Total No. of Questions : 12]

SEAT No. : ____

P1104

[Total No. of Pages : 3

[4264] - 401

B.E. (Civil)

ENVIRONMENTAL ENGINEERING - II

(2008 Pattern) (Sem. - I)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) What factors should be considered while selecting a material for sewer construction? **[6]**

b) Design a circular sewer to carry a maximum sewage flow of $102 m^3/s$ running at half full condition. Minimum velocity in the sewer should be more than 0.6m/s. Take n = 0.013. **[6]**

c) Write short note on oil and grease trap. **[4]**

OR

Q2) a) Define BOD and COD. Explain how the COD/BOD ratio influence the method of waste water treatment. **[2 + 2 + 4 = 8]**

b) Enlist various appertenances required for efficient operation and maintenance of sewerage system. Explain with a neat sketch, the principle and working of automatic flushing tank. What is the necessity of providing flushing tank in the sewer line. **[2 + 4 + 2 = 8]**

Q3) a) What is self purification of a polluted river? Explain the factors responsible for self purification of the river. **[2 + 6 = 8]**

b) Explain with neat sketch, the principle and working of grit chamber. Describe the method of disposal of grit. **[2 + 4 + 2 = 8]**

P.T.O.

OR

Q4) a) Explain the different zones of degradation of a polluted stream undergoing self purification. **[8]**

b) Explain with a neat sketch the principle, construction and working of primary sedimentation tank. Also show different zones in the sedimentation tank. **[2 + 4 + 2 = 8]**

Q5) a) Draw a typical flow chart for sewage treatment plant consisting primary and secondary treatment, with activated sludge process as the method for secondary treatment. State the type of impurities removed by each treatment unit in the flow chart. **[3 + 3 + 3 = 9]**

b) State various modifications in activated sludge process and hence differentiate between completely mixed activated sludge process and extended aeration process. **[3 + 6 = 9]**

OR

Q6) a) Draw a typical flow chart for sewage treatment plant consisting primary and secondary treatment. Use trickling filter as method for secondary treatment. Explain the impurities removed by each treatment unit. **[3 + 3 + 3 = 9]**

b) Explain the principle, construction and working of High rate trickling filter. State the NRC formula for determination of efficiency of trickling filter. Comment on the effect of recirculation ratio on efficiency of trickling filter. **[4 + 3 + 2 = 9]**

SECTION - II

Q7) a) Explain the root zone technology for wastewater treatment. **[4]**

b) Explain the working, advantages and disadvantages of oxidation ponds. **[8]**

c) Discuss the various aeration methods used in aerated lagoons. **[4]**

OR

Q8) a) Discuss the advantages and disadvantages of aerated lagoons. **[4]**

b) Write a short note on phyto remediation technology for waste water treatment. **[6]**

c) Explain the design aspects and parameters of oxidation ponds. **[6]**

Q9) a) Design a septic tank for a small colony of 100 people with sewage flow rate of 135 lit/cap/d. Also, design a suitable soil absorption system if the percolation rate is 3 min/cm and the depth of ground water table below GL is 1.5 m. **[8]**

b) Explain the various methods of sludge disposal along with their merits and demerits. **[5]**

c) Write a short note on Upflow Anaerobic sludge Blanket Reactor (USABR) **[5]**

OR

Q10) a) Explain the anaerobic sludge digestion process and discuss the various design parameters of anaerobic digesters. **[8]**

b) Explain the different methods of disposal of septic tank effluent. **[5]**

c) What do you mean by sludge thickening? Explain the various methods of sludge thickening. **[5]**

Q11) a) Discuss the characteristics of wastewater from following industries. **[4]**

i) Automobile

ii) Distillery

b) Explain with a flow diagram the manufacturing process and sources of wastewater in a paper and pulp industry. **[8]**

c) Write short notes on : **[4]**

i) Equalization

ii) Neutralization

OR

Q12) Explain with a flow diagram the treatment of wastewater from following industries. **[16]**

a) Sugar

b) Dairy

c) Textile

d) Distillery

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Total No. of Questions : 12]

SEAT No. :

P1112

[Total No. of Pages : 3

[4264] - 410

B.E. (Civil)

HYDROINFORMATICS

(2008 Pattern) (Elective - II) (Sem. - I)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) Enumerate the basic scientific disciplines giving important aspects of each on which hydro informatics is based. **[6]**

b) What are components of hydroinformatics systems? Explain in detail hardware and software components. **[6]**

c) Discuss about design of hydro informatics system for information regarding availability of ground water in a particular area. **[6]**

OR

Q2) a) Discuss the role of internet in rainfall forecasting system. **[6]**

b) A commercial hydroinformatics system is to be formed for managing reservoir operation with respect to release of water for an hydro electric power plant, what components you suggest, explain with justification. **[6]**

c) Explain role of numerical modeling in Hydroinformatics. **[6]**

Q3) a) A multi-criterion decision support systems is to be designed to collect information regarding availability of water resources viz. surface water, ground water, etc. in a tahsil, frame various alternative schemes. **[8]**

b) You have to design a graphical user interface for flood watch system, explain the front end and back end parameters. **[8]**

OR

P.T.O.

Q4) a) What is a decision support system in water resources engineering? What are its components? What is the role of private sector in decision support system? **[8]**

b) Name different softwares used in hydroinformatics. Explain any one of them in detail. **[8]**

Q5) a) Differentiate between physics based modeling and data driven modeling. Give examples of each. **[8]**

b) Discuss design of simulation model for household sewage collection system giving details of objective, scope, basic formulae used, underlying solution procedure, simulation technique used. **[8]**

OR

Q6) a) Discuss any commercial simulation model for two dimensional flow modeling. **[8]**

b) Discuss design of simulation model for water release from a dam with respect to objective, scope, basic formulae used, underlying solution procedure, simulation technique used. **[8]**

SECTION - II

Q7) a) Define a transfer function. Discuss various types of transfer functions. **[6]**

b) What is normalization? What is its need? What are typical ranges of normalization? **[6]**

c) Define epoch, epoch size, error function. **[6]**

OR

Q8) a) What is back propagation? Why it is slow compared to conjugate gradient algorithm? **[6]**

b) How artificial neural networks compare with statistics? What is the terminology used in statistics for the following terms used in ANN? Input, output, training, generalization. **[6]**

c) Define cross validation. State step by step procedure for carrying out the same. **[6]**

Q9) a) What are different types of evolutionary computing? Discuss the Genetic Algorithm approach in detail. **[8]**

b) What are Genetic operators? Explain any two of them in details. **[8]**

OR

Q10) a) Why Genetic Algorithm is used as an optimizing function? Can it be used to train a neural network? How? **[8]**

b) What is real coded Genetic Algorithm? How it differs from standard Genetic Algorithm? **[8]**

Q11) a) Discuss a study about application of Artificial Neural Networks in Water Resources Engineering giving details about problem definition, objective, data, inputs, outputs, algorithm used and results. **[8]**

b) State advantages of Genetic Algorithm over traditional methods. **[8]**

OR

Q12) a) Discuss limitations of ANN with respect to data requirement, magnitude of data, selection of architecture and lack of physical concept. **[8]**

b) Discuss a study about application of Genetic Algorithm in Water Resources Engineering giving details about problem definition, objective, data, inputs, outputs and results. **[8]**

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Total No. of Questions : 12]

SEAT No. :

P1113

[Total No. of Pages : 3

[4264] - 411

B.E. (Civil)

TQM AND MIS IN CIVIL ENGINEERING

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

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

Instructions to the candidates:

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

SECTION - I

Q1) a) Discuss the various steps to be considered for improving the overall quality of construction, in a contractor's organisation. **[9]**

b) "Provide quality or perish" - Justify the above statement in the context of the construction sector in India, w.r.t. the global challenges. **[9]**

OR

Q2) a) Name any 3 quality gurus and explain their interpretation of quality with the help of examples from a building project. **[9]**

b) Discuss the factors which are detrimental for the existence of quality. Suggest preventive measures for their non-occurrence. **[9]**

Q3) a) Prepare a checklist for avoiding honeycombing in concrete and for getting a very good finish for the de-shuttered concrete. **[8]**

b) Differentiate with examples between **[8]**

i) QA and QC

ii) TQM and TQC

OR

P.T.O.

Q4) a) Explain with examples : **[8]**

i) Customer satisfaction

ii) Systems approach

iii) Decision making based on facts

iv) Involvement of people

b) Define the following and explain with examples : **[8]**

i) Quality Control

ii) Quality Assurance

iii) Total Quality Control

iv) Total Quality Management

Q5) a) What is SCM? How does it support in the process of TQM? Explain with examples from construction. **[8]**

b) Following defects are noticed in construction work : **[8]**

i) Toilet Slab is leaking significantly.

ii) Rebars in beams are corroded.

Explain how you would determine the cost of poor quality for each of the above defects, in detail.

OR

Q6) a) Classify construction defects and explain them with examples. **[8]**

b) What is benchmarking? What are its advantages? Explain benchmarking for concreting of m 30 grade. **[8]**

SECTION - II

Q7) a) Explain input, processing and output as a system organisation with examples from the construction organisation developing an MIS for cost control. **[10]**

b) Discuss advantages and limitation of an MIS developed for a construction organisation representing a public sector client's organisation. **[8]**

OR

Q8) a) Explain with examples the following generic system concepts : **[8]**

i) Technology

ii) Management

iii) Development

iv) Applications

b) What are decision support systems? How are they developed? What are their advantages - Explain for a construction organisation executing road projects in India. **[10]**

Q9) a) Explain use of an MIS in the management control of a contractor's organisation executing township projects. **[8]**

b) Explain the 5 main heads of the PRRT software which are very effective in operational control and explain how to interact with the software for generating the various benefits from it. **[8]**

OR

Q10) a) Explain the MIS structure necessary for a construction organisation for communication within the company and for collaboration with its customers suppliers and other business stake holders with the help of flow charts. **[10]**

b) Explain relationship between strategic planning and an MIS with help of practical examples. **[6]**

Q11) a) Explain ERP as an MIS and elaborate on various modules which are commercially available for use in building construction. Discuss limitations of ERP softwares. **[10]**

b) Explain integration of Hardware, software data communication and processing, information gathering and processing with examples from construction field. **[6]**

OR

Q12) a) Explain with a flow diagram the acquisition, segregation, storing, processing and validation of the information necessary to develop an MIS for a construction organisation executing a building project in order to improve the existing quality system. **[7]**

b) Draw a diagram showing the 3 major roles played by an information based support system and explain each role in brief. **[9]**

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Total No. of Questions : 12]

SEAT No. :

P1218

[Total No. of Pages : 3

[4264] - 412

B.E. (Civil)

EARTHQUAKE ENGINEERING

(2008 Pattern) (Elective - II) (Sem. - I)

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

Instructions to the candidates:

1) ***From Section - I answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and from Section - II answer Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.***
2) ***Answers to the two sections should be written in separate answer books.***
3) ***Figures to the right indicate full marks.***
4) ***IS 456, IS 1893, IS 13920 are allowed in the examination.***
5) ***Neat diagrams must be drawn wherever necessary.***
6) ***If necessary, assume suitable data and indicate clearly.***
7) ***Use of electronic pocket calculator is allowed.***

SECTION - I

Q1) a) Explain elastic rebound theory. **[8]**

b) Explain the various types of earthquakes. **[8]**

OR

Q2) a) How are earthquake measured. Explain in brief. **[10]**

b) How are Tsunamis produced, explain in brief. **[6]**

Q3) a) Obtain the response for a SDOF system subjected to forced vibration. **[10]**

b) Explain dynamic magnification factor. **[6]**

OR

Q4) a) Determine the natural frequency for the system shown in Fig. 1 **[8]**

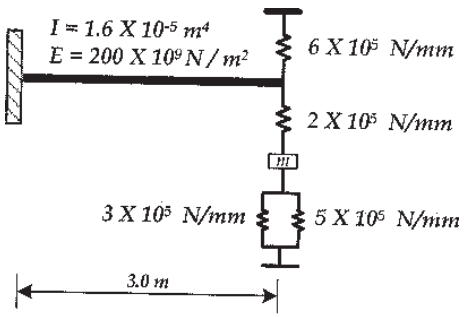

Fig. 1

P.T.O.

b) Derive the expression for an under damped system. **[8]**

Q5) a) Explain the various terms used in seismic coefficient method. **[9]**

b) What is modal analysis, explain in brief. **[9]**

OR

Q6) Perform modal analysis for the G + 3 building modeled as shown in Fig. 2 is located in seismic zone IV. The floor-to-floor height is 3.5 m. The building is supported on medium stiff soil. The R. C. frames are in-filled with masonry walls. The lumped weight due to dead loads is 12 kN / m^2 on floors and 8 kN / m^2 on the roof. The floor slabs are designed for a live load of 3 kN / m^2 and the roof is designed 2 kN / m^2. **[18]**

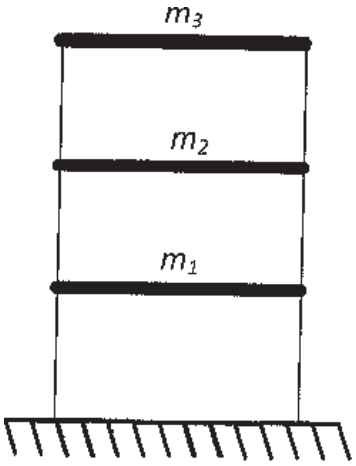

Fig. 2

SECTION - II

Q7) A (230 × 500) mm column is reinforced with 8 -16#. It is supported on an isolated footing. The load coming on the footing is 1500 kN and a moment of 21 kNm. The SBC of the soil is 174 kN / m^2. Use M 20 grade of concrete and steel of grade Fe 415 and design the footing. **[16]**

OR

Q8) a) Explain the phenomenon of liquefaction of soil. **[8]**

b) Briefly explain the codal provisions for static and dynamic analysis of structures. **[8]**

Q9) How are lateral loads resisted by structures. Explain with neat sketches. **[16]**

OR

Q10) State the merits and demerits of base isolation. **[16]**

Q11) Why structures need to be retrofitted? Explain the various methods available for retrofitting? **[18]**

OR

Q12) How are masonry structures retrofitted. Explain with neat sketches. **[18]**

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Total No. of Questions : 12]

SEAT No. :

P1114

[Total No. of Pages : 3

[4264] - 413

B.E. (Civil)

ADVANCED CONCRETE TECHNOLOGY

(2008 Pattern) (Elective - II) (Theory) (Semester - I)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) Enlist any five factors affecting workability of concrete. Explain how shape and size of aggregates affect the workability. **[8]**

b) Write a note on bulking of sand. **[5]**

c) Write a note on Fly ash. **[5]**

OR

Q2) a) Write short notes on the following operations to be carried out on concrete for finishing floors and slabs. **[2 × 4 = 8]**

i) Floating. ii) Trowelling.

b) What is flexural strength of concrete and how it is obtained by beam model and by split tensile test in laboratory. **[2 + 4 + 4 = 10]**

Q3) a) Write a note on light weight aggregates. Name any six naturally occurring and any six artificial light weight aggregates. **[4 + 3 + 3 = 10]**

b) What are the various methods of manufacture of light weight concrete. **[6]**

OR

P.T.O.

Q4) Write notes on : **[4 × 4 = 16]**

a) Vacuum concrete. b) Mass concrete.

c) Underwater concreting. d) Gap graded concrete.

Q5) a) What is the difference between non-destructive and semi-destructive methods. **[7]**

b) Enlist various non-destructive methods with their utility in brief. **[9]**

OR

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

a) Probe penetration.

b) Pulse echo method.

c) Pull off test.

SECTION - II

Q7) Write notes on : **[18]**

a) Classification of artificial fibres.

b) Relative fibre matrix stiffness.

c) Fibre matrix interfacial bond.

d) Factors affecting properties of FRC.

OR

Q8) a) List the properties that are improved by addition of polymers to concrete? **[6]**

b) List the areas where polymer concrete finds its applications. **[6]**

c) Write a note on proportioning of polymer concrete. **[6]**

Q9) a) Explain the various properties of hardened SCC. **[8]**

b) Write a note on current developments in FRC. **[8]**

OR

Q10) Write notes on :

a) Polymer impregnated concrete. **[5]**

b) Slurry infiltrated fibre concrete. **[5]**

c) Stress strain property and compressive strength Properties of FRC. **[6]**

Q11) a) Write notes on following casting techniques of ferrocement : **[8]**

i) Centrifuging ii) Guniting

b) Enlist the various components Where ferrocement can be used. **[4]**

c) Write the advantages and disadvantages of open mould Method. **[4]**

OR

Q12) a) Explain Skeletal armature method of ferrocement along with merits and demerits. **[8]**

b) Write a note on fibre reinforced polymeric meshes (FRP) along with merits and demerits. **[8]**

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Total No. of Questions : 12]

SEAT No. :

P1023

[Total No. of Pages : 4

[4264] - 415

B.E. (Civil)

TRANSPORTATION ENGINEERING - II

(2008 Pattern) (Semester - II)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) Write a short note on saturation system. **[6]**

b) Outline the main features of various road patterns commonly in use with their diagrams only. **[6]**

c) What are the different causes of traffic accidents. **[5]**

OR

Q2) a) Explain how the road length of NH and SH are determined by using the third road plan formule. **[6]**

b) What are the various vehicular characteristics affects the road design enlist their name with significance. **[6]**

c) Write a short note on preparation of Master plan. **[5]**

Q3) a) Write a short note on surface drainage system of highway. **[6]**

b) Enlist and explain the types of gradient also state cleanly the recommended values of them as per IRC. **[7]**

c) Design the rate of super elevation for a horizontal highway curve of 400m and speed of 90 kmph. **[4]**

OR

P.T.O.

Q4) a) Discuss the special care to be taken while aligning hill roads. **[6]**

b) What the objects are of providing transition curves on the horizontal alignment highway? Enlist the various types of transition curves used in highway. **[6]**

c) Calculate the extra widening required for a pavement within 7 m on a horizontal curve of radius 250 m if the longest wheel base of vehicle expected on be road is 7.0 m. Design speed is 60 kmph. **[5]**

Q5) a) Write a explanatory note on : **[6]**

i) Temperature stresses in case of Cement concrete Pavement.

ii) Joints in Cement concrete Pavement.

b) Explain the construction procedure for WBM Roads. **[4]**

c) Draw an illustrative sketches of the following : **[6]**

i) Aggregate crushing value test apparatus with accessories.

ii) Softening point test apparatus with accessory used to carry out this test on bitumen sample.

OR

Q6) a) Explain CBR method of design of flexible pavement. **[6]**

b) Enlist all the test that are to be performed on bituminous material and explain flash and fire point test. **[6]**

c) Discuss the various design factors to be considered in the design of pavement. **[4]**

SECTION - II

Q7) a) Write short notes on <u>any two</u> of the following : **[2 × 3 = 6]**

i) Effective gradient

ii) Three controls of an aircraft

iii) Aircraft characteristic

b) Enumerate the various factors which influence the location of an airport. **[5]**

c) The length of Runway under standard conditions is 600 m. The Airport site has an elevation of 100 m above mean sea level. Its reference temperature is 28°C. If the runway is to be constructed with an effective gradient of 0.5%, determine the corrected runway length. Also, carryout the usual checks as per ICAO. **[6]**

OR

Q8) a) Enlist the characteristics of a good airport layout. Draw a neat sketch of typical airport layout of single runway. **[5]**

b) Differentiate between : **[2 × 3 = 6]**

i) Apron and Hanger.

ii) Minimum Turning Radius and Minimum Circling radius.

iii) Clam period and cross wind component.

c) What is the use of wind rose diagram in the orientation of a runway ? Enumerate the differences between the Wind Rose type I and Wind Rose type II diagram. **[6]**

Q9) a) What do you mean by Economical span of a bridge? Derive the formula for the same. **[4]**

b) Draw a neat labeled sketch showing all the components of a bridge. **[4]**

c) Draw sketches of any two types of abutment and state he conditions under which they are recommended. **[4]**

d) How do you determine the flood discharge by direct method? **[5]**

OR

Q10) a) Explain any five types of stresses acting on a bridge. **[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 m^2, 7000 m^2 and 10000 m^2. Determine the height of afflux using Merriman's formula. Also find the increase in velocity due to afflux. Assume g = 9.81 m/sec/sec and Coefficient of discharge, C = 0.98. **[4]**

c) Write short notes on <u>any two</u> of the following : **[8]**

i) Lacey's silt factor

ii) Remedial measures to reduce the effect of scour

iii) Linear and natural waterway of a bridge.

iv) Column bents pier.

Q11) a) Explain any two types of erection methods employed during construction of bridges. **[4]**

b) Differentiate between : **[4]**

i) Permanent and Temporary bridges

ii) Expansion and Rocker bearings

c) Draw the illustrative sketches of **[4]**

i) Suspension bridge

ii) Cantilever bridge

d) What do you mean by Fixed span and Movable span bridges? Give one example each of fixed span and movable span bridge. **[4]**

OR

Q12) a) Explain the importance of bearings in bridges. **[4]**

b) Write a note of Maintenance of bridges. **[4]**

c) Draw the illustrative sketches of **[4]**

i) Swing bridge.

ii) Bascule bridge.

d) What do you mean by 'Floating bridge'? What are the advantages of floating bridge over fixed bridge? **[4]**

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Total No. of Questions : 12]

SEAT No. :

P851

[Total No. of Pages : 3

[4264] - 417

B.E. (Civil)

ADVANCED FOUNDATION ENGG.

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

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

Instructions to the candidates:

1) ***Answer 3 questions from Section - I and 3 questions from Section - II.***
2) ***Answers to the two sections should be written in separate books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Use of logarithmic tables, electronic pocket calculator is allowed & IS codes are not allowed.***
6) ***Assume suitable data, if necessary.***
7) ***Your answers will be valued as a whole.***

SECTION - I

Q1) a) How will you decide the depth of exploration & number of borings? Discuss in the light of IS code. **[9]**

b) Discuss the IRC provisions for exploration of roads. **[8]**

OR

Q2) a) Explain the following :

i) Significant depth. **[3]**

ii) IS code provisions for exploration. **[3]**

iii) IRC provisions for road exploration. **[3]**

b) Discuss case studies for failures of foundations. **[8]**

Q3) a) A building is planned to be constructed on R.C. Raft foundation of dimensions 14 m × 21m. The qu of clay is 15 kN/m^2. The pressume intensity at the base of raft is 140 kN/m^2. Design the depth of raft to provide a FOS = 3, against shear failure. Assume γ =19 kN/m^3. **[9]**

b) Discuss, IS- 2950 - 1965, provisions for design & construction of raft foundations. **[8]**

OR

P.T.O.

Q4) a) Explain the following :

i) Skemption's equation.

ii) Jerzagli's equation. **[8]**

b) Discuss the following :

i) Conventional method for Raft design. **[5]**

ii) Elastic method for Raft design. **[4]**

Q5) a) For a cyclic pile load test on a 300 mm dia. pile, following results are obtained. Determine the design load.

Load (kN)	→	20	40	60	80	100	120	140	160	180	200
Settlement (mm)	→	03	05	10	13	17	22	27	34	44	62

[9]

b) Explain with sketch,

'cyclic pile load test'. **[7]**

OR

Q6) a) Explain stepwise 'Reese & Matlock' method, for laterally loaded piles. **[9]**

b) Discuss, IS - 2911 - pt –3 –1973, provisions for underreamed pile design. **[7]**

SECTION - II

Q7) a) Discuss stepwise the design of under-reamed pile. **[8]**

b) A clay layer 5m thick is consolidated with the help of sand drains of dia. 30 cm & spaced at 2.7 m c/c. Determine the influence of chain wells on the Av. degree of consolidation, at the time when the degree of consolidation in the clay without wells would be 20%.

The drainwells may be arranged in square pattern, with following data,

i) Kr = Kz ii)for Uz = 20%, Tv = 0.031 **[9]**

OR

Q8) a) Explain the steps for design of sand drains. **[8]**

b) Discuss the following tests for under-reamed piles, as per IS - 2911 - pt -3 - 1973.

i) Initial test. **[5]**

ii) Routine test. **[4]**

Q9) a) Explain 'Banerjee & Gangopadhyay' analysis, for well foundation design. **[9]**

b) Discuss, upto which depth the 'Grip length' is designed? As per the IRC code for well foundation. **[8]**

OR

Q10) a) Discuss stepwise the design of well foundation. **[9]**

b) Discuss the case studies for failures of well foundations. **[8]**

Q11) a) Compute the embedment depth & pull in anchor rod for a sheet pile cofferdam, retaining 6 m. high backfill, with anchor rod 1 m. below the top. The soil of backfill & below Date is same, having the following properties, $\phi = \phi^1 = 30°$, $c = 0$, $\gamma_{sat} = 20$ kN/m^3 $r = 18$ kN/m^3, GWT = 3 m above Date

Use 'Free earth support method'. **[9]**

b) Explain the steps for design of 'Diaphragm wall Cofferdam'. **[7]**

OR

Q12) a) Differentiate between 'free earth support' method & 'fixed earth support' method of sheet pile cofferdam design. **[9]**

b) Discuss the important stages for the design of,

i) Cellular cofferdam. **[4]**

ii) Rockfill cofferdam. **[3]**

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Total No. of Questions : 12]

SEAT No. :

P853

[Total No. of Pages : 3

[4264] - 420

B.E. (Civil)

CONSTRUCTION MANAGEMENT

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

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

Instructions to the candidates:

1) ***Solve Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6 from section - I and Q. 7 or Q. 8, Q. 9 or Q. 10, Q. 11 or Q. 12 from section - II.***
2) ***Answer 3 questions from Section - I and 3 questions from Section - II.***
3) ***Answers to the two sections should be written in separate books.***
4) ***Neat diagrams must be drawn wherever necessary.***
5) ***Figures to the right indicate full marks.***
6) ***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) Describe the role of construction industry in infrastructure development of 21st century. **[9]**

b) Discuss various reasons for project time and cost over runs and suggest a few remedies to overcome. **[9]**

OR

Q2) a) Write various components of infrastructure sectors. Explain how infrastructure projects contribute to national development. **[5+5]**

b) Explain the role of Project Management Consultants on any major project with an example. **[8]**

Q3) a) State the importance of Work Breakdown structure in construction scheduling with an example. **[8]**

b) Define 'Work Study' and 'Work Measurement'. Explain their objectives with examples. **[8]**

P.T.O.

OR

Q4) a) Write various factors affecting scheduling of construction project in detail. **[8]**

b) How activity charts and string diagrams are useful for work study and work measurement? **[8]**

Q5) a) Write a note on 'Building and other construction workers Act 1996'. **[8]**

b) An infrastructure project of Rs. 1000/- crore estimated cost is to be executed. Discuss the various ways in which the funds required for the same may be raised. Make suitable relevant assumptions. **[8]**

OR

Q6) a) What is capital investment ? Explain the importance of working and fixed capital in any project. **[2+6]**

b) Write short notes on :

i) Workmans Compensation Act 1923

ii) Child Labour Act **[4+4]**

SECTION - II

Q7) a) State importance of mathematical modeling in Risk Management. **[9]**

b) Define 'value'. Explain importance of value analysis. Discuss any 3 methods used in value engineering in detail. **[1 + 2 + 6]**

OR

Q8) a) Explain 'Break Even Analysis'. How it can be applied to a multistoried construction project involving 500 flats? **[10]**

b) Explain importance of value analysis in value Engineering. **[8]**

Q9) a) Explain role of Material Management in construction Management. **[8]**

b) ABC company gets an order for the supply of 24000 units of its product for a year. The supply should be instantaneous. The customer does not maintain any buffer stock, so he will not tolerate any shortage in supply. The inventory holding cost is 10% and the set of cost of machine, fixture etc. is Rs. 350 per order. **[8]**

Find out **:**

i) Optimum size of production lot for minimum cost.

ii) How many orders will be required for this?

iii) Duration of each order.

iv) What is cycle time?

OR

Q10) a) What is the role of ERP in the material Management. **[8]**

b) A company has an order of supplying 50,000 units of its product per year, the cost of the setup is Rs. 1000/-.There are ten workers engaged with the wage rate of Rs. 15/- per day. The daily production capacity is 200 units. The material cost of each unit is Rs. 10/-. The annual rate of depreciation, insurance taxes and storage cost etc. is 20% of unit cost. The supply should be instantaneous and no shortage are permitted.

Find out :

i) The economic lot size

ii) The number of runs

iii) Duration of each run. **[8]**

Q11) a) Explain application of the Artificial Neural Network in civil Engineering. **[8]**

b) How genetic algorithm can be applied to construction scheduling with or without resources constraints? **[8]**

OR

Q12) a) Explain with an example fuzzi logic applications in civil Engineering **[8]**

b) How Artificial Neural Network helpsin material management in civil Engineering. **[8]**

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Total No. of Questions : 12]

SEAT No. :

P1119

[Total No. of Pages : 2

[4264] - 439

B.E. (Mechanical Engineering)

MACHINE TOOL DESIGN

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

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

Instructions to the candidates:

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

SECTION - I

Q1) a) State and explain the advantages of geometric progression. **[8]**

b) State and explain laws of speed range distribution. **[8]**

OR

Q2) Draw the structural diagrams of a machine tool speed box for n_{min} = 16 rpm. n_{max} = 770 rpm and ϕ = 1.26. Which layout is best and why? **[16]**

Q3) A 2 m long, 1 m high and 0.5 m wide lathe bed consists of two vertical walls strengthened by perpendicular or diagonal stiffeners. The thickness of the walls is 50 mm while that of the stiffeners is 25 mm. Calculate the reduced bending rigidity of the beds having perpendicular and diagonal stiffeners.**[16]**

OR

Q4) A hollow rectangular table is 2 m long, 60 cm wide and 9 cm high. The 15 mm thick horizontal walls of the table are joined by 10 mm thick vertical stiffeners spaced at 400 mm. Calculate reduced stiffness of the table. **[16]**

Q5) From amongst the slideway combinations flat - flat, flat - V and V - V of a lathe, which one would provide for the least radial deflection? Substantiate your conclusion with mathematical proof. **[18]**

OR

Q6) Derive the load - capacity expressions for a rectangular, hydrostatic pad bearing fed through capillary, orifice, constant - flow and constant - gap restrictors. **[18]**

P.T.O.

