

Total No. of Questions : 12]

SEAT No. :

P1068

[4659]-119

[Total No. of Pages : 3

B.E. (Electronics)

COMPUTER NETWORK AND SECURITY

(2008 Course) (Semester - I) (404207)

Time : 3Hours]

[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 Sections - I.*
- 2) *Attempt Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12 from Section - II.*
- 3) *Answers to the two sections should be written in separate answer books.*
- 4) *Neat diagrams must be drawn wherever necessary.*
- 5) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) Explain types of topologies. [6]
b) Explain the functions of each layer of OSI model. [6]
c) Explain X.25 Protocol. [4]

OR

- Q2)** a) What are the various types of networks? Explain. [4]
b) Compare two network reference models. [8]
c) Define service and primitives with an example. [4]
- Q3)** a) Give examples of application of Telnet and FTP. [8]
b) Explain how DNS Server works. [8]

OR

- Q4)** Write short on- Attempt any four [16]
a) Socket programming
b) HTTP
c) BOOTP
d) SMTP
e) P2P file sharing

P.T.O.

- Q5)** a) What is routing? What are the characteristics of routing algorithm? [6]
b) Explain any two Address mapping protocols. [6]
c) Draw format of UDP protocol and give its application. [6]

OR

- Q6)** a) What is Congestion in the Network? What is Quality of service in a network? Explain one technique to achieve QoS in a network. [9]
b) Explain with suitable diagram TCP connection Establishment, TCP data transfer and TCP connection Termination. [9]

SECTION-II

- Q7)** a) What are the design issues at Datalink layer? Discuss each. [9]
b) What is dynamic channel allocation? Discuss CSMA/CD. [9]

OR

- Q8)** a) Explain various connecting devices- Hub, Router, bridges, Gateway, and Repeater. [10]
b) Explain the IEEE 802.11 and IEEE 802.6. [8]
- Q9)** a) Explain microwave communication in detail. Also enlists its advantages and disadvantages. [10]
b) Explain how cable is used for internet? [6]

OR

- Q10)** a) Explain twisted pair cable for guided transmission with its types and applications. [8]
b) Compare Circuit switching, message switching and packet switching. [8]

- Q11)**a) What is Cryptography? Explain the Data Encryption standard in details. **[8]**
- b) What is asymmetric cryptography? Explain RSA Algorithm with example. **[8]**

OR

- Q12)**a) Explain the Hash Function. **[6]**
- b) Explain the cable tester. **[4]**
- c) Explain the basics of network security model. **[6]**

EEE

Total No. of Questions : 12]

SEAT No. :

P771

[Total No. of Pages : 3

[4659] - 120

B.E. (Electronics)

PROCESS AUTOMATION

(2008 Pattern) (Semester - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any three questions from each section.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *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) *Neat diagrams must be drawn wherever necessary.*

SECTION - I

- Q1)** a) Explain the following control system evaluation criteria. **[8]**
- i) Minimum area.
 - ii) Quarter amplitude.
- b) A sensor outputs a range of 20.0 to 250mV as a variable varies over its range. Develop signal conditioning so that this becomes 0 to 5V. **[8]**

OR

- Q2)** a) Explain with suitable example process control block diagram.
- b) A sensor resistance varies from 25 to 1.5k ohms as a variable changes from min to max. Design a signal conditioning system that provides an output voltage varying from -2 to 2V as the variable changes from min to max.

P.T.O.

Q3) a) State the equation for a proportional integral controller. Explain a OP-AMP based proportional integral (PI) mode controller. [8]

b) Explain Ziegler Nichols method of process loop tuning. [10]

OR

Q4) a) Explain open loop transient response method of process loop tuning.

b) State the equation for a proportional derivative controller. Explain a OP-AMP based proportional derivative (PD) mode controller.

Q5) a) Explain different types of control valve noise. [8]

b) An equal percentage valve has a rangeability of 32. If the maximum flow rate is 100 m³/hr find the flow at 2/3 and 4/5 open settings. [8]

OR

Q6) a) Explain the terms flashing and cavitation with respect to control valves.

b) An equal percentage valve has a maximum flow of 100 cm³/s and a minimum of 4 cm³/s. If the full travel is 3cm, find the flow at a 2cm opening.

SECTION - II

Q7) a) Explain combined feedback and feed forward control scheme for a heat exchanger. [8]

b) Explain cascade control scheme for a jacketed CSTR. [8]

OR

Q8) a) Explain with suitable example ratio control scheme.

b) Explain with block diagram the concept of Model Predictive Control.

Q9) a) Explain any one control scheme for a distillation column. [10]

b) Draw and explain P & I diagram for three element control of drum level in a boiler. [8]

OR

- Q10)** a) Draw & explain the P & I diagram for cascade control of multiple effect evaporator.
- b) Explain with neat diagram components of a Robotic system.

Q11) Write short notes on:

- a) Alarm Annunciator. [8]
- b) SCADA. [8]

OR

- Q12)** a) Explain with block diagram Distributed Control System.
- b) What is the necessity of a Square Root Extractor? Explain the working of a square root extractor.



Total No. of Questions : 12]

SEAT No. :

P725

[Total No. of Pages : 5

[4659] - 14

B.E. (Civil Engineering) (Semester - II)
QUANTITY SURVEYING, CONTRACTS & TENDERS
(2008 Pattern)

Time : 4 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Solve Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6, from Section - I and Q. 7 or Q. 8, Q. 9 or Q. 10, Q. 11 or Q. 12 from Section - II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *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) Enlist the different types of estimate used in civil engineering and hence explain the supplementary estimate in brief. **[6]**
- b) Explain the importance of brief description of an item required in the measurement sheet. **[4]**
- c) Explain how the knowledge of quantity surveying is essential to civil engineer during execution of a project. **[6]**

OR

- Q2)** a) List out various methods of preparing approximate estimate and the necessity of preparation of approximate estimate. **[6]**
- b) Explain the provisional sum and the provisional sum items in construction project. **[4]**

P.T.O.

c) State the range of provisions to be made for following items during preparation of detailed estimate : [6]

- i) Contingencies
- ii) Workcharge establishment
- iii) Water supply and drainage
- iv) Electrification

Q3) a) Fig. 1 shows the plans of an office building. Prepare a measurement sheet and determine the quantities of following items, writing brief description of each item in the measurement sheet.

- i) Excavation in earthwork for foundation. [2]
- ii) R.C.C. in slab. [2]
- iii) UCR masonry in plinth and foundation. [3]
- iv) Brick masonry (1 : 6) in superstructure. [3]

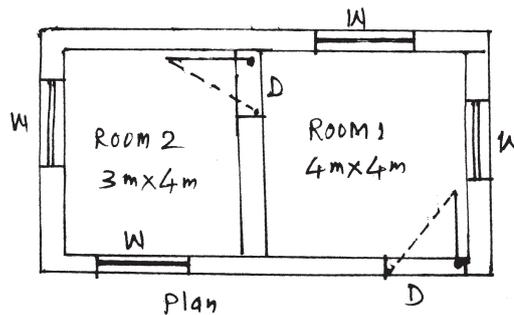


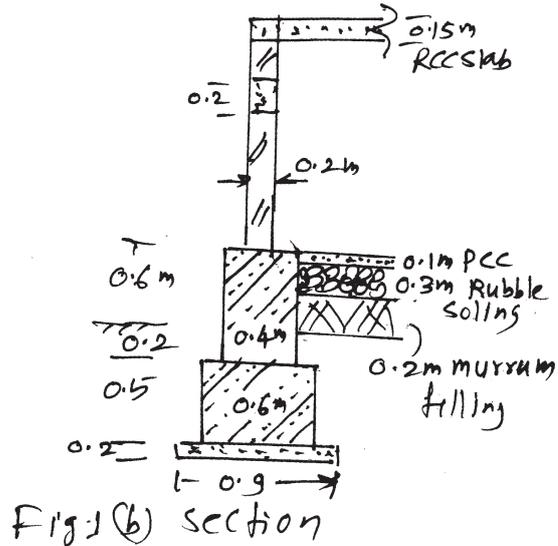
Fig No.1 (a) Plan

$$D = 1.2 \text{ m} \times 2.1 \text{ m}$$

$$W = 1.5 \text{ m} \times 1.2 \text{ m}$$

All walls 0.2 m thick.

- b) Explain the method of taking out quantities for RCC in footing, column, beam with necessary formula if any. [6]



- c) Explain the prime cost items. [2]

OR

- Q4) a) Fig. 2 shows the plan for an otta provided in front of a building. Determine the quantities of following items.

- i) Earthwork in excavation. [3]
- ii) Brick masonry in C.M. (1 : 6) [3]
- iii) Tile flooring [3]
- iv) Plastering to the surfaces [3]

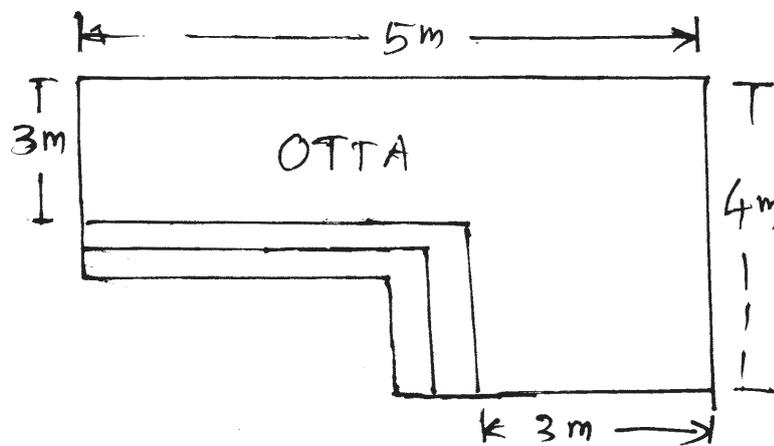
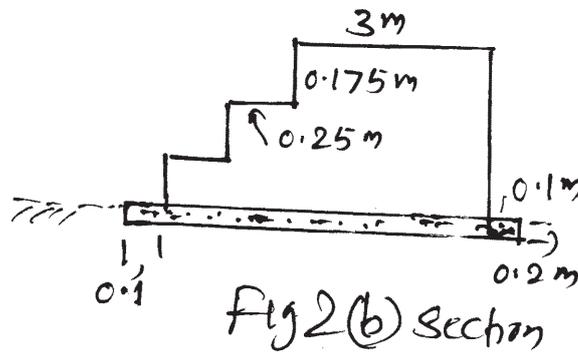


Fig 2(a) plan

- b) Write short note on : [6]
- Method of measurement and rule for deduction for item of plastering.
 - Method of measurement of timber work for doors and windows.



- Q5) a) Explain the purposes of preparing rate analysis for various items. [4]
- b) Explain the factors which affect the rate of an item. [4]
- c) Determine the rate per unit of measurement for brick masonry in C.M. (1 : 6) in superstructure. [8]

OR

- Q6) a) Determine the basic materials required for construction of 135 Cu.m. of brick masonry (1 : 6). [6]
- b) Explain the overhead charges. [4]
- c) Draft a detailed specification for execution of U.C.R. masonry in plinth and foundation with reference to : [6]
- Materials, quality of material, proportions.
 - Method of execution and workmanship.
 - Method of measurement and payment.

SECTION - II

- Q7) a) What is meant by 'value' of a commodity? State four parameters or characteristics a commodity should have to possess value. Also state six factors which affect valuation. [6]
- b) Explain two types of ownership or tenure of property. [6]
- c) State various methods of calculating 'depreciation' explain any one method in detail stating the formula used, merits / demerits of the method, etc. [6]

OR

- Q8)** a) Explain in brief six factors considered for valuation of a building. [6]
b) Write notes on : [6]
 i) Sinking fund
 ii) Years purchase
c) Write three differences between the following : [6]
 i) Scrap value - Salvage value
 ii) Building Lease - occupational Lease

- Q9)** a) Explain PWD procedure of administrative approval and technical sanction. [6]
b) Briefly explain the essential information of a tender notice. [6]
c) Justify earnest money and security deposit for a construction work. [4]

OR

- Q10)** a) Give types (Classification) of tenders (forms) and briefly explain them. [6]
b) Write notes on : [6]
 i) Opening of sealed tenders
 ii) Scrutiny of tenders
c) State and briefly explain any one method of execution of minor works in PWD. [4]

- Q11)** a) Discuss in brief essential requirements of a valid contract. [6]
b) State merits and demerits of pre-qualification of contractors. [6]
c) Write a note on cost plus or percentage contracts. [4]

OR

- Q12)** Write notes on any four of the following : [16]
a) Lump-sum contracts.
b) Arbitration and arbitrator.
c) Responsibilities of contractor regarding execution of work.
d) Registration of contractors.
e) Contents of F.I.D.I.C. document.



Total No. of Questions : 12]

SEAT No. :

P784

[Total No. of Pages : 4

[4659] - 141

B.E. (Production)

**COMPUTER INTEGRATED DESIGN AND MANUFACTURING
(2008 Pattern) (Semester - II)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Attempt one question of each unit from Section - I and Section - II.*
- 2) *Answer to the questions should be written on separate books.*
- 3) *Draw neat diagram wherever necessary.*
- 4) *Assume suitable data if required.*

SECTION - I

UNIT - I

- Q1)** a) Perform the following transformation if the coordinates of vertices of pentagon are A (1, 6), B (3, 2), C (7, 2), D (9, 6), E (5, 9) the transformation in sequence are - **[8]**
- i) Scaling by 2 units in X and Y direction.
 - ii) Rotate by 30 degree anticlockwise about A.
- b) Draw the representation of - **[8]**
- i) Ruled surface
 - ii) Tabulated surface
 - iii) Surface of revolution
 - iv) Coon's patch

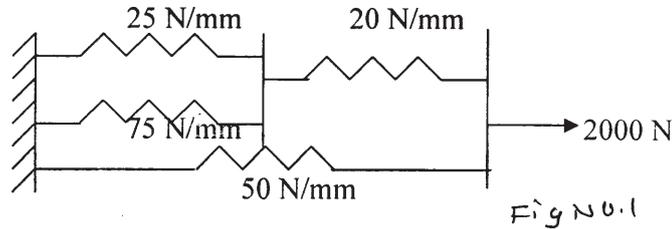
OR

- Q2)** a) Explain the concepts of a valid solid model with suitable example. Discuss how will you check the validity of the solid model. **[6]**
- b) A triangle PQR with end points P (4, 3), Q (6, 3) and R (5, 5) find new co-ordinates of a triangle for following transformation - **[10]**
- i) Translate X 1.5 unit and Y 2 unit.
 - ii) Scale in X and Y direction by 2.
 - iii) Rotate by 50 degree in CCW @ P.
 - iv) Reflection about origin

P.T.O.

