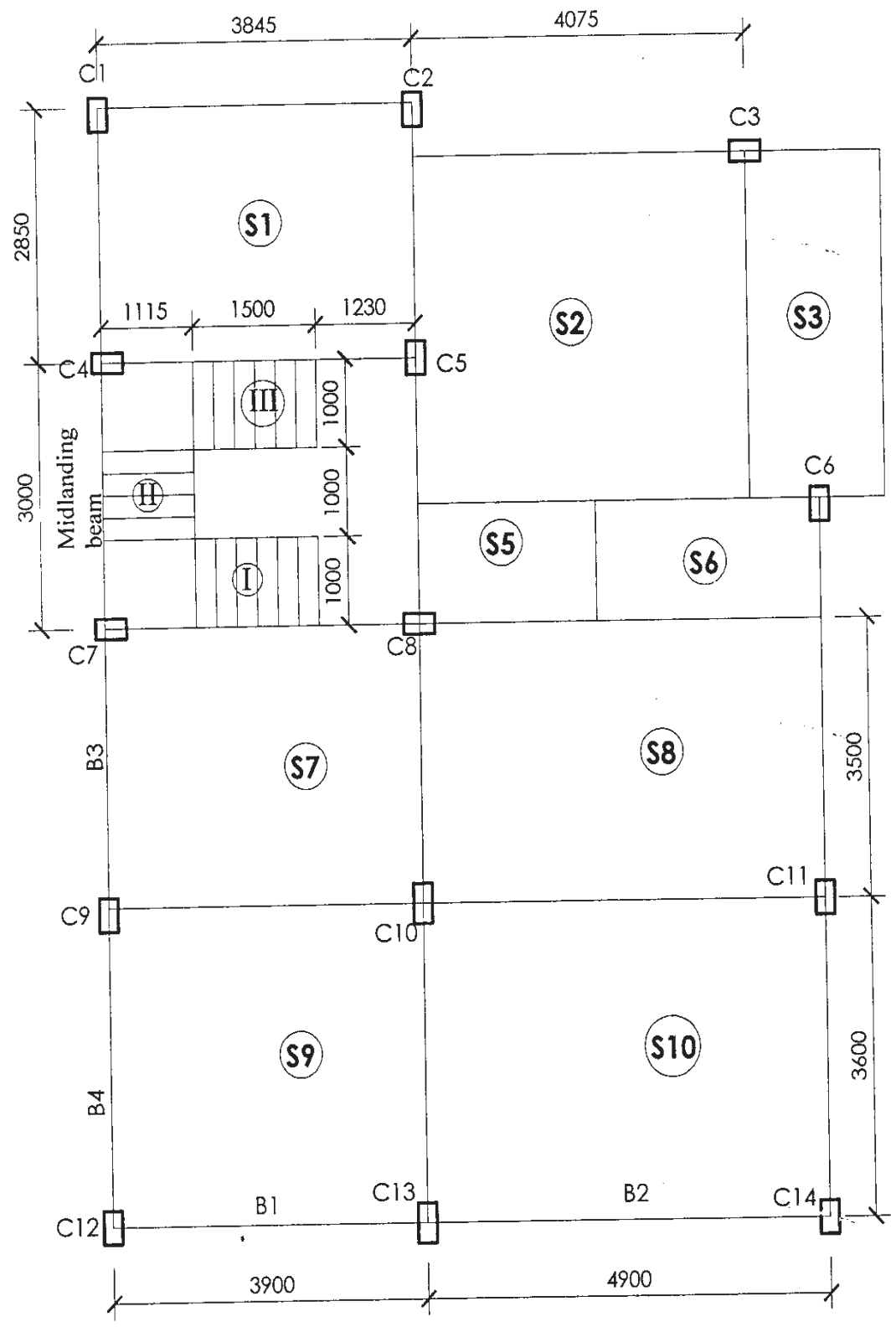

3845
4075
C1
C2
C3
2850
S1
S2
S3
1115
1500
1230
C4
C5
III
1000
Midlanding beam
II
1000
3000
C6
S5
S6
I
1000
C7
C8
B3
S7
S8
3500
C11
C9
C10
S9
S10
3600
B4
C12
B1
C13
B2
C14
3900
4900

FIG.1 (Q.3, Q.6 & Q.7)