SECTION - II

Q7) Describe the functions and requirements of spindle unit. **[16]**

OR

Q8) While turning a 750 mm long workpiece of 100 mm diameter between centres, the radial cutting force was found to be 1.5 kN when the tool was 200 mm from the tailstock. Calculate the machine tool and system compliances if the stiffness of the saddle, head stock and tailstock is 30, 40 and 25 kN/mm respectively. **[16]**

Q9) Derive the expression for the natural frequency of the system show in fig. 1. State the effect of placing viscous damper under mass m. **[16]**

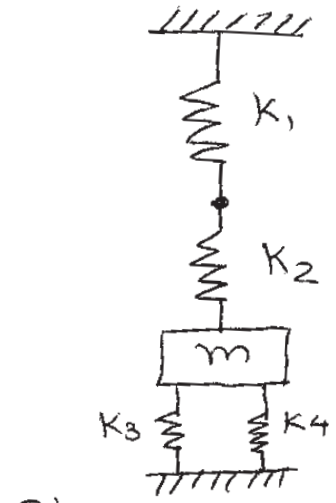

Fig. 1.

OR

Q10) Write the equations of motion and determine the natural frequencies of two - degree of freedom vibration system shown in Fig. 2. **[16]**

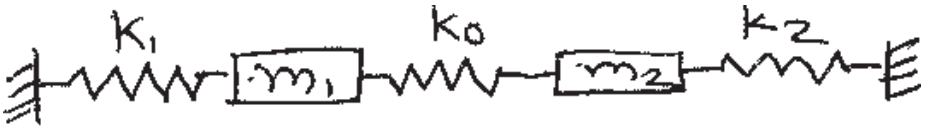

Fig. 2.

Q11) Explain ergonomic considerations applied to the design of control members. (any three) **[18]**

OR

Q12) Explain process optimization adaptive control system with neat block diagram. **[18]**

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Total No. of Questions : 12]

SEAT No. :

P988

[Total No. of Pages : 4

[4264] - 444

B.E. (Mechanical)

FINITE ELEMENT METHOD

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

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

Instructions to the candidates:

1) ***Answers to the two sections should be written in separate books.***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data, if necessary.***

SECTION - I

Unit - I

Q1) a) Explain general FEM procedure for one dimensional linear Element. **[8]**

b) Describe the terms discretization & degrees of freedom with the suitable example of each. **[8]**

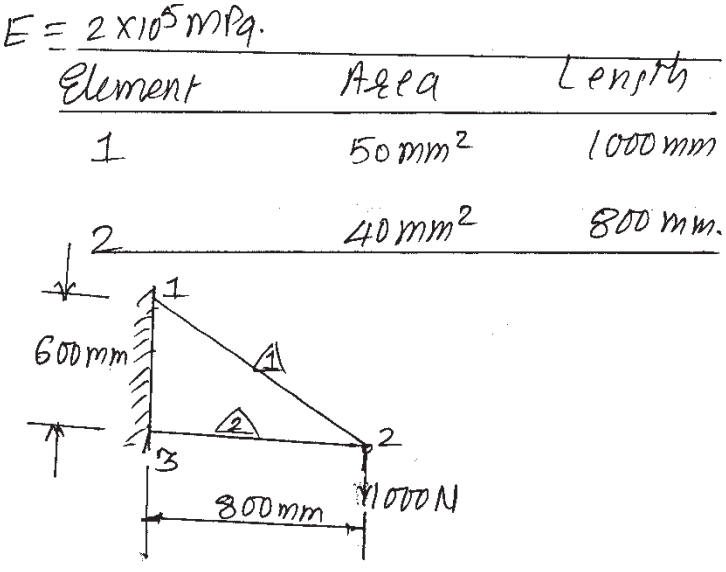
OR

Q2) a) What are types of Boundary Conditions & how they are treated in FEM. **[8]**

b) What are advantages & disadvantages of FEM method. **[8]**

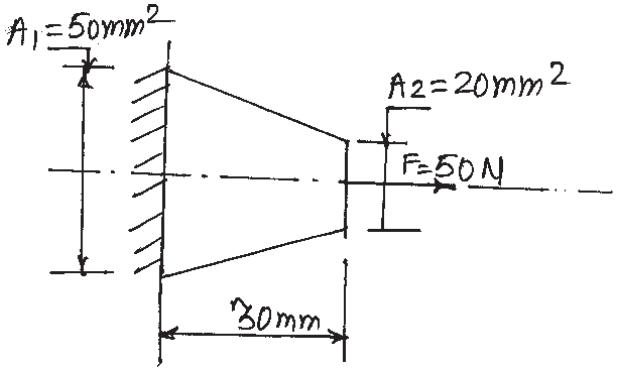
Unit - II

Q3) a) Analyse the truss shown in fig. for axial forces using FE method. Also find out unknown displacements. **[10]**



P.T.O.

b) Analyze the bar for axial displacements. Take three elements. Assume $E = 2 \times 10^5$ MPa **[8]**



OR

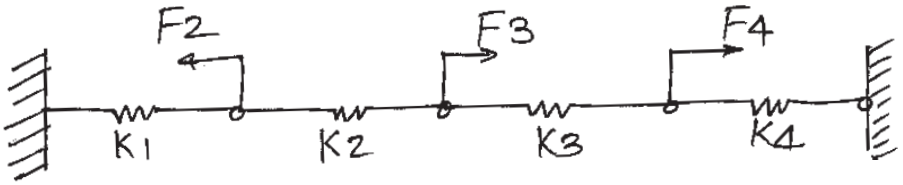
Q4) a) Derive Element stiffness matrix & force vector for two noded bar element using principle of minimum potential Energy (PMPE) method. **[10]**

b) A system of spring is shown in the figure. Find **[8]**

i) Nodal displacement

ii) Reaction forces

iii) Force in each spring



$K_1 = 10N/mm$ $K_2 = 15N/mm$ $K_3 = 25N/mm$ $K_4 = 20N/mm$

$F_2 = 20N$ $F_3 = 30N$ $F_4 = 50N$

Unit - III

Q5) a) Explain iso-parametric, sub parametric & super parametric Elements. **[8]**

b) Explain the difference between p&h refinement in FEM. **[8]**

OR

Q6) a) What is the significance of Numerical Integration in FEM. Explain Newton cotes method. **[12]**

b) What are higher order elements? Explain with suitable example. **[4]**

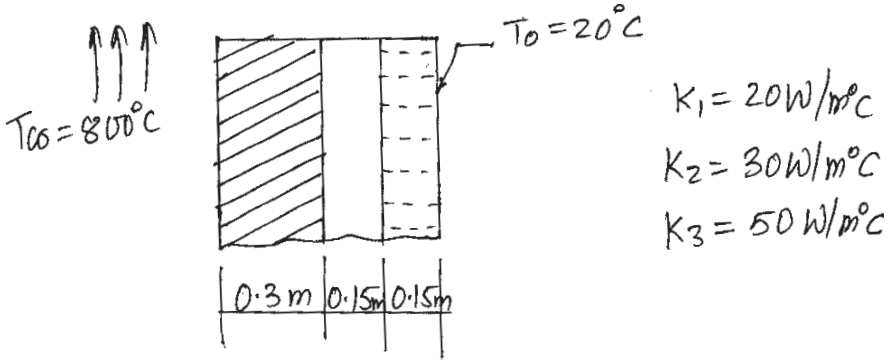
SECTION - II

Unit - IV

Q7) A composite wall consists of 3 materials as shown in figure below. The outer temperature is To = 20°C. The convection heat transfer takes place on the inner surface of the wall with T_∞ = 800°C and h = 25W/m²°C.

Determine temperature distribution in the wall. The element matrix equation is **[16]**

$$\frac{k^e}{he}\begin{bmatrix} 1 & -1 \\ -1 & 1 \end{bmatrix}\begin{Bmatrix} T_1^e \\ T_2^e \end{Bmatrix} = \begin{Bmatrix} Q_1^e \\ Q_2^e \end{Bmatrix}$$

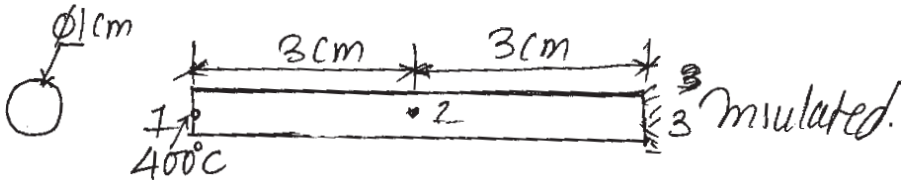


OR

Q8) A steel rod of 1cm diameter & length 6cm. With thermal conductivity K = 50 W/m°C has temperature at left end equal to 400°C. The surrounding temperature is 30°C. The convection heat transfer coefficient is h = 20 W/m°C. The right end is insulated. Find temperature at x = 3cm & x = 6cm. Use stiffness matrix as **[16]**

$$K^e = \frac{KA}{L}\begin{bmatrix} 1 & -1 \\ -1 & 1 \end{bmatrix} + \frac{hpL}{6}\begin{bmatrix} 2 & 1 \\ 1 & 2 \end{bmatrix} + hA\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \quad \& \quad \{K^e\}\{T^e\} = \{Q^e\}$$

Where A = Cross sectional area
K = Thermal conductivity
L = Length of an element
h = Convection heat transfer coefficient
p = Perimeter



Unit - V

Q9) a) Differentiate between consistent mass matrix j& lumped mass matrix. **[6]**

b) Derive the consistent mass matrix for bar element & truss element. **[12]**

OR

Q10) a) Explain eigen value problem for undamped free vibration system. **[6]**

b) Derive the consistent mass matrix for CST element. **[12]**

Unit - VI

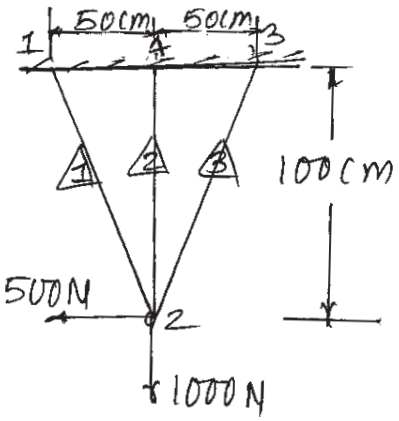
Q11) a) What are various meshing techniques. **[8]**

b) What is the difference between preprocessing, processing & post processing in commercial FEM softwares in general. **[8]**

OR

Q12) a) Explain aspect ratio & warp angle. **[4]**

b) Write down nodal coordinates, element connectivity, type of analysis, degrees of freedom, loading & Boundary conditions for the problem shown in fig. below. (Do not solve the problem) **[12]**



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Total No. of Questions : 12]

SEAT No. :

P989

[Total No. of Pages : 3

[4264] - 445

B.E. (Mechanical)

ROBOTICS

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

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

Instructions to the candidates:

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

SECTION - I

Q1) a) Explain the robot anatomy with figure. **[8]**

b) Compare the cylindrical co-ordinate and articulated configuration robot on the basis of

i) Work Volume

ii) Accuracy and Repeatability

iii) Mechanical Flexibility

iv) Dexterity

v) Applications **[10]**

OR

Q2) a) Explain the degree of freedom associated with robot arm and wrist. **[6]**

b) A Cartesian robot has a slide range of 1.5 m and it is desired that it will have a control resolution of 2.8 mm on this axis. Determine the bit storage capacity which control memory must possess to accommodate this level of precision. **[6]**

c) Explain the different joints used in robots. **[6]**

P.T.O.

Q3) a) What are the different considerations in the design of the gripper? **[8]**

b) A rectangular block weighing 12 kg is gripped at the middle and lifted vertically. If it accelerates at 25 m/s^2 and the coefficient of friction between the gripping pad and the block is 0.42. Draw gripper force analysis and calculate gripping force. **[8]**

OR

Q4) a) Explain important characteristics of robot sensors. **[8]**

b) State various types of sensors in robot. Explain capacitive and Ultrasonic sensors. **[8]**

Q5) a) Classify robot drives. **[6]**

b) Write short notes on Gear motor and Piston Motor. **[10]**

OR

Q6) a) Explain the Modeling and control of a single joint in robot. **[8]**

b) One of the joint of articulated robot has to traverse from initial angle of 20° to final angle of 84° in 4 seconds. Using a third degree polynomial calculate the joint angle at 1, 2 and 3 seconds. **[8]**

SECTION - II

Q7) a) Explain steps to implement Denavit Hertenberg convention for robot Manipulator. **[10]**

b) A point 'P' is attached to a frame (XYZ) is subjected to the following transformations, but all transformations relative to the current moving frame are as follows. **[8]**

i) A rotation of 'α' angle about the OX - axis.

ii) Then a translation of 'a' units along OX axis.

iii) Followed by a rotation of 'θ' angle about the OZ-axis.

Write homogenous transformation matrix to find new coordinate point of a frame.

OR

Q8) a) Sketch and explain the procedure to obtain robot joint Jacobian matrix. **[8]**

b) Derive an equation to calculate static force in two link arm manipulator. **[10]**

Q9) a) Explain three major functions of machine vision system. **[8]**

b) Enlist different ways to segment an image and explain any one in detail. **[8]**

OR

Q10) a) Enlist the capabilities and Limitations of lead through programming methods. **[8]**

b) Discuss the general features of robot programming language. **[8]**

Q11) a) Explain various techniques used for representing knowledge in artificial Intelligence. **[8]**

b) Explain possible schemes to represent the problem in artificial intelligence. **[8]**

OR

Q12) Write short notes on :

a) Economical aspects to design Robot. **[6]**

b) Robot simulation Tools. **[5]**

c) Singularities in robot. **[5]**

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Total No. of Questions : 12]

SEAT No. :

P992

[Total No. of Pages : 2

[4264] - 474

B.E. (Production Engineering)

AUTOMOBILE ENGINEERING

(2008 Pattern) (Elective - III) (Sem. - II)

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

Instructions to the candidates:

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

SECTION - I

UNIT - I

Q1) a) Describe the working of two stroke petrol engine with neat diagrams. **[8]**

b) List various types of frame and describe in brief the conventional frame. **[8]**

c) Define automobile engineering. **[2]**

OR

Q2) a) What is the principle of working of a mechanical governor? **[9]**

b) What are the various components of automobile? **[9]**

UNIT - II

Q3) a) What are the problems encountered with liquid cooling? **[8]**

b) What are antifreeze solutions? **[8]**

OR

Q4) a) What is the effect of inadequate cooling and overheating of engine parts? **[8]**

b) What is thermosyphon cooling? Explain. **[8]**

P.T.O.

UNIT - III

Q5) a) Explain in brief dry sump lubrication. **[8]**

b) List out the various tests performed on lubricants. **[8]**

OR

Q6) a) Explain pressure lubrication system with the help of diagram. **[10]**

b) What are the different types of lubricant? **[6]**

SECTION - II

UNIT - IV

Q7) a) With the help of neat sketch, explain the construction and operation of sliding mesh gear box. **[12]**

b) Where are dog clutches used? **[6]**

OR

Q8) a) How a multi-plate clutch is able to transmit more power in comparison to a single plate clutch. **[7]**

b) Explain the operation of an epicyclic gear box. **[8]**

c) Why is clutch pedal "free play" important? **[3]**

UNIT - V

Q9) a) Sketch and explain Ackermann steering mechanism. **[10]**

b) What are the objectives of suspension system? **[6]**

OR

Q10) a) What are the advantages and disadvantages of rubber spring? **[8]**

b) What are the components of the steering system? **[8]**

UNIT - VI

Q11) a) Describe in brief construction and working of hydraulic brakes. **[10]**

b) What are the functions of parking or emergency brakes? **[6]**

OR

Q12) a) Write short note on air brakes. **[8]**

b) Give the troubleshooting chart for cooling system with its complaint, cause and remedy. **[8]**

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Total No. of Questions : 12]

SEAT No. :

P993

[Total No. of Pages : 3

[4264] - 475

B.E. (Production)

MECHATRONICS

(2008 Pattern) (Elective - III) (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) Explain the Ladder programming Components. **[8]**

b) Write DeMorgan's Laws. **[8]**

OR

Q2) a) Write four applications of PLC in Manufacturing/ Production. **[8]**

b) Simplify $\overline{(A+B)}.\overline{(A+\overline{B})}$ **[8]**

Q3) a) Enlist six discrete PLC inputs with two application examples. **[9]**

b) Explain Examine ON and Examine OFF instructions to handle discrete inputs of PLC. **[9]**

OR

Q4) a) Enlist discrete PLC outputs with two application examples each. **[9]**

b) Explain ladder rung for latching output, setting and resetting output applied to PLC programming. **[9]**

Q5) a) Write a short note on Analog Input Data Representation. **[8]**

b) Explain the Analog Input Block in PLC ladder programming with details of each parameter. **[8]**

OR

P.T.O.

Q6) a) Write a short note on Analog output data representation. **[8]**

b) Explain why analog output Bypass is required and how it is done? **[8]**

SECTION - II

Q7) a) Explain Direct action I/O Interfaces and Intelligent I/O interfaces. **[8]**

b) Explain Position, encoders, Counters interfaces. **[8]**

OR

Q8) a) Describe Thermocouple Input Interface. **[8]**

b) Explain Network Interface Modules. **[8]**

Q9) a) List three important specifications of PLC. **[6]**

b) Given four push buttons (S1, S2 and S3) of Normally Open (NO) type, two lamps namely RED (L1) and GREEN (L2). Write the PLC ladder diagram for following objectives. **[12]**

i) When S1 is pushed and S2 is not pushed L2 (GREEN) lamp is On indicating the process has started. The GREEN light shall continue to be on till the process is stopped.

ii) When S1 is not pushed and S2 is pushed L1 (RED) lamp is On indicating the process has stopped.

iii) When S3 is pushed and process in on, a timer shall be activated for 30 seconds. When output of the timer is *High*, the process shall be Stopped. (Process stopped).

Write the names of input terminals to which switches are connected as well as output names to which lamps are connected

Write the Boolean (Digital) equations with truth table of each rung you draw.

Draw the ladder diagram using only Examine ON, Examine OFF and out put coil symbols

OR

Q10) a) Discuss Examine ON and Examine OFF conditions used in ladder program. **[6]**

b) Given three push to On buttons (P1, P2 and S), with two lamps (L1-Run and L2-Stop) write a PLC program to satisfy following objectives. **[12]**

i) When P1 (Start Button) is pushed the L1 (Run Lamp) shall go On and cycle shall start. The cycle shall continue to remain On until P2 (Stop Button) is pushed.

ii) When L1 is On then L2 is *Off* and vice a versa.

iii) When S button is pushed for first time, a counter is invoked as well as the output dependent on S shall be latched for 30 seconds.

iv) After each 30 seconds after S is pushed, counter is advanced by 1.

v) When the counter is done for 5 events the program STOPs.

vi) When P2 (Stop Button) is pushed the program shall stop.

vii) When program stops the L2 (Stop Lamp) shall be On.

Write the names of input terminals to which switches are connected as well as output names to which lamps are connected

Write the Boolean (Digital) equations with truth table of each rung you draw.

Draw the ladder diagram using only Examine ON, Examine OFF and output coil symbols.

Q11) a) Write a short note on Accelerometers. **[8]**

b) Explain any flow transducer to measure water flow w.r.t. PLC programing. **[8]**

OR

Q12) a) With respect to Principle, schematic construction, working and applications, explain LVDT. **[8]**

b) Write a short note on Pressure Transmitters w.r.t. PLC Programing. **[8]**

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Total No. of Questions : 12]

SEAT No. :

P944

[Total No. of Pages : 3

[4264] - 512

B.E. (Electrical)

SWITCHGEAR & PROTECTION

(2008 Pattern) (Sem. - 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 logarithmic tables slide rule, Mollier charts, electronic pocket calculator is allowed.***
6) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Explain are interruption theories in case of circuit breakers. **[8]**

b) A 3 phase 50 Hz alternator has inductance of 3 mH per phase & capacitance of 0.025 μF per phase. The circuit breaker opens when rms current is 8000 A. Determine - **[8]**

i) Frequency of oscillations

ii) Peak restriking voltage

iii) Av. rate of restriking voltage

iv) Max. value of RRRV

OR

Q2) Describe in detail the concept of **[16]**

a) Current chopping

b) Resistance switching

associated with high voltage circuit breakers.

Q3) a) Explain the construction & working of puffer Type SF_6 circuit breaker. **[8]**

b) Explain various ratings of high voltage CB's. **[8]**

OR

P.T.O.

Q4) a) Explain the construction & working of vacuum circuit breaker. **[8]**

b) Write short note on Auto reclosing. **[8]**

Q5) a) What do you mean by zones of protection? Explain primary & back-up protection. **[10]**

b) Explain following terms w. r. t. relay **[8]**

i) Plug setting

ii) Plug setting multiplier

iii) Time setting

iv) Operating time of relay.

OR

Q6) a) What do you mean by Protective Relaying? Explain the concept with basic block diagram. Why it is essential. What are different types of faults & its effects. **[10]**

b) Explain the basic requirements of good protective relaying. **[8]**

SECTION - II

Q7) a) Explain the least square method for estimation of phasor. **[8]**

b) With neat block diagram explain numerical relay. State its advantages over static relays. **[10]**

OR

Q8) a) With neat block diagram explain static relay state its advantages & disadvantages over electromagnetic relays. **[10]**

b) Write short notes on -

i) Sampling theorem

ii) Anti -aliasing filter **[8]**

Q9) a) Explain the difficulties faced by Merz price current differential protection used for protection of power transformer. **[8]**

b) A 11 kv, 70 MVA, alternator is provided with differential protection. The percentage of winding protected against phase to ground fault is 75%. 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) With respect to alternator explain following protection schemes- **[12]**

i) Unbalanced loading

ii) Loss of excitation.

iii) Loss of prime - mover

b) Explain high impedance bus bar differential protection scheme. **[4]**

Q11) a) Explain the effect of are resistance and power swing on the performance of distance relay. **[10]**

b) Write a short note on Wide Area Measurement (WAM) system. **[6]**

OR

Q12) a) Explain time graded system & current graded system protection of three phase fuder using over current relays. **[6]**

b) Explain concept of distance relaying applied to protection of transmisson lies. Compare impedance relay, reactance relay & Mho relay with reference to applications & characteristics. **[10]**

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Total No. of Questions : 12]

SEAT No. :

P1219

[Total No. of Pages : 3

[4264] - 528

B.E. (Electronics Engineering)

ADVANCED COMPUTER ARCHITECTURE

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

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

Instructions to the candidates:

1) ***Answers to the two sections should be written in separate books.***
2) ***Assume suitable data, if necessary.***
3) ***Neat diagrams must be drawn wherever necessary.***

SECTION - I

Q1) a) Explain parallel processing mechanisms used in a typical Uniprocessor. architecture. **[12]**

b) What are the various metrics used to measure the performance of parallel computers. **[6]**

OR

Q2) a) Discuss in detail the application of parallel processing in **[12]**

i) Predictive modeling and simulation.

ii) Engineering design and automation.

b) Explain Amdahl's and Gustafson's speedup Performance Laws. **[6]**

Q3) a) A nonpipelined processor X has a clock rate of 25 MHz and an average CPI (cycles per instruction) of 4. Processor Y, an improved successor of X, is designed with a five-stage linear instruction pipeline. However, due to latch delay and clock skew effects, the clock rate of Y is only 20 MHz. **[6]**

i) If a program containing 100 instructions is executed on both processors, what is the speedup of processor Y with X.

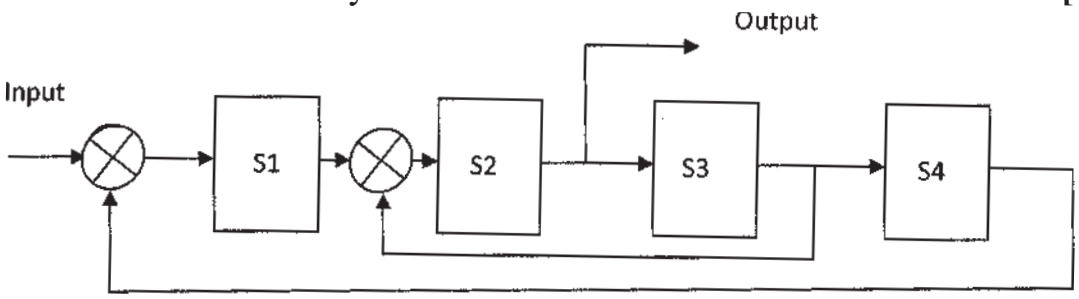
ii) Calculate MIPS rate of each processor during the execution of this particular program.

b) What are the different types of Hazards caused in the pipeline? How can these hazards be detected and resolved? **[10]**

OR

P.T.O.

Q4) Consider the following pipelined processor with four stages. This pipeline has a total evaluation time of six clock cycles. All successor stages must be used after each clock cycle. **[16]**



i) Specify the reservation table for this pipeline with six columns and four rows.

ii) List the set of forbidden latencies between task initiations and the initial collision vector.

iii) Draw the state diagram which shows all possible latency cycles.

iv) List all greedy cycles from the state diagram.

v) Calculate MAL

vi) What is the maximal throughput of this pipeline?

Q5) a) Explain the four types of vector instructions in Cray - 1 in detail. **[8]**

b) Give the complete detail of SIMD matrix multiplication. **[8]**

OR

Q6) a) Explain parallel sorting on Array processors. Assume mesh interconnection of 16 PE's. **[10]**

b) Give the details of vector chaining with respect to Cray - 1 architecture. **[6]**

SECTION - II

Q7) a) Write the notes on : **[8]**

i) Crossbar Switch ii) Multiport Memories

b) Write and explain a parallel algorithm to compute FFT. **[8]**

OR

Q8) a) Explain implementation details to multiply two 3 × 3 matrixes using parallel algorithm on Array processors. **[12]**

b) Give the details of any one static SIMD interconnection network. **[4]**

Q9) a) Discuss the typical implementation issues of a program on multiprocessor system. **[10]**

b) What is memory contention? Explain the Arbitration techniques to resolve the issue of contention. **[8]**

OR

Q10) a) Compare Loosely coupled and Tightly coupled multiprocessors. **[6]**

b) Explain cache coherence implementation in multiprocessor platform. **[12]**

Q11) a) What is latency hiding technique? Elaborate any two techniques. **[10]**

b) Compare Synchronous and Asynchronous message passing. **[6]**

OR

Q12) a) What are the typical Multithreading issues? Discuss the possible solutions. **[8]**

b) What is Data Parallel Programming? Explain in detail. **[8]**

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Total No. of Questions : 12]

SEAT No. :

P1149

[Total No. of Pages : 2

[4264] - 529

B.E. (Electronics)

ENTREPRENEURSHIP AND BUSINESS PLANNING

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

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

Instructions to the candidates:

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

SECTION - I

Q1) a) Why are small businesses so important to our economy? **[8]**

b) How do the concept of marginal benefit and the marginal cost help entrepreneurs make decisions? **[8]**

OR

Q2) a) What are the four types of sales transactions? Describe how you balance the cash drawer? **[8]**

b) Enumerate the various business etiquates to be maintained for business conversations. **[8]**

i) Across the table meeting.

ii) Telephone Conversation.

Q3) a) How is price determined in a market economy? **[8]**

b) Enumerate the different Questionnaires which should be raised while evaluating a Franchise opportunity? **[8]**

OR

Q4) a) Describe in detail the purpose of Business plan and Importance of Business plan? **[8]**

b) What are the advantages and disadvantages of a partnership firm? **[8]**

P.T.O.

Q5) a) Explain in brief the type of insurance you can purchase for your business? **[10]**

b) What is direct and indirect competition? What are the purpose of analysing competitors? **[8]**

OR

Q6) a) What is market Research? Explain secondary and primary data research? **[10]**

b) Enumerate some of the factors you should consider while selecting a specific site for your Business? **[4]**

c) How can you protect your business against the employee theft? **[4]**

SECTION - II

Q7) a) How do you determine the staffing needs of your business? **[8]**

b) Enumerate the different kinds of bank, payroll and tax records you have to keep? **[8]**

OR

Q8) a) Describe the two different inventory tracking methods? **[8]**

b) Enumerate the different Leadership characteristics a manager should posses? **[8]**

Q9) a) Explain the Break - Even point along with suitable graph? **[8]**

b) Explain the services provided by the financial experts? **[8]**

OR

Q10) a) State and explain the ways by which you can improve your cash flow? **[8]**

b) Enumerate what information should be uploaded on the website of a newly formed Engineering college. **[8]**

Q11) a) What are the laws that protect the businesses and the public? **[8]**

b) Name and explain two reasons entrepreneurs need to appreciate different cultures? **[10]**

OR

Q12) a) What are some sources of information that can help you find out about doing the business abroad? **[8]**

b) Write short notes on :

i) Code of ethics. **[3]**

ii) Business ethics. **[3]**

iii) Social Responsibility **[4]**

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Total No. of Questions : 12]

SEAT No. :

P1151

[Total No. of Pages : 4

[4264] - 531

B.E. (Electronics)

ROBOTICS AND AUTOMATION

(2008 Pattern) (Elective - II) (Sem. - I)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) Write and explain the four generations of the Robots in brief. **[4]**

b) Define the term 'Robot'. **[4]**

c) What are the major components of the Robots. Explain any three. **[6]**

d) Write and explain any two Industrial applications of the robots. **[4]**

OR

Q2) a) What are the "Three Rules (or Laws) of the Robotics"? **[4]**

b) What do you mean by 'Work Envelop'? Explain in brief. **[6]**

c) Explain (Any Two) : **[8]**

i) Cylindrical Coordinate system.

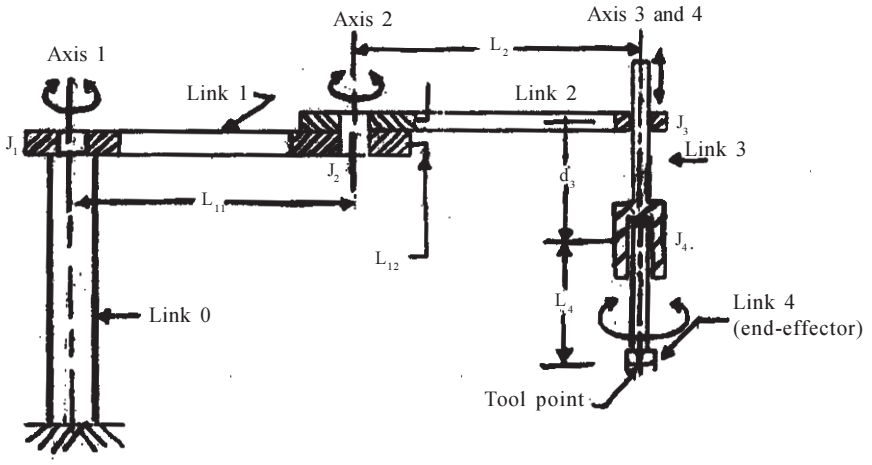
ii) Spherical Coordinate system.

iii) Cartesian Coordinate system.