UNIT - II

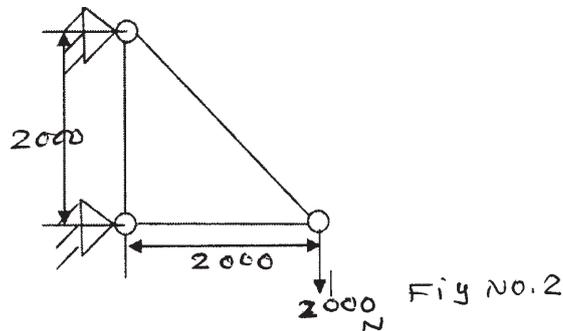
- Q3)** a) A figure No. 1 shows a cluster of four springs. When one end of the assembly is fixed and a force of 2000 N is applied at other end. Determine the deflection of each spring, reaction force at support. [12]



- b) Explain different coordinate system in FEA. [6]

OR

- Q4)** a) A figure No. 2 shows a truss consisting of three elements cross sectional area for each element is 200 mm^2 and modulus of elasticity is 200 GPa, Determine the deflection, reaction forces and stresses in each element. [12]



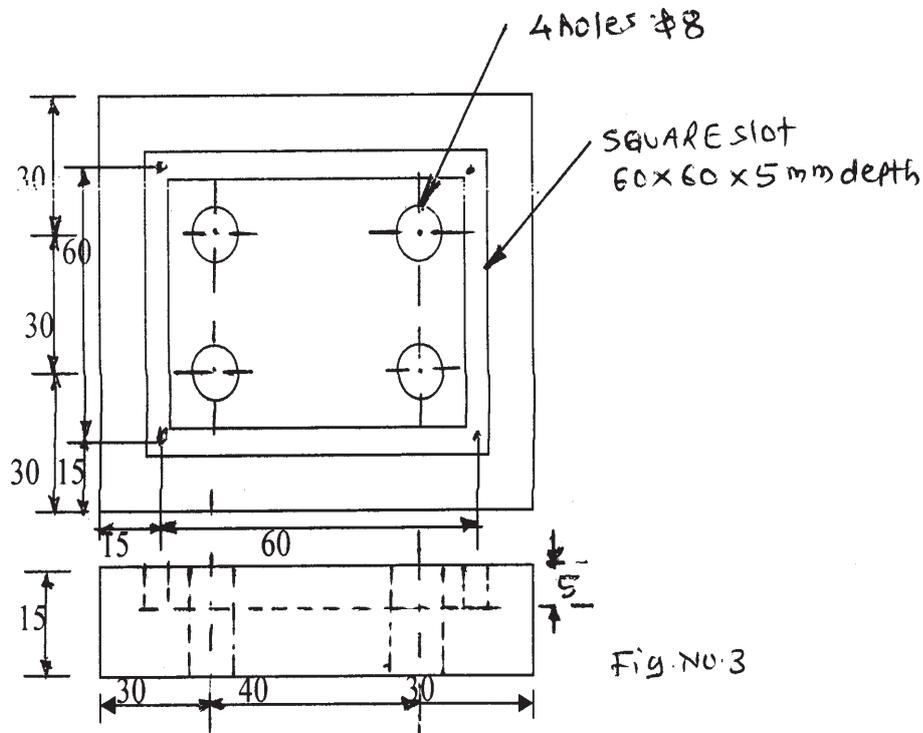
- b) Explain steps in FEA. [6]

UNIT - III

- Q5)** a) With neat sketch show an axis representation in different CNC machine tool. [6]
- b) Explain how accurate positioning control is obtained in NC/CNC. [5]
- c) Explain sub routine and Do loop used in CNC programming. [5]

OR

- Q6) a) What are the distinct features of NC, CNC, DNC machine tool. [6]
- b) Write a CNC program in G and M code for a part as shown in fig No.3. Also write a remark for each block. [10]



SECTION - II

UNIT - IV

- Q7) a) What is concurrent engineering? How it differs from sequential engineering? Explain with block diagram. [8]
- b) Explain shop floor control module in CIM. [8]

OR

- Q8) a) How robots are classified? Explain any three robots with figure according to configuration. [8]
- b) Explain any two manufacturing modules in MRP-II. [8]

UNIT - V

- Q9)** a) Determine most logical sequence for the following data according to To-from ratio, construct flow diagram, draw feasible layout and mark the quantity at entry, exist, intermediate places. [9]

To \ From	1	2	3	4	5	6
1	0	20	60	0	0	0
2	0	0	15	10	0	20
3	0	0	0	0	0	0
4	70	0	10	0	0	0
5	40	0	15	20	0	0
6	0	10	0	0	0	0

- b) What are the advantages of AGVS over other material handling system? Discuss automated storage and retrieval system. [9]

OR

- Q10)** a) Consider a CNC M/c center process a raw part at a time in M/M/1 fashion. Let parts arriving at a rate 20/hr and service rate is 30 part/hr. Find machine utilisation, mean number of parts in system and in queue, mean waiting time in system and in queue. [8]

- b) Write note on : [10]
- i) Cellular manufacturing system.
 - ii) Petrinets

UNIT - VI

- Q11)** a) Explain with neat sketch laminated object manufacturing techniques. [8]
- b) What is CIM OSA Model? How it will be apply in operating environment. [8]

OR

- Q12)** a) Explain with neat sketch solid ground curing process. [8]
- b) Explain NIST-AMRF Hierarchal model. [8]



Total No. of Questions : 12]

SEAT No. :

P785

[Total No. of Pages : 5

[4659] - 142

B.E. (Production)

PROCESS PLANNING AND TOOL SELECTION

(2008 Pattern) (Semester - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Attempt any one question from each unit of Section - I and Section - II respectively.*
- 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 and statistical tables is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

UNIT - I

- Q1)** a) Explain briefly the functions of Product Engineering department for an engineering industry. **[8]**
- b) What is the role of market research section in product design? List the main responsibilities of the product engineer. **[8]**

OR

- Q2)** a) Explain the statement, "Process engineering is the hub of organization," with a block diagram. **[8]**
- b) Explain the importance of "communication" in the field of engineering. **[8]**

P.T.O.

UNIT - II

- Q3)** a) Explain the six stages in the preliminary part print analysis. [8]
- b) What order should be followed in establishing process areas? Why should this order be followed? [8]

OR

- Q4)** a) Define the following geometric characteristic symbols used on the part print. [8]
- i) Flatness
 - ii) Angularity
 - iii) Concentricity
 - iv) Parallelism
- b) What is a datum? What is the advantage of using a datum? Is it always possible to establish a physical datum? Explain. [8]

UNIT - III

- Q5)** a) What is meant by tolerance stack? Explain the design tolerance stacks and process tolerance stacks. [9]
- b) What is the purpose of a tolerance chart? Explain why it is necessary to balance a tolerance chart. Where is the most logical place to start when balancing a tolerance chart? [9]

OR

- Q6)** a) What are the variables which interfere with workpiece control? Why are locators generally arranged in 3-2-1 pattern? [9]
- b) List the possible causes of workpiece deflection while in the location system of a holding device. Sketch the use of supports to control deflection of workpieces. [9]

SECTION - II

UNIT - IV

- Q7)** a) What are the three criteria for product acceptability which must be recognized when planning a process? [6]
- b) Why is it desirable to maintain the natural centerlines of a workpiece during manufacturing? [4]
- c) Explain the process engineer's responsibility for rechecking product specifications. [6]

OR

- Q8)** a) Briefly explain the relationship between process selection and machine selection. What sources of information usually are available to the process engineer to assist him in making a machine selection? [8]
- b) What is forced replacement? What are the three broad categories into which the costs of operating a machine can be divided? [8]

UNIT - V

- Q9)** a) What is an operation routing? Why would the routing be considered the master plan for production? [8]
- b) What information does the process picture provide? List some of the possible uses of the process picture. [8]

OR

- Q10)** a) What are the advantages and limitations of computer aided process planning? [8]
- b) Explain in detail the steps involved in variant process planning. List any four CAPP software packages used in manufacturing industry. [8]

UNIT - VI

Q11) Design a process sheet for the component shown in Fig. 1. The process sheet must contain detailed manufacturing plan with operation sequence, machine, tools, work-holding devices, tool holding devices along with time estimation for each operation. [18]

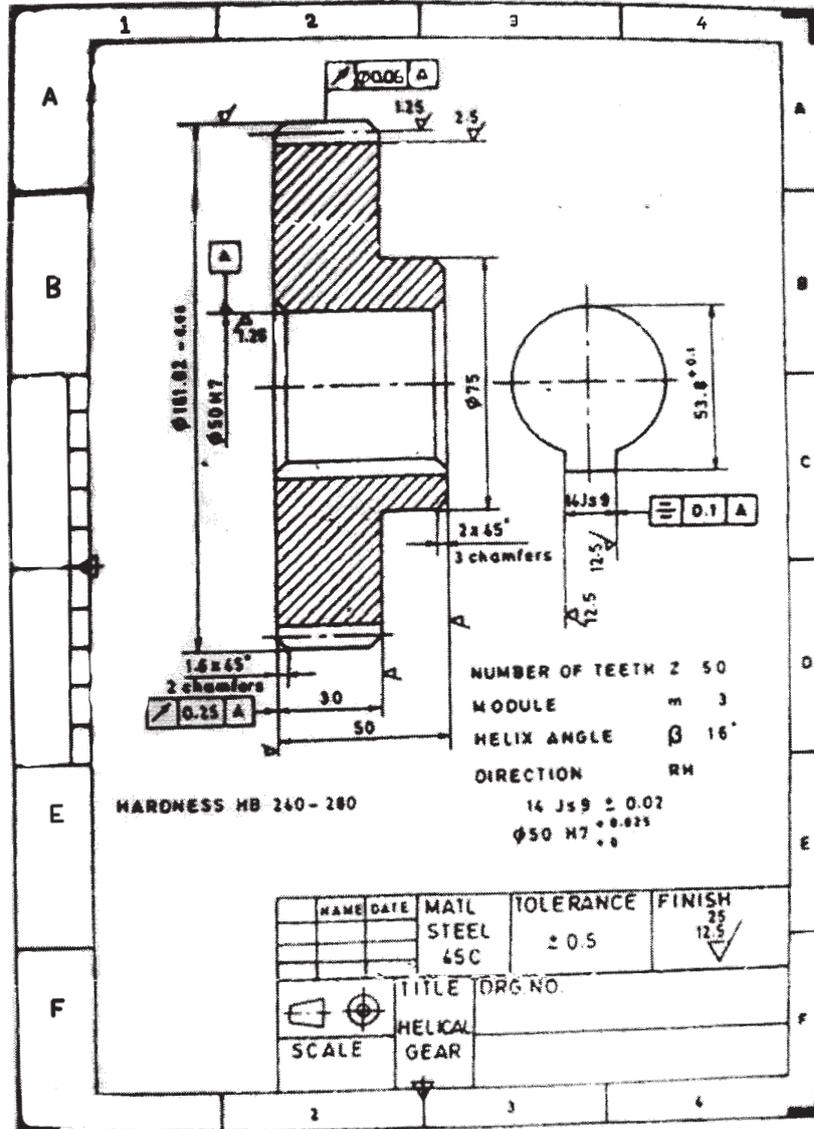


Fig. No. 1. Helical Gear

OR

Q12) Design a process sheet for the component shown in Fig. 2. The process sheet must contain detailed manufacturing plan with operation sequence, machine, tools, work-holding devices, tool holding devices along with time estimation for each operation. [18]

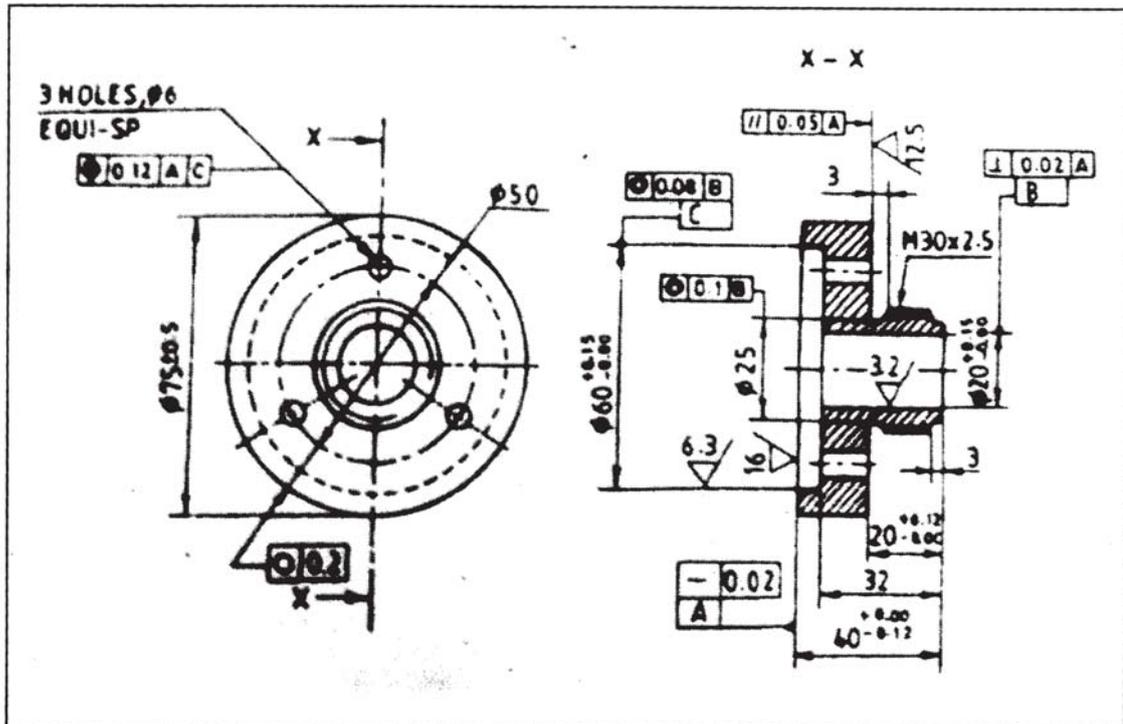


Fig. No. 2. Flange



Total No. of Questions : 12]

SEAT No. :

P726

[Total No. of Pages :4

[4659] - 15

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

TRANSPORTATION ENGINEERING - II

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :-

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

SECTION - I

- Q1)** a) Explain the objects of highway planning [5]
b) Write short notes on: [6]
i) Various traffic studies.
ii) Types of traffic signal.
c) Write down the major policies and objectives of the Lucknow Road plan.[6]

OR

- Q2)** a) Enlist the various road patterns with their suitability. [6]
b) Write a short note on: [6]
i) Preparation of master plan.
ii) Accident studies.
c) What are various types of traffic islands used? Explain the uses of each.[5]

P.T.O.

- Q3)** a) What are the various requirements of an ideal highway alignment? discuss briefly. [6]
- b) Define camber? What are the objects of camber? Specify the recommended ranges of camber for different types of pavement surface. [6]
- c) Design the rate of super elevation for a horizontal highway curve of radius 500 m and speed 100 kmph. [5]

OR

- Q4)** a) What are the requirements of a good highway drainage system? [6]
- b) Write a short note on: [6]
- i) Grade compensation.
- ii) Widening of pavement on horizontal roads.
- c) A valley curve is formed by a descending grade of 1 in 25 meeting an ascending grade of 1 in 30. Design the length of valley curve to fulfill comfort condition for a design speed of 80 kmph. Assume allowable rate of change of centrifugal acceleration $C = 0.6\text{m/sec}^3$. [5]

- Q5)** a) Discuss the desirable properties of bitumen. Compare tar and bitumen. [6]
- b) Explain group index method of flexible pavement design. [6]
- c) What are the requirements of good joints in cement concrete pavement? [4]

OR

- Q6)** a) Explain briefly penetration test of Bitumen. [6]
- b) State the various factors affecting on the pavement design. [4]
- c) Discuss the advantages and limitation of CBR method of design. [6]

SECTION - II

- Q7)** a) Differentiate between: [2 × 3 = 6]
- i) Wind Rose Type I and Type II diagram.
 - ii) Minimum Turning Radius and Minimum Circling Radius.
- b) Draw a neat sketch showing the aeroplane component parts. [5]
- c) Describe the corrections to be applied to the calculated basic runway length to get the actual runway length. [6]

OR

- Q8)** a) Enlist the various Aircraft characteristics and explain any two in brief. [5]
- b) Enumerate the advantages and limitations of air transport. [6]
- c) Write a detailed note on zoning laws. [6]

- Q9)** a) How do you determine the flood discharge by direct method? [5]
- b) A bridge is proposed to be constructed across an alluvial stream carrying a discharge of 250 m³/sec. Assume Lacey's silt factor equal to 1.0. Find the maximum depth of scour when the bridge consists of 4 spans of 20 m each. [4]
- c) Write a brief note on wing walls. [4]
- d) Write a short note on requirement of traffic in the design of highway bridges. [4]

OR

- Q10)** a) Give the various classifications of bridges. [5]
- b) The normal velocity of flow in a river is 1.5 m/sec. The normal, artificial waterway and the enlarged area upstream of the bridge respectively are 8000 m², 7000 m² and 9000 m². Determine the height of afflux using Merriman's formula. Also find the increase in velocity due to afflux. Assume $g = 9.81 \text{ m/sec/sec}$ and Coefficient of discharge, $c = 0.98$. [4]
- c) Write short notes on any two of the following: [2 × 4 = 8]
- i) IRC class A type of loading.
 - ii) Circular Pier.
 - iii) Economical span of bridge.
 - iv) Scour depth.