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

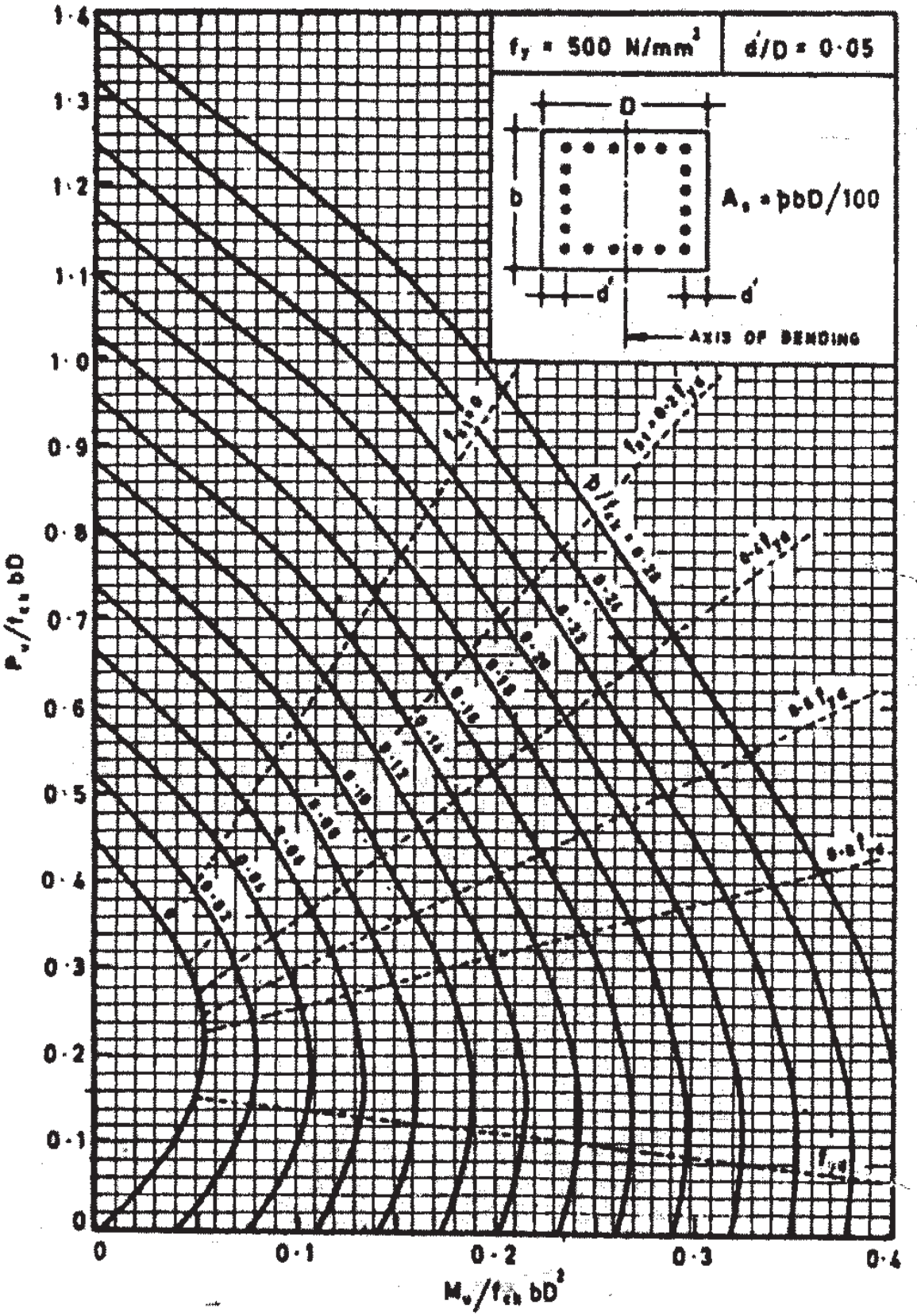


Chart - 14 Interaction Diagram for Combined Bending and Compression Rectangular Section - Equal Reinforcement on All Sides.