Q3) a) What do you mean by Degree of Freedom. Explain. **[4]**

P.T.O.

b) Obtain the direct Kinematic equation of the 4 - DOF Selective Compliance Assembly Robot Arm (SCARA) robots. **[8]**



c) What is 'Work Space'? Explain Reachable workspace. **[4]**

OR

Q4) a) State and explain the Newton-Euler Equation. Explain its significance. **[6]**

b) What are the steps to get DH parameters. **[6]**

c) What are the steps of the Kane's algorithm? What are the benefits of this algorithm. **[4]**

Q5) a) What are the three different types of the Grippers. Explain in brief. **[4]**

b) Differentiate Serial and Parallel Robots. **[4]**

c) Explain in Brief : (Any Four) **[8]**

i) DC Motor ii) Servo Motor

iii) Stepper Motor iv) Ultrasonic Sensor

v) Laser Range Finder vi) Tactile Sensor

OR

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

i) Gears. ii) Belt and Pulley.

iii) Rack and Pinion. iv) Slider Crack Mechanisms.

v) Four-Bar Linkage.

b) What do you mean by Actuators. Classify the different actuators. **[4]**

c) What is Optical Encoders, explain in brief. **[4]**

SECTION - II

Q7) a) What do you mean by the following features or the ability of the Robots? (any four) **:** **[8]**

i) Ability to define points in space.

ii) Ability to move between points.

iii) Program control.

iv) Control of end effectors.

v) Serviceability.

b) What do mean by Error Budgeting. What are the parameters related to it? **[6]**

c) Explain (Any Two) : **[4]**

i) Continuous Path.

ii) Via Points.

iii) Programmed Points.

OR

Q8) a) What do you mean by Denavit-Hartenberg Matrix, explain in brief. **[4]**

b) What is Jacobian Matrix? Write Jacobian form of DH matrix. **[8]**

c) What is PATH planning? What is Trajectory? Differentiate Path and Trajectory. **[6]**

Q9) a) State and explain any two important applications of the Robotic Vision system. **[4]**

b) What do you mean by Imaging Components? Explain Point, Line and Planer sensor. **[4]**

c) Explain the following image segmentation techniques with example. **[8]**

i) Edge Detection. ii) Contour Following.

OR

Q10) a) State and explain (with example) the following sensors : **[8]**

i) Status sensor.

ii) Environmental sensor.

iii) Noncontact sensors.

b) What do you mean by Video Analytics. Give its benefits. **[8]**

Q11) a) "The Quality of the product depends majorly on the Robotics Intelligence." Justify. **[8]**

b) Draw and explain the standard components in a Inspection system. **[8]**

OR

Q12) a) Explain in brief : **[8]**

i) PLC ii) DCS system

iii) SCADA iv) HMI

b) State and explain any one Home Automation system. **[8]**

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

P858 **[Total No. of Pages : 3**

[4264] - 532

B.E. (Electronics Engineering)

COMPUTER NETWORKS & SECURITY

(2008 Pattern) (Semester - II)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) Explain the working of ATM. **[8]**

b) Explain the structure and working of OSI model. **[8]**

OR

Q2) a) Write a short note on Frame Relay. **[6]**

b) Discuss various issues which occur during design of a network. **[6]**

c) What are the uses of computer networks ? **[4]**

Q3) Explain in detail the working and application of following protocols :

a) FTP **[6]**

b) SNMP **[5]**

c) BOOTP **[5]**

OR

Q4) a) What is the significance of DNS and how does it work ? **[8]**

b) Create a page for a company using HTML. **[8]**

P.T.O.

Q5) a) What are different types of addressing? Explain with the application. **[6]**

b) What is congestion? Explain one algorithm to control congestion. **[6]**

c) What is ARP and RARP ? **[6]**

OR

Q6) a) Compare UDP and TCP. **[4]**

b) How is Quality of Service defined in Computer Networks? Explain with the help of various parameters. **[8]**

c) What is a socket? What are the types of socket? How is a socket associated? Give the process of calling or associating a socket. **[6]**

SECTION - II

Q7) a) List the elementary protocols at Datalink Layer. Explain any one in detail. **[8]**

b) Write down the problems that are encountered in building the bridge between :

i) 802.3, 802.4

ii) 802.4, 802.5 **[6]**

c) What is a Virtual network? Where is it used? **[4]**

OR

Q8) a) What are various IEEE LAN standards? Elaborate the working of IEEE 802.6. **[8]**

b) How does Collision free protocols work? **[6]**

c) What is meant by flow control and error control ? **[4]**

Q9) a) It is required to transmit a data at a rate of 64kbps over a 3kHz telephone channel. What is the minimum SNR required to accomplish this ? **[4]**

b) Explain in detail the structure, working, connector required and application of twisted pair cable. **[8]**

c) How does internet work over cable ? **[4]**

OR

Q10) a) Discuss Microwave communication and Infrared communication. **[6]**

b) Compare Circuit switching, Message switching and packet switching. **[9]**

c) Is modem needed for DSL connection ? **[1]**

Q11) a) Explain AES in detail. **[8]**

b) How is internet accessed through Dial up, leased line and mobile handset ? **[8]**

OR

Q12) a) Explain in detail a model for network security. **[6]**

b) Write the steps of RSA algorithm. **[6]**

c) Write a note on Protocol Analyzer. **[4]**

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Total No. of Questions : 12]

SEAT No. :

P1154

[Total No. of Pages : 4

[4264] - 544

B.E. (E & TC)

DIGITAL IMAGE PROCESSING

(2008 Pattern) (Semester - I) (Elective - I)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) With respect to the elements of visual perception, explain the following : **[10]**

i) Brightness adaptation and discrimination.

ii) Mach Bands and simultaneous contrast.

b) Explain the necessity and concept of Image digitization. Also state an application of non uniform sampling and non uniform quantization. **[8]**

OR

Q2) a) Explain the significance of statistical properties of an image. Also explain the following statistical properties. **[10]**

i) Mean ii) Variance

iii) SNR iv) PSNR

b) Explain the following terms related to image processing or visual system. **[8]**

i) MTF

ii) Gray level resolution

iii) Spatial resolution

iv) Connectivity of pixels

P.T.O.

Q3) a) What is a colour space?
Discuss in brief about RGB, YIQ and HSI models for colour image. Also explain the applications of these colour models. **[8]**

b) Explain the terms false colouring and pseudocolouring. What are the various pseudocolouring techniques used for image enhancement. **[8]**

OR

Q4) a) Answer the following related to histogram of an image. **[8]**

i) If all the pixels in an image are shuffled, will there be any change in the histogram. Justify your answer.

ii) Why does histogram equalisation (discrete histogram equalisation) not produce a perfectly flat histogram.

iii) Can two different images have same histogram? Justify your answers.

iv) Two images have same histogram. Which of the following properties must they have in common?

1) Same total power. 2) Same interpixel covariance function.

b) Explain the following concepts in image enhancements, with appropriate applications : **[8]**

i) Gray level slicing ii) High Boost filtering

Q5) a) A 2×2 block of image is given as $\begin{bmatrix} 28 & 13 \\ 10 & 28 \end{bmatrix}$.

Determine the DCT coefficients. **[10]**

b) With reference to a 2D transform, explain : **[6]**

i) Symmetry.

ii) Separability.

iii) Basis image.

OR

Q6) a) Explain the necessity of image transformation. Write a short note on : **[10]**

i) Walsh transform. ii) Haar transform.

b) Explain the following properties of 2D Fourier transform. **[6]**

i) Translation.

ii) Rotation.

iii) Periodicy.

SECTION - II

Q7) a) Explain the following with respect to image compression. **[8]**

i) Entropy and entropy coding methods.

ii) Redundancy and fidelity criteria.

b) Compare lossy and lossless compression. Explain the methods used in these compressions. **[8]**

OR

Q8) a) In transform based image compression, image is subdivided into smaller subimages. Discuss the effect of subimage size on : **[8]**

i) Compression performance.

ii) Computational complexity.

b) Explain arithmetic coding with example. Compare with Huffman coding. **[8]**

Q9) a) Considering a binary image I and structuring element J as given below. **[8]**

I	J
0 0 0 0 0 0	
0 1 1 1 0 0	
0 1 1 1 0 0	
0 0 1 1 1 0	0 1 0
0 0 1 1 1 0	1 1 1
0 0 0 0 0 0	0 1 0

Perform image dilation and erosion.

b) Explain local and global thresholding in segmentation. **[8]**

OR

Q10) a) Give the eight directional chain code for the arbitary shape shown in figure. **[8]**

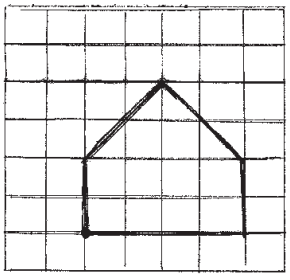

Fig. Arbitary shape Q 10 (a)

b) Explain image segmentation based on Thresholding. Explain the various types of thresholding techniques used in image segmentation. **[8]**

Q11) a) How is image restoration different from image enhancement? Explain the various methods used for restoration of an image. **[8]**

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

i) Acoustic imaging.

ii) Remote sensing using image processing.

OR

Q12) a) Explain the image degradation model in detail. **[8]**

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

i) Character recognition using image processing.

ii) Medical Imaging (any one application).

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Total No. of Questions : 12]

SEAT No. : ____

P1161

[Total No. of Pages : 3

[4264] - 551

B.E. (E & TC)

MOBILE COMMUNICATION

(2008 Pattern) (Elective - II) (Sem. - I)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) Compare & contrast the various 2.5G technology paths that each of the major 2G standards provide. Which path has the highest Internet access speed? **[9]**

b) Why would an entrenched US wireless carrier announce that its long term plan is to abandon its IS - 136 North American digital cellular standard in favour of a W - CDMA 3rd generation standard with foundations in GSM? **[9]**

OR

Q2) a) How would heavy HSCSD usage impact a cellular carrier's strategy in allocating channels in the base stations of a cellular network? How would the rapid adoption of Voice Over Internet Protocol (VOIP) impact cellular congestion? Explain. **[9]**

b) What is the concept of handoff strategy? Explain in detail the practical handoff considerations. **[9]**

Q3) a) Explain what is Brewster angle & why it occurs for parallel polarization. Calculate the Brewster angle, θB for a ware impinging on poor ground, having a permittivity of Er = 4 at the frequency of 100 MHz. Also calculate the same for typical ground with permittivity of Er = 15. **[8]**

P.T.O.

b) Explain the advantages & disadvantages of the two-ray ground reflection model in the analysis of path loss. **[8]**

OR

Q4) a) Derive the relationship between Bandwidth & Received power in case of multipath channel. **[8]**

b) Explain in detail the spread spectrum channel impulse response measurement system. **[8]**

Q5) a) Draw the Block - diagram of DPSK receiver & transmitter. Explain the function each block in detail. **[8]**

b) Give the comparison between GMSK & MFSK. **[8]**

OR

Q6) a) Draw the Block - diagram of a DS - SS system with binary phase modulation for transmitter & receiver. **[8]**

b) Draw the block - diagram of a simplified communication system using an adaptive equalizer at receiver. Explain the function of each block in detail. **[8]**

SECTION - II

Q7) a) Draw the block - diagram of GSM speech encoder & decoder. Explain the function of each blocks in detail. **[9]**

b) Explain the different criteria for selection of speech coders for Mobile communication. Also explain the linear predictive coders excitation methods. **[9]**

OR

Q8) a) What are the disadvantages of FDMA & TDMA? How these are overcome in CDMA technique? Explain in detail with diagram. **[9]**

b) Give the comparison between SDMA & OFDM. Explain the concept of Packet Radio. **[9]**

Q9) a) Draw the block-diagram for GSM system architecture. Explain the function of each block. **[8]**

b) Draw the GSM frame structure. Comment on each frame of the structure. **[8]**

OR

Q10) a) Give the different GSM channel types. Give the example of a GSM call. **[8]**

b) Explain in detail, with block - diagram the forward CDMA channel modulation process. **[8]**

Q11) a) Give the comparison between IS - 95 CDMA & CDMA 2000. **[8]**

b) Give the significance of air interface, in mobile communication system. **[8]**

OR

Q12) a) Draw the logical & physical channels for CDMA 2000 system. **[8]**

b) Explain how in the handover is done in the IS - 95 CDMA system. **[8]**

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Total No. of Questions : 12]

SEAT No. :

P995

[Total No. of Pages : 3

[4264] - 557

B.E. (E & TC)

TEST AND MEASUREMENT SYSTEMS

(2008 Pattern) (Elective - III) (Sem. - 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) Define the terms instrument, accuracy, error, precision, resolution, expected value, linearity, repeatability and sensitivity with proper example. **[12]**

b) Compare analog and digital signal processing as applied to measuring instrument. **[6]**

OR

Q2) a) With the help of neat diagrams, explain : **[9]**

i) Direct comparison calibration setup

ii) Indirect comparison calibration setup

iii) Echelon of traceability

b) List different statistical characteristics encountered to measure the central tendency of distribution. Calculate at least two characteristics for following readings : **[9]**

Resistance (ohm)	558	559	560	561	562
Frequency of readings	03	12	30	13	02

P.T.O.

Q3) a) Explain with the help of a neat diagram, the working of a dual slope DVM. **[8]**

b) A square wave with frequency 1 kHz, 50% duty cycle and peak value 2.5 volts is applied to ordinary multimeter for rms voltage measurement. Find true rms voltage of the waveform and reading of the ordinary meter. Also find absolute and % error in the reading. **[8]**

OR

Q4) a) What errors are associated with the measurement of Q using LCR-Q meter explain in detail. **[10]**

b) What are the problems of impedance measurement at RF and how these are taken care of? **[6]**

Q5) a) Draw block diagram of HF oscilloscope and give features of typical stages. **[8]**

b) Explain various sampling and interpolation methods used in DSO. **[8]**

OR

Q6) a) With respect to DSO explain following : **[10]**

i) Math function

ii) FFT

iii) Roll mode

iv) Zoom mode

v) Glitch mode

b) What are needs of active and 10:1 probes? **[6]**

SECTION - II

Q7) a) Explain functional block diagram of double conversion heterodyning wave analyzer. **[8]**

b) Explain following terms with respect to spectrum analyzer. **[10]**

i) Dynamic range

ii) Scan width

iii) Resolution Bandwidth

iv) Sensitivity

OR

Q8) a) Give typical specifications of Logic Analyzer. Explain how it can be used in fault finding in micro controller circuits. **[10]**

b) Draw block diagram and explain fundamental suppression harmonic distortion analyzer. **[8]**

Q9) a) Compare microwave solid state sources : YIG resonator, Gunn diode, Impatt diode and Avalanche oscillators for parameters stability, power output and tunability. **[10]**

b) Explain test setup for EMI measurement. **[6]**

OR

Q10) a) Give the measurement of parameters using combined reflection and transmission test set. **[10]**

b) What is frequency synthesizer? Explain typical applications of frequency synthesizer. **[6]**

Q11) a) With the help of block diagram explain automatic test system for measurement of various parameters of radio receiver. **[8]**

b) What are advantages and disadvantages of virtual instruments. **[8]**

OR

Q12) a) Give complete set of automatic test equipment used for measurements on microwave Network. **[10]**

b) Explain features of software used for virtual instruments. **[6]**

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Total No. of Questions : 12]

SEAT No. :

P1165

[Total No. of Pages : 2

[4264] - 565

B.E. (Instrumentation & Control)

LASER BASED INSTRUMENTATION

(2008 Pattern) (Elective - I) (Semester - I)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) Calculate the ratio of rates of spontaneous and stimulated emissions for a tungsten filament lamp operating at temperature of 2030 K with average frequency to be 5.5×10^{14} Hz. **[5]**

b) Estimate the relative populations of two energy levels such that a transition from the higher to the lower will give visible radiations of 570 nm at room temperature (T = 300 K). **[5]**

c) What are the properties of Laser? **[6]**

OR

Q2) a) Write a short note on the process of absorption, spontaneous and stimulated emissions of radiation. **[8]**

b) Discuss the significance of Einstein relations in emissions of radiation. **[8]**

Q3) a) Explain the construction and working of any gas laser. **[8]**

b) Classify the laser products for safety standards? **[4]**

c) Calculate the threshold pumping power of a laser for critical population inversion of $9 \times 10^{21}/m^3$ and spontaneous life time of 300 μs. The upper level is at energy of 1.5 eV. **[6]**

OR

Q4) a) What are different laser system components? Explain each in short. **[12]**

b) Estimate the efficiency of a GaAs laser operating well above threshold. The refractive index of material is 3.5 and laser cavity length is 0.1 mm. The loss coefficient is 600 per meter length and the internal quantum efficiency is 0.8. **[6]**

P.T.O.

Q5) a) Classify the basic optical interferometers? **[8]**

b) Describe subjective and objective speckles in detail. **[8]**

OR

Q6) a) Describe the electronic speckle pattern interferometer (ESPI) for displacement measurement. **[8]**

b) Describe the speckle in single point interferometers. **[8]**

SECTION - II

Q7) a) Explain the performance parameters of Laser Velocimeter. **[8]**

b) Differentiate between time domain and frequency domain processing of the Doppler signal? **[8]**

OR

Q8) a) Explain the time domain processing of Doppler signal in detail. **[8]**

b) Discuss the performance parameters of operation of laser velocimeter? **[8]**

Q9) a) Write short note on Sagnac effect. **[8]**

b) Describe the all fiber FOG configuration. **[8]**

OR

Q10) a) Write short note on Ring Laser Gyroscope. **[8]**

b) Explain in detail the Fiber Optic Gyroscope. **[8]**

Q11) a) A thin strip of the hologram undergoing stress parallel to the x-axis is illuminated by a He-Ne laser. The fringes are localized in a plane having slope of 1.5 per unit length in x-direction and the fringe spacing is found to be 1 mm. Hence find the strain. **[8]**

b) Explain the any one applications of holographic interferometer that you know. **[10]**

OR

Q12) Write a short notes on :

a) Holographic Interferometer. **[9]**

b) Applications of holographic interferometer. **[9]**

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Total No. of Questions : 12]

SEAT No. :

P863

[Total No. of Pages : 2

[4264] - 572

B.E. (Instrumentation & Control)

PROCESS DYNAMICS AND CONTROL

(2008 Pattern) (Semester - II)

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

Instructions to the candidates:

1) ***Answer 3 questions from Section - I and 3 questions from Section - II.***
2) ***Answers to the 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 Feed forward control loop.**[8]**

b) Derive the transfer function $\theta / \theta s$ 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 a Heat Exchanger. **[9]**

P.T.O.

Q5) a) Explain air / fuel ratio control 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 a 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) Elaborate reactor safety and interlocks with respect to CSTR. **[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) What is surge phenomenon in compressors? Explain the used of bypass valve to prevent it. **[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]**

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Total No. of Questions : 12]

SEAT No. :

P997

[Total No. of Pages : 3

[4264] - 575

B.E. (Instrumentation & Control)

FIBER OPTIC INSTRUMENTATION

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

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

Instructions to the candidates:

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

SECTION - I

Q1) a) Explain graded index optical fiber. Using simple ray theory concepts, discuss the transmission of light through the fiber. Indicate the major advantage of this type of fiber with regard to multimode propagation. **[10]**

b) Briefly indicate with the aid of suitable diagrams the difference between graded index and in step index fibers. **[6]**

OR

Q2) a) An optical fiber has a numerical aperture of 0.20 and a cladding refractive index of 1.59. Determine : **[8]**

i) The acceptance angle for the fiber in water which has a refractive index of 1.33;

ii) The critical angle at the core-cladding interface.

b) Describe with the help of simple ray diagram : **[8]**

i) Multimode step index fiber

ii) Single-mode step index fiber

Q3) a) What are the various losses in optical fibers? Compare the intrinsic and extrinsic absorption mechanisms. **[8]**

b) Describe the following scattering losses in optical fibers : **[8]**

i) Rayleigh scattering ii) Mie scattering

OR

P.T.O.

Q4) a) Compare Brillouin and Raman scattering in optical fibers. **[8]**

b) Explain Micro bending and Macro bending in optical fiber in detail. **[8]**

Q5) a) Briefly describe the processes by which light can be emitted from an atom with an energy level diagram of a common nonsemiconductor laser. **[9]**

b) Compare P-I-N diode with avalanche photodiode. **[9]**

OR

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

a) Splicing techniques

b) Optical fiber connectors

c) P-I-N diode

d) Avalanche photodiode

SECTION - II

Q7) a) What do you understand by intrinsic and extrinsic Optical Fiber Sensors? With the aid of suitable diagrams describe one Extrinsic Optical Fiber Sensor. **[8]**

b) What are the advantages and drawbacks of Optical Fiber Sensors? **[8]**

OR

Q8) What are the advantages of Intensity Modulated Optical Sensors (IMOS)? Describe following techniques of sensing which is based on intensity modulation. Also enlist different parameters, which can be sensed by using these techniques. **[16]**

a) Evanescent field

b) Coupling

c) Encoding based position sensors

Q9) a) Discuss the working of Fiber Bragg Grating. Also explain the manufacturing technique of Fiber Bragg Grating. **[8]**

b) Explain the working of Optical Fiber displacement sensor. **[8]**

OR

Q10) a) What are the advantages and disadvantages of Distributed Optical Fiber Sensing? Explain role of Optical Time Domain Reflectometer (OTDR) in Distributed Optical Fiber Sensing. **[8]**

b) Discuss the working of Fiber Bragg Grating. Also explain the manufacturing technique of Fiber Bragg Grating. **[8]**

Q11) a) Give major reasons which have led to the development of optical amplifiers, outlining the attributes and application areas. **[9]**

b) Explain with the aid of suitable diagrams, following integrated optical devices : **[9]**

i) Directional coupler

ii) Beam splitter

OR

Q12) Write short note on any three : **[18]**

a) Integrated Optics

b) Beam splitter

c) Directional coupler

d) Optical amplifier

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Total No. of Questions : 6]

SEAT No. :

P1170

[Total No. of Pages : 2

[4264] - 582

B.E. (Printing)

DIGITAL IMAGING & PRINTING

(2008 Pattern) (Semester - I)

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

Instructions to the candidates:

1) ***Answer three questions from Section - I and Section - II.***
2) ***Answers to the two sections should be written in separate books.***
3) ***Figures to the right indicate full marks.***

SECTION - I

Q1) Define image quality based on resolution. Also discuss resolution concept. **[18]**

OR

State and explain any 6 file formats used for digital printing. **[18]**

Q2) Pros and Cons of compressible and non compressible file formats. **[16]**

OR

Explain color temperature concept. Also discuss importance of white point. **[16]**

Q3) Describe Structure and working of DSLR camera. **[16]**

OR

Discuss Raw image processing and compare RAW file format with TIFF & JPG. **[16]**

SECTION - II

Q4) Describe in detail Structure and working of Electrostatic printing process. **[18]**

OR

Explain 6 (six) advantages of digital printing. **[18]**

P.T.O.

Q5) Explain detailed process and advantage of variable data printing. **[16]**

OR

Explain any 2 of the following : **[16]**

i) Magnetography ii) Dye sublimation

iii) Liquid toner technology iv) Large format inkjet

Q6) Discuss limitations of current digital presses in various aspects. **[16]**

OR

Discuss why digital printing is a shorter run process than long run? **[16]**

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Total No. of Questions : 6]

SEAT No. :

P1171

[Total No. of Pages : 3

[4264] - 584

B.E. (Printing)

QUALITY CONTROL TECHNIQUES IN PRINTING

(2008 Pattern) (Elective - I) (Semester - I)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) Define the term Quality & write down the need of Quality Inspection.

b) Explain the Quality control requirements in flexo platemaking. **[16]**

OR

a) Define the term Quality cost & explain each type of cost with suitable example. **[16]**

b) List out the Quality specification.

Q2) a) A line inspector in an engineering company recorded dimensions of each of the five jobs selected at the end of every half an hour off the five hours in the morning. **[14]**

Sample No	1	2	3	4	5
1	25.00	25.01	25.00	25.03	25.01
2	25.00	25.03	25.00	25.04	25.03
3	25.01	25.02	25.02	25.03	25.02
4	25.01	25.02	25.02	25.01	25.04
5	25.02	25.02	25.03	25.03	25.00
6	25.06	25.03	25.02	25.00	24.99
7	24.99	24.98	25.02	25.02	24.99
8	25.02	25.01	25.01	24.99	25.02
9	25.03	25.01	24.97	25.01	25.03
10	25.02	24.99	24.99	24.98	24.97

P.T.O.

Plot an X & R Chart & find out which of the given observation are out of control.

$A_2 = 0.5768$, $D_3 = 0$, $D_4 = 2.114$.

b) Define the O.C. Curve in detail. **[4]**

OR

a) Six consecutive lots of labels received from a vendor were inspected by sampling process. The sample size was varied. The number of defectives in each sample recorded as under. **[14]**

Sample No.	1	2	3	4	5	6
Sample size	125	125	50	80	200	125
No of Defectives	1	3	0	2	4	1

Construct a control chart for

i) Fraction defectives. ii) Number of defectives.

b) What are different types of sampling plans? **[4]**

Q3) a) Define CIM systems. How can it be used in production (machines) department of printing press? **[8]**

b) Write a note on Flexible manufacturing & Lean manufacturing. **[8]**

OR

a) Explain in short Mass Production & Batch production. **[8]**

b) Define in detail World class manufacturing. **[8]**

SECTION - II

Q4) a) State all surface properties affecting the print quality. Explain any 2 optical properties of paper which may affect color reproduction on paper. **[8]**

b) Which factors affect the viscosity of ink? How does the ink viscosity affect print quality and how is print quality if changed measured? **[8]**

OR

a) How do physical properties of paper affect runnability of paper on press? Explain any 2. **[8]**

b) Explain following properties color, opacity, and adhesion (surface energy) of an ink. **[8]**

Q5) a) Explain the process of linearization and characterization of a digital press in making a profile. Also explain need to make the profiles. **[8]**

b) Explain Raster image processing in detail. **[8]**

OR

a) What is a preflight check in printing? Where is it used and state its advantages. **[8]**

b) Explain any four file formats. Also explain the need to embed profile while sending for ripping. **[8]**

Q6) a) Explain the need to print a test forms and describe any 4 test elements in detail. **[9]**

b) Why are standards required for paper? How are TAPPI standards useful for paper? Describe the role of CIE. **[9]**

OR

Explain the sequence of steps in press standardization & characterization for newspaper printing press having 2 tower units, infeed and folder. **[18]**

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Total No. of Questions : 12]

SEAT No. :

P864

[Total No. of Pages : 3

[4264] - 592

B.E. (Printing)

ELECTRONIC PUBLISHING

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

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

Instructions to the candidates:

1) ***Answers to the two sections should be written in separate answer books.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Explain JPEG, PNG and GIF file formats in detail. Compare and explain which image file format is best in web page. **[12]**

b) Explain any two HTML tags with example. **[6]**

OR

Q2) Write HTML program to generate the table as shown in picture below. **[18]**

<table>
<tr><td></td><td colspan="2">Title</td><td></td></tr>
<tr><td rowspan="3">Some text should be written in this column.</td><td colspan="2">Some text should be written here</td><td rowspan="3">Please insert picture here</td></tr>
<tr><td colspan="2">Some text should be written here</td></tr>
<tr><td>Some text should be writte n here.</td><td>Some text should be writte n here.</td></tr>
</table>

P.T.O.

Q3) a) Explain why textual content formatting is necessary. Explain different factors considered for textual content formatting. **[10]**

b) Explain what plagiarism is. **[6]**

OR

Q4) a) Explain different features of e-pub, Mobi and AZW file format. **[12]**

b) Explain face book text editing features. **[4]**

Q5) a) Explain different types of 'SELECT' SQL statement with example. **[10]**

b) Explain difference between XML and HTML with example. **[6]**

OR

Q6) a) Explain 'JOIN' and 'UNION' SQL statements with examples. **[10]**

b) Write XML file to store data for 5 students. Data for a student should contain Student name, Marks and Roll no. **[6]**

SECTION - II

Q7) a) Explain concept of typography with example. Explain readability and legibility. **[12]**

b) Explain use of CSS in web page designing with example. **[6]**

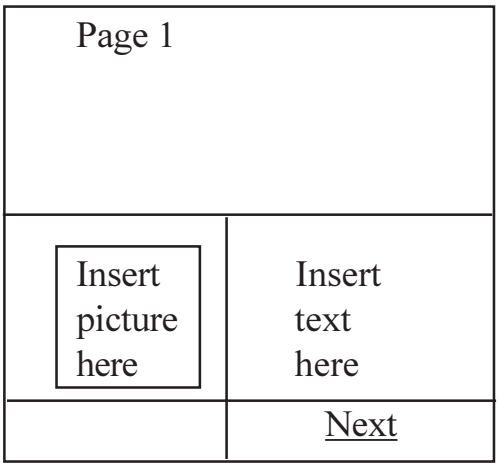
OR

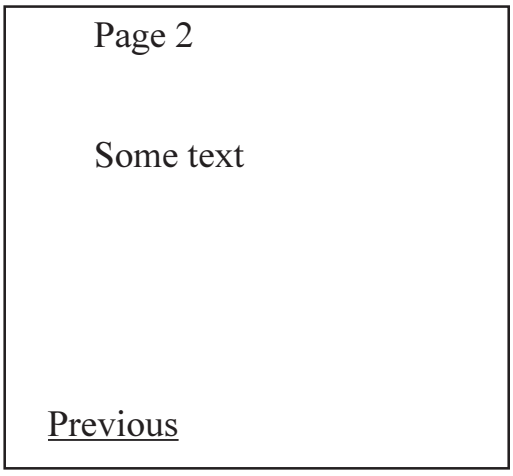
Q8) Explain concept of indexing. Write HTML program to design two pages shown below such that.

a) Next and Previous shown in are hyperlinks

b) For Page 1: When click on Next button, page 2 should be loaded.

c) For Page 2 when click on 'Previous' button, Page 1 should be loaded **[18]**





Q9) a) Explain difference between e-book reader and mobile book reader. **[8]**

b) Explain different features of Adobe. **[8]**

OR

Q10) a) Explain e-commerce banking application. **[8]**

b) Explain use of E-publishing in the field of printing. **[8]**

Q11) a) Explain content management system (CMS). **[8]**

b) Explain enterprise content management system (ECMS). **[8]**

OR

Q12) Write short notes on (any two)

a) Common language runtime (CLR) and Cross language portability in dot net .

b) Web content management system (WCMS).

c) Core implementation of dot net. **[16]**

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Total No. of Questions : 12]

SEAT No. : ____

P1172

[Total No. of Pages : 3

[4264] - 604

B.E. (Chemical)

ENVIRONMENTAL ENGINEERING

(2008 Pattern) (Elective - I) (Semester -I)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) Discuss 'The Biosphere' in detail. **[4]**

b) Elaborate on 'The Hydrologic Cycle'. (Diagram is necessary). **[6]**

c) Describe 'The Carbon Cycle' in detail. (Diagram is not necessary). **[6]**

OR

Q2) a) Enlist at least three basic mechanisms of removing particulate matter from gas streams. **[6]**

b) With the help of neat sketch, describe ESP for air pollution control. **[10]**

Q3) During a dispersion study the lapse rate was constant at 1.1 °C per 100 m. If the atmosphere is assumes to behave as a perfect gas, at what altitude was the pressure one-third the sea level. The sea level temperature and pressure were 14 °C and 1 atm. respectively. **[16]**

OR

Q4) The rate of emission of SO_2 from the stack of a power plant is 150 gm/sec. The stack height is 50 m. Calculate the effective stack height on a sunny September day when the wind velocity is 5 m/sec. Use Class B stability. The effluents are being released at 10 m/s and at a temperature of 310 °K. The atmospheric temperature is 293 °K. **(Assume stack diameter = 1m) [16]**

P.T.O.