- Q11)**a) Explain any two types of erection methods employed during construction of bridges. [4]
- b) Discuss the various types of culverts with respect to their suitability in the field. [4]
- c) Draw the illustrative sketches of. [4]
- i) Cable stayed bridge.
- ii) Bascule bridge.
- d) Write a note on maintenance of bridges. [4]

OR

- Q12)**a) State the purposes for providing bearings in bridge. [4]
- b) Explain in details; [4]
- i) Trestles.
- ii) Raft bridge.
- c) Draw the illustrative sketches of. [4]
- i) Pipe Culvert.
- ii) Expansion bearing.
- d) What do you mean by 'Floating bridge'? What are the advantages of floating bridge over fixed bridge? [4]



Total No. of Questions : 12]

SEAT No. :

P1179

[Total No. of Pages : 3

[4659] - 163

B.E. (Production Sandwich Engineering)
B : PLANT ENGINEERING AND MAINTENANCE
(2008 Pattern) (Semester - II) (Elective III)

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

UNIT - I

- Q1)** a) Discuss the principles of plant management. [9]
b) Explain following. [9]
i) Routine Maintenance
ii) Emergency work
iii) Preventive Maintenance

OR

- Q2)** a) Write a note on performance and productivity measurement. [8]
b) Discuss the importance of Pareto chart for plant engineering. [6]
c) Discuss the importance of training for maintenance and safety staff. [4]

UNIT - II

- Q3)** a) Explain PQ and PQRST analysis of layout used for planning of plant facilities. [8]
b) How are computers useful for optimization of layouts? [8]

P.T.O.

OR

- Q4)** a) Discuss Heating, ventilation and air conditioning in plant facility design. [8]
b) Discuss water supply and sanitation facility for building facility design in plant engineering. [8]

UNIT - III

- Q5)** a) Discuss condition based maintenance and explain with a good example. [8]
b) Compare between breakdown and preventive maintenance. [8]

OR

- Q6)** a) Discuss the concept of health and usage monitoring. [8]
b) Discuss software needed for spares management and inventory planning. [8]

SECTION - II

UNIT - IV

- Q7)** a) Discuss life cycle costing taking into consideration various parameters like maintenance, reliability, hazard function, etc. [9]
b) Discuss the concept of periodic preventive management. [9]

OR

- Q8)** a) Discuss rigorous models of life cycle costing. [9]
b) Discuss mathematical formulation of life cycle costing. [9]

UNIT - V

- Q9)** a) Discuss importance and implementation of plant safety against various hazards. [8]

- b) What do you mean by pollution control and waste disposal? [8]

OR

- Q10)**a) Discuss the importance of recycling of waste. [8]

- b) Explain the energy conservation factors during management and auditing of it. [8]

UNIT - VI

- Q11)**a) What are the aspects to condition based maintenance and its diagnostic techniques. [12]

- b) Define Total Productive Maintenance and draw 7 pillars of it with a neat sketch. [4]

OR

- Q12)**a) What is meant by OEE? How is it calculated? Explain its importance. [8]

- b) Explain RAM analysis. Discuss inherent availability and operational availability. [8]



Total No. of Questions : 6]

SEAT No. :

P1089

[Total No. of Pages :3

[4659] - 196

B.E. (Printing)

PACKAGE DESIGN AND TECHNOLOGY

(2008 Course) (Semester - II) (408289)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer to the two sections should be written in Separate books.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*

SECTION - I

Q1) a) Explain the Rigid packaging term. Write down advantages and disadvantages of rigid packaging over flexible packaging. **[18]**

OR

b) Explain various levels of packaging and their respective function.

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

- a) Explain the properties of raw material-Paperboard which is used for secondary packaging.
- b) Explain different types of pulps used in paperboard manufacturing process. The stages for paper board manufacturing.
- c) How the structural properties of fiber affect the following properties of paperboard.
 - Bursting strength
 - Folding Endurance

Q3) Explain any four: **[16]**

- a) Take-up factor.
- b) Edge compression strength.

P.T.O.

- c) Washboarding.
- d) Importance of Grain Direction of paperboard packaging.
- e) Application of wide flute and narrow flute profile.
- f) Paper board manufacturing defect warp.

SECTION - II

Q4) Draw a neat diagram and explain any three styles with their application. [18]

- a) Infold outfold tray carton style.
- b) Auto lock bottom system carton style.
- c) Slit lock tuck system.
- d) Telescope type carton style.
- e) Straight Tuck Carton style.

Q5) Answer any two:

[16]

A) Calculate the cost for making 4000 universal corrugated cartons.

- a) Size : 15" × 10" × 10"
- b) All papers 150gsm
- c) Paper cost Rs. 40,000/ton
- d) Conversion Rs. 8000/ton

Calculate a) Cost of carton b) Weight of carton c) Total paper required

B) Calculate the final strength of box for following given condition.

- Load carrying capacity of box at lab is 400KG.
- Three months stacking duration
- And 60 Relative Humidity
- Consider a factor of safety as 2
- If required assume suitable data

- C) Consider the following data
- a) Box of dimension 600mm × 400mm × 400mm
 - b) Stack height 24 feet
 - c) Individual box weight 50kg
 - d) Assume fluting is of 127 gsm with RCT of 1.0 and both liners of equal GSM.
 - e) What will be the board combination for a 3 ply boxes?

Q6) Write short notes on any three

[16]

- a) Water Penetration Test for Corrugated medium (TAPPI test).
- b) Flat Crush Strength (FCT).
- c) Tensile strength of Material.
- d) Ring Crush Strength (RCT).



Total No. of Questions : 6]

SEAT No. :

P1159

[Total No. of Pages : 2

[4659]-197

B.E. (Printing)

PRINT PRODUCTION PLANNING AND CONTROL

(2008 Pattern) (Semester - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

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

SECTION - I

Q1) Explain Jobbing and Batch type of production activity in detail with suitable examples. **[16]**

OR

Explain the functions of Production Control in detail with suitable examples.

Q2) Explain the CPM technique of Operation Research in detail with its applications. **[16]**

OR

Explain the PERT technique of Operation Research in detail with its applications.

Q3) Explain the Job Sequencing Technique of Operations Research in detail along with its applications. **[18]**

OR

Explain the various assumptions to be considered in Job Sequencing model of Operations Research. Also explain the three types of Job Sequencing models.

P.T.O.

SECTION - II

Q4) Explain the Hungarian method of Assignment model in detail with example. **[16]**

OR

Differentiate between Assignment Model and Transportation Model with reference to Definition, Assumptions and applications etc.

Q5) How Transportation Model of Operations Research area helps the management. Explain with the help of example. **[16]**

OR

Explain in brief NWCM and LCM methods of solving Transportation problem with suitable example.

Q6) Explain the applications of Linear programming Model of OR with few examples. **[18]**

OR

Explain in detail the procedure of formulating the Linear Programming Model with suitable examples.



Total No. of Questions : 12]

SEAT No. :

P801

[Total No. of Pages : 3

[4659]-214

B.E. (I.T.) (Semester - II)
DISTRIBUTED SYSTEMS
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

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

SECTION - I

- Q1)** a) Describe the working of Distributed system based upon middleware software system. Also clearly describe the role played by middleware in Distributed system. [9]
- b) Describe various architectural models and their variations with suitable examples. [9]

OR

- Q2)** a) Compare Distributed System versus Centralized Systems. [9]
- b) What are types of failures? Classify the following failures based on types of failures with justification. [9]
- i) Sudden shutdown of a system
 - ii) Network crash
 - iii) System reset while working
 - iv) Unnoticed event handler closing a word document
- Q3)** a) Define and explain following along with one application of it. [8]
- i) Synchronous Distributed Systems
 - ii) Asynchronous Distributed Systems
- b) Discuss the concept of request/reply message handling using HTTP protocol and TCP protocol. Compare the working, limitations and advantages of both protocols. [8]

P.T.O.

OR

- Q4)** a) What is primary motivation behind the development of a lightweight RPC System? Describe the four techniques used in a LRPC system that makes more efficient than a conventional RPC system. [8]
- b) Write a short note on [8]
- i) Sun RPC
- ii) CORBA
- Q5)** a) Compare Centralized, Decentralized, Distributed and Token ring mutual exclusion algorithms. [8]
- b) Explain network time protocol to distribute time information over Internet. [8]

OR

- Q6)** a) Explain how NTP is useful to distributed time over the Internet? Also state the features of NTP. [8]
- b) Discuss happens-before relationship in a set of events occurred in various processes. [8]

SECTION - II

- Q7)** a) How communication does takes place in CODA File System? Describe the implementation and resolution of CODA File identifier. [9]
- b) Explain file service architecture in detail. [9]

OR

- Q8)** a) What is Distributed File System? Explain different types of services provided by Distributed File System. [9]
- b) What are different file sharing semantics used in distributed file system? [9]
- Q9)** a) What is Distributed Shared memory? Explain its advantages. [8]
- b) What are the two options available for propagating updates made by one process to other processes? Also explain granularity of sharing. [8]

OR

- Q10)** a) Explain following consistency models in short. [8]
- i) Release consistency model
 - ii) Casual consistency model
 - iii) Processor consistency model
 - iv) Pipelined consistency model
- b) What is client centric consistency model? Explain in detail. [8]

- Q11)** a) Explain following protocols: [8]
- i) One-Phase Commit
 - ii) Two-Phase Commit
 - iii) Three-Phase commit
- b) What is the use of stable storage? How stable storage technique is used in recovery? [8]

OR

- Q12)** a) Explain following orderings: [8]
- i) FIFO
 - ii) Casual
 - iii) Total
 - iv) No Ordering
- b) What is a recovery line? Draw and explain domino effect n detail. [8]



Total No. of Questions : 12]

SEAT No. :

P802

[Total No. of Pages : 3

[4659]-215

B.E. (Information Technology) (Semester - II)

INFORMATION RETRIEVAL

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

- 1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 from Section - I & Q7 or Q8, Q9 or Q10, Q11 or Q12 from Section - II.*
- 2) *Answers to the two sections should be written in separate answer sheets.*
- 3) *Neat diagrams should 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) How to generate the Document representative using Conflation Algorithm. [10]
b) Explain Luhn's idea for understanding the context of the document. [8]

OR

- Q2)** a) What is the use of Clustering in IR? Explain Clustering Hypothesis for R-R and R-N-R associations of Collections. [10]
b) Differentiate between Data and Information Retrieval. [8]

- Q3)** a) Explain how Records are organized in Multi-lists state with an example and its advantage over inverted files. [8]
b) Explain different types of Search strategies. [8]

OR

- Q4)** a) Explain inverted index file concept with example. [8]
b) What is the role of XML in Information Retrieval? Explain XML data model and evaluation of queries. [8]

P.T.O.

- Q5)** a) Explain the TREC Collection. [8]
b) Explain the term. [8]
i) R-Precision
ii) Precision Histogram
iii) The Harmonic Mean
iv) The E Measure

OR

- Q6)** a) Explain various challenges for effective delivery of Digital Library Architecture. [8]
b) Write brief note on OPACs. [8]

SECTION - II

- Q7)** a) Write note on Ontology and the Ontology Life Cycle. [10]
b) Write brief note on “Query processing in a Distributed IR system”. [8]

OR

- Q8)** a) Describe MIMD architecture with respect to “Multitasking” in Parallel IR. [10]
b) Compare Distributed IR and Parallel IR. [8]

- Q9)** a) What is Multimedia IR? Discuss steps on which of data retrieval relies. [8]
b) Explain the steps involved for retrieving data in Multimedia IR systems. [8]

OR

- Q10)** a) Explain the MULTOS data model with example. [8]
b) Write short note on. [8]
i) SQL3 query language
ii) Generic multimedia indexing

- Q11)** a) Explain the centralized crawler-indexer and Harvest-distributed architecture of a search Engine. [8]
- b) Write short note on. [8]
- i) Meta searchers
 - ii) Metacrawler

OR

- Q12)** a) Explain how web search engine works. [8]
- b) Write short note on Dynamic search and Software Agents. [8]



Total No. of Questions : 12]

SEAT No. :

P890

[4659]-235

[Total No. of Pages : 4

B.E. (Computer Engineering)
DISTRIBUTED OPERATING SYSTEMS
(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) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) How do we achieve the security in the distributed operating system?
Explain it with access matrix model for security. **[6]**
- b) Explain the following issues with respect to RPC. **[10]**
- i) structure
 - ii) binding
 - iii) parameter and result passing
 - iv) semantics
 - v) error handling

OR

- Q2)** Explain the following with respect to distributed operating system: **[16]**
- a) Naming
 - b) Scalability
 - c) Compatibility
 - d) Process synchronization
 - e) Data migration
 - f) Computation migration.

P.T.O.

- Q3)** a) What is global state in distributed OS? How it ensure the stability and safety in DOS? [6]
- b) Why Lamport logical clock is required? What are the conditions satisfied by logical clocks? Also explain space time diagram with an example also discuss the limitation of Lamport's clock how do overcome those. [10]

OR

- Q4)** a) Give an example to show why event ordering is most important in most of the distributed application? Explain total ordering and compare it with partial ordering. [10]
- b) Discuss centralized approach for mutual exclusion. What are the necessary and sufficient condition that mutual exclusion algorithm should satisfy? [6]

- Q5)** a) Discuss the impact of message loss following deadlock detection algorithms. [10]
- i) a path pushing algorithms
- ii) a edge chasing algorithms
- b) Explain the Lamport's algorithm for mutual exclusion. Show that in Lamport's algorithm the critical section is accessed according to the increasing order of timestamp. [8]

OR

- Q6)** a) Distributed deadlock detection algorithms normally have substantial message overhead, even when there is no deadlock. Instead of using a deadlock detection algorithm, we can handle deadlocks in distributed systems simply by using "timeouts" i.e. after waiting certain time declares that it is deadlock, what are the risks in using this method? Explain the above scenario by comparing this with any deadlock detection algorithm. [10]
- b) Show that Byzantine agreement cannot always be reached among four processor if two processor are faulty. [8]

SECTION - II

- Q7)** a) What is distributed scheduling? Why it is needed? What are the different issues in load distribution? Explain sender initiated algorithm in detail. **[12]**
- b) Discuss distributed shared memory system with architecture. What is the main motivation behind implementing DSM. **[6]**

OR

- Q8)** a) What is distributed scheduling? Why it is needed? What are the different issues in load distribution? Explain receiver initiated algorithm in detail. **[12]**
- b) What are various coherence protocols used in DSM? Give the brief about each. **[6]**

- Q9)** a) Explain backward error recovery. What are various approaches for backward error recovery? What are the major problems associated with backward error recovery approach? **[8]**
- b) What is Rollback? How does it help in recovery mechanism? Explain in details the rollback recovery algorithm. **[8]**

OR

- Q10)** a) What is voting? Explain voting protocol in designing a fault tolerance system in distributed environment. **[8]**
- b) How do we achieve the security in the distributed operating system? Explain it with access matrix model for security. **[8]**

- Q11)** a) What is the cluster? How do you compare cluster with distributed system? How do we classify the clusters? Give any suitable example of the cluster. **[10]**

- b) What are web services? How do you compare it to components? And the Compare between service oriented architecture and component based architecture. **[6]**

OR

Q12)a) Explain the relation of the following system with distributed system:[10]

- i) cluster computing
- ii) grid computing
- iii) cloud computing
- iv) service oriented architecture

b) Explain the following with respect to cloud computing: **[6]**

- i) elements of cloud computing
- ii) features of cloud computing
- iii) advantages and disadvantages



Total No. of Questions : 12]

SEAT No. :

P857

[4659]-236

[Total No. of Pages : 3

B.E. (Computer) (Semester -II)
ADVANCED COMPUTER ARCHITECTURE
(2008 Pattern)

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 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 in brief general classification of parallel computer architectures based on following techniques. **[8]**
- i) Flynn's classification
 - ii) Feng's classification
- b)** With suitable example/flow chart explain: **[8]**
- i) Branch Prediction and
 - ii) Speculative loading

OR

- Q2) a)** Define parallel processing. How parallel computer architectures are classified? Discuss the levels of parallel processing. **[8]**
- b)** What is EPIC? Explain EPIC features of Itanium processor in details. **[8]**
- Q3) a)** With the help of the block diagram explain in detail branch prediction logic implemented in Pentium architecture. **[8]**
- b)** Explain various types of data hazards observed in Pentium processor. How these hazards could be detected? **[8]**

OR

P.T.O.

- Q4)** a) Explain in brief register window structure of SPARC. How it supports parameter passing through procedure calls? [8]
- b) Discuss the various features of UltraSPARC architecture. Explain in brief, the concept of RSE. [8]
- Q5)** a) Discuss with suitable example the necessity of Data routing and manipulation with respect to SIMD interconnection network. Also define data routing functions of 3 cube network. [10]
- b) For a Mesh interconnection network for array processors, discuss in detail the parallel algorithm for matrix multiplication. Obtain the time complexity for the same. [8]

OR

- Q6)** a) How a 3-cube network can be viewed as [6]
- i) Single stage recirculating network.
- ii) Multistage network.
- b) Discuss parallel sorting algorithm for array processors and obtain its time complexity. [6]
- c) With suitable example explain following features implemented in cray-1 architecture. [6]
- i) Vector chaining.
- ii) Vector looping.