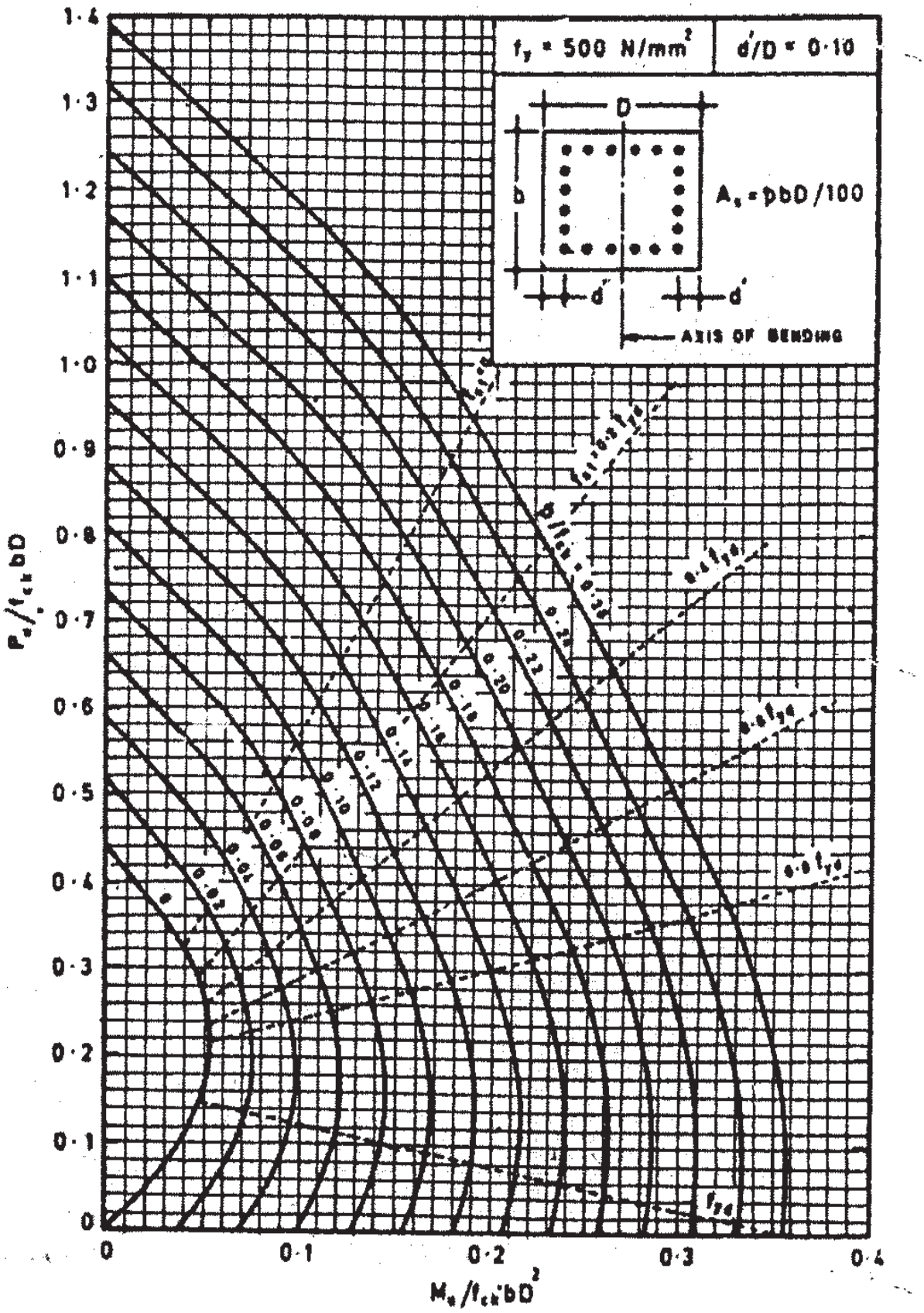
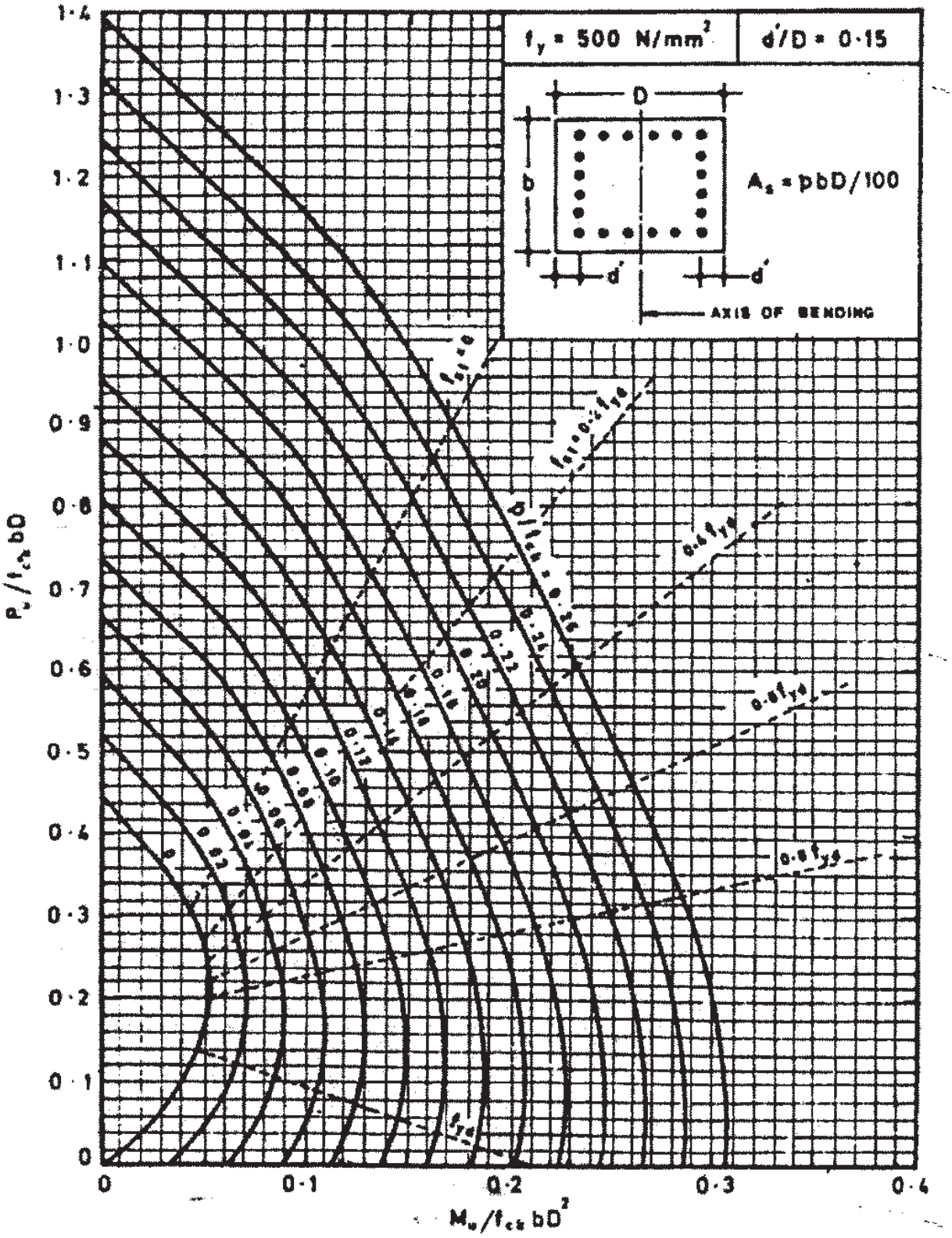


Chart - 15 Interaction Diagram for Combined Bending and Compression Rectangular Section - Equal Reinforcement on All Sides.