Q5) Write a short notes on each of the following with figure. **[18]**

a) Control of NO_x in a complex fertilizer plant.

b) Removal of hydrogen sulphide from sour gas in a petroleum industry.

OR

Q6) Write a short notes on each of the following with figure. **[18]**

a) Fabric filter systems.

b) Fixed bed adsorber

SECTION - II

Q7) a) Elaborate on 'Origin of Wastewater'. **[6]**

b) Write a note on 'Dissolved Oxygen in the water'. **[6]**

c) Describe 'Plant Nutrients' as water pollutants in detail. **[6]**

OR

Q8) a) Differentiate clearly between BOD and COD. How do you determine the BOD and what are the limitations of BOD tests? **[9]**

b) Write Streeter - Phelps equation and explain the terms used in the equation. **[9]**

Q9) Design an activated sludge process to yield an effluent BOD of 20 mg/1 and suspended solids of 25 mg/1. The influent BOD following primary clarification is 160 mg/1. Assume Y = 0.65, kd = 0.05 and sludge retention time 10 days. The waste flow is 10 m^3/min. **[16]**

OR

Q10) Design one stage high rate trickling filter to produce a BOD effluent of 50 mg/1. given the following data.

Q = 10,000 m3/d

Influent BOD = 400 mg/1.

Temperature T = 20°C

Primary sedimentation tank will be used before the trickling filter. **[16]**

Q11) a) Discuss in brief various treatment processes adopted for treating industrial wastewater. **[6]**

b) Explain the following points related to sugar industry. **[10]**

i) Manufacturing process and waste water generation.

ii) Characteristics of waste water and

iii) Methods of treatments.

OR

Q12) a) Give the typical classification of solid waste. Also, explain each class in brief. **[6]**

b) Describe 'sanitary land filling' operation for disposal of solid waste in detail. (Diagram is necessary). **[10]**

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Total No. of Questions : 12]

SEAT No. :

P1176

[Total No. of Pages : 2

[4264] - 613

B.E. (Chemical)

PETROLEUM REFINING

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

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

Instructions to the candidates:

1) ***Answer any 3 questions from each Section.***
2) ***Answers to the two sections should be written in separate books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Your answers will be valued as a whole.***
5) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Explain specifications of Kersosene and engine oil. **[8]**

b) Explain types of Refining. **[8]**

OR

Q2) Explain with neat sketch : Vaccum Distillation. **[16]**

Q3) Describe in details the atmospheric distillation. **[16]**

OR

Q4) a) What is straight run gasoline. **[4]**

b) Write a note on chemical Composition of Petroleum. **[12]**

Q5) Describe the desalting of Crude oil? Describe in details single and two stage desalting. **[18]**

OR

Q6) Write in details about various products Obtained from VDU along with process. **[18]**

P.T.O.

SECTION - II

Q7) a) Describe desalting of crude oil and Explain Chemical Composition Petroleum. **[4]**

b) What are various applications of cube oils? **[12]**

OR

Q8) Petroleum Refinary is a good source of Power generation. Express your views on methodology of integration of refinery and a power plant. **[16]**

Q9) a) Discuss in details : HDA. **[8]**

b) Discuss in details : HDM. **[8]**

OR

Q10) What is Acid Refining? Explain its necessity along with detailed process. **[16]**

Q11) What is FCC? Discuss about FCC with regenerator with neat sketches. **[18]**

OR

Q12) a) Note different catalysts used in refining. **[10]**

b) Discuss recent trends in world wide refineries. **[8]**

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Total No. of Questions : 12]

SEAT No. :

P995

[Total No. of Pages : 3

[4264] - 557

B.E. (E & TC)

TESTAND MEASUREMENT SYSTEMS

(2008 Pattern) (Elective - III)

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) Define the terms instrument, accuracy, error, precision, resolution, expected value, linearity, repeatability and sensitivity with proper example. **[12]**

b) Compare analog and digital signal processing as applied to measuring instrument. **[6]**

OR

Q2) a) With the help of neat diagrams, explain : **[9]**

i) Direct comparison calibration setup

ii) Indirect comparison calibration setup

iii) Echelon of traceability

b) List different statistical characteristics encountered to measure the central tendency of distribution. Calculate at least two characteristics for following readings : **[9]**

Resistance (ohm)	558	559	560	562
Frequency of readings	03	12	13	02

P.T.O.

Q3) a) Explain with the help of a neat diagram, the working of a dual slope DVM. **[8]**

b) A square wave with frequency 1 kHz, 50% duty cycle and peak value 2.5 volts is applied to ordinary multimeter for rms voltage measurement. Find true rms voltage of the waveform and reading of the ordinary meter. Also find absolute and % error in the reading. **[8]**

OR

Q4) a) What errors are associated with the measurement of Q using LCR-Q meter explain in detail. **[10]**

b) What are the problems of impedance measurement at RF and how these are taken care of? **[6]**

Q5) a) Draw block diagram of HF oscilloscope and give features of typical stages. **[8]**

b) Explain various sampling and interpolation methods used in DSO. **[8]**

OR

Q6) a) With respect to DSO explain following : **[10]**

i) Math function

ii) FFT

iii) Roll mode

iv) Zoom mode

v) Glitch mode

b) What are needs of active and 10:1 probes? **[6]**

SECTION - II

Q7) a) Explain functional block diagram of double conversion heterodyning wave analyzer. **[8]**

b) Explain following terms with respect to spectrum analyzer. **[10]**

i) Dynamic range

ii) Scan width

iii) Resolution Bandwidth

iv) Sensitivity

OR

Q8) a) Give typical specifications of Logic Analyzer. Explain how it can be used in fault finding in micro controller circuits. **[10]**

b) Draw block diagram and explain fundamental suppression harmonic distortion analyzer. **[8]**

Q9) a) Compare microwave solid state sources : YIG resonator, Gunn diode, Impatt diode and Avalanche oscillators for parameters stability, power output and tunability. **[10]**

b) Explain test setup for EMI measurement. **[6]**

OR

Q10) a) Give the measurement of s parameters using combined reflection and transmission test set. **[10]**

b) What is frequency synthesizer? Explain typical applications of frequency synthesizer. **[6]**

Q11) a) With the help of block diagram explain automatic est system for measurement of various parameters of radio receiver. **[8]**

b) What are advantages and disadvantages of virtual instruments. **[8]**

OR

Q12) a) Give complete set of automatic test equipment used for measurements on microwave Network. **[10]**

b) Explain features of software used for virtual instruments. **[6]**

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Total No. of Questions : 10]

SEAT No. : ____

P1177

[Total No. of Pages : 3

[4264] - 632

B.E. (Petroleum Engineering)

FORMATION EVALUATION

(2008 Pattern) (Semester - I)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Answers to the two sections should be written in separate answer books.***
3) ***Draw neat diagrams wherever necessary.***
4) ***Assume additional data, if required.***

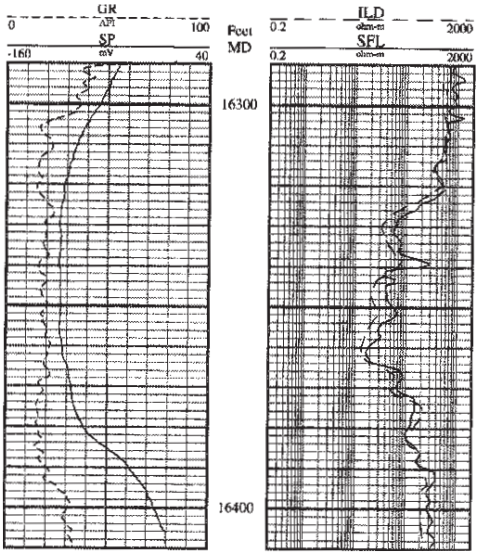
SECTION - I

Q1) a) Describe borehole environment with a suitable diagram. Explain empirical relationship between different zones and fluids. **[10]**

b) Explain various steps involved in the evaluation of formation. **[5]**

OR

Q2) a) Based on information given in the following log, explain different tracks, records available in them and also your impression on shape of curves obtained in tracks. **[10]**



b) Why it is necessary to use different combinations of logs for evaluation? **[5]**

P.T.O.

Q3) Explain important electrical logging methods with the help of neat sketches. **[15]**

OR

Q4) Describe important porosity determination logs. **[15]**

Q5) Answer **any two** of the following with neat diagrams, wherever possible :**[20]**

a) Detection of abnormal formation pressure

b) Data sources in mud logging

c) Use of core analysis in formation evaluation

d) Methods to estimate borehole geometry

e) Temperature logging

f) Logs used for the evaluation of cement

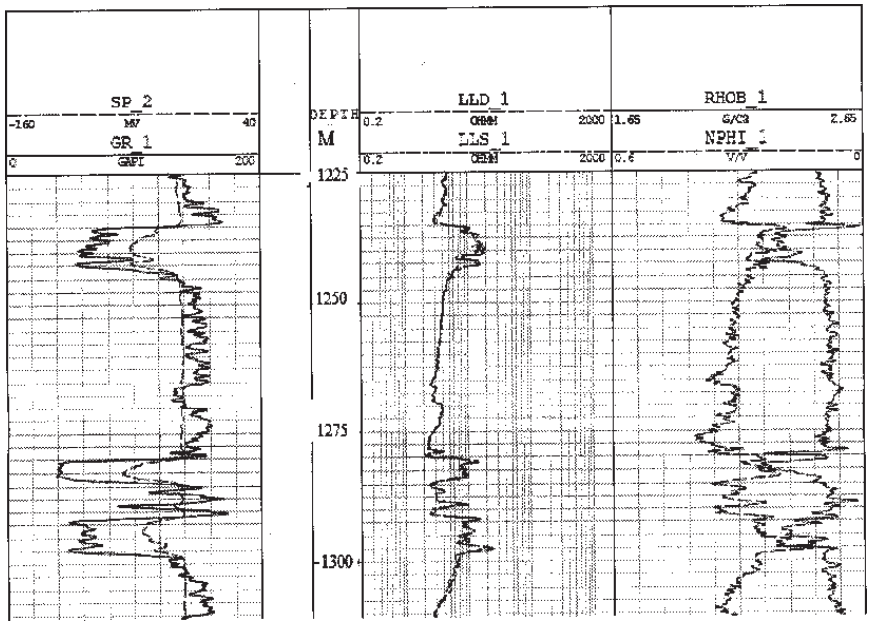
SECTION - II

Q6) a) What is a clean formation? How is it recognized? What problems occur in shaly reservoir while determination of lithology and porosity. **[10]**

b) How is bed boundary recognized? **[5]**

OR

Q7) a) A record of logs is given below in three different tracks along with their depth **[10]**



Write and interpret the log signatures and their relationships with respect to depth.

b) How are movable hydrocarbons recognized? **[5]**

Q8) a) What are quick - look methods of log interpretation? **[10]**

b) Write in brief about Litho - porosity cross plot. **[5]**

OR

Q9) a) Draw and describe the patterns showing coarsening and fining in grain size in upward direction under various depositional conditions. **[10]**

b) A clean sand formation/ horizon penetrated by a well contain water, oil and gas. Above and below the sand horizon occurs low resistivity shale. Resistivity of the formation below oil - water contact is 0.63 Ohm.m and that of above oil - water contact is 6.8 Ohm.m. If the Formation Water Resistivity is 0.02 Ohm.m with default values of A = 0.81, m = 2 and n = 2, calculate the porosity of the horizon. **[5]**

Q10) Answer **any four** from the following : **[20]**

a) Physical properties of clay

b) How are fractured reservoir detected?

c) Importance and methods to determine net to gross thickness

d) Recognition of oil and gas show during mud logging

e) What is MWD?

f) Logging in deviated horizontal wells

g) Image logs

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Total No. of Questions : 12]

SEAT No. :

P1183

[Total No. of Pages : 4

[4264] - 652

B.E. (Petrochemical Engg.)

PROCESS DYNAMICS AND CONTROL

(2008 Pattern) (Semester - I)

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 tables is allowed.*
5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Discuss the objectives of process control. **[4]**

b) Explain with the help of a block diagram the working of a closed loop feedback system with all its elements. **[8]**

c) What do you mean by control valve characteristics? Explain its significance with respect to process control. **[4]**

OR

Q2) a) A thermometer having first order dynamics is placed in a temperature bath of 45°C. After the thermometer reaches the equilibrium with the bath. The bath temperature is subjected to sinusoidal forcing function about its average temperature of 45°C with amplitude of 15°C. If the period of oscillation is 30 sec/cycle and the time constant of the thermometer is 10 second. Determine the following : **[8]**

i) Maximum and minimum temperature indicated by the thermometer.

ii) Amplitude ratio

iii) Phase lag

b) Explain the hierarchy of process control activities and discuss in detail the time scales involved in each activity. **[8]**

P.T.O.

Q3) a) The transfer function of a process, measuring element and the control valve are given by $G_p(s) = \left(\frac{3}{3s+1}\right)$, $H(s) = \left(\frac{1}{6s+1}\right)$ $G_v(s) = \left(\frac{1}{s+1}\right)$ respectively. A Proportional controller with a sensitivity Kc = 3 is used. Obtain the closed loop transfer function for a servo problem. Draw the block diagram showing all the transfer functions. **[8]**

b) With the help of a neat sketch obtain the transfer function for N-identical non-interacting system in series. Compare the dynamic response of a non-interacting and interacting system. **[8]**

OR

Q4) a) The overall transfer function of the control system is given as $G(s) = \left(\frac{16}{1.5s^2 + 2.4s + 6}\right)$ A step change of magnitude 6 is introduced into the system. Determine. **[10]**

i) Overshoot
ii) Period of oscillation
iii) Natural period of oscillation
iv) Rise time
v) Ultimate value of response and
vi) Maximum values of response

b) Derive the transfer function of a transportation lag parameter. Give the effects of transportation lag on process control. **[6]**

Q5) a) Derive the transfer function of a PID controller. A unit step change is given in the error signal to a PI controller. If the controller gain is 4, the integral time is 2 min. Obtain the response of the PI controller. **[8]**

b) Explain with neat sketch the effect of Proportional control action on a closed loop system response. Derive that the offset is the characteristics of proportional controller for a servo mechanism control problem following a step change. **[10]**

OR

Q6) a) Explain the following : **[8]**

i) Proportional band ii) Limit cycle
iii) Controller tuning iv) Integral wind up

b) Discuss the factors affecting the selection of the Air-to-Close or Air-to-open pneumatic control valve. **[4]**

c) A pneumatic controller is used to control temperature range of 0-100°C for the output change from 30 to 90 KN/m^2 as the temperature changes from 90 to 105°C. Calculate the proportional band sensitivity of the controller **[6]**

SECTION - II

Q7) Write a short note on the following : **[18]**

a) Routh Test for stability

b) Root Locus diagram

c) Bode Diagram

d) Gain margin and Phase margin

OR

Q8) a) Explain the role of frequency response analysis in the design of the control system. Derive the expression for Amplitude ratio and phase lag as a frequency response of a first order system. **[9]**

b) Derive the amplitude ratio and phase angle for the proportional derivative control. Draw the Bode diagram for the PD controller. **[9]**

Q9) a) Write a Short note with the help of block diagram on any two of the following : **[12]**

i) Cascade Control of a Shell and tube heat exchanger

ii) Inferential control strategy

iii) Ratio Control

iv) Adaptive control

b) Discuss advantages and disadvantages of feedback and feed forward control systems. **[4]**

OR

Q10) a) Explain significance of degrees of freedom analysis in design of a control system. **[5]**

b) Discuss the need of Advanced process control strategies for process industry. **[5]**

c) Write a short note on Model Predictive Control. **[6]**

Q11) What do you mean by SCADA? With respect SCADA discuss the following : **[16]**

a) Control components of SCADA

b) Network communication Components of SCADA

c) Configuration of SCADA

OR

Q12) a) What is DCS control system? Discuss in detail the comparison between SCADA and DCS. **[8]**

b) What is PLC? Explain its various components. What do you mean by Ladder diagram? Illustrate. **[8]**

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Total No. of Questions : 12]

SEAT No. :

P872

[Total No. of Pages : 2

[4264] - 664

B.E. (Petrochemical Engg.)

PROCESS MODELING AND SIMULATION

(2008 Course)

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

Instructions to the candidates:

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

SECTION - I

Q1) Explain synthesis, Analysis and Design of development of chemical process models. **[16]**

OR

Q2) Discuss in details on steps involved in simulation of a chemical process. **[16]**

OR

Q3) Develope a mathematical model for design of a CSTR undergoing first order reaction. **[16]**

OR

Q4) Write in details on principles and equations considered in design of a binary distillation column. **[16]**

Q5) a) Using crammer's rule, obtain the solution of :

$2x + 3y + 4z = 5$

$x + 2y + z = 4$

$3x - y + z = 6$ **[8]**

b) Explain the algorithm for finding of root of an equation by using Bisection method. **[10]**

OR

P.T.O.

Q6) Using Gauss-Seided iteration method, solve following simultaneous equations upto five iterations :

$4x_1 + 2x_3 = 4$

$5x_2 + 2x_3 = 3$

$5x_1 + 4x_2 + 10\,x_3 = 2$ **[18]**

SECTION - II

Q7) Enlist and discuss the various steps involved in formation of a problem in petrochemical industry. **[16]**

OR

Q8) What is decomposition of networks? Explain with flowchart and algorithm. **[16]**

Q9) Note important variations along with examples between lumped and distributed parameter models. **[16]**

OR

Q10) Describe in brief on each of different criteria involved in state-space representations. **[16]**

Q11) With algorithm, express design and development of Artificial Neural Network for a Petrochemical process. **[18]**

OR

Q12) Write in details on membership functions involved in Fuzzy Logic system development. [18]

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Total No. of Questions : 12]

SEAT No. :

P873

[Total No. of Pages : 3

[4264] - 667

B.E. (Petrochemical Engg.)

RENEWABLE ENERGY SOURCES

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

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

Instructions to the candidates:

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

SECTION - I

Q1) a) Name eight different renewable energy sources and discuss its present status in Indian subcontinent. **[8]**

b) Discuss the principle of Solar Drying with help of neat sketches and explain its advantages. **[8]**

OR

Q2) a) With help of suitable case studies discuss the challenges faced by the non-conventional energy sources. **[8]**

b) Comment on energy consumption in various sectors and explain how to optimize the usage. **[8]**

Q3) a) Explain the principle of solar water heating with help of neat sketches. **[6]**

b) Write in details limitations in application of solar energy. Discuss the possible solutions to get rid of it. **[10]**

OR

P.T.O.

Q4) a) With help of neat diagram explain working of Solar Collector. In this context discuss its efficiency. Comment on the solar panel utilized. **[8]**

b) Discuss Solar Space Heating and Cooling with help of neat sketches. **[8]**

Q5) a) Comment on "Land for Food ar Fuel". **[6]**

b) Discuss the second generation Biofuel Strategy and differentiate it from 1 First generation technology. **[6]**

c) Write a short note on Biorefinery and its products. **[6]**

OR

Q6) a) What are Lignin ? How those can be removed from cellulosic matter. Discuss the process of conversion of cellulose to biofuel. **[8]**

b) Obtain mass balance of the following biodiesel synthesis process:

500 ml of Cannola oil is transesterified with 99.5% pure methanol (in 1:6 mole ratio) in presence of 2.18 gm NaOH catalyst to produce 532 ml FAME and 487 ml of glycerol (density = 1.2 gm/cm^3).

Density of vegetable oil = 0.91 gm/cm^3 and it can be considered as pure triglyceride of oleic acid. **[10]**

SECTION - II

Q7) a) With help of neat sketches explain Opn Cycle OTEC Technology. **[6]**

b) What are the cost aspects of OTEC technology ? Discuss the steps to be considered in order to make it a sustainable energy source. **[6]**

c) What are causes of tide in the ocean? Discuss how energy can be extracted form the tides. **[6]**

OR

Q8) a) Discuss the design aspect of Wind Turbine. **[8]**

b) Discuss the seasonal variations of wind energy and how those can be reduced. **[4]**

c) Write a short note on design of Helical Turbine-Draw neat diagram. **[6]**

Q9) a) With help of neat diagram explain the Geothermal Reservoir and comment on the flow within the Reservoir. **[8]**

b) Explain the process of liquid dominated (wet steam) system of geothermal energy extraction with help of neat sketch. **[8]**

OR

Q10) a) Describe various energy extraction technologies used with hydrothermal (geothermal) resources. **[8]**

b) What do you understand by Geothermal energy ? What are geothermal fields ? **[8]**

Q11) a) With help of neat diagram explain Solid Oxide Fuel Cell. Discuss its applicability. **[8]**

b) Comment on Hybrid Vehicle and its energy source. How energy are stored in Hybrid Cars -discuss the challenges involved. **[8]**

OR

Q12) a) Discuss the importance of storage of electrical energy. Name different types of cells can be utilized. Discuss operation of any one of the cell. **[8]**

b) With help of schematic diagram explain the principle of operation of Fuel Cells. Comment on Cathode, Anode and the type of Electrolytes. **[8]**

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Total No. of Questions : 12]

SEAT No. : ____

P1188

[Total No. of Pages : 4

[4264] - 672

B.E. (Polymer)

MOLD AND DIE DESIGN - I

(2008 Pattern) (Semester - I)

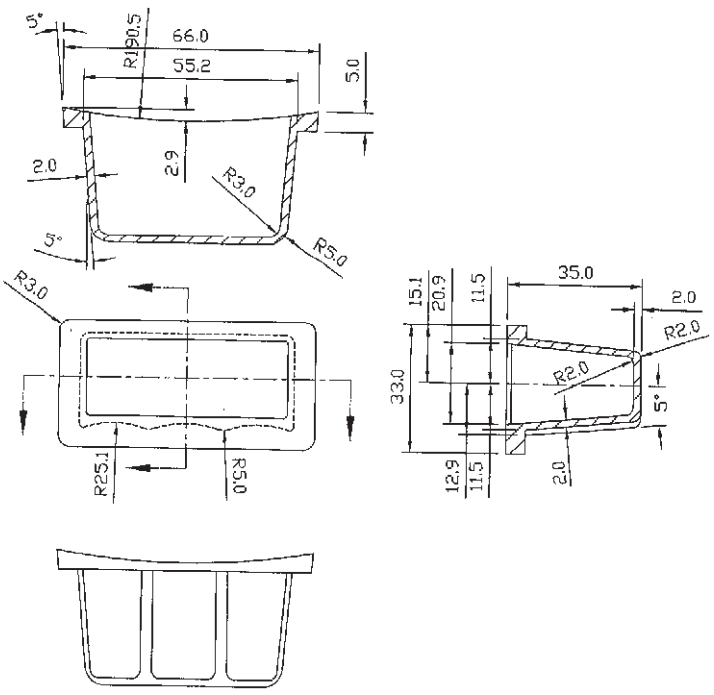
Time : 4 Hours] ***[Max. Marks :100***

Instructions to the candidates:

1) ***Answer question number 1 or 2, 3 or 4, 5 or 6 from Section - I. Answer question number 7 or 8, 9 or 10 and 11 or 12 from Section - II.***
2) ***Answers to the two sections must be written on separate answer books.***
3) ***Figures to the right indicate full marks.***
4) ***Draw neat sketches wherever required.***
5) ***Use of calculator, graph paper is allowed.***

SECTION - I

Q1) Design a 2 cavity 2 plate 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. **[35]**



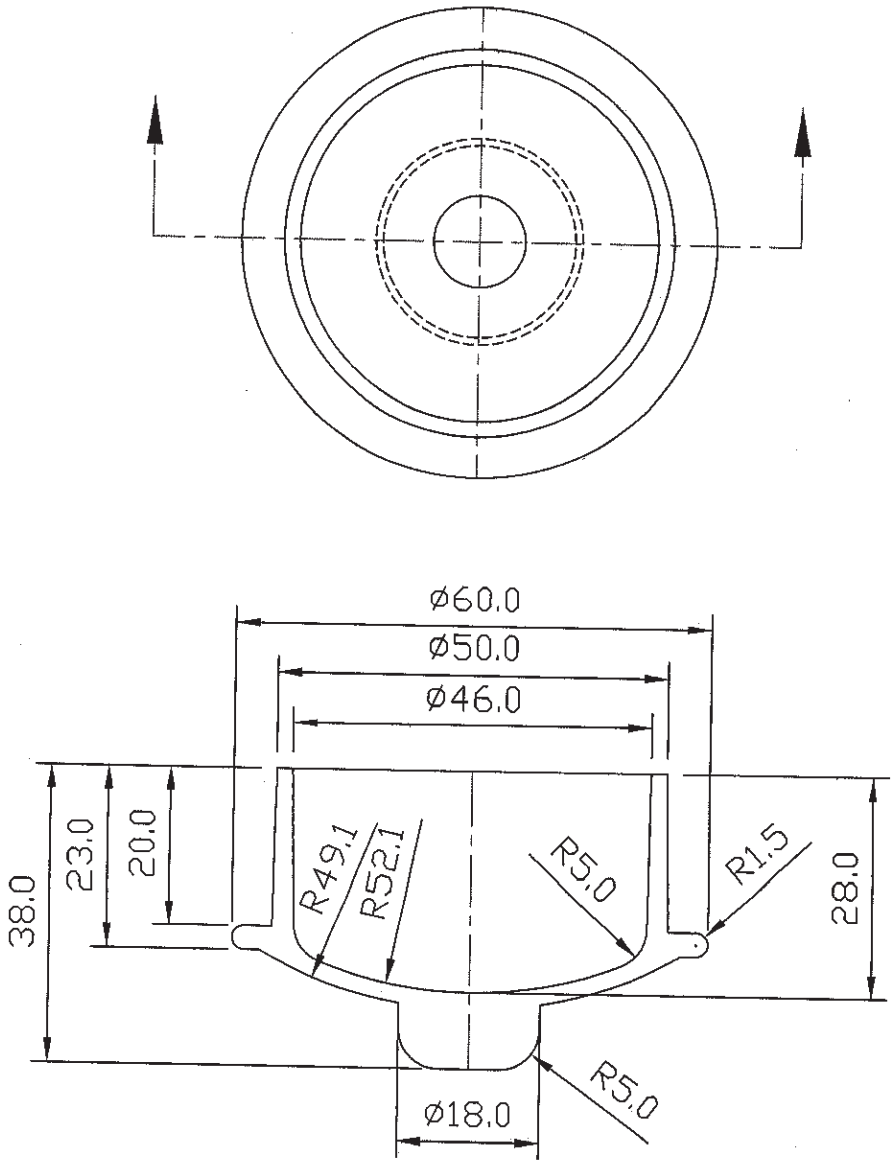
Notes : All dimensions are in mm.
Material : PP
Shrinkage : 2%
Cavity pressure : 350 kg/cm²

FIGURE - 1

P.T.O.