SECTION-II

- Q7)** a) What is the difference between static and dynamic bus arbitration techniques. Explain any two dynamic bus arbitration techniques. [8]
- b) Explain in brief desirable processor characteristics for multiprocessor architecture. [8]

OR

- Q8)** a) Explain features of IBM Power 4 Processor. [8]
- b) Explain time shared bus as an interconnection network for multiprocessor systems. Discuss daisy chaining arbitration algorithm, with neat diagram. [8]

- Q9)** a) Discuss the various context switching policies implemented in multithreaded architecture. [8]
b) Explain with suitable example shared memory parallel programming. [8]

OR

- Q10)** a) Discuss different latency hiding techniques used in multithreading architectures. [8]
b) Explain in brief the following with respect to multithreading: [8]
i) Latency.
ii) Context switched overhead.
iii) Interleaved multithreading.
iv) Number of threads.

- Q11)** a) Discuss the issues in multiprocessor operating system? Discuss in detail. [10]
b) What is the difference between grid computing and cluster computing? Discuss features of grid computing. [8]

OR

- Q12)** a) What are various performance measures for the parallel algorithms? [6]
b) Comment on PThreads (parallel threads) in shared memory system? [6]
c) What are the major features of FOR TRAN-90 to be qualified as parallel programming language? [6]

EEE

Total No. of Questions : 8]

SEAT No. :

P1178

[Total No. of Pages : 3

[4659] - 257

B.E. (Petrochemical) (Semester - II)

REFINERY PROCESS DESIGN

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Attempt any three questions from each section.*
- 2) *Answer to the two sections should be written in two separate answer books.*
- 3) *Figures to the right indicate full marks*
- 4) *Use of steam tables and electronic calculator is allowed.*
- 5) *Make use of K Charts, LMTD correction factor curves and Gilliland Curve given in the end wherever appropriate.*
- 6) *Assume suitable data wherever necessary.*

SECTION - I

Q1) A Total Condenser feed consists of 40 Mol% n-butane, 40 Mol% n-pentane and 20 Mol% n-hexane. Condensation is desired with the help of cooling water coming from cooling tower. Plant air has DBT 50 C and WBT as 35 C. Estimate the pressure at which we should operate the column so that adequate driving force is available in this countercurrent shell and tube exchanger. Do also report the LMTD made available, Also estimate the heat transfer area required for the given duty. **[18]**

Q2) Using FUG method, calculate number of theoretical and actual sieve trays required for a C2 splitter. Feed is 20% vaporized liquid having 60% ethylene and 40% ethane (Mol%). The column operates at 7 bar pressure. Recoveries of both ethylene and ethane are desired to be 99%. Also report the approximate height of the tower based on your calculations. State your assumptions clearly. **[16]**

Q3) a) Discuss Packie Charts from operational point of view. **[8]**

- b) Set up the material balance equations for feed zone calculations in ATU. Explain how coil outlet temperature can be determined using these calculations and other relevant data. **[8]**

P.T.O.

- Q4) a)** Pressure drop between the top and bottom of the hydrocarbon distillation tower having 100 actual plates is 1 bar. Average density of hydrocarbon liquid being handled is 855 Kg/m^3 . weir height over an individual sieve tray is 5 cm. Comment on the hydraulic condition of the column. [8]
- b) Discuss in detail structured and random packings used in distillation column. [8]

SECTION - II

- Q5) a)** State the steps used in the design of a shell and tube heat exchanger for a specified duty. [12]
- b) State the heat transfer coefficients you will assume in the following situations: [4]
- i) Light oil being heated
 - ii) Hydrocarbon vapor condensing.
 - iii) Water boiling
 - iv) Heavy oil being cooled.
- Q6) a)** With reference to the fired heaters, explain the following: [8]
- i) Basic heat transfer equation
 - ii) In which refining operations used
 - iii) How shape factor is calculated
 - iv) Approximate heat flux duties for which used
- b) Discuss constructional features of box furnace used in steam cracking of naphtha. [8]

Q7) With reference to centrifugal pump operation and design, discuss: **[18]**

- a) Optimal Operating Point
- b) NPSH and NPSHR
- c) Energy efficiency
- d) Power required

Q8) Discuss

- a) Anti-surge in Compressor operation **[5]**
- b) Compressor power rating **[5]**
- c) Choice of compressor type **[6]**



Total No. of Questions : 12]

SEAT No. :

P1162

[4659] - 258

[Total No. of Pages : 3

B.E.(Petrochemical) (Semester - II)
PLANT DESIGN AND PROCESS ECONOMICS
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Attempt Q1 or 2, Q3 or 4, Q5 or 6, Q7 or 8, Q9 or 10, Q11 or 12 .*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of logarithmic tables, slide rule, Mollier Charts, electronic pocket calculator and steam table is allowed.*
- 5) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Explain in detail the steps involved in a design of a chemical manufacturing process plant. [8]
- b) Draw a typical Plant Lay out of a chemical process plant as per norms. [8]

OR

- Q2)** a) Explain the importance of Pilot Plant studies in plant design. [8]
- b) Explain the role of various engineering departments in a manufacturing chemical process unit. [8]

- Q3)** a) Explain the structure and details of Equipment Data Sheet. Take an example of any process equipment. [8]
- b) What is a P& ID diagram? Draw a P&ID diagram with proper symbols for a control of a liquid level in a tank. [8]

OR

- Q4)** a) Explain the following: [8]
- i) Safety Relief Valve
 - ii) Flare Systems
- b) Write a short note on HAZOP studies. [8]

P.T.O.

Q5) Write a short note on: **[18]**

- a) Project Feasibility Report
- b) Annual Report of a company
- c) Battery Limits and Off site facilities

OR

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

- a) Project Management
- b) GANT Chart
- c) PERT - CPM Techniques

SECTION - II

Q7) a) Discuss the tree diagram showing cash flow for industrial operations. **[8]**

- b) Discuss with suitable example(s) the factors affecting investment and production cost of typical refinery project. **[8]**

OR

Q8) a) Discuss breakdown of Fixed Capital Investment (FCI) items for a chemical process. **[12]**

- b) State and explain types of capital cost estimates. **[4]**

Q9) a) A company is considering the manufacture of ethylene oxide as an intermediate for its polymer division. The process to be used is the direct oxidation of ethylene. The company built a similar unit in 1997 that had a rated capacity of 100,000 tons annually for Rs 66,000,000. The projected production of the new facility is to be 150,000 tons annually. Estimate the fixed capital investment in late 2012 to produce the required ethylene oxide. CE Index for 1997 = 386.5 CE Index for late 2012 = 396.8. **[9]**

- b) A shell- and-tube heat exchanger of 1000 ft² surface area fabricated of carbon steel was purchased in 1995 for Rs. 30,000. [9]
- i) Estimate the purchased price for a 2500 ft² exchanger using the six tenths exponent.
- ii) You read in the literature that exchangers of this size had a 0.70 cost capacity exponent. What is the difference in price compared to that using an exponent of 0.6?
Data: The 1995 CE Index is 381 and the present one is 399.

OR

- Q10)**a) Define and Estimate: Current Ratio, Acid-test ratio, Equity Ratio, Return on Total Assets, Return on Equity, Operating Margin, Profit Margin. [9]
- b) A process plant has an initial investment of Rs. 50 lakhs. The estimated salvage value is Rs. 2 lakhs. It has a life of 8 years. Estimate the book value of the plant after 5 years by [9]
- i) Straight line depreciation method.
- ii) Declining balance method and
- iii) Sinking fund method with a sinking fund interest rate of 10%.

Q11) A mining company is considering purchasing a machine which costs Rs. 30000 and is expected to last 12 years, with a Rs. 3000 salvage value. The annual operating expenses are expected to be Rs. 9000 for the first 4 years, but owing to decreased use, the operating costs will decrease by Rs. 400 per year for the next 8 years. Alternatively, the company can purchase a highly automated machine at a cost of Rs 58000. This machine will last only 6 years, and its salvage value will be Rs 15000. Its operating cost will be Rs 4000 per year. If money worth is 20% per year, which machine should be selected on the basis of a present-worth analysis? [16]

OR

- Q12)** Write a short notes on: [16]
- a) Break Even Analysis.
- b) Role of Insurance - Taxes in process Economics.



Total No. of Questions : 8]

SEAT No. :

P1177

[Total No. of Pages : 2

[4659] - 260

B.E. (Petrochemical Engineering)

B: FINE CHEMICAL INDUSTRIES

(2008 Pattern) (Semester - II) (Elective - III)

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) Differentiate fine chemicals from bulk chemicals. Give examples. [10]
b) Discuss 'green' aspects in manufacture of fine chemicals. [8]
- Q2)** a) Explain importance of selection of a catalyst in fine chemical manufacturing. [8]
b) Write a note on Indian fine chemicals sector. [8]
- Q3)** a) Discuss separation strategies crucial to fine chemicals manufacture. [10]
b) Discuss major outlets for fine chemicals at global level. [6]
- Q4)** a) Explain the concept of mixed plants. [10]
b) Discuss with examples strategies for waste minimization in fine chemicals sector. [6]

P.T.O.

SECTION - II

- Q5)** a) Discuss operation of batch plants with merits and demerits. [12]
b) What is the relevance of scale down methodologies? [6]
- Q6)** a) Discuss in detail manufacturing process for any one fine chemical. [10]
b) Write a note on effect of scale of manufacturing with reference to the fine chemical industry. [6]
- Q7)** a) Write a note on ion exchange resins in preparation of fine chemicals. [10]
b) Discuss the possible reasons for shifting of manufacturing bases for fine chemicals from west to the east. [6]
- Q8)** Discuss : [16]
a) Supercritical Extraction
b) Heterogeneous vs homogeneous catalysis



Total No. of Questions : 8]

SEAT No. :

P1102

[4659]-278

[Total No. of Pages : 4

B.E. (Petroleum Engineering)

IMPROVED OIL RECOVERY AND RESERVOIR SIMULATION

(412387) (2008 Course)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections must be written in separate answer books.*
- 2) *Question No 2 (two) and 8(eight) are compulsory.*
- 3) *Figures to the right indicate full marks.*
- 4) *Answer 3 questions from Section I and 3 questions from Section II.*
- 5) *Neat diagrams must 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)** How is reservoir simulation integrated with a geological / static model? What are the steps involved in building one? **[6]**
- b) Why do we use discretization in reservoir simulation? Explain with appropriate figures, equations and explanations. **[10]**
- Q2) a)** Explain in detail 3 implicit and 3 explicit methods of discretizing an equation. Discretize the following equation given below, using 1 of the above defined explicit and 1 implicit scheme. **[10]**
- $$\frac{\partial^2 u}{\partial x^2} = 0$$
- b) Derive the diffusivity equation in radial coordinates. **[8]**
- Q3) a)** Write the 1-D horizontal general fluid flow equation for oil, water and gas (both under-saturated as well as saturated). **[6]**

P.T.O.

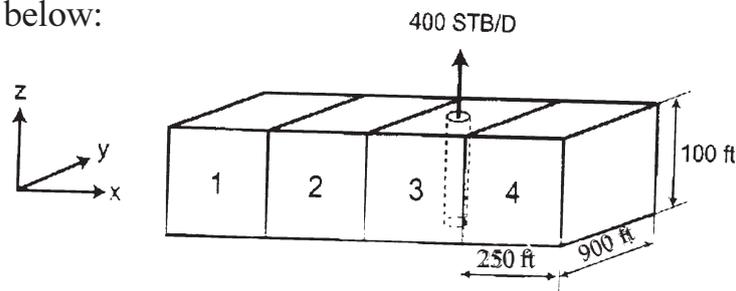
- b) Using any of the finite difference schemes, solve the following differential equation. Consider a 3 element system with four nodes, u_1 to u_4 , with both these being boundary nodes. Boundary conditions are provided for these nodes: [10]

$$\frac{\partial^2 u}{\partial x^2} - 2u = 0 \text{ where } 0 < x < 1 \text{ and } f(x) = 4x^2 - 2x - 4$$

Boundary conditions are:

$$u_1 = 0 \text{ @ } x = 0 \text{ and } u_4 = -1 \text{ @ } x = 1.$$

- Q4)** a) A well produces @ 400 STB/D. Dimensions of the block are - $\Delta x = 250$ ft; $w = 900$ ft; $h = 100$ ft; $kx = 270$ md. $Fvf = 1.0$ rb/stb; viscosity = 2cp. Write the flow equation for block 3, as shown in the figure below: [8]



- b) State the important steps used in building a reservoir model? How are these steps related to each other? Explain in detail. [8]

SECTION - II

- Q5)** What do you mean by EOR? Describe it in detail with the screening criteria. Why does such a screening criteria exist. [16]
- Q6)** How does SAGD differ from Huff and Puff method? Explain with diagrams, its advantages and disadvantages. [16]
- Q7)** Write a detailed note on In-Situ Combustion. [16]
- Q8)** Write short notes on (any three): [18]
- Waterflooding.
 - Miscible and Immiscible Flooding.
 - Fractional flow theory.
 - ASP Flooding.

Formulas / Equations for the exam

$$\int_{t^n}^{t^{n+1}} \{T_{x_{i+1/2}} [(p_{i+1} - p_i) - \gamma_{i+1/2} (Z_{i+1} - Z_i)]\} dt + \int_{t^n}^{t^{n+1}} \{T_{x_{i-1/2}} [(p_i - p_{i-1}) - \gamma_{i-1/2} (Z_i - Z_{i-1})]\} dt + \int_{t^n}^{t^{n+1}} q_{sc_i} dt = \frac{V_{b_i}}{\alpha_c} \frac{d}{dp} \left(\frac{\phi}{B} \right)_i [p_i^{n+1} - p_i^n],$$

$$\int_{t^n}^{t^{n+1}} w_x \Big|_{x_{i-1/2}} dt - \int_{t^n}^{t^{n+1}} w_x \Big|_{x_{i+1/2}} dt + \int_{t^n}^{t^{n+1}} q_{m_i} dt = m_{a_i}$$

$$\begin{aligned} & T_{z_{i,j,k-1/2}}^m [(p_{i,j,k-1}^m - p_{i,j,k}^m) - \gamma_{i,j,k-1/2}^m (Z_{i,j,k-1} - Z_{i,j,k})] \\ & + T_{y_{i,j-1/2,k}}^m [(p_{i,j-1,k}^m - p_{i,j,k}^m) - \gamma_{i,j-1/2,k}^m (Z_{i,j-1,k} - Z_{i,j,k})] \\ & + T_{x_{i-1/2,j,k}}^m [(p_{i-1,j,k}^m - p_{i,j,k}^m) - \gamma_{i-1/2,j,k}^m (Z_{i-1,j,k} - Z_{i,j,k})] \\ & + T_{x_{i+1/2,j,k}}^m [(p_{i+1,j,k}^m - p_{i,j,k}^m) - \gamma_{i+1/2,j,k}^m (Z_{i+1,j,k} - Z_{i,j,k})] \\ & + T_{y_{i,j+1/2,k}}^m [(p_{i,j+1,k}^m - p_{i,j,k}^m) - \gamma_{i,j+1/2,k}^m (Z_{i,j+1,k} - Z_{i,j,k})] \\ & + T_{z_{i,j,k+1/2}}^m [(p_{i,j,k+1}^m - p_{i,j,k}^m) - \gamma_{i,j,k+1/2}^m (Z_{i,j,k+1} - Z_{i,j,k})] \\ & + q_{sc_{i,j,k}}^m = \frac{V_{b_{i,j,k}}}{\alpha_c \Delta t} \left[\left(\frac{\phi}{B} \right)_{i,j,k}^{n+1} - \left(\frac{\phi}{B} \right)_{i,j,k}^n \right], \end{aligned}$$

$$\begin{aligned} & T_{x_{i,j-1/2}}^m [(p_{i,j-1}^m - p_{i,j}^m) - \gamma_{i,j-1/2}^m (Z_{i,j-1} - Z_{i,j})] \\ & + T_{x_{i-1/2,j}}^m [(p_{i-1,j}^m - p_{i,j}^m) - \gamma_{i-1/2,j}^m (Z_{i-1,j} - Z_{i,j})] \\ & + T_{x_{i+1/2,j}}^m [(p_{i+1,j}^m - p_{i,j}^m) - \gamma_{i+1/2,j}^m (Z_{i+1,j} - Z_{i,j})] \\ & + T_{y_{i,j+1/2}}^m [(p_{i,j+1}^m - p_{i,j}^m) - \gamma_{i,j+1/2}^m (Z_{i,j+1} - Z_{i,j})] + q_{sc_{i,j}}^m = \frac{V_{b_{i,j}}}{\alpha_c \Delta t} \left[\left(\frac{\phi}{B} \right)_{i,j}^{n+1} - \left(\frac{\phi}{B} \right)_{i,j}^n \right] \end{aligned}$$