Total No. of Questions :12]

SEAT No. :

P1642

[Total No. of Pages :4

[5058]-90

T.E. (Electronics and Telecommunication)

WAVE THEORY AND ANTENNAS

(2008 Course) (Semester - II)

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

Instructions to the candidates:

1) ***Answers to the two sections should be written in separate books.***
2) ***Neat diagrams must be drawn whenever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data, if necessary.***

SECTION-I

Q1) a) A normally incident E filed has amplitude 1V/m in the free space just outside of sea water. For a frequency of 30MHz at what depth will be amplitude of E be 1m V/m? **[8]**

b) What is pointing vector? What is its significance? Derive an expression for pointing vector? **[8]**

OR

Q2) a) State Maxwell's field equation with their significance and derive the wave equation for lossless dielectric medium. **[8]**

b) What do you meant by uniform plane wave? Explain the transverse electromagnetic wave. **[8]**

Q3) a) Derive the fundamental equation for free space propagation and explain its parameter. **[8]**

b) For a flat earth assume that at 400 km reflection takes place. The maximum density of the ionosphere corresponds to a refractive index of 0.9 at 10MHz. Calculate range for which f_{MUF} = 10MHz. **[8]**

OR

P.T.O.

Q4) a) Explain the effect of earth's magnetic field on ionospheric propagation. **[8]**

b) Explain in detail the structure of atmosphere. **[8]**

Q5) a) A lossless resonant $\lambda/2$ dipole antenna with input impedance of 73 Ω is to be connected to a transmission line whose characteristics impedance is 50 Ω. Assuming that the pattern of the antenna is given approximately by $U=B\sin^3\theta$. Find the overall maximum gain of this antenna. **[9]**

b) Explain: **[9]**

i) How wave gets detached from antenna?

ii) Relationship between radian and steradian.

OR

Q6) a) Explain the following parameters of antenna with relevant diagram and mathematical expressions. **[9]**

i) Radiation Intensity

ii) Antenna Input Impedance

iii) Radiation Power Density

b) Explain the various types of antenna apertures. **[9]**

SECTION-II

Q7) a) Derive the expression for radiation resistance of half wave dipole. **[8]**

b) The diameter of a circular loop antenna is 0.04λ. How many turns of the antenna will give a radiation resistance of 36Ω. **[8]**

OR

Q8) a) Write a short notes on: **[5]**

Binomial Array

b) Enlist the properties of LF antenna and explain the working principle of Marconi Antenna. **[5]**

c) A uniform linear array consists fo 16 isotropic point sources with a spacing of $\lambda/4$. If the phase difference is 90^{o}, calculate **[6]**

i) HPBW

ii) Directivity in dB

iii) Beam solid angle

iv) Effective aperture

Q9) a) Explain the effect of height and ground on antenna performance. **[8]**

b) Explain in detail the difference between resonance and non-resonance antenna. Also describe the constructional details, features, applications and radiation pattern of Travelling Wave Antenna. **[8]**

OR

Q10) Write a short notes on following antennas with respect to structural details, radiation pattern, features and applications **[16]**

a) Whip Antenna

b) Ferrite Rod Antenna

c) Rhombic Antenna

d) Hertz Antenna

Q11)a) With the help of neat sketch explain the principle of operation and applications of Lens antenna. **[5]**

b) Calculate the lengths of dipole, reflector, director 1, director 2 and director 3 of the Yagi-Uda antenna along with the spacing between the element for with a dimensions and inert element spacing for channel 5(VHF-III). **[5]**

c) Explain with suitable sketches radiation in helical antenna. **[8]**

OR

Q12) Write a short notes on the following antennas: **[18]**

a) Microstrip Patch Antenna.

b) Parabolic Reflector Antenna.

c) Turnstile Antenna.

d) Horn Antenna.

EEE

Total No. of Questions :12]

SEAT No. :

P1643

[Total No. of Pages :2

[5058] - 91

T.E. (Instrumentation & Control)

INSTRUMENTATION FOR CHEMICAL ANALYSIS

(2008 Course) (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) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10, Q11 or Q12.***
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) Give the detail classification of Instrumental method of chemical analysis. **[8]**

b) Explain experimental set up of Conductometry with neat sketch. **[8]**

OR

Q2) a) Explain Potentiometry with neat sketch. **[8]**

b) List Radiometric and Photometric units of chemical analysis. **[8]**

Q3) a) Explain Multichannel filter photometer with neat sketch. **[8]**

b) What is spectrophotometer? Explain Micro processor based spectrophotometer with neat sketch. **[10]**

OR

Q4) a) List Various Types of nebulizer, Explain Babington types nebulizer with sketch. **[10]**

b) Explain in detail Premix burner with neat sketch. **[8]**

P.T.O.

Q5) a) Explain FTIR with neat sketch. **[8]**

b) Explain Flame Photometry with neat sketch. **[8]**

OR

Q6) a) Explain Inductively coupled plasma(ICP) with neat sketch. **[8]**

b) Explain Direct coupled plasma (DCP) with neat sketch. **[8]**

SECTION - II

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

b) Explain with neat sketch Multichannel flouriometer. **[8]**

OR

Q8) a) Explain with neat sketch CO Analyser. **[8]**

b) Explain NMR Spectroscopy with neat sketch. **[8]**

Q9) a) Enlist different types of Mass Spectrometer. Explain Working of quadrupole Type mass spectrometer with neat sketch. **[10]**

b) Explain HPLC with neat sketch. **[8]**

OR

Q10)a) What is GC? Explain the working Principle of Gas Chromatography with neat sketch. **[10]**

b) Explain Any one type of detector used in GC with neat sketch. **[8]**

Q11)a) Explain Instrumentation for 'X-ray Spectroscopy. **[8]**

b) Explain with neat sketch scintillation counters. **[8]**

OR

Q12)a) Explain GM counter with neat sketch. **[8]**

b) What is ESCA? Explain auger emission spectroscopy. **[8]**

Total No. of Questions :12]

SEAT No. :

P1644

[Total No. of Pages : 3

[5058] - 92

T.E. (Instrumentation & Control)

EMBEDDED SYSTEM DESIGN

(2008 Pattern) (Semester - I)

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

Instructions:

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

SECTION-I

Q1) a) Draw and explain memory mapping of internal RAM with address. **[8]**

b) 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]**

OR

Q2) a) Explain the function of pins $\overline{PSEN}$ and ALE of 8051 microcontroller with suitable example. **[8]**

b) Explain the different timer modes with the help of 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 to add 10-bytes stored at external memory location starting 6000H. Put the result (2-byte) on next two memory locations where 10-byte of data ends. **[8]**

OR

P.T.O.