OR

Q2) Design a 2 cavity 3 plate 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. **[35]**



Notes : All dimensions are in mm.
Material : GPPS
Shrinkage : 0.5%
Draft : 1°
CAVITY PR : 300 kg/cm²

FIGURE 2

Q3) Explain the baffle cooling for cores. **[6]**

OR

Q4) What are the various factors which determine the force required for ejection force of a injection molded component? **[6]**

Q5) Determine the pressure drop through land section and adapter section for a rod die. Diameter of the rod die is 20mm, land length 40mm, critical strain rate $\varepsilon_c = 20$ sec $^{-1}$, melt density = 0.7 g/cc, extruder size = 50mm, output 40 kg/hour, power law index n = 0.3, extensional viscosity $\lambda = 0.9 \times 10^4$ N - sec/m^2, k = 3500N sec^{-1}/m^2. **[9]**

OR

Q6) Draw a neat labeled sketch of an in-line pipe die. Explain it's constructional features. **[9]**

SECTION - II

Q7) a) Discuss the characteristic features of surface hardening. **[6]**

b) Describe in detail the process of up milling and down milling with a neat sketch. **[6]**

c) Explain with a neat sketch cutting tool geometry of a plain milling cutter. **[4]**

OR

Q8) a) Derive an expression for machining time in terms of speed, feed and length of block for a face milling operation. **[6]**

b) Discuss the variables affecting the hardening of steel. **[5]**

c) Select and justify the material for the following mold components

i) Core and cavity inserts

ii) Guide pillars and guide bush

Write down the chemical composition of the same. **[5]**

Q9) a) Explain in details the method used for determination of straightness and flatness using autocollimator. **[8]**

b) Draw different fringe patterns that are observed during flatness testing using optical flat. Give explanation for each of them. **[5]**

c) Explain with neat sketches, different types of gauges that are used for checking holes. **[5]**

OR

Q10) a) Explain the principle of interferometry as applied to flatness testing. **[5]**

b) Determine the actual dimensions to be provided for a shaft and hole of 90mm size for H7/g6 type of fit. Size 90mm falls in diameter steps of 80 to 100mm. Value of tolerance for IT7 and IT6 are 16i and 10i respectively. Value of fundamental deviation of 'g' type shaft is $(-2.5D^{0.34})$. Take the value of tolerance unit $i = 0.45\left(\sqrt[3]{D}\right) + 0.001D$. Sketch and identify the fit type. **[8]**

c) Derive an expression for the best wire size for measuring effective or pitch diameter of a screw thread. **[5]**

Q11) a) Explain with neat figures, constructional features of overlap gate and film gate. **[6]**

b) Justify the type of gate which is most suitable for molding of a compact disc, cylindrical sleeve and rectangular box. Illustrate with neat figures. **[6]**

c) Explain the process of calculating the cavity pressure for an injection mold. **[4]**

OR

Q12) a) Explain factors taken into consideration while deciding runner size and type. **[6]**

b) Explain factors taken into consideration while deciding gate location. **[6]**

c) Explain the various methods of clamping injection molds on the machine platen with neat figures. **[4]**

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Total No. of Questions : 12]

SEAT No. :

P1336

[Total No. of Pages : 7

[4264] - 677

B.E. (Polymer Engineering)

PRODUCTION PLANNING & CONTROL

(2008 Pattern) (Elective - II) (Sem. - I)

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

Instructions to the candidates:

1) ***Answer Q. No. 1 or 2, Q. No. 3 or 4 and Q. No. 5 or 6 from Section - I. Answer Q. No. 7 or 8, Q. No. 9 or 10 and Q. No. 11 or 12 from Section - II.***
2) ***Answers to the two sections must be written in separate answer books.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if required.***
5) ***Use of scientific calculator, graph paper is allowed.***

SECTION - I

Q1) a) The following are the details of estimated time of activities of a certain project. **[8]**

Activity	Duration (days)
1 – 2	6
1 – 3	5
2 – 4	10
3 – 4	3
3 – 5	4
4 – 5	6
4 – 6	2
5 – 6	9

Draw the PERT network and determine the critical path. Also, find the total, free and in dependent float for each activity.

b) Explain Johnson's algorithm for processing n jobs on two machines. Apply the algorithm to solve the following sequencing problem. **[8]**

Jobs.	A	B	C	D	E	F	G	H	I
Machine I	2	5	4	9	6	8	7	5	4
Machine II	6	8	7	4	3	9	3	8	11

OR

P.T.O.

Q2) a) A project has the following characteristics : **[8]**

Activity	Most optimistic Time	Most pessimistic Time	Most Likely Time
1 - 2	1	5	1.5
2 - 3	1	3	2
2 - 4	1	5	3
3 - 5	3	5	4
4 - 5	2	4	3
4 - 6	3	7	5
5 - 7	4	6	5
6 - 7	6	8	7
7 - 8	2	6	4
7 - 9	5	8	6
8 - 10	1	3	2
9 - 10	3	7	5

Construct a PERT network. Find the critical path and variance for each event. Find the project duration at 95% probability.

b) There are six jobs, each of which must go through machines A, B and C, in the order ABC. Processing times (in hours) are given in the following table:

Job :	1	2	3	4	5	6
Machine A :	8	3	7	2	5	1
Machine B :	3	4	5	2	1	6
Machine C :	8	7	6	9	10	9

Find the optimal sequence to minimise the total elapsed time. Find also the idle time for each machine, for the optimal sequence. **[8]**

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

i) Lead time. ii) Order Cycle.

iii) Re-order level. iv) Economic Order quantity.

b) A textile mill buys its raw material from a vendor. The annual demand of the raw material is 9000 units. The ordering cost is Rs. 100 per order and the carrying cost is 20 % of the purchase price per unit per month, where the purchase price per unit is Re. 1. **[7]**

Find the following :

i) Economic order quantity.

ii) Number of orders per year.

iii) Time between two consecutive orders.

iv) Total cost w.r.t EOQ.

c) Find the optimum order quantity for a Product for which the price breaks are as follows : - **[6]**

Quantity	unit cost (Rs.)
$O \leq Q_1 < 600$	100
$Q_2 \geq 600$	98

The monthly demand is 300 units. Ordering cost is Rs. 2500 and storage cost is 4 % of the unit cost.

OR

Q4) a) Derive an expression for Economic Order Quantity (EOQ) for a EOQ model with the following assumptions : - **[9]**

i) Production is at a finite rate (k), per unit time.

ii) Demand rate is constant (r), per unit time.

iii) Shortages are not allowed.

iv) Each production run of length t consists of two parts t_1 and t_2, such that there is no replenishment or production during time t_2.

v) Lead time is zero.

vi) Holding cost and set up cost to be considered.

b) The annual demand for an automobile component is 36,000 units. The carrying cost is Rs. 0.50 / unit/ year and the ordering cost is Rs. 25.00 per order and shortage cost is Rs. 15.00 / unit / year. Find the EOQ, maximum inventory and maximum shortage quantity, number of orders per year. **[9]**

Q5) a) For an sampling plan N = 1500, n = 100 and c = 1, determine the probability of acceptance of following lots. **[7]**

i) 0.5 % defective

ii) 1 % defective

iii) 1.5 % defective

iv) 2 % defective

v) 2.5 % defective

vi) 3 % defective

vii) 3.5 % defective

viii) 4 % defective

ix) 5 % defective

x) 10 % defective

Draw an OC curve. Comment on the sampling plan and OC curve.

b) Following is the observation about number of defects found in a wind mill blade made up of FRP. Draw C-chart and plot the same. **[5]**

Sr. No.	1	2	3	4	5	6	7	8	9	10
No. of Defects	3	4	2	1	6	4	2	5	1	3

c) Define : **[4]**

i) Lot Tolerance Percentage Defective (LTPD).

ii) Acceptable Quality Level (AQL).

OR

Q6) a) Explain one sided process capability ratio's and process capability ratio's for an off-center process. **[6]**

b) "Process performance indices P_p and P_{pk} do not give meaningful information about process capability." Discuss the statement. **[4]**

c) Discuss advantages and limitations of statistical quality control. **[6]**

SECTION - II

Q7) a) Obtain an initial basic feasible solution to the following transportation problem, by Vogel's method. **[7]**

		Stores.				
		I	II	III	IV	Availability
	A	7	3	5	5	34
	B	5	5	7	6	15
Warehouses	C	8	6	6	5	12
	D	6	1	6	4	19
Demand		21	25	17	17	80

b) Solve the following Assignment Problem. **[9]**

	a	b	c	d	e	f
A	9	22	58	11	19	27
B	43	78	72	50	63	48
C	41	28	91	37	45	33
D	74	42	27	49	39	32
E	36	11	57	22	25	18
F	3	56	53	31	17	28

OR

Q8) a) Find the optimum solution to the following transportation problem, by Vogels Approximation Method. **[7]**

	D_1	D_2	D_3	D_4	Availability
O_1	5	3	6	2	19
O_2	4	7	9	1	37
O_3	3	4	7	5	34
Demand	16	18	31	25	

b) A car hire company has one car at each of the five depots a, b, c, d and e. A customer requires a car in each town, namely A, B, C, D and E. Distance (in kms) between depots (origins) and towns (destinations) are given in the following matrix. **[9]**

	a	b	c	d	e
A	160	130	175	190	200
B	135	120	130	160	175
C	140	110	155	170	185
D	50	50	80	80	110
E	55	35	70	80	105

How should the cars be assigned to customers, so as to minimize the distance travelled?

Q9) a) The Oil India Corporation (OIC) is considering whether to go for an offshore oil drilling construct, to be awarded in Bombay High. If OIC bid, value would be Rs. 600 million with a 65% chance of gaining the contract. The OIC may set up a new drilling operation or move already existing operation; which has proved successful, to a new site. The

probability of success and expected returns are as follows : - **[8]**

Out come	New Drilling operation		Existing operation	
	Probability	Existing operation	Probability	Expected Revenue (Rs million)
Success	0.75	800	0.85	700
Failure	0.25	200	0.15	350

If the corporation do not bid or lose the contract, they can use Rs. 600 million to modernize their operation. This would result in a return of either 5 percent or 8 percent on the sum invested with probabilities 0.45 and 0.55 respectively.

i) Construct a decision tree for the problem showing clearly the courses of action.

ii) By applying an appropriate decision criterion, recommend whether or not Oil India Corporation should bid the contract.

b) Write short note on characteristics of Game theory. The pay off matrix of a game is given. Find the solution of the game to the player A and B. **[10]**

		B				
		I	II	III	IV	V
A	I	−2	0	0	5	3
	II	3	2	1	2	2
	III	−4	−3	0	−2	6
	IV	5	3	−4	2	−6

OR

Q10) a) An investor is given the following investment alternatives and percentage rates of return **[8]**

	Low	Medium	High
Regular shares	7%	10%	15%
Risky shares	–10%	12%	25%
Property	–12%	18%	30%

Over the past 300 days, 150 days have been medium market conditions and 60 days have had high market increases.

On the basis of these data, state the optimum investment strategy for the investment.

b) For the following payoff table, transform the zero - sum game into an equivalent linear programming problem and solve it by simplex method. **[10]**

Player Q

		Q_1	Q_2	Q_3
Player P	P_1	9	1	4
	P_2	0	6	3
	P_3	5	2	8

Q11) a) Explain the kend all notation, used in Queueing Theory, and give the classification of Queueing models, based on this notation. **[6]**

b) A 24 - hour open highway petrol station has one service channel, and the arrival rate of vehicles throughout the day and night is according to Poisson's distribution, with an average of one vehicle every 12 minutes. The service rate at the petrol station also follows Poisson distribution, with an average of 9 minutes per vehicle. Find **[10]**

i) Utilisation factor of the service channel.
ii) The probability that the service channel is busy.
iii) The probability of having 3 vehicles in the system.
iv) The average number of vehicles in the queue at any time.
v) The average waiting time of the vehicles in the queue.

OR

Q12) a) A supermarket has four salesmen at the sale counters. Customers arrive at the rate of 15 per hour and the arrival rate follows Poisson distribution. The service time also follows Poisson distribution and is at the rate of 10 per hour. Find **[9]**

i) Expected percentage of idle time for each counter.
ii) p_0 and p_1.
iii) L_q and W_q.

b) A car servicing station has two service men. Due to space limitation, only 4 cars are accepted for servicing. The arrival pattern is Poisson with 12 cars per day. The service time of both men is also Poisson, at the rate of 8 cars per day, per person. Find the average number of cars in the service station, the average number of cars waiting to be serviced and the average time a car spends in the system. **[7]**

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Total No. of Questions : 12]

SEAT No. :

P877

[Total No. of Pages : 2

[4264] - 684

B.E. (Polymer Engineering)

SPECIALITY POLYMERS AND APPLICATIONS

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

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

Instructions to the candidates:

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

SECTION - I

Q1) a) What is liquid crystallinity? Explain the structural requirements for polymers to exhibit liquid crystalline character. **[8]**

b) With suitable diagram explain various types of LCPs and phases. **[8]**

OR

Q2) a) Give the synthesis of any three LCPs. **[8]**

b) With suitable examples write a note on applications of any four category of LCPs. **[8]**

Q3) a) Explain the theory of conduction. Discuss the band theory in detail. **[8]**

b) Give the synthesis of any three Conducting Polymers. **[8]**

OR

Q4) a) Write a note on requirements for polymer to show conductivity. **[8]**

b) Discuss in detail doping in conducting polymers. **[8]**

Q5) a) Give the synthesis of polyimides and polyquinoxalines. **[9]**

b) Discuss the factors on which thermal stability of a polymer depends. **[9]**

OR

P.T.O.

Q6) a) Explain any two methods in detail to determine heat resistance of a polymer. **[9]**

b) Write in short the synthesis, properties and applications of PBO and PBI. **[9]**

SECTION - II

Q7) a) With suitable examples give the applications of photosensitive polymers in various fields. Explain the need of photosensitivity for that particular application. **[8]**

b) What are the requirements of a polymer to work as coating additive? **[8]**

OR

Q8) a) Define membrane. Give their types and explain any two methods to prepare them. **[8]**

b) Give the synthesis of any two polymers used as coating additives. **[8]**

Q9) Write a note on :

a) Control release theory **[8]**

b) Orthopedic applications of biomaterials. **[8]**

OR

Q10) a) Define biopolymers. Explain natural and synthetic biopolymers. **[8]**

b) Write a note on any one ASTM testing method of biopolymers. **[8]**

Q11) With reference to any two specific polymers each write a note on -

a) Polymer composites in aerospace. **[9]**

b) Polymers in construction and building applications. **[9]**

OR

Q12) Write a note on :

a) Polymers in cosmetics and food applications. **[9]**

b) Polymers in agricultural applications. **[9]**

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Total No. of Questions : 12]

SEAT No. :

P1195

[Total No. of Pages : 4

[4264] - 692

B.E. (Computer Engineering)

PRINCIPLES OF COMPILER DESIGN

(2008 Pattern) (Semester - I)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) What is role of Lexical Analyzer in compiler design? Why Lexical Analyzer and Parser are two separate phases? Why they are combined in a single pass? **[6]**

b) Show that following grammar is LR(1) but not LALR. **[8]**

$S \rightarrow Aa \mid bAc \mid Bc \mid bBa$

$A \rightarrow d$

$B \rightarrow d$

c) Compare and contrast Recursive Descent parser and Predictive parser. **[4]**

OR

Q2) a) Explain the working of Operator Precedence parser with an example. **[6]**

b) Explain : Error detection and recovery in YACC. **[4]**

c) Explain role of Regular Expression and DFA in Lexical Analyzer. **[8]**

Write LEX specification for following :

To count positive and negative numbers from a text file, and display them.

P.T.O.

Q3) a) Suppose declarations are generated by following grammar : **[8]**

$D \rightarrow idL$

$L \rightarrow ,idL \mid :T$

$T \rightarrow int \mid real$

Construct a translation scheme to enter the type of each identifier into the symbol table.

b) Write short note : semantic Analysis **[4]**

c) What is type expression? Write type expression for following :

An array of pointers to reals, where array index ranges from 1 to 100 **[4]**

OR

Q4) a) Write LEX and YACC specification for construction of syntax tree from arithmetic expression. **[8]**

b) What is L attributed definition? Give example. **[4]**

c) Generate annotated parse tree for following expression : **[4]**

a+b*c–d

Q5) a) Write Syntax Directed Translation scheme for boolean expression. Explain use of backpatching. **[8]**

b) Generate quadruples for following : **[6]**

a = –b * c / e ^ f + g * h

c) Compare triple and indirect triple representation. **[2]**

OR

Q6) a) Write Syntax Directed Translation scheme for array. Generate intermediate code in 3 addr form for following statement : **[8]**

a = b[i]

b) Generate three addr statements for following pieces of code : **[6]**

```
While (a < b)
{
   if (p < q and m > n)
      x = x + 1;
   else
      x = x – 1;
}
```

c) What is need for intermediate code? **[2]**

SECTION - II

Q7) a) Explain the difference in storage organization and allocation strategies for block structured and non block structured languages. **[6]**

b) Explain procedure call with an example. **[6]**

c) Write short note : Symbol Table. **[4]**

OR

Q8) a) Explain in detail run time storage management. **[8]**

b) What are contents of activation record? **[4]**

c) Explain how various phases of compiler interact with symbol table. **[4]**

Q9) a) What is DAG? What are its uses? Generate DAG for following : **[6]**

X1 = a + b * 12

X2 = a / 2 + b * 12

b) Explain Dynamic programming algorithm for code generation. **[8]**

c) Explain following terms with respect to simple code generation algorithm : **[4]**

Register descriptor

Address descriptor

OR

Q10) a) What are different issues in code generation? **[4]**

b) Explain labeling algorithm for tree. **[8]**

c) Generate code for following statement using simple code generation algorithm : **[6]**

d = (a–b) + (a–c) + (a–c)

Explain the assumptions and steps of algorithm clearly.

Q11) a) Explain following code optimization techniques with example : **[10]**

Common subexpression elimination

Variable propagation

Code movement

Strength reduction

Dead code elimination

b) By taking suitable flow graph as an example, explain computation of GEN set and KILL set. **[6]**

OR

Q12) a) Explain following fundamental data flow properties : **[9]**

i) Available expression

ii) Reaching definitions

iii) Live variables

Support your answer with proper example flow graphs wherever necessary.

b) What is control flow analysis? **[3]**

c) Explain principle sources of code optimization. **[4]**

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Total No. of Questions : 12]

SEAT No. :

P1201

[Total No. of Pages : 2

[4264] - 698

B.E. (Computer Engineering)

MULTIMEDIA SYSTEMS

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

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

Instructions to the candidates:

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

SECTION - I

Q1) a) Explain importance of digital representation of multimedia? Explain process of digital to analog conversion? **[9]**

b) Explain role of API in multimedia applications with example. **[9]**

OR

Q2) a) Explain the architecture of Distributed Multimedia Systems and their applications. **[8]**

b) Explain following in detail :

i) Multimedia authoring tools **[5]**

ii) Multimedia operating systems **[5]**

Q3) a) Explain Shannon-Fano algorithm with example? **[8]**

b) What is histogram? Explain histogram equalization with mathematical model. **[8]**

OR

Q4) a) Explain following file formats with example **[8]**

i) BMP ii) TIFF

b) Explain various basic gray level enhancement transformations. **[8]**

P.T.O.

Q5) a) What is MIDI? What are the different MIDI components? What is the application of MIDI in Multimedia projects? **[8]**

b) Explain WAVE file format in detail. **[8]**

OR

Q6) a) Enlist different compression types in Audio. Explain any one in detail? **[8]**

b) Explain MPEG file format in detail. **[8]**

SECTION - II

Q7) a) What is text compression? Compress the string "ABABBABCABABBA" using LZW compression technique. Also calculate compression ratio. **[9]**

b) Enlist and compare different video transmission standard. **[9]**

OR

Q8) a) Explain MPEG1 standard mentioning the role of I, P, B frames. **[6]**

b) Explain Huffman coding with example. **[6]**

c) Write and explain any three text file formats. **[6]**

Q9) a) Explain any four principles of animation. **[8]**

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

i) Open GL ii) SDK

OR

Q10) a) Explain various techniques of animation with example. **[8]**

b) Explain how atmospheric effects can be introduced in 3D animation. **[8]**

Q11) a) Explain role of Multimedia in web based applications and e-learning. **[8]**

b) Explain different factors effecting quality of data transmission. **[8]**

OR

Q12) a) Explain in detail media on demand. **[8]**

b) Explain any four applications of multimedia in brief. **[8]**

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Total No. of Questions : 12]

SEAT No. :

P1204

[Total No. of Pages : 2

[4264] - 701

B.E. (Computer Engineering)

SOFTWARE TESTING & QUALITY ASSURANCE

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

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

Instructions to the candidates:

1) ***Answers to the two sections should be written in separate books.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Describe in brief Defect Life Cycle. **[8]**

b) What should be done after a BUG if found? **[8]**

OR

Q2) a) Explain how you prepare a defect report. **[8]**

b) Explain Test Plan in IEEE Format. **[8]**

Q3) a) Describe black box testing? When to do black box testing? How can it be known when to stop testing? **[10]**

b) Describe boundary value analysis with an example. **[6]**

OR

Q4) Write Short Notes on (any two) : **[16]**

a) Test Case Design Criteria.

b) Documentation & Domain Testing.

c) User Documentation Testing.

d) Need of Black box Testing.

Q5) a) Explain the challenges in white box testing. **[9]**

b) Write short note on Mutation Testing. **[9]**

OR

P.T.O.

Q6) a) Describe test case designs for white box testing. **[6]**

b) Write a short note on testing of Object Oriented Systems. **[6]**

c) Explain in short data flow testing. **[6]**

SECTION - II

Q7) a) What is GUI Testing and how it is done? **[8]**

b) Describe in detail Specification based testing and Ad-hoc testing. **[8]**

OR

Q8) a) What is structure of testing? Which measurement tools are used for this. **[8]**

b) Describe in detail Ad-hoc & Scenario Testing with suitable examples. **[8]**

Q9) a) How would you begin to measure the quality of software? **[9]**

b) Describe ISO and why we need to go for the ISO? **[9]**

OR

Q10) a) Describe in short what quality is & project management. **[8]**

b) Describe in brief Quality Assurance & Quality Control. **[5]**

c) What is the role of documentation in QA? **[5]**

Q11) a) Differentiate between manual and automated testing. **[8]**

b) How can world wide web be tested? **[8]**

OR

Q12) a) Suppose a Product / Application has to deliver to the client at 5.00PM, at that time you or your team member caught a high severity defect at 3PM. But the client cannot wait for long time. You should deliver the product at 5.00PM exactly. Then what is the procedure you follow? **[8]**

b) What will be the Test case for ATM machine & Coffee machine? **[8]**

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Total No. of Questions : 12]

SEAT No. :

P1025

[Total No. of Pages : 3

[4264] - 702

B.E. (Computer Engg.)

ADVANCED COMPUTER ARCHITECTURE

(2008 Pattern) (Semester - II)

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

Instructions to the candidates:

1) ***Attempt Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6 from section - I and Q. 7 or Q. 8, Q. 9 or Q. 10, Q. 11 or Q. 12 from section - II.***
2) ***Answers to the two sections should be written in separate books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) What is VLIW architecture? Compare EPIC architecture with super scalar architecture. **[8]**

b) What is scalability? Define speedup and efficiency w.r.t. Parallel computer systems in terms of scalability. State any four parameters affecting the scalability. **[8]**

OR

Q2) a) What is parallel Processing? How flynn has classified parallel computers? Why MISD architecture does not exist? **[8]**

b) State the following terms in brief : **[8]**

i) Instruction level parallelism.
ii) Thread level parallelism.
iii) Software parallelism.
iv) Hardware parallelism.

Q3) a) State the following terms w.r.t. Pipeline processing : **[8]**

i) Hazards ii) Efficiency
iii) Dynamic pipeline iv) Internal forwarding.

b) What is the use of reservation Table? How it is presented? Explain how a control strategy can be implemented for job sequencing problem.**[10]**

OR

P.T.O.

Q4) a) With suitable example explain loop unrolling and trace scheduling techniques implemented in optimizing compiler. **[10]**

b) Design a 5 bit multiplier unit using CSA tree. Specify the number of pipelines stages with its function. **[8]**

Q5) a) State the concept of pipeline chaining. What is vector looping? With example explain it w.r.t. Cray 1 architecture. **[8]**

b) How array processing is different than vector Processing? Discuss the basic architecture of ILLIAC - IV model I array processor. **[8]**

OR

Q6) a) What is the necessity of routing functions? State routing functions for Mesh Interconnection Network. Define & obtain "permutation Cycles" for all the routing functions. **[8]**

b) Discuss with algorithm the problem of parallel sorting w.r.t. Mesh interconnection network with suitable example & specify its complexity. **[8]**

SECTION - II

Q7) a) Discuss the necessity of cache coherency in multiprocessor system. Discuss pentium MESI protocol with it's state diagram. **[8]**

b) Discuss following terms. **[10]**

i) Cross bar switch

ii) Multiport memory model

iii) Shared memory system Architecture

iv) Distributed systems.

OR

Q8) a) Compare loosely & tightly coupled multiprocessor system with example. **[8]**

b) What is cow & Now architecture? Explain any one with diagram. **[10]**

Q9) a) Compare between synchronous and Asynchronous message passing. What standard primitives are used in message passing parallel programming. **[8]**

b) Discuss different techniques used for latency hiding in multithreaded architecture. **[8]**

OR

Q10) a) With suitable example discuss important features and constructs of Data parallel programming. **[8]**

b) How multithreaded architecture are classified? Define the various performance measuring parameter w.r.t. Multithreaded architecture. **[8]**

Q11) a) How parallel Algorithms are classified for multiprocessor system? Discuss one such algorithm with suitable example. **[8]**

b) With standard constructs discuss the important features of CCC parallel programming language. **[8]**

OR

Q12) a) Compare between PVM and MPI. Discuss in brief different communication functions implemented in MPI. **[8]**

b) Explain the terms cluster and grid with suitable diagram. Discuss in brief the architecture of cluster computing with suitable diagram. **[8]**

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Total No. of Questions : 12]

SEAT No. :

P850

[Total No. of Pages : 7

[4264] - 414

B.E. (Civil)

QUANTITY SURVEYING, CONTRACTS AND TENDERS

(2008 Pattern) (Semester - II)

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) What is an approximate estimate? State the purposes of preparing approximate estimate. **[2 + 4 = 6]**

b) Differentiate between supplementary and revised estimate. **[4]**

c) What factors are considered while deciding the plinth area rate for preparing approximate estimate? **[6]**

OR

Q2) a) Enlist the different types of estimate used in civil engineering projects. Hence explain the method of preparing detailed estimate of a building. **[2 + 4 = 6]**

b) Prepare an approximate estimate for a two storried R.C.C. building using following data. **[6]**

i) Floor area on each floor = 200 sq.m.
ii) Built up area = 1.2 time the floor area.
iii) Plinth area rate = Rs. 1800/- per sq.m.
iv) Work charge establishment and contingencies = 8% of construction cost.
v) Cost of water supply, drainage and electrification = 16% of the sum total.

P.T.O.

c) Explain the rule for measurement of plastering work as per IS 1200. **[4]**

Q3) a) Figure 1 shows the plan and section of an office building. Determine the quantities of following items and prepare the measurement sheet with appropriate description of each item.

i) Earth work in excavation in hard murrum for foundation. **[3]**

ii) UCR masonry in C.M. (1:6) in plinth and foundation. **[3]**

iii) Brick masonry in C. M. (1:6) in superstructure. **[3]**

iv) RCC M20 in slab and lintels assuming 15cm projection on either side of openings. **[4]**

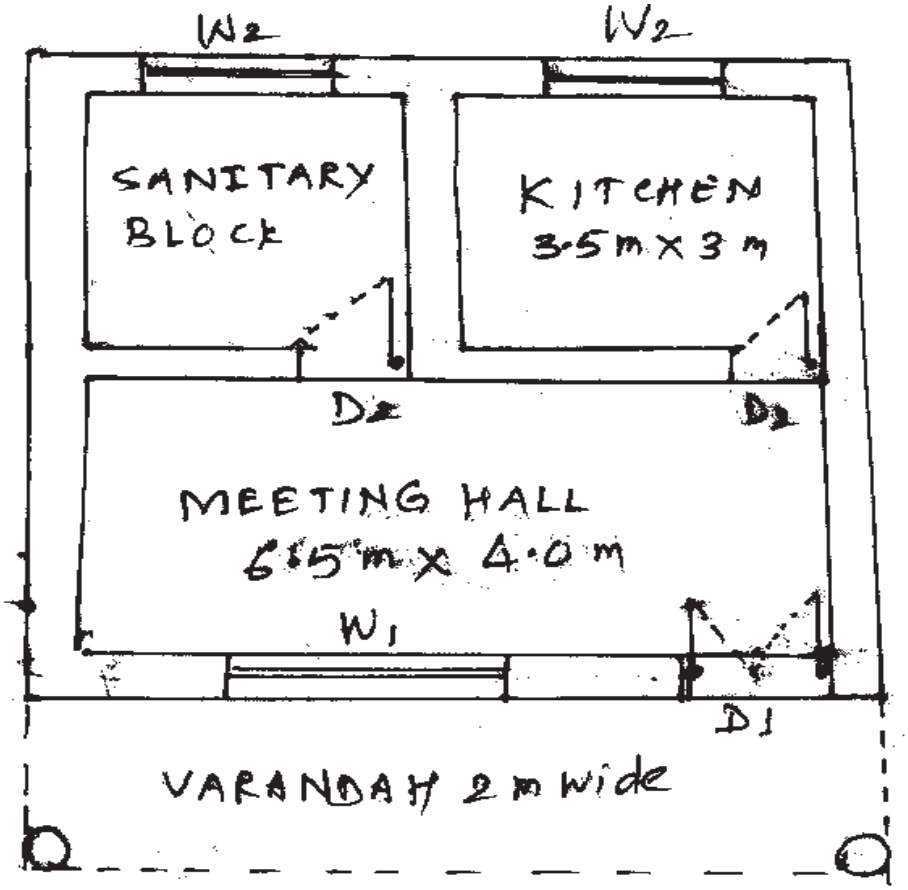

Fig. 1 (a) : Plan

b) A R.C.C. beam 4 m long, 0.23 m × 0.45 m in cross-section is provided with reinforcement as given below. Reinforcement at bottom = 2 No / 12 mm dia. straight and 2 No/12 mm dia. bent up bars.
Reinforcement at top = 2 No / 8 mm dia. anchor bars stirrups = 6 mm dia. at 150 mm C/C.
Prepare bar bending schedule and determine the quantity of 6 mm, 8 mm and 12 mm dia, steel reinforcement. **[5]**

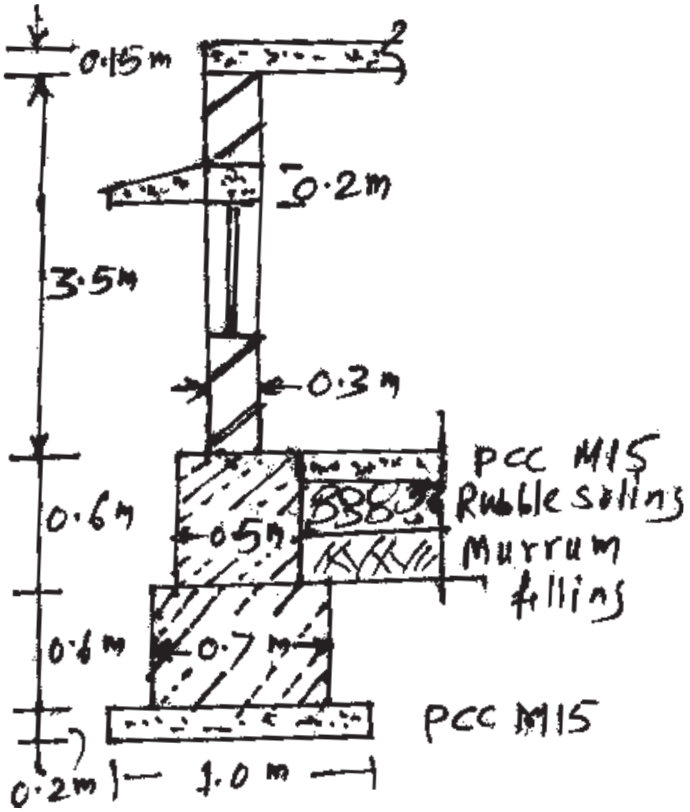

Fig. 1 (b): Section

D_1 = 1.5 m × 2.1 m
D_2 = 1.0 m × 2.1 m
W_1 = 1.5 m × 1.2 m
W_2 = 1.2 m × 1.2 m

OR

Q4) a) Figure 2 shows the section of 10 m long masonry wier. Determine the quantities of following items, entering them in a measurement sheet with appropriate description of each item.