$$\int_{t^n}^{t^{n+1}} \left(\frac{u_x A_x}{B} \right) \Big|_{x_{i-1/2}}^{x_i} dt - \int_{t^n}^{t^{n+1}} \left(\frac{u_x A_x}{B} \right) \Big|_{x_{i+1/2}}^{x_i} dt + \int_{t^n}^{t^{n+1}} q_{sc_i} dt = \frac{V_{b_i}}{\alpha_c} \left[\left(\frac{\phi}{B} \right)_i^{n+1} - \left(\frac{\phi}{B} \right)_i^n \right]$$

$$T_{x_{i-1/2}}^m [(p_{i-1}^m - p_i^m) - \gamma_{i-1/2}^m (Z_{i-1} - Z_i)] + T_{x_{i+1/2}}^m [(p_{i+1}^m - p_i^m) - \gamma_{i+1/2}^m (Z_{i+1} - Z_i)] + q_{sc_i}^m = \frac{V_{b_i}}{\alpha_c \Delta t} \left[\left(\frac{\phi}{B} \right)_i^{n+1} - \left(\frac{\phi}{B} \right)_i^n \right]$$

$$T_{x_{i-1/2},k} = \left(\beta_c \frac{k_x A_x}{\mu B \Delta x} \right) \Big|_{x_{i-1/2},k} = \left(\beta_c \frac{k_x A_x}{\Delta x} \right)_{x_{i-1/2},k} \left(\frac{1}{\mu B} \right)_{x_{i-1/2},k} = G_{x_{i-1/2},k} \left(\frac{1}{\mu B} \right)_{x_{i-1/2},k}$$

$$T_{y_{i,j+1/2},k} = \left(\beta_c \frac{k_y A_y}{\mu B \Delta y} \right) \Big|_{y_{i,j+1/2},k} = \left(\beta_c \frac{k_y A_y}{\Delta y} \right)_{y_{i,j+1/2},k} \left(\frac{1}{\mu B} \right)_{y_{i,j+1/2},k} = G_{y_{i,j+1/2},k} \left(\frac{1}{\mu B} \right)_{y_{i,j+1/2},k}$$

$$T_{z_{i,j,k+1/2}} = \left(\beta_c \frac{k_z A_z}{\mu B \Delta z} \right) \Big|_{z_{i,j,k+1/2}} = \left(\beta_c \frac{k_z A_z}{\Delta z} \right)_{z_{i,j,k+1/2}} \left(\frac{1}{\mu B} \right)_{z_{i,j,k+1/2}} = G_{z_{i,j,k+1/2}} \left(\frac{1}{\mu B} \right)_{z_{i,j,k+1/2}}$$



Total No. of Questions : 12]

SEAT No. :

P1103

[4659]-279

[Total No. of Pages : 3

B.E. (Petroleum)

PETROLEUM PRODUCTION ENGINEERING - II

(Semester - II) (412388) (2008 Course)

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 indicate full marks.*
- 5) *Use of calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

- Q1) a)** Discuss considerations in optimization of surface production facility design. **[6]**
- b) Draw and design a two phase vertical separator using the following data: **[12]**

Gas flow rate (Q_g) = 11 MMscf/day

Oil flow rate (Q_o) = 2100 bbls/day for 42°API

Operating Pressure = 980 psia

Operating Temperature = 60°F

Specific Gravity of Gas = 0.6

Gas Compressibility = $Z = 0.83$

From std. graph given value of $k = 0.284$ (Constant based on liquid gas properties)

Liquid drop to be separated = $d_m = 100$ micron

Assume slenderness ratio of 3 & 4. Retention time 2, 2.5, & 3 minutes.

OR

P.T.O.

Q2) Draw and explain in brief process flow diagram of separation facility, gas compression, emulsion treater and water treating system. Indicate various components and features of it. **[18]**

Q3) Following data is known for sizing of a horizontal treater. **[16]**

Oil gravity = 36° API. Oil flow rate = 7000 bbl/day. Initial oil temperature = 90°F. Inlet BS & W and outlet BS & W are 7% and 2% respectively. Water S.G . = 1.02.

Plot d Vs L_{eff} , computation of vessel diameter and length of coalescing section with retention time less than 15 minutes. Calculate heat required and choose suitable combination of d and L_{eff} that is not in the shaded area, for this treater. Comment on your findings.

Treating temperatures	100°F	120°F	140°F
Corresponding Oil viscosity in cp	33	16	8
Diameter of water droplet to be settled from the oil, in microns	110	140	160

OR

Q4) a) Explain in brief Heater treater. **[6]**

b) Discuss in detail working of skimmer tanks. **[10]**

Q5) a) Describe in brief any one method to control the corrosion in oilfield operations. **[10]**

b) Explain corrosion inhibitors in brief. **[6]**

OR

Q6) a) Write the role of different factors that contribute to corrosion process. **[10]**

b) Discuss the factors that are helpful in prevention of corrosion. **[6]**

SECTION - II

Q7) a) Discuss in brief any two methods to remove paraffin from wells. **[9]**

b) Write various categories of scale and discuss the method of their removal in brief. **[9]**

OR

- Q8)** a) What is the role of temperature and pressure variation in wax deposition? Explain. [6]
 b) Draw and explain typical DST curve. [6]
 c) Write applications of RFT in formation evaluation. [6]

Q9) For the following data, evaluate the formation damage using pressure - build up method. Show plot of ' P_{ws} ' Vs ' $(t_o + \Delta t) / \Delta t$ ' on a semi log graph paper. Flow test data: 100bbl/day. Pay zone thickness, $H = 20$ ft. Bottom hole flowing pressure $P_{wf} = 1400$ psi. Drainage radius, $r_e = 800$ ft. Wellbore radius, $r_w = 0.33$ ft. Fluid Properties: Viscosity 10 cp, Oil formation volume factor, $B_o = 1.11$ res.bbl/STB. Cumulative production = 3500 bbl. Total shut in time, $t_o = 700$ hrs. Readings of pressure build up are given below. Values of Δt are included in the term ' $(t_o + \Delta t) / \Delta t$ ', use this term directly. [16]

P_{ws}	1480	1645	1750	1970	2020	2050	2070	2090	2105	2115	2120	2125	2129	36
$(t_o + \Delta t) / \Delta t$	1440	721	361	181	121	91	72	61	52	46	37	31	25	21

OR

Q10) Write different methods to control gas, water and sand production in oilfield operations? Explain any one method in brief for each. [16]

- Q11)** a) Discuss downhole separation, injection and application of produced gas and water to improve the production performance of oilfield in brief. [10]
 b) Draw neat schematic sketch of a multilateral well with application of intelligent completion system in it. Show various elements of it. [6]

OR

Q12) Write short notes on: [16]

- a) Separation and processing of oil and gas.
 b) Challenges in heavy oil production.
 c) Applications of Intelligent well completion.
 d) Applications of Multilateral well completion.



Total No. of Questions : 12]

SEAT No. :

P1166

[Total No. of Pages : 2

[4659] - 301

B.E. (Chemical) (Semester - II)
PROCESS MODELING AND SIMULATION
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

- 1) Answer any 3 questions from each Section.*
- 2) Answers to the two Sections should be written in separate 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) Draw a flowchart showing the major steps in process modeling. Show the interrelations between the flowchart stages. Alongside each major step, list in brief, point the key issues for each major modeling task. [9]
- b) Provide a classification of the major categories of equations in a mechanistic process model. What are the subclasses in each major category? Outline how each of the classes of equations is interrelated.[9]

OR

- Q2)** a) What is lumped and distributed model? Explain it with suitable example.[9]
- b) What is linear and non linear model? Explain it with suitable example.[9]
- Q3)** a) What is continuity equation and transport equation? [8]
- b) Write equation of state, phase and chemical equilibrium. [8]

OR

P.T.O.

- Q4)** a) Explain degrees of freedom with example. [8]
b) What is the key difference between independent variable and dependent variable? [8]

Q5) Develop a model for triple effect evaporator with assumptions. [16]

OR

Q6) Develop a model for fluid solid operation. [16]

SECTION - II

Q7) Develop a model for plug flow reactor. [16]

OR

Q8) Develop a model for vaporizer. [16]

Q9) Develop a model for CSTR. [18]

OR

Q10) Develop a model for Trickle Bed Reactor. [18]

Q11) What is simulation? Explain the simulation of effluent treatment plant. [16]

OR

Q12) Write different process simulation software and explain Hysis with example. [16]



Total No. of Questions : 12]

SEAT No. :

P1167

[Total No. of Pages : 3

[4659] - 302
B.E. (Chemical)
Process Engg. Costing & Plant Design
(2008 Pattern) (Semester - II)

Time : 3 Hours]

[Maximum 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) *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.*

SECTION - I

- Q1)** a) Explain factors affecting process selection. **[10]**
b) Explain the factors that govern selection of plant location. **[8]**

OR

- Q2)** a) Discuss in detail the techno - economic feasibility of report of a project. **[10]**
b) Explain significance of laboratory data in process development. **[8]**

- Q3)** a) Define depreciation and discuss its need and significance? **[8]**
b) Discuss various methods of determine depreciation charges. **[8]**

OR

Q4) Write note on :

- a) Fixed capital. **[4]**
- b) Working capital. **[4]**
- c) 6/10 factor rule. **[4]**
- d) Insurance. **[4]**

P.T.O.

- Q5)** a) Explain in detail mathematical methods for profitability evaluation with neat diagram. [8]
 b) Explain cash flow analysis for an industrial operation. [8]

OR

- Q6)** a) Explain with a neat sketch cumulative cash position showing effects of cash flow with time for an industrial operation neglecting time value of money. [8]
 b) A company has three alternative investments which are being considered. Because all these investments are for the same type of unit and yields same service only one of the investments can be related. If a company in charge expects 15% rate of return on original investment which one will be suitable? [8]

Item	Investment (I)	Investment (II)	Investment (III)
Initial Fixed Capital (Rs.)	1,00,000	1,70,000	2,10,000
Working Capital Investment (Rs.)	10,000	10,000	15,000
Annual Cash flow (Rs.)	30,000	52,000	59,000
Annual Expenditure (Rs.)	15,000	28,000	21,000

SECTION - II

- Q7)** a) Give difference between market survey and market research. [8]
 b) Explain with a neat sketch the break – even chart for production schedule and its significance for optimum analysis. [8]

OR

- Q8)** A plant produces refrigerators at the rate of P units per day. The variable costs per refrigerator have been found to be Rs. (47.73 + 0.1 P^{1.2}). The total daily fixed charges are Rs. 1750 and all other expenses are constant at Rs. 7325 per day. The profit is selling price per refrigerator minus total cost per refrigerator. Total cost per refrigerator is given as [16]

$$C_T = 47.73 + 0.1P^{0.2} + \frac{1750 + 7325}{P}$$

If the selling price per refrigerator is Rs. 173

Determine :

The daily profit at a production schedule giving the minimum cost per refrigerator.

- i) The daily profit at a production schedule giving the maximum daily profit.
 ii) The production schedule at the break - even point.

- Q9)** a) Derive the following equation for the optimum outside diameter of insulation in a wire for maximum heat loss.

$$D_{opt} = \frac{2k_m}{(h_c + h_r)_c}$$

Where k_m is the mean thermal conductivity of the insulation and $(h_c + h_r)_c$ is the combined and constant surface heat transfer coefficient. The values of k_m and $(h_c + h_r)_c$ can be considered as constants independent of temperature level and insulation thickness. [10]

- b) Find the values of x , y and z that minimize the function $x + 2y^2 + z^2$ subject to the constraint that $x + y + z = 1$, making use of the Lagrangian multiplier. [8]

OR

- Q10)** a) Write an explanatory note on Pinch technology. [9]
b) Discuss the points in brief required while preparation of techno-economic feasibility report. [9]

- Q11)** Define CPM and PERT and explain the application of the same for setting up a new chemical plant. Define the activities involved in this project and construct the network diagram. [16]

OR

- Q12)** a) What points should be considered while deciding plant location? Draw a plant layout and name the parts. [8]
b) Differentiate between CPM and PERT. Give one example of each. [8]



Total No. of Questions : 12]

SEAT No. :

P1117

[4659] - 323

[Total No. of Pages : 3

B.E. (Polymer)

PRODUCT DESIGN AND POLYMER TESTING

(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 indicate full marks.*
- 5) *Use of calculator is allowed.*
- 6) *Assume suitable data if necessary.*

SECTION - I

- Q1)** a) Why design consideration is important while designing a component. explain with any one example. [6]
- b) Give application of creep curves with suitable example. [6]
- c) Explain stress relaxation and its significance during product design. [6]

OR

- Q2)** a) Write a note on design of bosses and ribs used in Injection molded components and what benefit do they offer to the component. [6]
- b) Write a note on factors to be considered while designing gears from plastics. [6]
- c) With a suitable example describe the process of material selection used during plastic product design. [6]

- Q3)** a) Write a note on different types of snap fittings and fit assembly. [8]
- b) Why welding is required and what are the different welding techniques used for plastics. [8]

OR

P.T.O.

- Q4)** a) Write a note on [8]
i) Rivets,
ii) Self tapping screw
b) Write a note on mechanical fasteners, adhesives and inserts required by polymers. [8]

- Q5)** a) Give the reason why standards are created for testing. [4]
b) With some product justify when and how impact and abrasion properties are to be studied. [8]
c) Describe the test procedure to determine coefficient of linear thermal expansion. [4]

OR

- Q6)** a) Explain what is VST and how is it found. [5]
b) Discuss the effect of varying strain rate during tensile testing on the results obtained. [6]
c) Define Heat deflection temperature. (HDT). Describe the test procedure to determine HDT. [5]

SECTION - II

- Q7)** a) Explain what is permeability and the factors affecting it. Also explain what is meant by $\rho = S \times D$ with suitable eg. [9]
b) Give the significance of density for polymers. Explain the method to find density by density gradient method. [9]

OR

- Q8)** a) Explain what is meant by non-destructive testing. Explain any one test method with proper diagram. [9]
b) Give the method used for finding moisture content. and also burst strength method for pipes. [9]

- Q9)** a) Explain why and how luminous transmittance and haze properties are studied. [8]
b) With any one eg. explain why and how electrical properties are studied. Explain any one in detail. [8]

OR

- Q10)a)** Define refractive index and explain the refractometric method to determine the index of refraction. [8]
- b) Explain following terms [8]
- i) Volume and surface resistivity
 - ii) Arc resistance
 - iii) Specular gloss

- Q11)a)** Which polymers are prone to ESCR and why. Explain ESCR test method with diagram. [8]
- b) Explain flammability test for self supporting plastics in horizontal position. Also explain what is flash ignition temperature. [8]

OR

- Q12)a)** Why weathering resistance properties are studied and explain test methods for checking fungi resistance of plastics. [8]
- b) Explain dielectric strength and factors affecting them. [8]



Total No. of Questions : 12]

SEAT No. :

P1118

[4659] - 324

[Total No. of Pages : 3

B.E. (Polymer)

MOLD AND DIE DESIGN - II

(2008 Course) (Semester - II)

Time : 4 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Explain the various stages with neat figures in collapsible core method for ejection of internally threaded components. [9]
- b) Explain the rack and pinion method with neat sketch for ejection of threaded components. [9]

OR

- Q2)** a) Discuss in details with a neat figure rotating withdrawing core method for ejection of internally threaded components. [9]
- b) Discuss in details axially fixed rotating core method for ejection of internally threaded components with neat figures. [9]

- Q3)** a) A manifold block is heated from 40°C to 220°C. Calculate expansion between centers of secondary nozzles which are situated 600mm in x direction and 300 mm in y direction. Coefficient of thermal expansion for steel $\alpha = 13 \times 10^{-6}$ mm/mm °C. [8]
- b) Explain the various heating techniques used for heating hot runner blocks with neat sketches. [8]

OR

P.T.O.