Q4) a) Draw and Explain the SCON register of 8051 microcontroller. **[8]**

b) Explain below mnemonics with suitable example. **[10]**

i) ADD A,@R0

ii) ORL A,R0

iii) MUL AB

iv) DIV AB

v) CJNE A,#10H,LOOP

Q5) a) With a neat sketch explain the interfacing of DAC with 8051 microcontroller. **[8]**

b) Draw Interfacing diagram of 16x2 LCD to 8051 and explain it in detail. **[8]**

OR

Q6) a) Write a short note on RS-232 standard. **[8]**

b) Draw the interfacing diagram of Stepper motor with 8051 microcontroller. **[8]**

SECTION-II

Q7) a) Draw & explain the Status Register SREG of AT Mega8535. **[8]**

b) Explain the function of Watchdog timer of AT Mega8535 microcontroller. **[8]**

OR

Q8) a) Explain any four addressing modes with suitable instructions for AVR microcontroller. **[8]**

b) Draw and explain the architecture of AT mega8535 microcontroller. **[8]**

Q9) a) Explain the RS232 communication link 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 instructions of AVR microcontroller. **[10]**

i) ST X +, r15

ii) ADD r2,r3

iii) INC r4

iv) SBRC r3, 0

v) ROL r13

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 16x2 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. :

P1645

[Total No. of Pages : 3

[5058]-93

T.E. (Instrumentation & Control)

CONTROL SYSTEM COMPONENTS

(2008 Course) (Semester-I)

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

Instructions to the candidates:

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

SECTION-I

Q1) a) Compare electromechanical relay with solid state relay. **[6]**

b) Explain the construction, working and application of following types of switches. **[12]**

i) Temperature switch.

ii) DIP Switch.

OR

Q2) a) How is a contactor different from a relay give specification of an industrial contacter. **[8]**

b) Give application of following types of switches. **[10]**

i) SPDT

ii) Rotary switch

iii) Level switch

iv) Drum switch

v) Limit switch

P.T.O.

Q3) a) Draw electrical wiring diagram for star delta starter. **[8]**

b) Write a short note on protection of motors. **[8]**

OR

Q4) a) Using standard symbols, draw electrical wiring diagram for oven control. Heater should start only if temperature is low and door is closed. Heater will turn OFF if temperature is high. Provide start/stop switch and LED indication for heater ON/OFF and door open. **[8]**

b) Explain the construction and working of thermal overload relay. **[8]**

Q5) a) Draw symbols for following pneumatic components and give application in brief: **[8]**

i) FRL

ii) 3/2 direction control valve

iii) Cheek valve

iv) Shuttle valve.

b) Draw pneumatic circuit extension of single acting cylinder only if both hands of operator are engaged. **[8]**

OR

Q6) a) Compare pneumatic systems with electrical systems. **[8]**

b) Draw using standard symbols, pneumatic circuit showing the application of quick exhaust valve. **[8]**

SECTION-II

Q7) a) Explain hydraulic supply with the help of neat block diagram. **[8]**

b) Draw using proper symbols, meter in and meter out hydraulic circuits. **[10]**

OR

Q8) a) Draw symbols for following hydraulic components and give application in brief. **[10]**

i) Pump

ii) Bidirectional motor

iii) Nonreturn flow control valve

iv) Pressure relief valve

v) 4/3 direction control valve

b) Draw using proper symbols, hydraulic circuit for reciprocation of double acting cylinder. **[8]**

Q9) a) Write specifications of alarm annunciator give one sequence. **[8]**

b) How is a HRC fuse different from ordinary fuse. **[8]**

OR

Q10)a) List different types of feeders. Explain any one type. **[8]**

b) Explain the construction and working of seal and snubber as an accessory for pressure gage. **[8]**

Q11)a) Give applications were sanitary pipe fittings are used. Explain what care is taken in such applications with respect to pipe fittings. **[8]**

b) Explain various parts, connectors used in tube fittings. **[8]**

OR

Q12)a) Give hazardous area classification. **[8]**

b) Give difference in x, y, z types of purefing. **[8]**

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Total No. of Questions :12]

SEAT No. :

P1646

[Total No. of Pages :3

[5058] - 94

T.E. (Instrumentation and Control)

ELECTRONIC INSTRUMENTATION

(2008 Course) (Semester - I)

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

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4 , Q.5 or Q.6 in Section I, Q.7 or Q.8, Q.9 or Q.10 and Q.11 or Q.12 in Section II. Total six questions to be attempted minimum.***
2) ***Start each question on a new page.***
3) ***Assume suitable data wherever required.***
4) ***Neat labelled diagrams are expected.***

SECTION - I

Q1) a) Explain true RMS concept. Draw true RMS meter and explain. **[8]**

b) How low and high resistance measurements are carried out in DMM? **[8]**

OR

Q2) a) What are the Automations in digital instruments? Explain autoranging with suitable circuit diagrams. **[8]**

b) Explain what is stray capacitance in Q meter. The self-capacitance is measured by making two measurements at different frequencies. The values are, f1 = 0.5 MHz, f2= 1.5 MHz, C1= 390pF, C2 = 10pF. Find the values of – stray capacitance and L. **[8]**

Q3) Draw block diagram of function generator. State the characteristics. Explain the operation and also draw and explain triangular to sine wave conversion with suitable waveforms. **[16]**

OR

P.T.O.