i) Earthwork in excavation. **[2]**

ii) P.C.C. M 15 in foundation. **[2]**

iii) C. R. Masonry in C. M. (1:6) in the wier. **[4]**

iv) Pointing in C. M. (1:4) for the masonry work. **[4]**

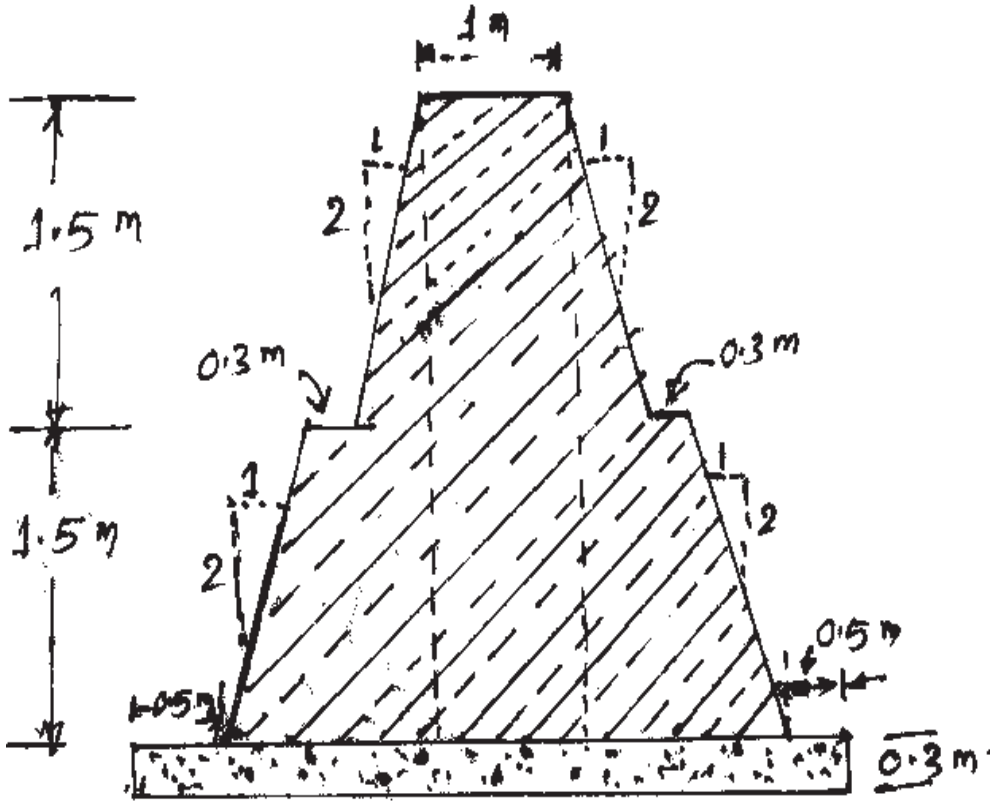

Fig. 2 : Section

b) State the methods used for calculation of earthwork in roads and hence explain any one method. **[2 + 4 = 6]**

Q5) a) Draft a detailed specification for item of brick masonry work in superstructure with reference to.

i) the materials and proportion,

ii) method of execution, workmanship and

iii) mode of measurement and payment. **[8]**

b) A compound wall 40 m long, 0.3m wide and 1.5 m in height is constructed in UCR masonry in C. M. (1:6). Determine,

i) The quantity of basic materials like rubble, Cement and sand required for the work.

ii) If two masons and 08 mazdoors are employed for the work, find the time in days required to complete the work. **[8]**

OR

Q6) a) Determine the rate per unit for construction of BM (1:4) in superstructure. **[8]**

b) Draft a detailed specification for construction of C. R. masonry in superstructure with reference to

i) the materials and proportions

ii) method of execution , workmanship and

iii) mode of measurement and payment. **[8]**

SECTION - II

Q7) a) An old bungalow is purchased today for Rs. 80000/- Determine the amount of sinking fund and annual installment of sinking fund for a future life of 20 years for this bungalow. Given: The scrap value is 10% of the cost of purchase and rate of interest is 5%. **[5]**

b) Discuss five types of values of a property in brief. **[5]**

c) Briefly explain 'land and building basis' of valuation. **[4]**

d) Explain briefly the essential characteristics of 'Value' of a property. **[4]**

OR

Q8) a) Owner of a building earns a net annual income of Rs. 50000/- Calculate years Purchase and value of the building for an expected life of 50 years if :

i) The property is perpetual and simple rate of interest is 6%.

ii) The property is receivable with a dual rate of interest 6% and sinking fund is 3%. **[5]**

b) What is meant by 'Value' of a property? Briefly discuss the factors on which the value or valuation of a property depends. **[5]**

c) Clearly explain four objectives of valuation. **[4]**

d) State various methods used for valuation of buildings. Explain in short any one method. **[4]**

Q9) a) Discuss the amounts of Earnest Money and Security Deposit and their necessity (purpose). **[5]**

b) What is meant by a 'tender notice' ? State eight essential factors which must be a part of tender notice. **[5]**

c) Write a note on 'registration as a contractor' with respect to following points:

i) Different classes of contractors and corresponding limits for amount of works

ii) Application form (information to be filled)

iii) Documents to be submitted along with the form. **[6]**

OR

Q10) a) Discuss the 'balanced' and 'unbalanced' types of tenders with examples. **[5]**

b) Explain essential elements of a typical tender form. **[5]**

c) Write a detailed note on various categories (classes) of works executed by PWD. **[6]**

Q11) a) What is meant by a 'contract' in civil engineering? Elaborate on three essential requirements (characteristics) of a valid (lawful) contract. **[4]**

b) What is meant by 'arbitration'? Explain its necessity with examples. State four matters which can not be lawfully referred to an arbitrator. **[4]**

c) Explain 'general' and 'special' conditions of contract with examples. **[4]**

d) List out the advantages and disadvantages of a 'labour contract'. **[4]**

OR

Q12) a) Write a note on 'breach of contract'. **[4]**

b) Discuss the meaning and necessity of :

i) Interim payment

ii) Liquidated damages **[4]**

c) Clearly explain 'legally competent parties' for a lawful (valid) contract. **[4]**

d) Enlist various types of civil engineering contracts. Explain any one type of contract in detail. **[4]**

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Total No. of Questions : 6]

SEAT No. :

P852

[Total No. of Pages : 2

[4264] - 418

B.E. (Civil Engineering)

ADVANCED ENGINEERING GEOLOGY WITH ROCK MECHANICS

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

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Answer to the two sections should be written in separate answer books.***
3) ***Figures to the right indicate full marks.***
4) ***Neat diagrams should be drawn wherever necessary.***

SECTION - I

Q1) a) State engineering significance of older metamorphic rocks of Maharashtra state. **[8]**

b) Field characters of fractures. **[6]**

c) Lateral & vertical extensions of flows in Deccan Trap Area. **[4]**

OR

a) Regional distribution of Deccan Trap Basalt. **[6]**

b) Civil Engineering significance of Precambrian secondary rocks in Maharashtra State. **[8]**

c) Field Characters of dykes. **[4]**

Q2) a) What are the defects in rock masses? How to treat them? Explain with suitable examples from dam foundation point of view. **[10]**

b) Dams located on limestones & quartzites. **[6]**

OR

a) Significance of fractures from dam foundation point of view. **[4]**

b) Engineering significance of tachylytic basalt. **[6]**

c) Reasons of tail channel erosion in Deccan Trap Area. **[6]**

P.T.O.

Q3) a) What are different methods of conservation of water? Explain in detail. **[12]**

b) Residual soils of Maharashtra State. **[4]**

OR

a) Influence of climate on soil formation. **[6]**

b) Deep seated wells in Deccan Trap Area. **[4]**

c) Possibility of getting sand in Deccan Trap Area. **[6]**

SECTION - II

Q4) a) Explain in details various mechanical properties of rocks masses in detail. **[9]**

b) Bieniawski's Geo mechanical Classification of rock masses. **[9]**

OR

a) List only various physical properties in detail & explain any 3 properties in brief. **[8]**

b) 'Q' System of Classification of rock masses. **[6]**

c) Rock Quality Designation. **[4]**

Q5) Discuss the influence divisional planes during tunneling. Give suitable case histories. **[16]**

OR

Write notes on :

a) Tunneling through Compact Basalts. **[6]**

b) Safe Bearing Capacity of bridge foundation. **[6]**

c) Tunnel through fractures. **[4]**

Q6) a) Treatment to be given to fault zone crossing dam alignment. Give examples. **[8]**

b) Scarcities of Sand in Deccan trap area. **[4]**

c) Filled Grounds. **[4]**

OR

a) Compact Basalt as a construction material. **[4]**

b) R.I.S. and dams. **[8]**

c) Role of Geology in Urban Planning. **[4]**

■■■

Total No. of Questions : 12]

SEAT No. :

P1134

[Total No. of Pages : 3

[4264] - 488

B.E. (Production Sandwich)

ERGONOMICS AND HUMAN FACTORS IN ENGINEERING

(2008 Pattern) (Elective - II) (Sem. - I)

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

Instructions to the candidates:

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

SECTION - I

Unit - I

Q1) a) Explain various types of movements of human body members. **[6]**

b) Explain performance criteria for physical activity. **[6]**

c) What are Human Machine systems? Explain its types. **[6]**

OR

Q2) a) Explain objectives of Human Factors Engineering. **[6]**

b) Explain Design of MMH Task. **[6]**

c) Explain features of human body & explain measures of physiological functions. **[6]**

Unit - II

Q3) a) Explain the considerations in designing a STANDING workplace. **[8]**

b) Explain Physical space & principles of arrangement of components. **[8]**

OR

P.T.O.

Q4) a) What is Anthropometry and explain principles used in application of anthropometric data. **[8]**

b) Explain use of anthropometric data in designing of interior of Passenger car. **[8]**

Unit - III

Q5) Explain arrangement of following components at work place (any four). **[16]**

a) Visual displays.

b) Control on panels.

c) Hand controls.

d) Two hand controls.

e) Foot controls.

f) Controls that require force.

OR

Q6) Write short note on (any two) **[16]**

a) Hand tool design.

b) Functions of controls.

c) Concept of visibility.

d) Location of controls in work place.

SECTION - II

Unit - IV

Q7) a) Explain Discomfort glare & Disability glare. **[9]**

b) Explain the physiological effects of heat & cold . Explain its remedies. **[9]**

OR

Q8) a) Explain the system of measurement of light. Also explain effect of light intensity on work performance. **[9]**

b) What is Wet Bulb Globe temperature? How do you calculate it? Explain its utility in hot humid conditions. **[9]**

Unit -V

Q9) a) What are the characteristics of system design? Explain its any two phases. **[12]**

b) Explain the significance of warnings in brief. **[4]**

OR

Q10) a) Explain the term Accident. Explain its relationship with human errors. **[8]**

b) Explain perception of risk & describe risk evaluation process. **[8]**

Unit - VI

Q11) a) Explain MOST and its types in brief. **[8]**

b) Explain the various considerations used in MTM 1. **[8]**

OR

Q12) Explain the following PMTS (Predetermined Motion Time Analysis). Determine the variants & stability of each. **[16]**

a) Work factor system.

b) Method Time measurement.

■■■

Total No. of Questions : 12]

SEAT No. :

P1135

[Total No. of Pages : 3

[4264] - 489

B.E. (Production Sandwich)

MATERIALS MANAGEMENT & LOGISTICS

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

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

Instructions to the candidates:

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

SECTION - I

Q1) a) Explain objectives of materials management in manufacturing industry. **[9]**

b) Define value Analysis & Explain FAST diagram in detail. **[9]**

OR

Q2) a) Explain MRP-I in detail. **[9]**

b) Explain Break even Analysis. **[9]**

Q3) a) Explain import procedure when purchasing from foreign supplier. **[8]**

b) Explain vendor development & vendor Rating. **[8]**

OR

Q4) a) Explain 5 R'-S in purchasing. **[8]**

b) Explain :

i) Bill of lading.

ii) Letter of credit. **[8]**

P.T.O.

Q5) a) Explain in detail various steps involved in waste management. **[10]**

b) Explain Two Bin system. **[6]**

OR

Q6) a) Explain & differentiate centralised and Decentralised stores. **[8]**

b) Explain various alternatives of disposed off the solvable waste. **[4]**

c) Explain KODAK system of coding. **[4]**

SECTION - II

Q7) a) Explain the following terms in relation to logistic Management. **[8]**

i) Procurement cycle.

ii) Manufacturing support cycle.

iii) Physical distribution cycle.

b) Explain briefly various factors to be considered in warehouse design. **[8]**

OR

Q8) a) Describe any four modes of transportation identifying the most significant characteristic of each. **[8]**

b) Explain transportation Management. Explain the factors affecting transportation cost. **[8]**

Q9) a) Explain the following : **[8]**

i) F-S-N Analysis

ii) V-E-D Analysis.

b) EOQ formula

$$\frac{\sqrt{2 \times \text{Annual consumption} \times \text{Procurement Cost Per Order}}}{\text{Price perunit} \times \text{Inventory carrying cost.}}$$

is based on set of assumptions. State the assumptions and derive the formula. **[8]**

OR

Q10) a) What are inventories? Why are they required in any organisation? Describe the various types of inventories. **[8]**

b) Explain A-B-C analysis technique used in materials function. **[8]**

Q11) a) Derive the formula for Economic Manufacturing Quantity. State the assumptions. **[9]**

b) Explain fixed order Quantity & Fixed period. System. **[9]**

OR

Q12) a) An item is produced at the rate of 50 nos per day and is consumed at the rate of 25 nos per day. If the set up cost is Rs. 100 per production run & holding cost in stock is Rs. 0.01 per unit per day. Find economic lot size for one run assuming shortages are not permitted. Also find the time of cycle and minimum total cost of one run. **[9]**

b) Finished goods invention in mass and flow production units can be regulated by determining the frequency of production cycle. Discuss. **[9]**

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Total No. of Questions : 12]

SEAT No. :

P1141

[Total No. of Pages : 3

[4264] - 508

B.E. (Electrical)

RESTRUCTURING & DEREGULATION

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

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

Instructions to the candidates:

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

SECTION - I

Q1) a) Explain in detail the functions of **[12]**

i) CEA ii) PFC

b) Why the reformation has taken place in electrical power system? **[6]**

OR

Q2) a) What are various challenges before Indian Power Sector? **[9]**

b) Describe the operation of Indian Energy Exchange. **[5]**

c) Describe the concept of power Exchange. **[4]**

Q3) Explain in brief (any five) **[16]**

a) Capital Cost b) Debt and Equity

c) Depreciation d) Average cost

e) Marginal cost f) Avoided cost

P.T.O.

OR

Q4) a) Explain the tariff setting principle. **[8]**

b) What do you mean by

i) Subsidy and cross-subsidy

ii) O and M expenses **[8]**

Q5) a) What is a role of regulation? **[8]**

b) What are the regulation externalities. **[8]**

OR

Q6) a) Write short note on **[10]**

i) CERC

ii) Regulatory process in India

b) Give the structure of regulatory process in India. **[6]**

SECTION - II

Q7) a) Explain in detail "The California Crisis". **[8]**

b) Explain electricity reforms of Orissa and Maharashtra. **[8]**

OR

Q8) a) Explain the electricity reforms of : **[8]**

i) Nordic pool

ii) United Kingdom

b) Write a short note on the following electricity trading models based on industrial structure: **[8]**

i) Pool and bilateral trades

ii) Multilateral trades.

Q9) a) What is trading of electricity market? What are the rules that govern the electricity markets? **[8]**

b) Explain in detail decentralized trading model. **[8]**

OR

Q10) Write short note the following electricity trading models: **[16]**

a) Integrated

b) Wheeling

c) Decentralised

Q11) a) What are transmission congestion issues, explain in detail. **[8]**

b) Explain the various transmission pricing methods. **[10]**

OR

Q12) a) What are the functions of TRANSCO, Independent System Operators (ISO) and Load Dispatch Center (LDC)? **[10]**

b) Explain the concept of open access and transmission rights. **[8]**

■■■

Total No. of Questions : 12]

SEAT No. :

P1142

[Total No. of Pages : 3

[4264] - 509

B.E. (Electrical)

EMBEDDED SYSTEM

(2008 Pattern) (Semester - I) (Elective - II) (Theory)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) What is an Embedded System & explain challenges while designing Embedded System. **[6]**

b) Explain in detail categories of embedded systems. **[6]**

c) Explain Design Process in Embedded Systems with waterfall model. **[6]**

OR

Q2) a) Explain characteristics and features, overview any one of the 8 - bit Atmel Microcontroller. **[6]**

b) Differentiate between RISC and CISC processor and explain the characteristics and features of PIC 18F4520 Microcontroller. **[6]**

c) Explain architecture of any DSP processor family with block diagram? **[6]**

Q3) a) Explain types of ADC, its microprocessor interfacing with diagram. **[8]**

b) Explain optical sensors with diagram. **[8]**

OR

P.T.O.

Q4) a) Explain interfacing of 4×4 matrix keypad to microcontroller with diagram. **[6]**

b) Explain solid - state motion sensor. **[4]**

c) Explain Temperature sensors and their interfacing with microcontroller through ADC. **[6]**

Q5) a) Define solenoids and relays. Explain microprocessor interfacing to Solenoids - Relay with diagram. **[6]**

b) What are types of stepper motors? Explain bipolar versus unipolar operation of stepper motors. **[6]**

c) Explain in detail actuators? **[4]**

OR

Q6) a) What are types of stepper motors? **[4]**

b) Explain DC motor controller ICs (LM628 & LM629). **[6]**

c) Explain BLDC motor & its driving. **[6]**

SECTION - II

Q7) a) Explain Inter-process communication and synchronization of process, tasks and threads. **[6]**

b) What is semaphores & explain in detail different types of semaphores. **[6]**

c) What is interrupt latency? ISR? Interrupt recovery time ? **[6]**

OR

Q8) a) Explain in detail following scheduling algorithms

i) First in first out

ii) Round robin

iii) Round robin with priority

iv) Shortest job first

v) Non-preemptive multitasking

vi) Preemptive multitasking **[10]**

b) Explain mailbox and message queues in detail? What is application of each? **[8]**

Q9) a) Explain architecture of kernel in detail. **[6]**

b) Define RTOS. What is real time system? Name RTOS available? **[6]**

c) What is pipe and event register ? **[4]**

OR

Q10) a) Explain the features of Vxworks RTOS. What are its application areas? **[8]**

b) What are differences between General purpose operating systems and RTOS ? **[4]**

c) List the memory management functions of RTOS. **[4]**

Q11) Explain Digital camera with functional block diagram. **[16]**

OR

Q12) a) Explain case study of an embedded system for a smart card. **[8]**

b) Design a control system for a flight simulation and control. **[8]**

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Total No. of Questions : 12]

SEAT No. :

P1143

[Total No. of Pages : 2

[4264] - 511
B.E. (Electrical)
SMART GRID
(2008 Pattern) (Semester - I) (Elective - II)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) What is the need of Smart Grid. Explain the functions of Smart Grid. **[10]**

b) Explain the concept of Resilient and Self healing grid. **[8]**

OR

Q2) a) Explain difference between Conventional Grid and Smart Grid. **[8]**

b) Explain national and international policies of Smart Grid. **[10]**

Q3) a) Compare outage Management System (OMS) in conventional Grid and Smart Grid. **[8]**

b) Explain home and building automation. **[8]**

OR

Q4) a) Why real time prizing should be implemented. **[8]**

b) What is mean by smart sensors? Explain smart sensors required for measurement of power. **[8]**

P.T.O.

Q5) a) Explain any two smart storage equipments. **[8]**

b) Explain the importance of making substation smart. **[8]**

OR

Q6) a) What are the applications of Intelligent Electronic Devices explain in detail. **[8]**

b) Explain the role of Phaser Measurement Unit in Smart Grid. **[8]**

SECTION - II

Q7) a) Describe the concept of Micro Grid, and also its need and applications. **[10]**

b) Write a note on, variable speed wind generator. **[8]**

OR

Q8) a) Discuss different issues of micro grid when interconnected. **[10]**

b) Write a note on, Fuel cells. **[8]**

Q9) a) Why power quality is considered to be an important issue especially in smart grid. **[8]**

b) Highlight on the power quality issues of grid connected renewable energy sources. **[8]**

OR

Q10) a) Describe the EMC and how it is role in smart grid. **[8]**

b) Explain how power quality can be improved in smart grid by monitoring with the help of Web based technology. **[8]**

Q11) a) Explain the concept AMI related to smart grid. **[8]**

b) Focus on, Wireless Mesh Network in smart grid. **[8]**

OR

Q12) a) Write short note on NAN. **[8]**

b) Why cyber security is most important in smart grid. **[8]**

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Total No. of Questions : 12]

SEAT No. :

P1150

[Total No. of Pages : 3

[4264] - 530

B.E. (Electronics Engineering)

SYSTEM ON CHIP

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

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

Instructions to the candidates:

1) ***Answer any three questions from each Section.***
2) ***Attempt from Section -I : Q1 or Q2, Q3 or Q4, Q5 or Q6 and from Section - II : Q7 or Q8, Q9 or Q10, Q11 or Q12.***
3) ***Draw neat diagrams.***
4) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) What are the performance parameters of Gyroscope? **[8]**

b) What are scaling laws of miniaturization? Explain with example scaling law in geometry of a MEMS device. **[8]**

OR

Q2) a) Explain basic working principal of micro accelerometers and micro inertial sensor. **[8]**

b) Explain various technological aspects of sensors. **[8]**

Q3) a) Justify, Why silicon is ideal substrate for Micro-MEMS? **[8]**

b) What is polymer? Explain their characteristics and give principal applications of polymers. **[8]**

OR

Q4) a) Explain working principal of silicon piezoresistors? **[8]**

b) Explain principal planes of a silicon crystal. What characteristics do silicon principal planes offers? **[8]**

P.T.O.

Q5) a) Explain working principal of RF transducers. At what frequency they are operated? **[9]**

b) Explain working principal of chemical sensor. What problems crop up in designing of these sensors? **[9]**

OR

Q6) a) Explain working principal of biosensor for measurement of blood glucose concentration in a patient. **[9]**

b) Explain working principal of magnetic transducers. In which applications it is used? **[9]**

SECTION - II

Q7) a) Explain SoC architecture in detail. What are advantages of SoC design over VLSI design? **[8]**

b) Explain in detail schematic of an MPEG2 encoder for terrestrial transmission. **[8]**

OR

Q8) a) Explain in detail operation and working of dataflow execution. **[8]**

b) Justify how processor can be seen as interpreters. **[8]**

Q9) a) Which features of MEMS SoC designer should look in layout synthesis tool ? **[8]**

b) Explain cycle dependency and generation of problem with suitable example in context to cell placement. **[8]**

OR

Q10) a) What do you mean by user constraints? What role they play in implementation of design? **[8]**

b) Which different strategies are used in power supply distribution and body-tie placement? **[8]**

Q11) a) Which reliability issues are crop up in packaging? Which factors leads failures in packaging? **[9]**

b) What do you mean by fault simulation? Explain generic fault simulation procedure? **[9]**

OR

Q12) a) Which features are inculcated in co-design tool? Explain design steps for co-design. **[9]**

b) Explain generic test generation procedure with flowchart. Explain embedded core based system on chip test strategies. **[9]**

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Total No. of Questions : 12]

SEAT No. :

P859

[Total No. of Pages : 3

[4264] - 537

B.E. (Electronics Engineering)

SOFT COMPUTING TOOLS

(2008 Pattern) (Elective - III) (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) What is soft computing? Describe the different soft computing characteristics. **[8]**

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

i) Conventional AI and Machine Intelligence.

ii) Hard computing and soft computing.

OR

Q2) a) Consider two fuzzy sets A & B find complement union, intersection, Difference & Demorgan's law. **[8]**

$$A = \left\{ \frac{1}{0.1} + \frac{0.75}{1.5} + \frac{0.3}{2.0} + \frac{0.15}{2.5} + \frac{0}{3.0} \right\}$$

$$B = \left\{ \frac{1}{1.0} + \frac{0.6}{1.5} + \frac{0.2}{2.0} + \frac{0.1}{2.5} + \frac{0}{3.0} \right\}$$

b) Define a fuzzy set & explain the concept of fuzzy member. What is the significance of fuzziness. **[8]**

P.T.O.

Q3) a) Explain the extension principle for fuzzy set with suitable example. **[8]**

b) Describe the concept of composition of fuzzy relation with suitable example explain max-min composition & max-product composition.**[8]**

OR

Q4) a) Define and Explain following terms. **[8]**

i) Support

ii) Normality

iii) Fuzzy singleton

iv) α - cut & strong α - cut.

b) Suppose x, y & z are three different sets such as $x = [x_1, x_2, x_3]$, $y = [y_1, y_2, y_3]$, $z = [z_1, z_2, z_3]$. Let R represents the fuzzy relation of close ness of y & z. These fuzzy relation are given by fuzzy matrices such as.

$$R = \begin{bmatrix} 1 & 0.6 & 0.3 \\ 0.4 & 0.9 & 0.1 \\ 0.5 & 0.2 & 0.7 \end{bmatrix} \quad S = \begin{bmatrix} 1 & 0.1 & 0.5 \\ 0.7 & 0.9 & 0.2 \\ 0.1 & 0.8 & 0.8 \end{bmatrix}$$

Obtain the max-min composition & max-product composition which represents the closeness between x to z. **[8]**

Q5) a) What are the principle design parameters of a fuzzy logic controller? Explain with suitable example? Draw a block diagram of fuzzy logic controller. **[10]**

b) What are the advantages of fuzzy logic controller over that of a conventional controller. **[8]**

OR

Q6) Write a short notes on following (Any three) **[18]**

a) Tsukomoto fuzzy models.

b) Mamdani type fuzzy logic controller.

c) Sugeno fuzzy inference model.

d) Synthesis & validation of fuzzy logic controller.

SECTION - II

Q7) a) Describe in detail the back propagation learning rule for multilayer perceptron (MLP) what are different methods used for speeding up of MLP training. **[8]**

b) List & explain activations functions used in Neural Networks. **[8]**

OR

Q8) a) What is meant by topology of artificial Neural Networks? Give basic topological structures of artificial Neural Networks? **[8]**

b) List & explain basic learning laws in detail. **[8]**

Q9) a) Explain how neural networks use in visual image recognition. **[8]**

b) Explain learning algorithm for kohonen's topology preserving Network. **[8]**

OR

Q10) Write the application of Neural Networks and Explain any two applications in detail. **[16]**

Q11) a) Explain unsupervised learning mechanism in contrast with a supervised learning mechanism. **[8]**

b) Describe adaptive Neuro fuzzy inference system. Discuss the ANFIS architecture with the fuzzy sugeno model. **[10]**

OR

Q12) Write a short notes on following (Any three) **[18]**

a) Radial basis function Network.

b) Use of ANN in process control.

c) Hybrid learning Algorithm.

d) Neuro fuzzy control.

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Total No. of Questions : 12]

SEAT No. :

P1158

[Total No. of Pages : 3

[4264] - 548

B.E. (E & TC)

ENTREPRENEURSHIP DEVELOPMENT

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

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

Instructions to the candidates:

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

SECTION - I

Q1) a) Explain the steps in problem solving process? In a company, general Manager observed that the items in the store department are missing and the data register is not maintained property. How can you solve this problem by using problem solving model so that the theft or missing of items will be controlled. **[10]**

b) What are mark ups and mark down prices? Explain with example. **[6]**

OR

Q2) a) What are the different sources to investigate the opportunities for business? During your project work, if you have developed a product, how can you find the opportunities to market your product by establishing a company? How can you set your goals? **[10]**

b) Explain the types of communication skills in detail, required for the entrepreneur. **[6]**

Q3) a) Explain the concept of cost and write the difference between fixed cost & variable cost? **[8]**

b) Explain the legal form of ownerships? Also evaluate the advantages & disadvantages of each. **[8]**

OR

P.T.O.

Q4) a) Write down the advantages & disadvantages of starting your own business. How can you overcome the disadvantages? **[8]**

b) Subodh Roy want to start a Franchise business of 'Natural Icecream,' having its headoffice at Mumbai. What are the steps he has to follow to get the Franchise? What are the costs he has to consider? What will be the advantages & disadvantages to purchase the Franchise of 'Natural Ice cream'. **[8]**

Q5) a) Create a business plan in detail for the following example-"Establishing a Veg Restaurant in urban area". **[12]**

b) What is target market? How to identify target market? **[6]**

OR

Q6) a) Develope a business plan for establishing a Super Market Multiproduct Mall'. **[12]**

b) Explain the purpose & importance of a Business plan. **[6]**

SECTION - II

Q7) a) State merit and demerit of computerised record keeping. **[6]**

b) Write a short note on "Tracking the inventory". **[6]**

c) Explain the different locations for retail business and give merits & demerits of each. **[6]**

OR

Q8) a) Write down the different ways to motivate the employees? **[6]**

b) Write a short note on "Marketing Mix". **[6]**

c) Write down the different ways to recruit the employees? **[6]**

Q9) a) Write a short note on 'Hire the experts'. **[8]**

b) Explain break-even analysis by a suitable graph. **[8]**

OR

Q10) a) How do you improve your cash flow in the business? **[8]**

b) How the technology helps to improve the business? **[8]**

Q11) a) What is ethics ? Why you want to establish an ethical workplace? **[8]**

b) Which are the laws that protect business & consumers. **[8]**

OR

Q12) a) What are the different social responsibilities about customes supplies & community. **[8]**

b) What are the benefits and risks involved when competing globally? **[8]**

■■■

Total No. of Questions : 12]

SEAT No. :

P1160

[Total No. of Pages : 3

[4264] - 550

B.E. (Electronics and Telecommunication)

MICROELECTROMECHANICAL SYSTEM AND SYSTEMS ON CHIP

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

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

Instructions to the candidates:

1) ***Attempt three questions from each Section.***
2) ***Attempt from Section -I : Q1 or Q2, Q3 or Q4, Q5 or Q6 and from Section - II : Q7 or Q8, Q9 or Q10, Q11 or Q12.***
3) ***Draw neat diagrams.***
4) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Explain basic working principal of micro pressure sensor. What are major problems in these sensors? **[8]**

b) What do you mean by scaling in electromagnetic force? Justify: electromagnetic force is $F \alpha l^4$ for cross section area of conductor. **[8]**

OR

Q2) a) Explain with example working principle of accelerometers? **[8]**

b) What are scaling laws of miniaturization? Explain with example scaling law in geometry of a MEMS device. **[8]**

Q3) a) Compare GaAs Vs Silicon. **[8]**

b) Explain principal planes of a silicon crystal. What characteristics do silicon principal planes offers? **[8]**

OR

Q4) a) What is polymer? Explain their characteristics and give principal applications of polymers. **[8]**

b) Explain the concept of **[8]**

i) Mobility ii) Resistivity in context to Piezo crystal.