- Q4)** a) Explain in details with neat figures any 2 secondary nozzles. [8]
 b) With a neat sketch, explain construction of a circular manifold block. [8]
- Q5)** a) Explain in details constructional features of molds used for vacuum forming. [10]
 b) Discuss in details materials used for fabrication of rotational molds. [6]
- OR
- Q6)** a) Explain in details semi positive and positive compression molds. [10]
 b) Explain constructional features of molds used for injection stretch blow molding. [6]

SECTION - II

- Q7)** Design a 2 cavity mold for the component shown in figure 1. Draw at least 2 views with one sectional view to bring out the details of the feed, cooling and ejection system. Illustrate the relevant design calculations. [30]

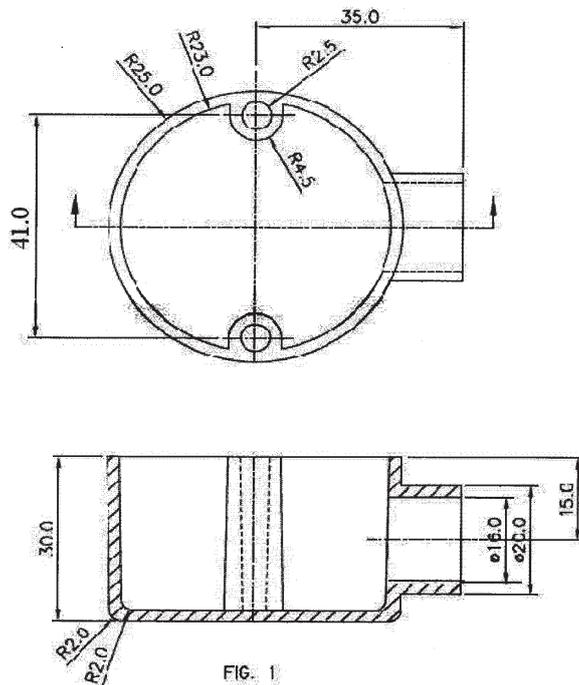


FIG. 1
 Material :ABS
 Draft : 1°
 Cavity pressure : 350kg/cm²
 Uniform wall thickness = 2.0 mm

OR

Q8) Design a 2 cavity mold for the component shown in figure 2. Draw at least 2 views with one sectional view to bring out the details of the feed, cooling and ejection system. Illustrate the relevant design calculations. [30]

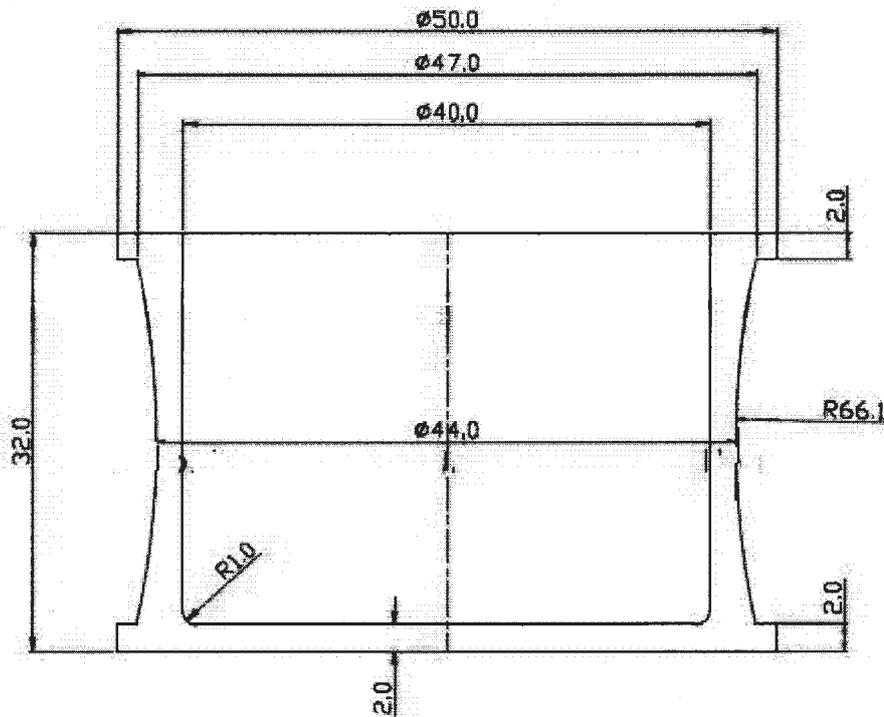


FIG. 2
 Material: GPPS
 Draft: 1°
 Cavity pressure: 300kg/cm²
 Uniform wall thickness = 2.0 mm

Q9) Explain in details constructional features of a flat film die. [10]

OR

Q10) List the various design formulae used in design of coat hanger sheet die. Give the detailed design process. [10]

Q11)a) Discuss effect of gate location on location of weld line and air traps with an example. [5]

b) Explain the term shrinkage. Give 2 reasons for shrinkage. [5]

OR

Q12) Discuss Ellis and Carreau viscosity models in details. [10]



Total No. of Questions : 12]

SEAT No. :

P884

[Total No. of Pages :2

[4659] - 343

B.E. (Instrumentation and Control)
PROCESS DYNAMICS AND CONTROL
(2008 Course) (Semester - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer three questions from Section I and three questions from Section - II.*
- 2) *Answers to the two sections should be written in separate 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) Describe the factors considered in development of a process control strategy for the application of a Surge Tank. [8]
- b) Explain the role of modeling in Process Control [8]

OR

- Q2)** a) With the help of necessary equations explain the dynamic behavior of a first order system considering any suitable process. [8]
- b) List various types of mathematical models. Describe any two types in detail. [8]
- Q3)** a) For a typical Heat Exchanger sensors are installed to measure inlet, outlet, water, steam temperature, inlet water flow and steam flow. Sketch selecting proper sensors, Feedback and Feedforward control loop. [8]
- b) Derive the transfer function θ/θ_s to describe the dynamic behavior of a steam heated exchanger. [10]

OR

- Q4)** a) Explain the effect of Measurement lag on temperature control system of a heat exchanger. [9]
- b) Explain with neat sketch how Cascade concept is implemented in Heat Exchanger. [9]

P.T.O.

- Q5)** a) Define 'Interlock'. Explain Various Safety interlocks used in a boiler. [8]
b) With the help of necessary diagram, explain FF-FB boiler drum level control. [8]

OR

- Q6)** a) Describe Burner Management System in a boiler. [12]
b) Explain 'Inverse Response' in a Boiler. [4]

SECTION - II

- Q7)** List various dynamic elements existing in jacketed temperature controlled reactor. Analyze the effect of each element on control performance. Suggest methods to marginalize the effect. Assume suitable data. [16]

OR

- Q8)** a) Sketch a detailed control activity model for a batch process. Explain the first level i.e. Safety Interlock level of this model. [8]
b) With the help of necessary diagrams explain end point detection in continuous reactors. [8]

- Q9)** a) With the help of necessary equations explain mass and energy balance in distillation process. [10]
b) Elaborate 'Reflux Control' in a typical distillation column. [8]

OR

- Q10)** a) Explain with neat sketch the composition, level and pressure control in a distillation column. [10]
b) Explain the effect of lag in vapor flow on distillation process. [8]

- Q11)** a) Explain with neat sketch Anti-surge protection used for compressors. [8]
b) Describe the Instrumentation system required for a centrifugal pump. [8]

OR

- Q12)** Describe the automation strategy used in water treatment plant considering the steps involved in it. [16]



Total No. of Questions : 12]

SEAT No. :

P885

[Total No. of Pages :2

[4659] - 344

**B.E. (Instrumentation Engineering)
INDUSTRIALAUTOMATION
(2008 Course) (Semester - II)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer three questions from Section I and three questions from Section - II.*
- 2) *Answers to the two sections should be written in separate 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 in detail about the benefits of Automation in a plant with suitable example. **[16]**

OR

Q2) Explain the role of SCADA in automation with suitable example in detail. **[16]**

Q3) Compare HART & Foundation fieldbus Protocols with respect to OSI model in detail. **[16]**

OR

Q4) Explain the communication details of foundation field bus with field devices with example. **[16]**

Q5) a) Explain in detail about functional block diagram and sequential function chart of PLC programming. **[9]**

b) What is IEC 1131 - 3 with respect to PLC programming. **[9]**

OR

Q6) a) Write short note on CNC machine. **[9]**

b) Explain various step involved in developing PLC based automation project. **[9]**

P.T.O.

SECTION - II

Q7) Explain in detail the functional block of DCS system. **[16]**

OR

Q8) Explain the architecture of DCS in detail. **[16]**

Q9) a) Explain in detail about user access management in DCS. **[8]**

b) Explain Alarm & how Alarms are calssified & prioritized. **[8]**

OR

Q10)a) Explain third party Interface with suitable example in detail. **[8]**

b) Explain DCS support for Enterprise Resource planning. **[8]**

Q11)What is safety system architecture? Explain IEC 61511 standard for functional safety. **[18]**

OR

Q12)What is process Hazard Analysis?

Explain different methods for PHA in detail. **[18]**



Total No. of Questions : 12]

SEAT No. :

P1135

[4659]-362

[Total No. of Pages :2

B.E. (Biotechnology)

BIO PROCESS MODELING AND SIMULATION

(2008 Course) (Semester - II) (415469)

Time : 3Hours]

[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 4, Q.5 or 6 from section I and Q.7 or 8, Q.9 or 10, Q.11 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) Define the following with a suitable example: **[16]**

- a) Mathematical Modelling.
- b) Degrees of freedom and its variations.
- c) Chemical Equilibria.
- d) Phase Equilibria.

OR

Q2) Discuss in detail the following models: **[16]**

- a) Segregated models.
- b) Comparison between Rigid and Stochastic models.

Q3) Derive the energy equation for a CSTR with consecutive first order reaction with exothermic heat of reaction λ_1 and λ_2 with proper assumptions and nomenclature accompanied by a neat sketch. Prove that the system is critically defined. **[16]**

OR

Q4) Model Gravity flow system with proper assumptions and a neat sketch. **[16]**

P.T.O.

- Q5)** Write short notes on the following with suitable examples: [18]
- a) Parameters
 - b) Dependent variables
 - c) Static Model

OR

- Q6)** Give detailed notes on Distributed parameter models and Lumped parameter models. [18]

SECTION-II

- Q7)** Give the simulation equations of a Batch reactor with proper nomenclature, assumptions and a neat sketch. [16]

OR

- Q8)** Explain in detail Cell growth kinetics and application of Michaels Menton equation. [16]

- Q9)** Write short notes on activated sludge systems. Model Suspended growth systems with proper diagram and assumptions. [16]

OR

- Q10)** Write short notes on Agitated and Sparged Bio reactor. List out their applications in Biotech industries? [16]

- Q11)** Model a Multi component batch distillation column and prove that the system is critically specified. [18]

OR

- Q12)** Write a detailed notes on working process of binary distillation column accompanied by a neat sketch. What are the advantages of distillation over conventional separation process? [18]

EEE

Total No. of Questions : 12]

SEAT No. :

P1136

[4659]-363

[Total No. of Pages :2

B.E. (Biotechnology)

PLANT ENGINEERING AND PROJECT COSTING

(2008 Course) (Semester - II) (415470)

Time : 3Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Figures to the right indicate full marks.*
- 2) *Use of programmable calculator is not allowed.*
- 3) *Draw a neat sketch wherever necessary.*
- 4) *Make necessary assumptions where required.*
- 5) *Answer any three questions from section I and any three questions from section II.*

SECTION-I

Q1) Explain the following: **[18]**

- a) Pilot Plant Data.
- b) Quantitative Process Flow Diagram.
- c) Qualitative Process Flow Diagram.

OR

Q2) a) State a series of stages by which a plant design project moves to completion. **[9]**

b) Discuss the importance of process flow diagram in plant design. **[9]**

Q3) a) Explain in detail the factors to be considered for preparing a plant layout with a suitable example. **[8]**

b) Explain the criteria for location of different buildings and facilities in the drawing of plant layout of penicillin production plant. **[8]**

OR

Q4) What are the factors affecting plant location and layout? Explain in detail. **[16]**

Q5) a) Write short note on color code of pipeline carrying utilities. **[8]**

b) Explain the procedure of preparation of bill of material for piping. **[8]**

OR

P.T.O.

- Q6)** a) State different types of thermal insulation for heating and cooling used in piping design. [8]
b) Explain the concept of water hammering in process design. [8]

SECTION-II

- Q7)** a) Discuss about CPM/PERT technique with suitable example. [8]
b) Distinguish between process plant commissioning and process plant testing. [8]

OR

- Q8)** a) What are the different methods of raising finance? Explain any two. [8]
b) What are the different factors affecting on investment? [8]

Q9) Write short note on: [18]

- a) Profitability analysis
b) Marginal additional investment

OR

Q10) State different types of taxes? Explain any four. [18]

- Q11)** a) Write short note on static and mobile pressure vessel (SMPV). [8]
b) State and explain any two methods of depreciation? [8]

OR

- Q12)** a) Explain HAZOP studies. How HAZOP study is useful for controlling the process parameter. [8]
b) Write short note on IBR issue. [8]

EEE

Total No. of Questions : 12]

SEAT No. :

P757

[Total No. of Pages : 3

[4659] - 381

B.E. (Automobile Engineering) (Semester - II)
ALTERNATIVE FUELS AND EMISSION CONTROL
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Differentiate between conventional and non-conventional fuels. [6]
b) What is enthalpy of formation and enthalpy of combustion? [10]

OR

- Q2)** a) Explain the term quality rating of SI and CI engine fuels. [6]
b) What do you mean by alternative fuel? Explain it's need, advantages and application in an automobile. [10]

- Q3)** a) Write a note Bio-diesel [6]
b) Differentiate CNG and diesel by it's properties, advantages, disadvantages and applications [6]
c) Can we use ethenol as alternative fuel for IC engine? Explain. [6]

P.T.O.

OR

- Q4)** a) What are engine modification required while using bio-diesel as a fuel?[6]
b) Write a note on storage of hydrogen fuel. [6]
c) Explain the use of vegetable oil as an alternative fuel. [4]

- Q5)** a) Write a short note on syngas. [8]
b) What are the types of synthetic fuel? Explain biomass to liquid (BTL) fuel. [8]

OR

- Q6)** a) Explain any two synthetic fuel with it's properties, advantages, disadvantages and handling. [8]
b) Can we use water as fuel for vehicle? Explain [8]

SECTION - II

- Q7)** a) Write content of SI engine emission.Enlist methods of reducing HC emission. [4]
b) What are the causes of co-emission in SI engine? Give any two remedies.[4]
c) Explain positive crankcase ventilation system for reduction of uBHC emission. [8]

OR

- Q8)** a) What are the methods of exhaust after treatment explain any one. [6]
b) What is the effect of design and operating variable on SI engine emission.[10]

Q9) Explain effect of design and operating parameters on CI engine emission.[16]

OR

- Q10)**a) How will you reduce the NOx emission? Explain EGR system in details.[8]
b) Explain any one method of smoke measurement in details. [8]

Q11) Write short note on :

- a) Emission inventory [6]
- b) Ambient air quality monitoring [6]
- c) Indian emission norms [6]

OR

- Q12)**
- a) What are the effects of engine emission on human health and on environment? [8]
 - b) Enlist any eight remedies to reduce the engine emission with explanation. [8]



Total No. of Questions : 10]

SEAT No. :

P758

[Total No. of Pages : 2

[4659]-382

B.E. (Automobile Engg.) (Semester - II)
VEHICLE PERFORMANCE & TESTING
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

- 1) *Answers of two sections should be written in separate answer books.*
- 2) *Assume suitable data wherever necessary.*
- 3) *Neat diagrams must be drawn wherever necessary.*

SECTION - I

- Q1)** a) Explain in brief about 'Exhaust gas recirculation' & its impact on vehicle performance. [8]
- b) Write in brief about impact of high torque generating engine & transmission on vehicle performance. [8]

OR

- Q2)** a) Write a short note on : [8]
- i) Economy.
 - ii) Grad ability.
 - iii) Stopping distance.
 - iv) Ride.
- b) Explain with neat sketch 'Lambda close loop sensor'. [8]

- Q3)** a) Explain, epicyclic transmission system & its advantages over stepped transmission. [8]
- b) Write in brief about gear box testing for noise & shifting force. [8]

OR

- Q4)** a) Which type of gear box & transmission is suitable for city variant & highways? Why? [8]
- b) Explain in brief 'working of differential unit' & its impact on performance. [8]

- Q5)** Write a brief note on following (any three) : [3 × 6 = 18]

- a) Virtual Testing of vehicle.
- b) Coast down test.
- c) Proving Ground tracks.
- d) Chassis dynamometer.

P.T.O.