Q4) a) What is frequency synthesis? What are the methods? Briefly explain them. **[8]**

b) Draw and Explain the internal block diagram of 8038. **[8]**

Q5) a) State the different types of probes. Explain the attenuator (10:1) probe. **[9]**

b) Explain with the help of appropriate waveforms ALT and CHOP modes in CRO. **[9]**

OR

Q6) a) State the various modes in DSO. Explain the baby sitting mode. What is the significance of sampling rate in DSO? **[10]**

b) Draw block diagram of Dual Beam and explain. Give any two differences between dual beam and dual trace CROs. **[8]**

SECTION - II

Q7) a) Draw 3 bit flash type ADC and explain in detail. **[10]**

b) What is sample and hold concept? What is the need? Draw suitable circuit and explain. **[8]**

OR

Q8) a) Write a short note on data logger. **[8]**

b) Briefly explain any five specifications of data converters. **[10]**

Q9) Draw block diagram of Universal counter and explain in detail. What are the different modes of measurement? Explain any two modes with waveforms. **[16]**

OR

Q10)a) Explain the automations in digital instruments. **[8]**

b) Explain the application of counters as frequency counter. **[8]**

Q11)a) What is a spectrum analyser? Explain the heterodyne type of spectrum analyser with the help of a neat block diagram. **[8]**

b) Write short note on - Virtual Instrumentation. **[8]**

OR

Q12)Write short notes on: **[16]**

a) Distortion meter.

b) THD analyser.

c) Wave analyser.

d) Virtual Instrumentation Architecture.

Total No. of Questions :12]

SEAT No. :

P2945

[Total No. of Pages :3

[5058]-95
T.E. (Instrumentation & Control)
INDUSTRIAL MANAGEMENT
(2008 Course) (306265)

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

i) Area Vs Product Matrix

ii) SWOT analysis

OR

Q2) a) What is a BCG matrix? Explain use of it for industries in changing business environment. **[10]**

b) Draw Ishikawa diagram and explain its use. **[8]**

Q3) a) Explain with importance Quality Circle. **[6]**

b) Briefly explain salient features of ISO 9001 standard. Explain the clauses-Internal Audit, Statistical process control and Design & Data control.**[10]**

OR

P.T.O.

Q4) Write notes on: **[16]**

a) Industry Institute interaction.

b) Business expansion in relation with global market.

Q5) a) Define 'Inventory'. Explain how inventory control is important in today's era? **[10]**

b) What is outsourcing? Give its advantages and disadvantages. **[6]**

OR

Q6) a) Explain related To Purchasing: **[10]**

i) Objectives

ii) Specifications

iii) Methods

iv) General procedure

b) Explain store keeping and material handling. **[6]**

SECTION-II

Q7) a) What is manpower planning? What is its need? Give different steps in it. **[8]**

b) Define Human Resource Management and explain its Aims. Principles and Functions. **[10]**

OR

Q8) a) State & explain various methods of training how it influences productivity. **[12]**

b) Explain the Leadership skill? **[6]**

Q9) a) Differentiate between CPM and PERT. **[8]**

b) Write a note on 'Capital budgeting'. **[8]**

OR

Q10)a) Write a note on 'Letter of Credit'. **[8]**

b) What is finance? Explain various sources of raising finance. **[8]**

Q11)Write short notes on: **[16]**

a) Safety and Environmental norms.

b) Global Warming.

OR

Q12)a) Explain the value added tax. **[8]**

b) Explain the provisions on safety precautions as specified in the Electricity Rules. **[8]**

EEE

Total No. of Questions : 12]

SEAT No. :

P1647

[Total No. of Pages : 3

[5058]-96

T.E.(Instrumentation & Control)

DIGITAL SIGNAL PROCESSING FUNDAMENTALS

(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) ***Answer to the two sections should be written in separate answer books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Use of 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 systems. **[8]**

b) Explain the classification of discrete-time signals. **[8]**

OR

Q2) a) Determine the cross-correlation of following sequences: **[8]**

$x(n)=\{4,2,5,7\}, h(n)=\{10,3,5,7\}$

b) Determine the linear convolution of following sequences. **[8]**

$x(n)=\{1,4,5,2\}, h(n)=\{7,8,9,2\}$

Q3) a) Sketch the direct form structure of system function. **[8]**

$$H(z)=\frac{1-0.8z^{-1}+0.15z^{-2}}{1+0.1z^{-1}-0.72z^{-2}}$$

b) Determine and plot the frequency response of the discrete-time system described by, $y(n)-2y(n-1)+4y(n-2)=u(n)$ to unit – step input. Use $\omega=0,\pm\frac{\pi}{4},\pm\frac{\pi}{2},\pm\pi$. **[8]**

OR

Q4) a) Determine the poles and zeros of the system described by

$H(z)=1+2z^{-1}+3z^{-2}+4z^{-3}+5z^{-4}$.

Also, sketch the frequency response. **[8]**

b) Obtain the direct-form II structure of discrete-time system describe by:

$$H(z)=\frac{1+2z^{-1}+2z^{-2}+z^{-3}}{1-0.8z^{-1}+0.49z^{-2}-0.57^{-3}}.$$ **[8]**

P.T.O.