P.T.O.

Q5) a) Explain optical silicon properties and working principal of optical sensors. **[9]**

b) Explain various technological aspects of sensors. **[9]**

OR

Q6) a) Explain working principal of biosensor for measurement of blood glucose concentration in a patient. **[9]**

b) Explain working principal of chemical sensors with example? **[9]**

SECTION - II

Q7) a) Explain SoC architecture in detail. What are advantages of SoC design over VLSI design? **[8]**

b) Explain in detail schematic of an MPEG2 encoder for terrestrial transmission. **[8]**

OR

Q8) a) What are the important parameters which define wafer level bonding? Also give its significance. **[8]**

b) Explain in detail new ways for speeding up execution of instructions. **[8]**

Q9) a) Which different strategies are used in power supply distribution and body-tie placement? **[8]**

b) Explain working of PVD? Which new CVD process are used to overcome drawbacks of CVD process. **[8]**

OR

Q10) a) What is LEGAL? Explain LEGAL algorithm steps. What kind of improvement inculcated in LEGAL in context to earlier routing algorithms? **[8]**

b) What reliability issues are crop up in packaging? Which factors leads failures in packaging? **[8]**

Q11) a) Explain generic test generation procedure with flowchart. Explain embedded core based system on chip test strategies. **[9]**

b) What are the issues in testing of core based systems on chip? Explain features of co-design tool. **[9]**

OR

Q12) a) Which features are inculcated in co-design tool? Explain design steps for co-design. **[9]**

b) Explain GDC algorithm with reference to behavioral VHDL and Hybrid Behavioral RTL VHDL. **[9]**

■■■

Total No. of Questions : 12]

SEAT No. :

P1167

[Total No. of Pages : 2

[4264] - 568

B.E. (Instrumentation and Control)

ENVIRONMENTAL INSTRUMENTATION

(2008 Pattern) (Sem. - I) (Elective - II)

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

Instructions to the candidates:

1) ***Answer 3 questions from each Section.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Your answers will be valued as a whole.***
5) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Discuss on sensor requirements for environment. **[10]**

b) Explain the Ultraviolet analyzer method in environmental analysis. **[8]**

OR

Q2) a) Explain total hydrocarbon analyzer using flame ionization detector. **[8]**

b) What are the different portable and stationary analytical instruments. Discuss their advantages and disadvantages. **[10]**

Q3) a) Discuss on water quality parameters. **[8]**

b) What are the requirements of water treatment facilities. **[8]**

OR

Q4) a) Explain thermal conductivity detectors used in water treatments. Discuss their advantages and disadvantages. **[8]**

b) Explain opacity monitors and their applications in water quality treatment plants. **[8]**

Q5) a) What are different types of settling methods? Explain hindered settling. **[8]**

b) Discuss on the laboratory analysis of ground water sample. **[8]**

OR

Q6) a) Discuss on design criteria of settling tank. **[8]**

b) Discuss on sludge removal and storage. **[8]**

P.T.O.

SECTION - II

Q7) a) What are the objectives of sampling programs? Explain the selection criteria for water sampling locations. **[8]**

b) What are different sample collection methods? List the advantages and disadvantages of different sampling methods. **[10]**

OR

Q8) a) List the different flow measurement techniques in wastewater treatment. Explain any two in details. **[10]**

b) Discuss the latest methods of wastewater treatment plants? **[8]**

Q9) a) Which are the different air sampling methods? Explain anyone in detail. **[8]**

b) Discuss on air pollution from thermal power plant and their characteristics. **[8]**

OR

Q10) a) Explain any two analytical methods for air pollution studies. **[8]**

b) Discuss on control of air pollution by process changes. **[8]**

Q11) a) What are the different methods of measurement of ambient air quality. **[8]**

b) Write a short note on gas flow measurements. **[8]**

OR

Q12) a) Explain open channel wastewater flow measurements. **[8]**

b) Write a short note on Rain water harvesting. **[8]**

■■■

Total No. of Questions : 12]

SEAT No. :

P1168

[Total No. of Pages : 3

[4264] - 569

B.E. (Instrumentation & Control)

NANO INSTRUMENTATION

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

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

Instructions to the candidates:

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

SECTION - I

Q1) a) Explain the electron tunneling through potential barrier and give the parameters on which electron Transport depends at the nano scale. **[6]**

b) Explain the Self Assembly Techniques viz. **[6]**

i) L-B

ii) Electrostatic

c) Explain the nano materials viz. **[6]**

i) nano particles

ii) nano wires

iii) nano magnetic

OR

Q2) a) Give the two approaches of making nano materials and explain the nano lithography. **[6]**

b) Explain the physical vapour deposition for the synthesis of nano materials. **[6]**

c) Explain the various properties of nano materials. **[6]**

Q3) a) Explain the principle, working of an atomic force microscope with various modes of operation. **[8]**

b) Explain the scanning tunneling microscope in detail. **[8]**

P.T.O.

OR

Q4) a) Explain the principle, working of Scanning Near Field Optical microscope in detail. **[8]**

b) Explain magnetically and optically actuated cantilevers. **[8]**

Q5) a) What are carbon nano tubes? Give the structure and explain the parameters-Chiral Vector, Chiral Angle. How it leads to metallic or semiconducting behavior with band structure. **[8]**

b) Explain the CNT Transistor (CNT Based FET) in detail. **[8]**

OR

Q6) a) Explain the CNT Based Quantum Dot Structure and R.F. filter based on CNT Array. **[8]**

b) Explain SWCNT Based Resonant tunneling diode in detail. **[8]**

SECTION - II

Q7) a) Explain the terms in Spintronics: Spin Transport, Spin & Magnetic Quantum Numbers, Spin Polarization, Spin Orbit Coupling, Spin Relaxation. **[8]**

b) Write Short notes on spin diode & spin Transistor. **[8]**

OR

Q8) a) Explain the term Magneto Resistance with the help of ferromagnetic materials and spin Valve Device. **[8]**

b) Explain the Tunneling Magneto resistance effect and spin filtering device. **[8]**

Q9) a) Write short notes on single electron transistor & coulomb Blockade effect. **[8]**

b) Explain the concept of resonant tunneling and resonant tunneling diode. **[8]**

OR

Q10) a) What is mesoscopic scale and explain the Ballistic Rectifier as one of the mesoscopic device at Room temperature. **[8]**

b) Explain the effect of scaling down of MOSFET dimension up to few nm and Ballistic transport. **[8]**

Q11) a) What are nano transducers and sensors? Explain nano mechanical sensor with basic design. **[6]**

b) Write a short note on nano laser and light emitting diode based on semiconducting nano wires. **[6]**

c) Explain in short electrically controlled nano actuators. **[6]**

OR

Q12) Write short notes on the following :

a) Nano switches or molecular switches **[6]**

b) Magnetic nano transducers **[6]**

c) Nano scale chemical sensor. **[6]**

■■■

Total No. of Questions : 12]

SEAT No. :

P1169

[Total No. of Pages : 3

[4264] - 570

B.E. (Instrumentation and Control)

ADVANCED DIGITAL SIGNAL PROCESSING

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

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

Instructions to the candidates:

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

SECTION - I

Q1) a) State whether following systems are linear/nonlinear and time-variant/ time invariant: **[8]**

i) Decimator

ii) Interpolator

b) Write a note on 'polyphase filter structures' **[8]**

OR

Q2) a) Explain sampling rate conversion by a rational factor I/D in detail. **[8]**

b) Determine the z-transform of the signal $x(n)$ when it is **[8]**

i) down sampled by factor D and

ii) up sampled by factor I

Q3) a) Determine the Yule Walker equations or normal equations for AR Process. **[9]**

b) Explain Levinson-Durbin algorithm in detail. **[9]**

OR

P.T.O.

Q4) a) Determine the lattice coefficients corresponding to the FIR filter with system function $H(z) = A_3(z) = 1 + \frac{1}{4}z^{-1} + \frac{1}{8}z^{-2} + \frac{1}{2}z^{-3}$ **[9]**

b) Determine the FIR filter coefficients for $K_1 = \frac{1}{2}, K_2 = \frac{1}{2}, K_3 = \frac{1}{4}$ **[9]**

Q5) a) Sketch the energy density spectrum for $x(n) = 0.5^n u(n)$ **[8]**

b) Write a short note on (any one) **[8]**

i) Bartlett method

ii) Welch method

OR

Q6) For a sequence $x(n) = \{2, 3, 1, 5, 2\}$, determine following:

a) Autocorrelation **[6]**

b) Energy density spectrum (EDS) **[6]**

c) Plot the EDS for $-\pi \leq \omega \leq \pi$ **[4]**

SECTION - II

Q7) a) What is principle of adaptive filtering? Explain the statistical approach of adaptive filters? **[8]**

b) Explain any one application of adaptive filtering from following: **[8]**

i) System Identification

ii) Adaptive equalization

iii) Adaptive line enhancer

OR

Q8) a) Explain the filtering problem with fixed filters. What are the main advantages of adaptive filters over fixed filters? **[8]**

b) Write short note on (any one) **[8]**

i) LMS algorithm

ii) RLS algorithm

Q9) a) List out the important features of the DSP. **[9]**

b) Draw and explain in detail the architecture of DSP processor. **[9]**

OR

Q10) a) Compare the general purpose processor and DSP processor. **[9]**

b) Write the assembly language program for implementation of FIR filter. **[9]**

Q11) a) Define following :

i) Stationary signal

ii) Non-Stationary signal

What are the short comings of Fourier Transform ? **[8]**

b) State the equations and properties of FT, STFT and CWT. **[8]**

OR

Q12) a) Compare FT, STFT and CWT. **[8]**

b) Describe the steps in computation of STFT. **[8]**

■■■

Total No. of Questions : 12]

SEAT No. :

P1173

[Total No. of Pages : 3

[4264] - 605

B.E. (Chemical)

MEMBRANE TECHNOLOGY

(2008 Pattern) (Elective - I) (Semester - I)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) Define membrane and membrane process in general. Also state phenomenological equation used for describing membrane process. **[6]**

b) Define and explain the following terms flux, retention, separation factor. **[6]**

c) Classify the solid synthetic membranes based on morphology (structure). **[6]**

OR

Q2) a) State advantages and limitations of membrane separation processes over conventional separation processes. **[6]**

b) Classify membranes used for separation based on thickness, transport mechanism, material electric charge and nature of material used. **[6]**

c) State membrane separation processes based on pressure difference driving force. **[6]**

Q3) a) Explain the linear / branched chain, crass-linked polymers, and copolymers structures used for membranes. **[8]**

b) Explain three different isomeric structures in care of vinyl polymers and state their properties. **[8]**

P.T.O.

OR

Q4) a) Explain how polymer chain flexibility depend on the characteristics of main chain elements and side-group elements. **[8]**

b) Explain the importance of glass transition temperature in determining state of the polymer. **[8]**

Q5) Explain the following methods of preparation of membranes:

a) Sintering

b) Stretching

c) Track etching

d) Template leaching **[16]**

OR

Q6) Explain the following phase inversion techniques used for preparation of membranes:

a) Precipitation by solvent evaporation

b) Precipitation by controlled evaporation

c) Thermal Precipitation

d) Immersion precipitation **[16]**

SECTION - II

Q7) a) Explain the effect of pore geometry (structure) and surface porosity on properties of membranes. **[8]**

b) Explain the following methods of characterization of MF membranes.

i) Scanning Electron Microscopy (SEM)

ii) Bubble point method **[8]**

OR

Q8) a) Explain the following methods of characterisation of MF membranes:

i) Mercury intrusion method

ii) Permeability method **[8]**

b) Explain the following methods of characterization of uF membranes:

i) Thermoporometry

ii) Permporometry **[8]**

Q9) Explain the construction and working of the following membrane modules used in membrane separation processes :

a) Spiral - wound module

b) Plate - and - frame module

c) Tubular module

d) Hollow fiber module **[16]**

OR

Q10) a) Distinguish between surface or screen filters and depth filters used as uF /MF membranes. Explain mechanical exclusion model for surface filters and state the expression for solute rejection. **[8]**

b) Distinguish between solution - diffusion model for transport through non-porous membranes and pore -flow model for porous membranes. State the assumptions used and necessary equations. **[8]**

Q11) a) Explain concentration polarization and fouling in case of membranes. Explain boundary layer film model for concentration polarization. Derive the expression for polarization modulus (m) in the form

$$\mathbf{M} = \frac{\exp\left(J_v \delta / D_i\right)}{1 + E_o \exp\left(\frac{J_v \delta}{D_i} + 1\right)}$$

Where the symbols have their usual meaning. **[8]**

b) Distinguish between osmosis and R.O. Explain use of R.O. process for desalination of water. Derive the expression for salt rejection factor in the form.

$$\%\,R = \left[1 - \frac{\rho_w B}{A\,(\Delta P - \Delta \Pi)}\right] \times 100$$ **[10]**

(symbols have their usual meaning)

OR

Q12) Explain the following applications of uF process

a) Recovery of electrocoat paint in automobile plants.

b) Clarification of fruit juice

c) Oil - water emulsions **[18]**

■■■

Total No. of Questions : 12]

SEAT No. :

P1180

[Total No. of Pages : 3

[4264] - 635

B.E. (Petroleum)

ADVANCED INSTRUMENTATION AND PROCESS CONTROL IN PETROLEUM INDUSTRY

(2008 Pattern) (Elective - I) (Semester -I)

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

Instructions to the candidates:

1) ***Answer three questions from each Section.***
2) ***Answers to the two sections should be written in separate books.***
3) ***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) With help of suitable examples explain the importance of Instrumentation and Control for Petroleum Engineers. **[8]**

b) Write a short note on Hazardous Area Classification for Oil and Gas facilities. Provide a suitable diagram of hazardous area for conventional Drilling Rig. **[8]**

OR

Q2) a) Name various types of Adjustable Speed Drives in Oil and Gas Industries. Highlight their field applications as well. **[6]**

b) What is digital signal? With help of neat diagram explain Analog to Digital Signal conversion and vice-versa. **[10]**

Q3) a) Name four different means of temperature measurements. **[4]**

b) With help of neat sketch explain operational procedure of Turbine Flow Meter. **[6]**

c) Name various types of Switches often employed in Upstream Industry. Explain operations of them in brief. **[6]**

OR

P.T.O.

Q4) a) Discuss the principle of operation of Orifice Meter. **[6]**

b) Name four different strategies to measure level of a tank-Explain any one of them in depth. **[6]**

c) Write a short note on Solenoid Valve. **[4]**

Q5) a) Obtain the unsteady state mathematical expression of a Tank, getting filled with constant density liquid having flow-rate of q_{in}.The tank has an outlet operating at rate of q_{out}. Initial height of the tank can be considered to be h. Assume that output flow-rate varies linearly with level of the liquid inside the tank. Resistance to flow through outlet pipe can be considered to be constant R. Draw a neat diagram of the process. Comment on the order of the system. **[10]**

b) With help of neat diagram explain why it is not possible for a proportional controller to remove Offset completely. **[4]**

c) What are gain and time constant for a first order system? **[4]**

OR

Q6) a) Define with help of diagrams: Damping Factor, Rise Time, Overshoot, Response Time. **[8]**

b) What is meant by Controller Tunning? Discuss its necessity. Explain any Tuning Method in details. **[6]**

c) What will be your preferred choice of Controller for proper monitoring and control of Gas Pressure in a Cross Country pipeline. **[4]**

SECTION - II

Q7) a) Differentiate between PLC and SCADA based Controllers Provide suitable field example. **[6]**

b) Why accuracy and reliability of real life processes are inferior compared to systems analyzed in Laboratory. **[6]**

c) Write the important characteristics of Upstream Process Sensors. **[6]**

OR

Q8) a) Discuss the merits and usefulness of Feed-forward and Feed-back Control loops. **[6]**

b) Crude and water need to be separated based on their differences in density inside a 2-phase separator. Develop a programmable logic control (PLC) algorithm for this important process. Provide suitable diagram. **[6]**

c) With help of neat diagram explain Ratio Control Strategy. **[6]**

Q9) a) Explain the Control Scheme of a production well along with the suitable sensors and control logic. **[8]**

b) How kick can be detected? Discuss Well Control Strategy with help of suitable field example. **[8]**

OR

Q10) a) With help of neat diagram explain the operation of Radioactive Tomography applied in Upstrem Industry. **[8]**

b) Discuss the dynamic positioning of Floating Vessels in deep sea operations. Provide the cascade control diagram. **[8]**

Q11) a) Discuss the basic components of modern control system as applied in Production Automation. Explain function of each of them in brief. **[8]**

b) Write short notes on

i) Sub-sea Valves and Actuators

ii) Emergency Shutdown System. **[8]**

OR

Q12) a) Discuss the working principle of Multiphase flow meter. Highlight important characteristics of ideal Multiphase flow meter. Name any four commercial variants. **[10]**

b) With help of neat diagram explain Automated Control of Steam Injection Process. **[6]**

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Total No. of Questions : 8]

SEAT No. :

P868

[Total No. of Pages : 2

[4264] - 645

B.E. (Petroleum Engg.)

DEEP WATER TECHNOLOGY

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

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

Instructions to the candidates:

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

SECTION - I

Q1) a) Draw subsea BOP stack and discuss pressure test in detail. **[12]**

b) Discuss importance of center of gravity and Metacenter in designing offshore rig. **[6]**

Q2) a) What is off set? Discuss dynamic positioning system on a floater rig. **[10]**

b) Discuss the effect of equivalent circulating density on bottom hole pressure. **[6]**

Q3) a) Discuss Mohr's criteria of rock failure. **[4]**

b) What is hydraulics? Discuss mud weight design using mud window concept for vertical and horizontal deepwater well. **[10]**

c) Discuss Biot's Constant (α) **[2]**

Q4) Write short notes on : **[16]**

a) ROV
b) Environmental forces on floating rig
c) Motion compensator
d) Formation integrity test (FIT)

P.T.O.

SECTION - II

Q5) a) Discuss drill stem test in detail. **[8]**

b) Discuss horizontal tree with suitable sketch. **[8]**

c) What are different stimulation techniques. **[2]**

Q6) a) Discuss water flooding technique with five spot pattern. **[10]**

b) Discuss different types of storage tanks. **[6]**

Q7) a) Describe in detail the general design considerations for production platform. **[8]**

b) Discuss offshore field development and planning. **[8]**

Q8) Write short notes on : **[16]**

a) Offshore pipeline design.

b) Production riser

■■■

Total No. of Questions : 12]

SEAT No. :

P869

[Total No. of Pages : 3

[4264] - 646

B.E. (Petroleum)

TRANSPORT OF OIL AND GAS

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

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

Instructions to the candidates:

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

SECTION - I

Q1) a) State and explain any two correlations of multiphase flow in a horizontal pipeline? **[8]**

b) Discuss the working of Central Processing facility in brief. **[8]**

OR

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

a) Steady state flow in a pipe line

b) Gas properties

c) Sp. gravity and viscosity of oil

d) Process flow diagram of GGS

Q3) Discuss in detail pipe line design considerations for transportation of oil and gas. **[16]**

OR

P.T.O.

Q4) **Given :** flow rate of gas is 24 MMSCFD **[16]**
Viscosity = 4 cp, Gas gravity = 0.85, Length = 7100 ft, Inlet pressure = 900 psi
Temperature = 80°F, Gas viscosity = 0.014, Roughness factor = 0.005
(assume old steel), Z = 0.77, E = 0.95.

Calculate pressure drop in a 4 - in. and 6 - in. ID line using the :

a) General equation

b) Assumption of $\Delta P < 13\% P1$

c) Panhandle 'B' Equation

d) Weymouth Equation

Q5) a) Discuss in brief pipeline flow monitoring system. **[8]**

b) Explain in detail any two types of valves with neat sketch? **[10]**

OR

Q6) a) Explain in detail oil and gas metering. **[8]**

b) What do you mean by testing of oil and gas pipelines? Explain. **[5]**

c) List the pipe line maintenance considerations arrangements that are necessary. **[5]**

SECTION - II

Q7) a) Which pumps are used in pipe line transportation of oil? Explain their working. **[8]**

b) Classify different pumps and describe their specifications. **[8]**

OR

Q8) a) Classify different compressors and describe their specifications. **[8]**

b) Given following data of a centrifugal compressor. Answer the following. **[8]**
Operating conditions : Ps = 780 psia, Pd = 1050 psia, Ts = 549 Deg R, Td = 587 Deg R, Q g,sc = 341 MMSCFD
Gas properties : SG = 0.63, k = 1.3, $Z_{avg.} = 0.90$
Calculate:

i) Isentropic efficiency?

ii) Actual volumetric flow rate?

iii) Isentropic head?

iv) Power requirement (assume 95% mechanical efficiency)?

Q9) a) Explain in brief any two methods of gas monetization? **[8]**

b) Explain marginal gas fields and their development. **[8]**

OR

Q10) Explain in brief : **[16]**

a) CNG

b) LNG

c) Methanol production using gas

d) Gas processing

Q11) Discuss in detail any one case study of subsea installation, operation and troubleshooting of oil and gas pipeline. Explain the challenges, design considerations, advantages with reference to the objectives of field development. **[18]**

OR

Q12) a) Explain in detail about flow assurance problems? **[8]**

b) Write short notes on : **[10]**

i) Pipe line testing

ii) Use of PPD and drag reducers

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Total No. of Questions : 12]

SEAT No. :

P1191

[Total No. of Pages : 8

[4264] - 675

B.E. (Polymer)

MECHANICS OF COMPOSITES

(2008 Pattern) (Semester - I) (Elective - I)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) Obtain mathematical expression for finding reduced transform compliance matrix from reduced compliance matrix. **[6]**

b) For a angle ply lamina with $\theta = 75^{o}$, the strains in local co-ordinate system are : $\varepsilon_1 = 0.005$ $\varepsilon_2 = 0.001$ $\gamma_{12} = 0.0001$
Find strains in the global co-ordinate system **[3]**

c) Prove that the restriction on different Poisson's ratio for orthotropic material with plane stress condition can be given by, **[7]**

$$|\upsilon_{12}| = \left(\frac{E_1}{E_2}\right)^{\frac{1}{2}} \quad |\upsilon_{21}| = \left(\frac{E_2}{E_1}\right)^{\frac{1}{2}} \quad |\upsilon_{23}| = \left(\frac{E_2}{E_3}\right)^{\frac{1}{2}} \quad |\upsilon_{32}| = \left(\frac{E_3}{E_2}\right)^{\frac{1}{2}}$$

$$|\upsilon_{31}| = \left(\frac{E_3}{E_1}\right)^{\frac{1}{2}} \quad |\upsilon_{13}| = \left(\frac{E_1}{E_3}\right)^{\frac{1}{2}}$$

OR

Q2) a) For a orthotropic lamina under plane stress with fibers at 45^{o}, the stresses applied are as follows : **[8]**

$$\begin{bmatrix} \sigma_x \\ \sigma_y \\ \tau_{xy} \end{bmatrix} = \begin{bmatrix} 50 \\ -20 \\ 0 \end{bmatrix} \text{MPa}$$

Find

P.T.O.

1) Compliance and stiffness matrices
2) Local stresses
3) Local strains
4) Global strains

Use following engineering properties

E_1 = 40 GPa = *Modulus in direction* 1,

E_2 = 10 GPa = *Modulus in direction* 2

G_{12} = 3 GPa = *Shear Modulus*

υ_{12} = 0.285 = *Poission's ratio* 1 – 2 *plane*

b) For unidirectional orthotropic angle lamina with plane stress condition, prove that **[8]**

$$\eta_{xy,x} = E_x[\{\frac{2}{E_1} + \frac{2\upsilon_{12}}{E_2} - \frac{1}{G_{12}}\}\sin(\theta)\cos^3(\theta) - \{\frac{2}{E_2} + \frac{2\upsilon_{12}}{E_1} - \frac{1}{G_{12}}\}$$

$$\sin^3(\theta)\cos(\theta)]$$

Where

E_2 = *Modulus in direction* 2

E_1 = *Modulus in direction* 1

E_x = *off – axis modulus at an angle* θ

G_{12} = *Shear Modulus in* 1 – 2 *plane*

υ_{12} = *Poission's ratio in* 1 – 2 *plane*

$\eta_{xy,x}$ = *Coefficient of mutual influence of the second kind*

Q3) a) Reduce Maximum strain theory applicable to biaxial stress condition for uniaxial fiber reinforced lamina and uniaxial load($\sigma_x = \sigma$ *and all other stresses zero*) to following condition,

$$\sigma_x < \frac{X}{\cos^2(\theta) - \upsilon_{12}\sin^2(\theta)}$$

$$\sigma_x < \frac{Y}{\sin^2(\theta) - \upsilon_{21}\cos^2(\theta)}$$

$$\sigma_x < \frac{S}{\cos(\theta)\sin(\theta)}$$

Where σ_x = *Uniaxial Load at an angle* θ *in direction x*

X,Y refer to tensile failure strength in direction 1 and 2 respectively. S refers to shear strength in 1-2 plane. **[6]**

b) Prove that Hoffman's criterion reduces to Tasi-Hill failure criterion for orthotropic material with plane stress condition for equal strength in tension and compression i.e

$X_c = -X_t = -X$ *and* $Y_c = Y_t = -Y$ Where "X" refers to strength in direction 1 and "Y" refers to strength in direction 2. The subscripts "c" stands for compression and "t" stands for tension. **[7]**

c) Following data is known about unidirectional lamina. **[5]**

Tensile failure strength direction 1 = 1500MPa

Tensile failure strength direction 2 = 50MPa

Compression failure strength direction 1 = 500MPa

Compression failure strength direction 2 = 300MPa

Shear strength 1-2 plane = 100MPa

E_{11} = 50 GPa = *Modulus in direction* 1,

E_{22} = 10 GPa = *Modulus in direction* 2

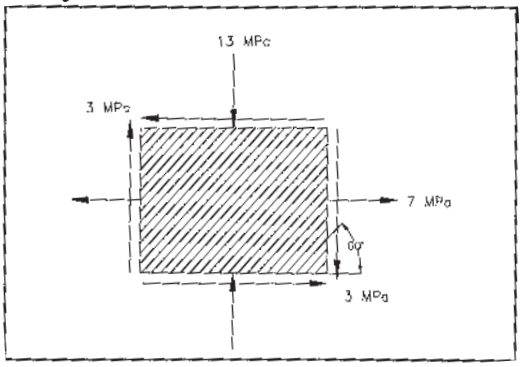
G_{12} = 10 GPa = *Shear Modulus*

υ_{12} = 0.2 =*Poission's ratio* 1-2 *plane*

A tensile stress in direction X of 5MPa is applied at 60 to fibre direction, check failure as per Tsai - Hill theory.

OR

Q4) a) Analyze the failure of the following lamina with loading condition in global co-ordinate system as shown in fig number 1 and using Tsai-Wu Failure theory.



Take engineering constant values as-

Tensile failure strength in direction 1 = 1000 MPa

Compressive failure strength in direction 1 = 600 MPa

Tensile failure strength in direction 2 = 30 MPa

Compressive failure strength in direction 2 = 150 MPa

Shear strength in 1-2 plane = 70 MPa

E_2 = 10 GPa = *Modulus in direction* 2

E_1 = 40 GPa = *Modulus in direction 1*

G_{12} = 4 GPa = *Shear Modulus*

υ_{12} = 0.285 = *Poission's ratio* 1 - 2 *plane* **[9]**

b) Explain the effect of sign of shear stress on strength of an orthotropic lamina with suitable examples. **[6]**

c) Explain the experimental set up or the test required to find out fourth order strength tensor F_{12} as considered in Tsai-Wu failure theory. **[3]**

Q5) a) Prove that the shear modulus in 1-2 plane for an orthotropic unidirectional lamina is given by- $$G_{12} = \frac{1}{\left(\frac{4}{E_x} - \frac{1}{E_1} - \frac{1}{E_2} + \frac{2\upsilon_{12}}{E_1}\right)}$$

Where $E_x = 45^o$ *off axis modulus*

Explain also the experimental procedure and set up. **[6]**

b) Find out thermal strains in local as well as global co-ordinate system for a unidirectional lamina with fibers at 60^o using following data for the lamina

$\Delta T = 100^o C$

α_1 = *thermal expansion coefficient direction* 1 = $0.88 \times 10^{-6}/^oC$

α_2 = *thermal expansion coefficient direction* 2 = $31 \times 10^{-6}/^oC$ **[4]**

c) "Up to 50% of volumetric fiber loading, the engineering constants E_1 and G_{12} are dominated by matrix modulus for glass-epoxy, boron-epoxy composites", explain. **[3]**

d) Write upper and lower limitation on young's modulus as derived by elasticity approach. **[3]**

OR

Q6) a) Fibre volume fraction for a lamina is 0.6. Using the matrix and fiber properties given below, estimate the transverse Young's modulus E_2, Shear modulus G_{12} using mechanics of materials approach.