SECTION - II

- Q6)** a) Write a short note on Electronic stability program. [8]
b) Why particulate trap function is necessary for environmental safety? Explain with construction? [8]

OR

- Q7)** a) Write a brief introduction of HANS system. [8]
b) Differentiate active safety & passive safety & write any 4 motor safety standards. [8]

- Q8)** a) Explain Dummies with it types. [10]
b) Write a short note on crash data acquisition system. [8]

OR

- Q9)** a) With the help of neat sketch, explain working & construction of crash test sensor & its location of mounting in case of air bags. [10]
b) Explain about rear crash testing. [8]

Q10) Write a brief note on following (any four) : [4 × 4 = 16]

- a) Engine noise & vibration.
- b) Hydrometer.
- c) Prototype testing.
- d) Road shock transmission to passengers.
- e) Endurance test.



Total No. of Questions : 12]

SEAT No. :

P738

[Total No. of Pages : 3

[4659]-42

B.E. (Mechanical) (Semester - II)
POWER PLANT ENGINEERING
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

- 1) *Solve Q1 or 2, Q3 or 4, Q5 or 6 from section - I.
Solve Q7 or 8, Q9 or 10, Q11 or 12 from section - II.*
- 2) *Figures to the right indicate full marks.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam table is allowed.*
- 5) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Compare Diesel and Hydro Power Plants. **[4 × 2]**
- b) A power plant has the following annual factors : Load factor = 0.75, Capacity factor = 0.6, Use factor = 0.65. Maximum demand is 60MW. Estimate **[4 × 2]**
- i) Average load
 - ii) Annual energy production
 - iii) Reserve capacity over and above peak load
 - iv) The hours during which the plant is not in service per year

OR

- Q2)** a) Write a note on : present status of power generation in India and Maharashtra. **[4 + 4]**
- b) How cost of electric Energy is calculated? Explain it related to fixed and operating cost. **[2 + 6]**

P.T.O.

- Q3)** a) Write note on : coal classification, and coal handling. [4 + 4]
b) Draw Ideal reheating process on T-s and h-s diagram. Show change in work done during reheating. State advantages of reheating. [3 + 3 + 2]

OR

- Q4)** a) Describe : fluidized bed combustion systems, and Air cooled condenser. [4 + 4]
b) Draw sketches of any two types of surface condensers. Also define : condenser efficiency and vacuum efficiency. [4 + 4]

- Q5)** a) Explain working of governing of pelton wheel turbine in a hydro power plant. [4 + 4]
b) A gas turbine power plant operates between temperature limits of 295K and 1085K. Find [4 × 2]
i) Optimum pressure ratio for cycle if plant is to be operated for maximum power output
ii) Compressor work
iii) Turbine work
iv) Shaft work
c) What is ‘hydrograph’? [2]

OR

- Q6)** a) Explain types of spillways with figures. [8]
b) Draw Brayton Cycle for ‘open cycle gas turbine’ in p - V and T –s diagram. Derive expression for efficiency in terms of pressure ratio. [4 + 4]
c) What is “Mass curve”? [2]

SECTION - II

- Q7)** a) Explain “PWR” with neat sketch. State its advantages. [3 + 3 + 2]
b) Discuss various losses related to Diesel engine power plant. [2 × 4]

OR

- Q8)** a) Explain the problems and solutions associated with Nuclear Waste Disposal. [4 × 2]
b) Draw detailed schematic diagram of Diesel Engine Power plant. State site selection factors for same. [4 + 4]

- Q9)** a) Write a note on : earthling of power system, and transformer. [8]
b) Enlist elements of instrumentation used in Power plant. Explain any two with block diagram. [4 + 4]

OR

- Q10)** a) Enlist protective equipments and explain working of circuit breakers in power plant. [4 + 4]
b) Describe : switch gear for power station, fuel cells. [4 + 4]

- Q11)** a) Explain - Global warming and green house effect. [8]
b) State hazards Constitutes in the atmosphere as pollutants, also state their effect on human health. [4 + 4]
c) What is “Acid Rain”? [2]

OR

- Q12)** a) How will you control pollutants such as particulate matter? [4 + 4]
b) State any four power plants with the way they generate pollution. [2 + 3 + 3]
c) What is ‘Soot’? [2]



Total No. of Questions : 12]

SEAT No. :

P739

[Total No. of Pages : 7

[4659]-43
B.E. (Mechanical)
MECHANICAL SYSTEM DESIGN
(2008 Pattern) (Semester - II)

Time : 4 Hours]

[Max. Marks : 100

Instructions to the candidates :

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

SECTION - I

- Q1)** a) Draw the stress distribution in a compound cylinder and explain how it helps to increase the load carrying capacity of the cylinder. [6]
- b) A hydraulic cylinder, made of gray cast iron FG 300, is subjected to an internal pressure of 15 MPa. If the inner and outer diameters of the cylinder are 200 mm and 240 mm respectively, determine the factor of safety.
- If the cylinder pressure is further increased by 30 %, What will be the factor of safety. [10]

OR

- Q2)** a) Explain the various categories of the welded joints used in unfired pressure vessel. [6]
- b) A pressure vessel consist of a cylinder shell with an inner diameter of 1500 mm, and a thickness of 20 mm. It is provided with a nozzle of inner diameter 250 mm and a thickness of 15 mm. The yield strength of material for the shell and nozzle is 200 N/mm² and design pressure is 2.5 MPa. The extension of nozzle inside the vessel is 15 mm. The corrosion allowance is 2 mm, while the weld joint efficiency is 85%. Neglecting the area of welds, determine whether or not a reinforcing pad is required for the opening. If so, determine the dimensions of pad made from a plate of 15 mm thickness. [10]

P.T.O.

Q3) a) What is desirable properties of I.C. engine piston material? What are the advantages and disadvantages of aluminium piston over cast iron piston. [6]

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

Brake power = 7.5 KW

Speed = 1400 rpm

Indicated mean effective pressure = 0.35 MPa.

Mechanical efficiency = 80%

Maximum gas pressure = 3.5 MPa.

The cylinder liner and head are made of gray cast iron FG 260 ($S_{ut} = 260 \text{ N/mm}^2$ and $\mu = 0.25$). The studs are made of plain carbon steel ($S_{yt} = 380 \text{ N/mm}^2$). The factor of safety for all parts is 6. Use table 1 for reboring allowance.

Determine

- i) bore and length of cylinder liner
- ii) thickness of the cylinder liner
- iii) thickness of the cylinder head
- iv) size and number of studs

Table 1. Reboring allowance for cylinders (mm)

D	100	150	200
C	2.4	4.0	6.3

(D and C are in mm)

OR

Q4) a) Why the connecting rod is made of I sections. [4]

b) Design a connecting rod for a high speed I.C. engine using the following data. [14]

Cylinder bore = 125 mm

Length of connecting rod = 300 mm

Maximum gas pressure = 3.5 MPa

Length of stroke = 125 mm

Mass of reciprocating parts = 1.6 kg

Engine speed = 2200 rpm

Assume suitable data and state the assumptions you make.

Q5) a) What is ‘adequate design’ and ‘optimum design’? Explain with suitable examples. **[6]**

b) A shaft is to be used to transmit a torque of 1500 N-m. The required torsional stiffness of the shaft is 100 N-m / degree, while the factor of safety based on yield strength in shear is 2. Using maximum shear stress theory, design the shaft with objective of minimizing the weight, out of following materials. **[10]**

Material	Weight density (W) N/m ³	Yield strength (Syt) N/mm ²	Modulus of Rigidity (G) N/mm ²
M1	77×10^3	420	84×10^3
M2	76.5×10^3	230	84×10^3
M3	44×10^3	900	42×10^3
M4	17.5×10^3	225	15×10^3

OR

Q6) A tensile bar of circular cross section made of plain carbon steel 40 C8 ($S_{ut} = 580 \text{ N/mm}^2$, $S_{yt} = 330 \text{ N/mm}^2$; $E = 207 \times 10^3 \text{ N/mm}^2$ and $\rho = 7750 \text{ kg / m}^3$) is subjected to the cyclic tensile force which varies from zero to 90 kN. The required stiffness of bar is $3.5 \times 10^5 \text{ N/mm}$. The surface finish and size factors are 0.76 and 0.6 respectively. Using the Soderberg criterion, design the bar with the objective of optimizing the factor of safety. The following limitations are used in the design. **[16]**

$$d \leq 30 \text{ mm}$$

$$350 \text{ mm} \leq L \leq 500 \text{ mm}$$

$$M \leq 3 \text{ kg.}$$

SECTION - II

- Q7)** a) It is observed from a sample of 300 forgings that the lengths are normally distributed with mean of 150.5 mm and standard deviation of 0.02mm. Determine the tolerances specified by designer if 15 jobs are rejected. [10]

Refer Table No: 02 for the Areas under normal distribution curve from $Z = 0$ to Z

Table No : 02

- b) Justify that the Display and Control elements of a music system are designed based on the ergonomic considerations. [6]

OR

- Q8)** a) If a device has failure rate of 40^{-6} failures / Hr, what is its reliability in 250 hours? If there are 1000 items in test, how many failures are expected in 250 hours? [8]

- b) Write a short note on 'Design for Assembly'. [8]

- Q9)** a) What is the need of multispeed gearbox in a machine tool or automobile? [4]

- b) A multispeed gearbox is to be designed for speed varying from 200 RPM to 2000 RPM. Recommended series is R5. It is to be driven by a motor running at 2880 RPM. Design the optimum gearbox considering 'Symmetric Structure Diagrams'. [14]

OR

- Q10)** a) Explain and compare different laws of Stepped Speed Regulation. [6]

- b) Draw Symmetric Structure Diagrams for following structure formulae and find out optimum formula out of them along with the justification

2(1) 2(2) 3(4), 2(1) 2(6) 3(2), 2(2) 2(1) 3(4) [12]

- Q11) a)** Explain the following in connection with belt conveyor: **[8]**
- i) Angle of Repose
 - ii) Surcharge Angle
 - iii) Flowability
 - iv) Effective belt width
- b) A flat horizontal belt conveyor is to be used for transporting material with mass density 2.5 ton/m^3 . The belt is 800mm wide and has speed of 1.75 m/s. Determine capacity of conveyor if surcharge angle is 25° . **[8]**

OR

- Q12)** Following data relate to a horizontal belt conveyor used for conveying coal in a thermal power station: **[16]**

Capacity of conveyor : 1000 ton/hr

Density of coal : 750 kg/m^3

Belt speed : 1.5 m/s

Surcharge factor : 0.1

Number of plies : 4

Material Factor K_1 : 2

Belt tension and contact factor K_2 : 100

Material conveying length : 455m

Center distance between snub pulleys : 450 m

Ratio of tail pulley to drive pulley dia. : 1.0

Ratio of snub pulley to drive pulley dia. : 0.5

Mass of each carrying run idler : 25 kg

Mass of each return run idler : 20 kg

Pitch of carrying run idlers : 1 m

Pitch of return run idlers: 2.5 m

Friction factor for idlers : 0.02

Snub factor for snub pulleys : 0.03

Snub factor for Drive and tail pulleys : 0.06

Material velocity component along belt drive : 1 m/s

Angle of lap on drive pulley : 210°

Coefficient of friction between belt and pulley : 0.35

Drive efficiency : 95%

Mass of belt / mm width / mm length = .015 kg /mm/m

Motor speed 1440 RPM

Determine following parameters of the conveyor:

Standard belt with rounded off to nearest hundred mm.

Reduction ratio of the gear reducer

Power required to drive the conveyor.

z	0	1	2	3	4	5	6	7	8	9
0	0.0000	0.0040	0.0080	0.0120	0.0160	0.0199	0.0239	0.0279	0.0319	0.0359
0.1	0.0398	0.0438	0.0478	0.0517	0.0557	0.0596	0.0636	0.0675	0.0714	0.0753
0.2	0.0793	0.0832	0.0871	0.0910	0.0948	0.0987	0.1026	0.1064	0.1103	0.1141
0.3	0.1179	0.1217	0.1255	0.1293	0.1331	0.1368	0.1406	0.1443	0.1480	0.1517
0.4	0.1554	0.1591	0.1628	0.1664	0.1700	0.1736	0.1772	0.1808	0.1844	0.1879
0.5	0.1915	0.1950	0.1985	0.2019	0.2054	0.2088	0.2123	0.2157	0.2190	0.2224
0.6	0.2257	0.2291	0.2324	0.2357	0.2389	0.2422	0.2454	0.2486	0.2517	0.2549
0.7	0.2580	0.2611	0.2642	0.2673	0.2704	0.2734	0.2764	0.2794	0.2823	0.2852
0.8	0.2881	0.2910	0.2939	0.2967	0.2995	0.3023	0.3051	0.3078	0.3106	0.3133
0.9	0.3159	0.3186	0.3212	0.3238	0.3264	0.3289	0.3315	0.3340	0.3365	0.3389
1	0.3413	0.3438	0.3461	0.3485	0.3508	0.3531	0.3554	0.3577	0.3599	0.3621
1.1	0.3643	0.3665	0.3686	0.3708	0.3729	0.3749	0.3770	0.3790	0.3810	0.3830
1.2	0.3849	0.3869	0.3888	0.3907	0.3925	0.3944	0.3962	0.3980	0.3997	0.4015
1.3	0.4032	0.4049	0.4066	0.4082	0.4099	0.4115	0.4131	0.4147	0.4162	0.4177
1.4	0.4192	0.4207	0.4222	0.4236	0.4251	0.4265	0.4279	0.4292	0.4306	0.4319
1.5	0.4332	0.4345	0.4357	0.4370	0.4382	0.4394	0.4406	0.4418	0.4429	0.4441
1.6	0.4452	0.4463	0.4474	0.4484	0.4495	0.4505	0.4515	0.4525	0.4535	0.4545
1.7	0.4554	0.4564	0.4573	0.4582	0.4591	0.4599	0.4608	0.4616	0.4625	0.4633
1.8	0.4641	0.4649	0.4656	0.4664	0.4671	0.4678	0.4686	0.4693	0.4699	0.4706
1.9	0.4713	0.4719	0.4726	0.4732	0.4738	0.4744	0.4750	0.4756	0.4761	0.4767
2	0.4772	0.4778	0.4783	0.4788	0.4793	0.4798	0.4803	0.4808	0.4812	0.4817
2.1	0.4821	0.4826	0.4830	0.4834	0.4838	0.4842	0.4846	0.4850	0.4854	0.4857
2.2	0.4861	0.4864	0.4868	0.4871	0.4875	0.4878	0.4881	0.4884	0.4887	0.4890
2.3	0.4893	0.4896	0.4898	0.4901	0.4904	0.4906	0.4909	0.4911	0.4913	0.4916
2.4	0.4918	0.4920	0.4922	0.4925	0.4927	0.4929	0.4931	0.4932	0.4934	0.4936
2.5	0.4938	0.4940	0.4941	0.4943	0.4945	0.4946	0.4948	0.4949	0.4951	0.4952
2.6	0.4953	0.4955	0.4956	0.4957	0.4959	0.4960	0.4961	0.4962	0.4963	0.4964
2.7	0.4965	0.4966	0.4967	0.4968	0.4969	0.4970	0.4971	0.4972	0.4973	0.4974
2.8	0.4974	0.4975	0.4976	0.4977	0.4977	0.4978	0.4979	0.4979	0.4980	0.4981
2.9	0.4981	0.4982	0.4982	0.4983	0.4984	0.4984	0.4985	0.4985	0.4986	0.4986
3	0.4987	0.4987	0.4987	0.4988	0.4988	0.4989	0.4989	0.4989	0.4990	0.4990
3.1	0.4990	0.4991	0.4991	0.4991	0.4992	0.4992	0.4992	0.4992	0.4993	0.4993
3.2	0.4993	0.4993	0.4994	0.4994	0.4994	0.4994	0.4994	0.4995	0.4995	0.4995
3.3	0.4995	0.4995	0.4995	0.4996	0.4996	0.4996	0.4996	0.4996	0.4996	0.4997
3.4	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4998
3.5	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998
3.6	0.4998	0.4998	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999
3.7	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999
3.8	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999
3.9	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000

Table No: 02, Areas below Normal Distribution Curve for 0 to Z.



Total No. of Questions : 12]

SEAT No. :

P823

[4659]-76

[Total No. of Pages : 3

B.E. (Electrical)

SWITCHGEAR & PROTECTION

(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 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 are interruption Theories in case of circuit breaker. **[8]**
- b) A 3 phase 50Hz alternator with grounded neutral has inductance of 1.6 mH per phase and is connected to busbar through a CB. The capacitance to earth between the alternator & CB is 0.003 μ f per phase. The CB opens with rms value of current 7500 Amp. Determine: **[8]**
- i) Frequency of oscillations.
 - ii) Maximum RRRV.
 - iii) Max. value of restriking voltage.
 - iv) Time for max RRRV.