Q5) a) Determine the 4-point DFT of $x(n) = \{1, 1, -1, -1, \}$. **[6]**

b) State any two properties of DFT. **[4]**

c) Determine the circular convolution of $x(n) = \{1, 2, 3, 0\}$ and $h(n) = \{1, 2, 0, 0\}$. **[8]**

OR

Q6) a) Compute the circular convolution of the sequences: **[12]**

$x_1(\mathrm{n}) = \{2, 3, 1, 4\}, x_2(n) = \{4, 3, 2, 4\}$ using DFT method.

b) State any three properties of DTFT. **[6]**

SECTION-II

Q7) a) Develop decimation in frequency algorithm for $N = 4$ and sketch signal flow graph. **[9]**

b) Determine the 4-point DFT of $x(n) = \{1, 3, 4, 6\}$ using decimation in time FFT algorithm. **[9]**

OR

Q8) a) Sketch the decimation-in-frequency (DIF) FFT algorithm for N=8. **[9]**

b) Determine the 4-point DFT of $x(n) = \{10, 20, 30, 40\}$ using DIF FFT algorithm. **[9]**

Q9) Design a low-pass FIR filter with 11 coefficients for the following specifications: Passband frequency=0.25 KHz and sampling frequency =1 KHz. Use rectangular, Hamming and Hanning windows in the design. **[16]**

OR

Q10) The desired frequency response of an FIR low pass filter is describeb by:

$$H_d(\omega) = \begin{cases} e^{-j3\omega} & \text{for } |\omega| \le \frac{\pi}{5} \\ 0 \quad \text{for } \frac{\pi}{5} & < |\omega| \le \pi \end{cases}$$

a) Design the filter using rectangular window. **[8]**

b) Design the filter using Blackman window. **[8]**

Q11) Design a digital low pass Chebyshev Type I filter using impulse invariance method to meet the following specifications: **[16]**

Passband ripple: 0.92

Passband edge: 400 Hz

Stopband attenuation: 0.18

Stopband edge: 600Hz

Sampling frequency: 3kHz

OR

Q12) Design a digital low pass Butterworth filter using bilinear transformation method to meet the following specifications: **[16]**

Passband ripple: 0.9

Passband edge: 120 Hz

Stopband attenuation: 0.2

Stopband edge: 170 Hz

Sampling frequency: 512 Hz

✓ ✓ ✓

Total No. of Questions :12]

SEAT No. :

P1648

[Total No. of Pages :3

[5058] - 97

T.E. (Instrumentation and Control)

INSTRUMENTATION SYSTEM DESIGN

(2008 Pattern) (306270) (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) Write short note on IP 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) Explain features, operation of HCNR 201 analog opto coupler. **[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 poit 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 drive a 5V, 100 Ω 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°C full scale. **[9]**

b) It is desired to drive the stepper motor using 89C51 microcontroller and ULN 2803 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) Write short note on mass soldering. **[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]**

Total No. of Questions : 12]

SEAT No. :

P2946

[Total No. of Pages : 2

[5058]-98

T.E. (Instrumentation & Control)

POWER PLANT INSTRUMENTATION

(2008 Course) (Semester- II) (306268) (Theory)

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

Instructions to the candidates:

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

SECTION-I

Q1) a) Explain with neat sketch filtration unit operation? **[8]**

b) Explain Distillation unit operation with neat sketch? **[8]**

OR

Q2) a) What are the different applications of dryers? Explain turbo dryer in details. **[8]**

b) Explain fan and blowers with neat sketch? **[8]**

Q3) a) Explain working of refrigeration plant with neat sketch? **[8]**

b) What is LMTD?Derive equation for LMTD for any heat exchanger. **[8]**

OR

Q4) a) What is mass transfer.Explain it with suitable example. **[8]**

b) Explain the main components of shell and tube heat exchanger. **[8]**

Q5) a) What is smoke detector? Explain working smoke detector. **[9]**

b) Explain the block diagram of hydro power plant. **[9]**

OR

Q6) a) Explain with neat diagram dust monitor in power plant. **[9]**

b) Explain with neat sketch the components of thermal power plant. **[9]**

P.T.O.

SECTION-II

Q7) a) Explain in detail burner management for boiler **[8]**

b) Explain with neat sketch FBC boiler. **[8]**

OR

Q8) a) Explain 2-element drum level control for boiler operation. **[8]**

b) Explain air to fuel ratio control used for boiler with neat sketch. **[8]**

Q9) a) Enlist types of sensors and their purpose in turbine instrumentation. **[8]**

b) Explain with neat sketch lubricant oil temperature control in turbine. **[8]**

OR

Q10)a) Explain dissolved oxygen analyzer in power plant with neat diagram. **[8]**

b) Explain in detail thermal stress control in power plant. **[8]**

Q11)a) Explain working of Diesel power plant with neat sketch. **[9]**

b) Explain the instrumentation used for wind power generator. **[9]**

OR

Q12)a) Explain importance of safety in power generation plant. **[9]**

b) What are advantages and disadvantages of Tidal power plant. **[9]**

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Total No. of Questions :12]

SEAT No. :

P1649

[Total No. of Pages :4

[5058]-99
T.E. (Instrumentation)
CONTROL SYSTEM DESIGN
(2008 Course) (Semester - II)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of logarithmic tables, electronic pocket calculator and steam table is allowed.***
5) ***Your answer will be valued as a whole.***
6) ***Assume suitable data, if necessary.***

SECTION-I

Q1) a) What is necessity of compensator in control system? Realise all three basic compensators electrically. **[6]**

b) Design a lag compensator for the system whose open-loop transfer function is $G(s)\,H(s)=\frac{2}{s(s+1)(s+4)}$. So that the static velocity error constant is 5 sec^{-1}, damping ratio is 0.4 and settling time for 5% tolerance is 10 sec. **[12]**

OR

Q2) a) What is the effect of addition of poles on the root locus? **[4]**

b) Design a suitable compensator for the system whose open-loop transfer function is $G(s)\,H(s)=\frac{1}{s(s+16)}$. So that the static velocity error constant K_V is 20 sec^{-1} without appreciably changing the original location of poles. **[14]**

P.T.O.