OR

- Q2)** a) With neat waveform, explain: **[8]**
- i) Restriking voltage.
 - ii) RRRV.
 - iii) Recovery voltage.
- b) In case of CB, Explain following ratings: **[4]**
- i) Making capacity.
 - ii) Breaking capacity.

P.T.O.

- c) An OCB is rated as 3 phase, 1500 Amp, 2000 MVA, 33 KV, 3 sec. Determine: [4]
- i) the breaking current.
 - ii) making current.
 - iii) short time current.
 - iv) rated normal current.

- Q3)** a) With neat diagram explain construction & working of Vacuum Circuit breaker. [8]
- b) Write a short note on Auto-reclosing. [8]

OR

- Q4)** a) With neat diagram explain construction & working of Air blast circuit breaker. [8]
- b) Explain important properties of SF₆ gas used in case of SF₆ CB. [8]

- Q5)** a) With neat diagram explain construction & working of Induction Type over current relay. [8]
- b) Classify relays on the basis of operating time. [4]
- c) With neat diagram explain protection of parallel feeders. [6]

OR

- Q6)** a) What do you mean by primary & back-up protection? Explain zone of Protection. [10]
- b) Explain in detail the problems associated with simple or plain current differential relay. [8]

SECTION - II

- Q7)** a) Draw a neat block diagram of static relays and explain function of each block, merits & demerits. [10]
- b) Write a short note on: [8]
- i) Sampling theorem.
 - ii) Anti aliasing filter.

OR

- Q8)** a) Explain least square method for estimation of phasor. [8]
b) Draw and explain block diagram of Phasor Measurement Unit (PMU). [10]
- Q9)** a) Explain the effect of inrush magnetizing current on the protective system of transformer. Also explain the principle of harmonic restraint with the help of necessary schematic diagram. [8]
b) An 11KV, 100MVA alternator is provided with differential protection. The percentage of winding to be protected against phase to ground fault is 85%. The relay is set to operate when there is 20% out of balance current. Determine the value of the resistance to be placed in the neutral to ground connection. [8]

OR

- Q10)** a) Explain the percentage differential protection (Merz price protection scheme) of transformers and difficulties faced in the protection. Also draw neat circuit diagram for the same. [8]
b) Explain abnormal operating conditions of alternator: [8]
i) Unbalance loading
ii) Loss of prime mover.
- Q11)** a) Explain the concept of distance relaying applied to protection of transmission lines. Compare impedance relay, reactance relay and mho relay. [8]
b) Discuss wide area measurement system. [8]

OR

- Q12)** a) Explain the effect of arc resistance and power swings on the performance of distance relay. [8]
b) Explain time graded and current graded system of protection of three phase feeder using over current relay. [8]



Total No. of Questions : 12]

SEAT No. :

P1156

[Total No. of Pages : 4

[4659] - 77

B.E. (Electrical)

INDUSTRIAL DRIVES AND CONTROL

(2008 Pattern) (Semester - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

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

SECTION - I

- Q1) A)** A drive has the following parameters $T = 200 - 0.2N$, N-m where N is the speed in rpm. Load torque $T_l = 100$, N-m. Initially the drive is operating in steady-state. The characteristic of the torque are changed to $= -200 - 0.2N$, N-m. Calculate initial and final equilibrium speeds. For given drive also calculate the time from initial speed to final speed, if $J = 20 \text{ kg} - \text{m}^2$. **[8]**
- B)** What are the different components of load torque? Explain in details. **[8]**

OR

- Q2) A)** A motor is equipped with a flywheels is to supply a load torque of 100Nm for 10 sec followed by a light load period of 200Nm long enough for flywheel to regain its steady state speed. It is desired to limit the motor load torque to 700Nm. What should be moment of inertia of flywheel? Motor has inertia of $10 \text{ kg} - \text{m}^2$. Its no load speed is 500 rpm and slip at a torque of 500Nm is 5%. Assume speed torque characteristic of motor to be straight line in the region of interest. **[8]**
- B)** Explain nature and classification of load torques. **[8]**

P.T.O.

- Q3) A)** A 2 pole separately excited dc motor has the ratings of 220V, 100 A and 750 rpm. Resistance of the armature circuit is 0.1Ω . The motor has two field coils which are normally connected in parallel. It is used to drive a load whose torque is expressed as $T_L = 500 - 0.3N$, N-m where N is the motor speed in rpm. **[10]**
- i) Calculate the motor armature current and speed when armature voltage is reduced to 100V
 - ii) Calculate the motor speed and current when two field coils are connected in series.
- B)** Explain dynamic method for braking operation with characteristic of following drives. **[8]**
- i) DC shunt motor
 - ii) Three phase induction motor

OR

- Q4) A)** A 400V, star connected 3-phase 6-pole, 50Hz, induction motor has following parameters referred to stator: $R_s = R'_r = 1\Omega$, $X_s = X'_r = 2\Omega$ For regenerative braking operation of this motor determine: **[10]**
- i) Maximum overhauling torque it can hold and range of speed for safe operation
 - ii) Speed at which it will hold an overhauling load with a torque of 100 N-m
- B)** Explain closed loop speed control of electric drives with current limit, torque and speed control. **[8]**
- Q5) A)** Explain operation of chopper controlled separately excited DC motor drive with suitable waveforms. **[8]**
- B)** A 230V, 1500 rpm, 50A separately excited DC motor has armature resistance 0.5Ω and assumes that motor is operating in continuous conduction mode. The motor is controlled by three phase fully controlled converter with source voltage of 440V, 50Hz. A star delta connected transformer is used to feed the armature so that motor terminal voltage equals rated voltage when converter firing angle is zero. **[8]**
- i) Calculate transformer turns ratio
 - ii) Determine when firing angle when a motor current is 1 200 rpm and rated torque.

OR

- Q6)** A) Explain operation of single phase fully controlled converter fed separately DC motor drive with suitable waveforms and derive relation between speed and firing angle. [8]
- B) A 230V, 1000 rpm, 100 A separately excited DC motor has armature resistance 0.8Ω and assumes that motor is operating in continuous conduction mode. The motor is controlled by single phase fully controlled converter with source voltage of 230V, 50Hz. Calculate speed [8]
- i) At $\alpha = 30^\circ$ and torque 100N-m
- ii) At $\alpha = 120^\circ$ and torque 100N-m

SECTION - II

- Q7)** A) A 400V, 50Hz, 4-pole, 1400rpm star-connected squirrel cage induction motor is fed from a voltage source inverter. The drive is operated with a constant v/f control from 10 to 50Hz. By assuming speed-torque curve for various frequencies to be parallel lines, calculate [8]
- i) Speed for frequency of 40Hz and 70% of full load torque
- ii) Frequency for a speed of 900 rpm and full load torque
- iii) Torque for frequency of 40Hz and speed of 1000 rpm as percentage of full load torque
- B) With neat diagram, explain $\frac{v}{f} = \text{constant}$ speed control method for induction motor. [8]

OR

- Q8)** A) Explain regenerative braking of VSI fed induction motor drives. [8]
- B) Explain stator voltage speed control method of induction motor drives using AC voltage regulator. [8]
- Q9)** A) Explain energy conservation using static rotor resistance control in induction motor. [8]
- B) Explain components used for obtaining signals for interlocking and sequencing operations and protection. [8]

OR

Q10)A) Explain static sherprius based slip power recovery scheme for electrical drive. [8]

B) What are different losses in electrical drives and also enlist energy conservation measures. [8]

Q11)A) Explain flux oriented vector control of induction motor. [9]

B) Write short note on commutator less DC drive. [9]

OR

Q12) Explain the industrial application of electrical drives in [18]

- i) Textile mills
- ii) Centrifugal pumps
- iii) Paper mills
- iv) Traction
- v) Sugar mills
- vi) Rolling mills



Total No. of Questions : 12]

SEAT No. :

P838

[4659]-97

[Total No. of Pages : 3

B.E. (Electronics and Telecommunication)
TELECOMMUNICATION & SWITCHING SYSTEM
(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 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 various functions of a switching system with a detailed trunking diagram and state the advantages of digital switching. **[10]**
- b) Explain operation of Input controlled time division space switching with a neat block diagram. **[8]**

OR

- Q2)** a) State and explain issues of Digital switching in an analog environment. **[8]**
- b) Write a brief note on two dimensional switching. Draw the block diagram for a TS Switch and explain various functional entities. **[10]**
- Q3)** a) Define with suitable expressions the following in case of a Queue system with a single server having FIFO discipline. **[8]**
- i) Probability of Delay.
 - ii) Mean length of the queue.
 - iii) Mean Delay, when there is delay.
 - iv) Mean Delay, averaged over all time.
- b) State and explain formula for the grade of Service of loss systems in tandem and 'Erlang C' formula. **[8]**

OR

P.T.O.

Q4) a) State and explain 'Erlang Delay formula'. Explain its application to Circuit and Packet switches. [8]

b) Explain how the End to End Blocking Probabilities in a large network are calculated with assumptions and sources of error. [8]

Q5) a) Define Graded Groups. Explain the procedure for designing grading to provide access to 'N' trunks from switches with availability 'k'. Which is the best grading? [8]

b) Explain the design procedure for 'N' by 'N' switch with two stages and no. of links = N. What is the total no. of cross-points required? [8]

OR

Q6) a) Explain in detail the sequence of operations involved in a telephone call. [8]

b) Draw and explain block schematic diagram of CCITT signaling system No. 7. [8]

SECTION - II

Q7) a) Describe in brief about different types of Jitter and explain how elastic store is used to remove the accumulated Jitter with a neat diagram. [8]

b) Explain the need of synchronization in a network containing digital switching systems. [8]

OR

Q8) a) What is network synchronization and enlist the basic approaches of network synchronization. [8]

b) Explain the methods related to flow control in Network management. [8]

Q9) a) Explain the data Transmission in PSTN with the help of a diagram. [8]

b) Explain the different classes of Routing algorithms and measures to assess performance of a Routing Algorithm. [8]

OR

- Q10)a)** Explain the Internetworking Structures for the repeater, bridge, router and gateway with the help of an ISO-OSI reference model. [8]
- b) Explain Numbering and Addressing in ISDN. [8]

- Q11)a)** Explain the terms: [10]
- i) Micro cells and pico cells.
 - ii) Sectoring.
 - iii) Co-channel interference.
 - iv) Soft and hard hand-off.
 - v) Dualization.
- b) Explain forward link channel structure of IS-95 air interface. [8]

OR

- Q12)a)** Draw block diagram for the GSM system architecture and explain various functional entities. [10]
- b) Justify whether CDMA is having better security than GSM or not. [8]



Total No. of Questions : 12]

SEAT No. :

P839

[4659]-98

[Total No. of Pages : 4

B.E. (E & TC)

OPTICAL FIBER COMMUNICATION

(2008 Course) (Semester - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to candidates:

- 1) *Answers to the two sections should be written in separate books.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume suitable data, if necessary.*
- 5) *Use the following data if necessary:*
 - a) *Planks constant $h = 6.6256 \times 10^{-34}$ J.S.*
 - b) *Electron volt $q = 1.60218 \times 10^{-19}$ C.*
 - c) *Velocity of Light $c = 3 \times 10^8$ m/s.*

SECTION - I

- Q1) a)** Using ray theory derive an expression for the Numerical Aperture and the solid acceptance angle in terms of the physical parameters of a step index fiber and explain their importance in the propagation of optical signal through the fiber. Why do we need cladding? **[8]**
- b) Calculate the number of modes propagating at 820nm wavelength in graded index fiber having parabolic refractive index profile. The core radius is $25 \mu\text{m}$. The refractive index at the centre of core is 1.48 and cladding refractive index is 1.46. **[8]**

OR

- Q2) a)** Under what conditions of the propagation constant ' β ', mode remains guided in the core? Write an expression for the V number which is connected with the cutoff condition and determines the number of modes a fiber can support. **[8]**
- b) A step index fiber has core refractive index 1.5 and $\Delta=1.3\%$ with core diameter of $100 \mu\text{m}$. The operating wavelength is 850nm. Calculate assuming that the fiber is kept in air the **[8]**
- i) Numerical Aperture of fiber.
 - ii) Acceptance angle.
 - iii) Critical angle.
 - iv) Angle of incidence.

P.T.O.

- Q3)** a) What does the term 'The state of polarization' mean? Does it describes the fiber properties? Explain. [8]
- b) The threshold optical powers for stimulated Brillouin and Raman scattering in a long $8\mu\text{m}$ core diameter single-mode fiber are found to be 190mw and 1.70w respectively, when using an injection laser source with a bandwidth of 1GHz. Calculate the operating wavelength of the laser and the attenuation in decibels per kilometre of the fiber at this wavelength. [8]

OR

- Q4)** a) Describe the fiber structures utilized to provide. [6]
- i) Dispersion shifting &
- ii) Dispersion flattening in single-mode fibers.
- b) A multimode fiber with near parabolic refractive index profile has a material dispersion of $30\text{psnm}^{-1}\text{km}^{-1}$ when used with a good LED source of rms spectral width of 25nm. The fiber has numerical aperture of 0.4 and core refractive index of 1.48 and cladding refractive index of 1.47. Estimate the total rms pulse broadening per km within the fiber. [10]
- Q5)** a) Distinguish between spontaneous and stimulated emission. How is stimulated emission assured in Laser diode? Give comparison between LED and Laser. [8]
- b) A step index fiber has a core refractive index of 1.47, a relative refractive index difference of 2% and a core diameter of $80\mu\text{m}$. The fiber is jointed with a lateral offset of $2\mu\text{m}$ an angular misalignment of the core axes of 3° and a small air gap (no longitudinal misalignment). Estimate the total insertion loss. [10]

OR

- Q6)** a) Draw the schematic and energy band diagram of double heterojunction LED diode and explain the process involved in its operation as LED. Explain why it is more efficient in its action than a homojunction LED.[8]
- b) The radiative and non-radiative recombination lifetime of minority carriers in active region of double heterojunction LED are 60 ns and 100ns respectively. Determine bulk recombination life time and power internally generated within the device when peak emission wavelength is $0.87\mu\text{m}$ at a drive current of 38mA. [10]

SECTION - II

- Q7)** a) Explain what is 'P⁺ Π Pn⁺' structure of an avalanche photodiode? How the term 'reach through' is concerned with its operation? Which type of carriers are responsible for the avalanche action? How this avalanche effect causes a gain in the responsivity of the diode? [10]
- b) The quantum efficiency of RAPD is 80% for the direction of radiation at wavelength of 0.9 μm, when the incident optical power is 0.5 μw, the output current from the device is 11 μA. Determine the multiplication factor or gain of the photodiode under this condition. [8]

OR

- Q8)** a) Explain the different sources of noise in optical fiber receivers. [8]
- b) State the types of receiver structures used in digital optical fiber system and explain each in brief. [10]

- Q9)** a) Explain the design procedure with graphical representation for link loss budget analysis. [8]
- b) Components are chosen for a digital optical link of overall length of 6km. LED chosen is capable of launching -10dBm into a graded index fiber, which has an attenuation of 3dbkm⁻¹. It requires splicing every kilometer with a loss of 0.5dB. per splice. The connector loss at the receiver is 1.5dB. The receiver requires mean optical power of -41dBm in order to give necessary BER of 10⁻¹⁰. It is also predicted that a safety margin of 6dB will be required. Write down the optical power budget for the system and hence determine its viability. [8]

OR

- Q10)** a) Draw a neat block diagram representing basic elements of an analog link and hence explain the major noise contributors. [8]
- b) An optical fiber system is to be designed to operate over an 8km length without repeaters. The rise times of the chosen components are
- source LED = 8ns
- Fiber: Intermodal = 5ns/km
- Intramodal = 1ns/km
- Pin Detector = 6ns
- Estimate the maximum bit rate that may be achieved on the link using NRZ format. [8]

- Q11)**a) Show the structure of an Erbium-doped fiber amplifier and explain the function of each component. [8]
- b) Explain the principle of operation of Fabry-Perot amplifier. State the advantages and drawbacks of SOA. [8]

OR

- Q12)**a) Describe the concept of Wavelength Division Multiplexing and state the key system features of WDM. [8]
- b) Describe and differentiate between active and passive WDM couplers. [8]