Q3) The open-loop transfer function of the uncompensated system is $G(s)\,H(s)=\frac{k}{s(s+2)}$. Design a phase lead compensator for the system so that the phase margin is atleast 45^{o} and $K\upsilon = 12\ sec^{-1}$ using Bode plot approach. **[16]**

OR

Q4) A unity gain feedback control system has an open loop transfer function is given by $G(s)=\frac{1}{s(s+1)}$. Design a suitable compensator network such that $K_V = 10$ and $PM < 50^{o}$. Draw Bode plot of compensated system. **[16]**

Q5)

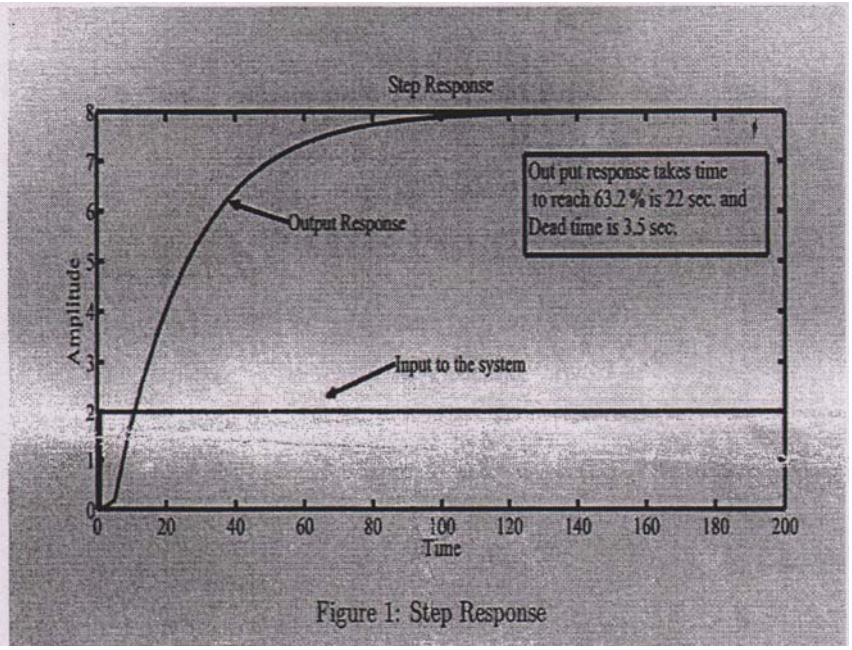

Figure 1: Step Response

a) Step test data is given in figure given above. Find the P, PI, PID using Cohen-coon method. **[12]**

b) Explain tuning of controller using Ziegler Nicholas Method. **[4]**

OR

Q6) The transfer function of unity feedback system is given below:

$$G(s)=\frac{1}{s(s+3)(s+1)}.$$

Find the parameters for P, PI and PID using Ziegler-Nicholas method. **[16]**

SECTION-II

Q7) The forward path transfer function of unity feedback control system is given below:

$$G(s) = \frac{20}{(s+5)(s+3)}.$$

The system is to have a Phase Margin = 65° at ω= 6 rad/sec. Design a PI controller. **[16]**

OR

Q8) A unity feedback control system having forward path transfer function given below:

$$G(s) = \frac{4}{(2s+3)}.$$

Design a controller to meet following specifications $G(s) = \frac{1}{(s+5)}$. **[16]**

Q9) a) Define State, State variable, State Vector, and State Space. **[4]**

b) A matrix is given by $A = \begin{bmatrix} 1 & -1 \\ 0 & 2 \end{bmatrix}$ find e^{At} using Laplace Transform method. **[12]**

OR

Q10) a) A system is given by **[8]**

$$\dot{x} = \begin{bmatrix} 1 & 0 & 1 \\ 1 & 2 & 1 \\ 1 & 1 & 3 \end{bmatrix} x + \begin{bmatrix} 1 \\ 0 \\ 2 \end{bmatrix} u$$

$$y = \begin{bmatrix} 2 & 1 & 3 \end{bmatrix} x + \begin{bmatrix} 1 \\ 0 \\ 2 \end{bmatrix} u$$

Check whether system is completely state controller and completely observable or not.

b) A matrix is given by $A = \begin{bmatrix} 1 & -1 \\ 0 & 2 \end{bmatrix}$ find e^{At} using Caley Hamilton Theorem. **[8]**

Q11) Consider a system having transfer function $G(s) = \frac{2}{s^2+3s+2}$. Find the state space model of the given transfer function. Verify that the system is controllable, If so, Design a state feedback controller using Ackerman's method such that closed-loop poles are at s1 = -4, s2 = -5. **[18]**

OR

Q12) Consider a system having transfer function $G(s) = \frac{2}{s^2+6s+8}$. Find the state space model of the given transfer function. Verify that the system is observable, If so, determine the observer gain matrix using Ackerman's method to place the observer poles at s1 = -5 and s2 = -10. **[18]**

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