E_f = 400 GPa E_m = 4GPa G_f = 30 GPa G_m = 2 GPa **[6]**

b) Show that stress-strain relationship for an angle ply lamina can be written in terms of engineering constants as :

$$\begin{bmatrix} \varepsilon_x \\ \varepsilon_y \\ \gamma_{xy} \end{bmatrix} = \begin{bmatrix} \frac{1}{E_x} & -\frac{\upsilon_{xy}}{E_x} & -\frac{m_x}{E_1} \\ -\frac{\upsilon_{xy}}{E_x} & \frac{1}{E_y} & -\frac{m_y}{E_1} \\ -\frac{m_x}{E_1} & -\frac{m_y}{E_1} & \frac{1}{G_{xy}} \end{bmatrix} \begin{bmatrix} \sigma_x \\ \sigma_y \\ \tau_{xy} \end{bmatrix}$$

Where $m_x = -\overline{S}_{16}E_1 = -\frac{\sigma_x}{\gamma_{xy}E_1}$ $m_y = -\overline{S}_{26}E_1$

X-Y-Z stand for global co-ordinate system and $\overline{S}$ stands for elements of reduced transformed compliance matrix. **[5]**

c) For a randomly oriented discontinuous fiber lamina, the engineering constants are E_m= 3GPa E_F = 80GPa. Fiber length is 5 mm and fiber diameter is 15 μm. Fiber volume fraction is 50%. Assuming fiber shape reinforcement factor to be $\xi = 2$, calculate transverse Young's modulus using Halpi- Tsai equations. **[5]**

SECTION - II

Q7) a) Explain X-ray radiography non-destructive testing method. **[4]**

b) Explain losopescu shear test procedure for measurement of in -plane shear properties. **[6]**

c) Why is weibull distribution preferred over Normal distribution for statistical analysis of composite properties? Explain the two parameter Weibull distribution used for statistical analysis of composite properties. **[6]**

OR

Q8) a) Explain the method for obtaining the true tensile modulus from experimentally determined tensile modulus for an off-axis specimen. **[6]**

b) Explain thermography non-destructive testing method. **[4]**

c) Explain in details the ASTM D790 method used to determine flexural properties of the composites. State the limitations of this test method for composites as compared to isotropic material. **[6]**

Q9) a) Write down the [A], [B] and [D] matrices for a single layer specially orthotropic laminate in terms of engineering constants. **[4]**

b) For a $[0/60/]_s$ laminate with the following lamina properties, calculate the moduli for the laminate in the global X-Y directions and the strains in the laminate if stress of $\sigma_X = 10$ MPa and $\sigma_Y = -12$ MPa is applied. Assume the thickness of each lamina to be 1mm.
$E_1 = 140$GPa, $E_2 = 10$GPa, $G_{12} = 6$GPa, $U_{12} = 0.3$. **[14]**

OR

Q10) a) For the following laminates, mention their type and state which elements of [A], [B] and [D] of the following laminates will be zero:

i) [20 /–45 /–20 / 45]

ii) $[\alpha / -\alpha / \alpha / -\alpha / \alpha]$

iii) $[\alpha / -\alpha / -\alpha / \alpha]$

iv) $[\alpha / -\alpha / \alpha / -\alpha]$ **[4]**

b) For a symmetric laminate $[0/35]_s$, calculate the midplane strains and curvatures in the global and local directions if an in-plan stress of $\sigma_x = 100$MPa is applied. All plies are 1mm thick. Lamina properties are $E_1 = 150$GPa, $E_2 = 15$GPa, $G_{12} = 4$GPa, $U_{12} = 0.3$. **[14]**

Q11) a) Derive equilibrium equations in terms of displacements for a transversely loaded specially orthotropic laminated plate. **[9]**

b) For a simply supported specially orthotropic beam with length 100 mm, width 25 mm and depth 8 mm, carrying a uniformly distributed load of 10N/m, obtain the deflection if the lay up is symmetric. The D matrix for the beam **[7]**

$$D = \begin{bmatrix} 1370 & 33 & 0 \\ 33 & 290 & 0 \\ 0 & 0 & 60 \end{bmatrix}$$

OR

Q12) a) With neat figures, explain the different types of bonded joints. **[5]**

b) For a $[0/ \pm 45/90]_s$, determine the of number of $0, \pm 45, 90$ plies if the minimum strength in x - direction is 391MPa and modulus is 61GPa. The laminate thickness is 4 mm. Refer to fig. 1 and fig. 2. – **[6]**

c) List the governing equations for laminated beams. If the beam is clamped at both end, obtain the deflections of the beam for a uniformly distributed load. **[5]**

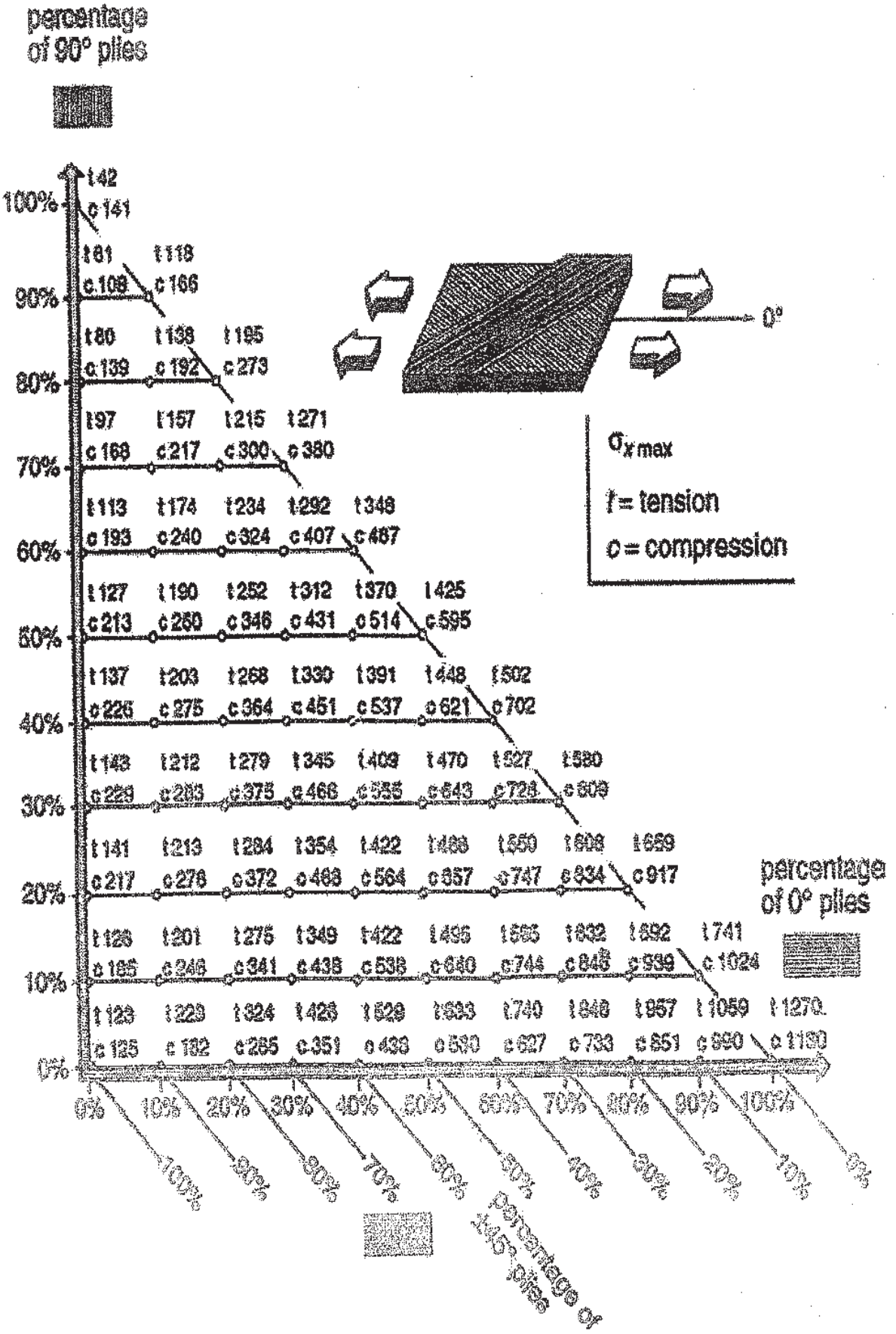


Figure . 1 Strength

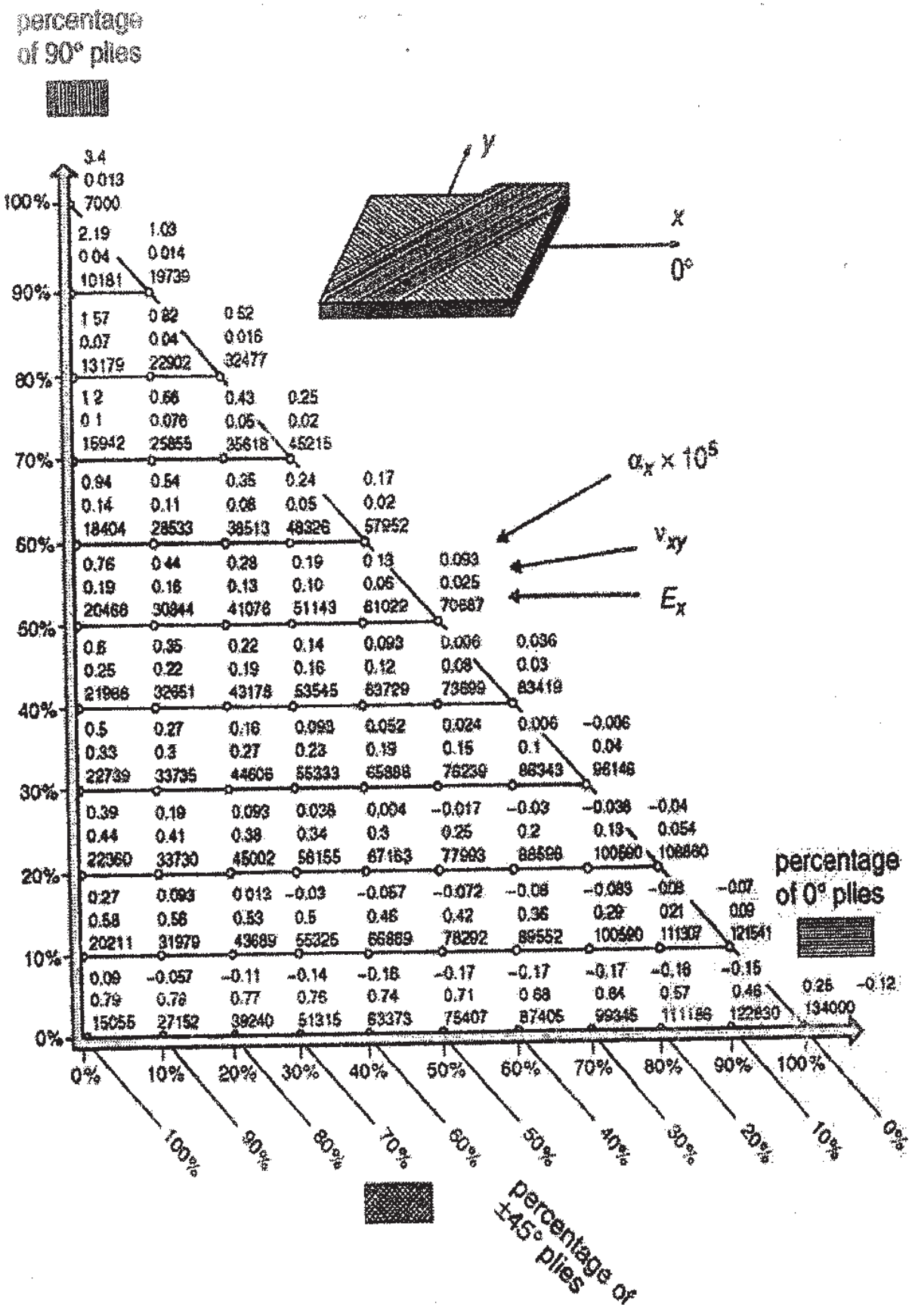


Figure . 2 Modulus

Total No. of Questions : 12]

SEAT No. :

P880

[Total No. of Pages : 3

[4264] - 723

B.E. (Information Technology)

REAL TIME SYSTEM

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

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

Instructions to the candidates:

1) ***Answer three questions from Section - I and three questions from Section - II.***
2) ***Answers to the two sections should be written in separate answer books.***
3) ***Neat diagrams should be drawn wherever necessary.***
4) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Describe the classification of real time system with suitable example. What are the issue in real time computing. **[8]**

b) Consider a traffic light control system. A traffic light will be normally green for G second, yellow for Y second and red for R second. During night for certain period of time the intersection will automatically suspend normal service and its will flash yellow. Consider intersection two - two way street. **[8]**

i) Find accomplishment level.

ii) Find hierarchical view performance.

OR

Q2) a) What are the various factor, that are to be consider while estimating the program ran time in real time system. Describe analysis of source code, drive lower bounds and upper bounds for suitable example. **[10]**

b) What is performability ? Explain with suitable example. In what way it is different then traditional measure of performance. **[6]**

Q3) a) Explain the classification of uniprocessor scheduling algorithm. With the help of suitable example explain the RM scheduling algorithm.**[10]**

b) Describe the priority inheritance protocol. What is the advantage of this protocol over the priority inheritance protocol? **[8]**

OR

P.T.O.

Q4) a) State the assumptions made for implementation of Deadline Monotonic Algorithm (DMA). **[6]**

b) Is the following task set schedulable by DMA? Also check whether it is schedulable wing RMA. **[6]**

$T_1 = (e_1 = 10$ m sec, $P_1 = 50$ m sec, $d_1 = 35$ m sec),

$T_2 = (e_2 = 15$ m sec, $P_2 = 100$ m sec, $d_2 = 20$ m sec),

$T_3 = (e_3 = 20$ m sec, $P_3 = 200$ m sec, $d_3 = 200$ m sec),

c) How does the ceiling priority protocol overcome the problem of deadlock that occurs due to priority inheritance. **[6]**

Q5) a) Describe the Adaptive Earliest Deadline (AED) algorithm used in transaction priorities. **[6]**

b) Explain use of POSIX programming API in Real Time system. With any eight API. **[10]**

OR

Q6) a) State the major disadvantage of the two phase locking approach used in pessimistic concurrency control. How can this approach be modified to resolve this problem. **[8]**

b) Describe the skeleton and optimistic algorithm under the two phase approach to improve predictability of a real time transaction. **[8]**

SECTION - II

Q7) a) Explain the VTCSMA protocol using a suitable example. Draw the VCRC trajectory for this example for $n = 2$ and $n = 4$. Discuss the performance of this algorithm. **[10]**

b) Describe the timed token protocol. Why this protocol is attractive for RTS. **[8]**

OR

Q8) a) Explain the window protocol used in broadcast network with a suitable example. Does it give deadline guarantees? Why/ why not? **[8]**

b) What is the palled Bus protocol? How it is implemented? **[6]**

c) Describe the stop and Go Multihop Protocol. **[4]**

Q9) a) Write short notes on the following mechanisms present in a real time operating system. **[10]**

i) Time services.

ii) Scheduling mechanisms.

b) State the commonly found features of commercial real time operating system. **[6]**

OR

Q10) a) Discuss with block diagram the real time extension of Linux Operating System. **[8]**

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

i) QNX/Neutrino

ii) VRTX

Q11) Draw UML diagram for alarm clock interface. Expected Design level requirement like this. **[16]**

a) Purpose - 24 hour digital with one alarm.

b) Input - Set time, Set alarm, hour, minute, alarm on/off.

c) Output - Four digit display, PM indicator, alarm ready, buzzer.

d) Function - Keep time, Set time, Set alarm, turn alarm on/off, activate buzzer by alarm.

OR

Q12) a) Explain the procedure used to implementation of Time Redundancy for Backward Error Recovery. Why check pointing is expensive in memory and time. How it be modified to over come the problem. **[8]**

b) Describe the 3 types of voters in cases where an approximate agreement is required to achieve hardware redundancy through voting and consensus. **[8]**

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Total No. of Questions : 12]

SEAT No. :

P883

[Total No. of Pages : 3

[4264] - 742

B.E. (Biotechnology)

FOOD BIOTECHNOLOGY

(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 answer books.***
3) ***Neat diagrams should be drawn whenever necessary.***
4) ***Figures to the right indicate full marks.***

SECTION - I

Q1) a) What are the different mechanisms which lead to the spoilage of food? **[8]**

b) Explain in detail the various extrinsic parameters which lead to the spoilage of food. **[8]**

OR

Q2) a) Discuss the different types of growth of micro organisms which occurs during microbial spoilage of food. **[8]**

b) Discuss the biochemical changes brought about in food due to microbial spoilage. **[8]**

Q3) Describe in detail the different preliminary processing methods used in the food industry. **[18]**

OR

Q4) Write notes on the following : **[18]**

a) Sterilization

b) Microwave cooking

c) Extrusion

P.T.O.

Q5) a) The decimal reduction time D at 121°C (D_{121}) and the value z for a thermophilic spore in whole milk were determined experimentally to be equal to 30 s and 10.5°C respectively. Calculate the D value at 150°C (D_{150}). **[6]**

b) Calculate the time necessary to dry a vegetable from 90% to 25% moisture (wet basis) in an industrial dryer where 2kg dry solid/m^2 surface area exposed to the air is loaded. It is given that the critical moisture content is 5kg water/kg dry solid, the equilibrium moisture content is 0.033kg water/kg dry solid, and the drying rate at the critical moisture content is 3kg water/m^2h under the specified drying conditions. **[10]**

OR

Q6) a) Steam is used for peeling potatoes in a semi-continuous operation. Steam is supplied at the rate of 4kg per 100 kg of unpeeled potatoes. The unpeeled potatoes enter the system with a temperature of 17°C, and the peeled potatoes leave at 35°C. A waste stream from the system leaves at 60°C. The specific heats of unpeeled potatoes, waste stream, and peeled potatoes are 3.7, 4.2 and 3.5kJ/(kg K), respectively. If the heat content (assuming 0°C reference temperature) of the steam is 2750kJ/kg, determine the quantities of the waste stream and the peeled potatoes from the process. **[10]**

b) 1000 kg of meat will be cooled from 25°C to 58°C in 2 h. Calculate the rate of heat removal if the heat capacity of the meat is 3.35 kJ/kg°C. Assume that the effect of water evaporated from the surface of the meat is negligible. **[6]**

SECTION - II

Q7) Discuss the biotechnology of microbial polysaccharides in food. **[16]**

OR

Q8) Write notes on the following : **[16]**

a) Microbial production of oils and fats.

b) Food applications of algae

Q9) a) Discuss the various classes of industrially important enzymes. **[9]**

b) Discuss the application of enzymes in the bakery industry. **[9]**

OR

Q10) Elaborate on the methods of production of proteases and describe their various applications pertaining to the food industry. **[18]**

Q11) Classify the different types of food wastes and enlist the treatments applicable to them. **[16]**

OR

Q12) Write notes on the following : **[16]**

a) Anaerobic processes for treatment of food wastes.

b) Other biological methods of food waste treatment.

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Total No. of Questions : 12]

SEAT No. :

P884

[Total No. of Pages : 2

[4264] - 744

B.E. (Biotechnology)

INTRODUCTION TO SYSTEMS BIOLOGY

(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 answer books.***
3) ***Draw neat diagrams wherever necessary.***
4) ***Figures to the right indicate full marks.***

SECTION - I

Q1) What is Human Genome Project ? Enlist the different phases involved in it. In what ways did the Human Genome project impact biology? **[18]**

OR

Q2) What is the Central dogma of Molecular biology ? Mention the different components of systems biology and describe the four distinct phases which lead to system level understanding. **[18]**

Q3) How and in which fields has genomics transformed the outlook. **[16]**

OR

Q4) Describe in detail pyrosequencing technique? What is the approach taken by the Roche 454 sequencer, give a detailed summary. Write a note on Genome annotation. **[16]**

Q5) What is a microarray? Give the various types of microarrays available in the market. What are the applications of microarrays ? **[16]**

OR

Q6) Write a short note on RNAi technology and its real world applications. **[16]**

P.T.O.

SECTION - II

Q7) Write a short note on epigenetics. What are the different types of modifications observed which lead to epigenetic inheritance of various traits? **[18]**

OR

Q8) Comment on Epigenetics and disease with respect to prions causing disease in mammals. **[18]**

Q9) Describe pharmacogenomics as an upcoming field. What are the different benefits and the barriers to drugs developed using the pharmacogenomic approach. **[16]**

OR

Q10) Write a note on methods for drug delivery, drug metabolism and excretion, what are slow metabolizers and extensive metabolisers. **[16]**

Q11) Describe in detail any two of the techniques (8 marks each) : **[16]**

a) 2-D Gel electrophoresis

b) MALDI-TOF analyzers

c) Mass spectrometry

OR

Q12) What is a metabolome. What are the different techniques used in metabolomics study, comment on the use and applications of metabolomics. **[16]**

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[4264] – 752

Seat No.	

B.E. Automobile Examination, 2012
AUTOMOTIVE NVH
(2008 Course)

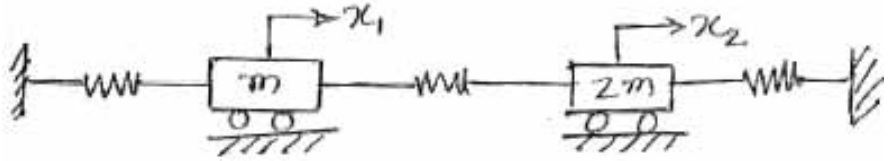
Time : 3 Hours | Max. Marks : 100

SECTION – I

1. Solve **any three** : **(6×3=18)**
   a) Define the terms sound, noise and harshness.
   b) Discuss basics of reciprocating unbalance.
   c) Physiological effects of noise and vibration.
   d) The decibel scale.
   e) Define sound intensity and sound power.
   f) Discuss main causes of vibration in detail.

2. a) Explain coordinate coupling. **8**

   b) For the system shown in figure find the natural frequencies of vibration and the principal modes of vibration. **8**



OR

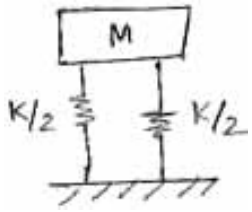
   a) Explain generalized coordinates. **8**

   b) An aircraft radio weighing 118 N is to be isolated from engine vibrations, ranging in frequencies from 1600 to 2200 cpm. What static deflection must the isolator have for 80% isolation ? **8**

P.T.O.

3. a) Explain mechanism of slip damping and effect of pressure and amplitude. **4**

   b) Derive the equation of transmissibility ratio for isolation using springs as shown in the figure. **8**



   c) Discuss vibration isolation. **4**

OR

3. a) Discuss dry friction damping. **6**

   b) A damped torsional pendulum with a mass moment of inertia I = 2.35 kg-m^2 and torsional stiffness of K_t = 103 kN-m/rad is subjected to forced vibrations. The resonance amplitude θ_r was measured to be 1.07° and for a frequency of f = 50 cps, the amplitude θ was found to be 0.3° find the coefficient of viscous damping and the amplitude of harmonic torque. **10**

SECTION – II

4. a) Discuss noise as a cause of stress. **4**

   b) Explain octave band analysis. **6**

   c) Spherical wave propagation. **6**

OR

4. a) Derive the relation for sound pressure intensity and power level. **10**

   b) Plane wave propagation. **6**

5. a) List various types of microphones and discuss carbon granule microphone in detail. **8**

   b) The pulsating surface of radius 0.1 m has a radial surface displacement which varies harmonically at 50 Hz with a surface velocity magnitude of 0.1 m/s. Calculate the magnitude of pressure fluctuations generated at a distance of 10 m from the centre of sphere. **8**

   c) List sound intensity measurement techniques. **2**

OR

5. a) Discuss response of a SDOF system to transient and random excitations. **8**

   b) A spherical source of diameter 20 mm is driven with rms surface velocity of 0.5 m/s. Calculate the acoustic power and sound power level radiated into the surrounding air for excitation at 100 Hz and 800 Hz. **8**

   c) Explain mode shape. **2**

6. a) The combustion starts in a gasoline engine and the pressure rises to 200 times the atmospheric pressure and temperature to 1000° C. Determine the speed of sound in the engine consider, ratio of specific heats of the gas mixture is 1.35 and the gas density is 1.4 kg/m^3 at 0° C and atmospheric pressure. **10**

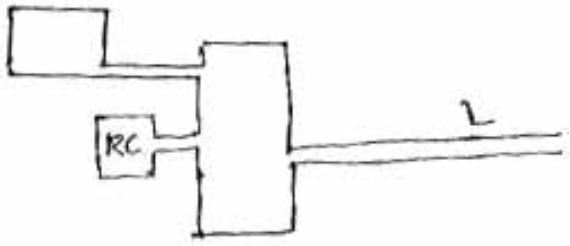
   b) Explain :

      i) Equivalent viscous damping.

      ii) Critical damping. **(2×3 each)**

OR

6. a) For the muffler system shown in figure draw an equivalent acoustical circuit. Assume that the termination pipe has an infinite length, the sound source is a reciprocating compressor. **10**



*RC – Reciprocating compressor.

   b) Explain :

      i) Balancing

      ii) Undamped natural frequency

      iii) Response. **(3×2 each)**

Total No. of Questions : 12]

SEAT No. : ____

P1323

[Total No. of Pages : 4

[4264] - 436

B.E. (Mech.)

DESIGN OF PUMPS, BLOWERS AND COMPRESSORS

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

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

Instructions to the candidates:

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

SECTION - I

Q1) a) Explain the performance characteristics of pumps, compressors, fans and blowers. **[8]**

b) A centrifugal pump delivers 2.5 m^3/s under a head of 14m and running at a speed of 2010 rpm. The impeller diameter of the pump is 125 mm. If a 104 mm diameter impeller is fitted and the pump runs at a speed of 2210 rpm, what is the volume rate? Determine also the new pump head. **[8]**

OR

Q2) a) Explain the different applications of compressors, fans and blowers. **[6]**

b) Write equations of energy transfer between fluid and rotor. **[6]**

c) Define specific speed. What is its significance? **[4]**

Q3) a) The impeller of a centrifugal pump has 1.4 m outside diameter. It is used to lift 1800 liters of water per second against a head of 10 m. Its Vanes make an angle of 45^o with the direction of motion at outlet and runs at 400 rpm. If the radial velocity of flow at outlet is 3.5 m/s, find the manometric efficiency. Also find the power required if the overall efficiency is 82%. **[8]**

P.T.O.

b) Explain various efficiencies of centrifugal pump. **[8]**

OR

Q4) a) Explain various types of characteristic curves usually prepared for centrifugal pumps. **[8]**

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

i) Different types of Losses in pumps.

ii) Cavitations in centrifugal pump.

Q5) a) A centrifugal pump running at 1450 rpm has the characteristic as given below :

Discharge (Lit/sec)	11.3	16.9	22.6	28.3	34.0	39.6	45.2
Head (m)	25.8	25.0	24.1	23.2	21.4	18.9	15.8
Efficiency (%)	65	70	73	74	72	69	62

Draw the operating characteristic of the pump and determine its specific speed. The pump lifts water against a static head of 12 m through a long pipeline in which the loss of head in meters, due to friction is given by the expression, hf = 0.012 Q2, where Q is the discharge in liters/sec. the minor losses in the pipe may be neglected. Determine the power required to drive the pump. **[10]**

b) Explain the design procedure of centrifugal pump. **[8]**

OR

Q6) a) Write a short note on pump selection. **[8]**

b) Explain various forms of corrosion occurred in hydraulic machines. **[10]**

SECTION - II

Q7) a) Discuss various applications of fan. **[6]**

b) An axial fan stage consisting of rotor and UGVs for –ve inlet swirl and to eliminate outlet swirl, has the following data;

Rotor blade air angle at inlet	86^{o}
Tip diameter	60 cm
Hub diameter	30 cm
Rotational speed	960 rpm
Power required	2 kW
Flow coefficient	0.245

(Inlet flow conditions p_1 = 1.02 bar, T_1 = 316 K)

Determine the rotor blade angle at exit, the flow rate, stage pressure rise, overall efficiency, degree of reaction and specific speed. **[10]**

OR

Q8) a) How does dust erosion of centrifugal impellers occurs? What is its effect on the performance? **[8]**

b) Prove the following relations for an axial fan stage with UGVs and DGVs :

$(\Delta p)_{st} = 2\rho u^2(\Phi \tan\beta_2 - 1)$, $\psi = 4(\Phi \tan\beta_2 - 1)$ and R = 1. **[8]**

Q9) a) Explain functions of an airfoil and discuss the characteristic curves of airfoils. **[8]**

b) A centrifugal blower takes in 180 m^3/min of air at p_1 = 1.013 bar and T_1 = 43^{o}C, and delivers it at 750 mm of W.C. Taking the efficiencies of the blower and drive as 80% and 82% respectively, determine the power required to drive the blower and the state of air at exit. **[8]**

OR

Q10) a) State design considerations and empirical relations used to determine various fan design parameters. **[8]**

b) What is surging? What are its effects? What is stalling? How it is developed? **[8]**

Q11) a) What is the work done factor for an axial compressor stage? How does it vary with the number of stages? **[6]**

b) Derive the following relations for an axial compressor stage with constant axial velocity. **[12]**

i)

ii) $\psi = \phi(\tan\beta_1 - \tan\beta_2)$

iii)

iv) $\eta_{st} = \dfrac{(\Delta p)_{st}}{\Omega \rho u V_x (\tan\alpha_2 - \tan\alpha_1)}$

OR

Q12) a) The impeller tip speed of a centrifugal compressor is 370 m/s, slip factor is 0.90, and the radial velocity component at the exit is 35 m/s. If the flow area at the exit is 0.18m^2 and compressor efficiency is 0.88, determine the mass flow rate of air and the absolute Mach number at the impeller tip. Assume air density = 1.57 kg/m^3 and inlet stagnation temperature is 290K. Neglect the work input factor. Also, find the overall pressure ratio of the compressor. **[10]**

$$\frac{(\Delta p)_{st}}{\rho u^2} = \phi(\tan\alpha_2 - \tan\alpha_1)\tan\beta_2 = \frac{c_2}{V_x}$$

b) Explain briefly what is the purpose of inlet guide vanes and inducer blades. Why is the radialtipped impeller most widely used in centrifugal compressor stages? **[8]**

Total No. of Questions : 12]

SEAT No. :

P1326

[Total No. of Pages : 4

[4264] - 483

B.E. (Production S/W)

ADVANCED PRODUCTION TECHNOLOGY

(2008 Pattern) (Semester - I)

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

Instructions to the candidates:-

1) ***Answer 3 questions from Section I and 3 questions from Section II.***
2) ***Answers to the two sections should be written in separate books.***
3) ***Neat diagrams must be drawn wherever necessary.***

SECTION - I

Q1) a) Describe the overall influence of high cutting speed on the performance of machining. **[6]**

b) Explain & draw the graph of Theoretical behaviour of the resultant cutting force and it's component at ultra high cutting speed. **[6]**

c) Describe the criteria of high speed / high velocity machining. **[6]**

OR

Q2) a) Describe Machining of monolithing parts. **[6]**

b) Describe the comparison of three different cooling strategies Flood, MQL and Dry machining. **[6]**

c) Explain Dry machining operations. **[6]**

Q3) a) Define & explain

i) Nano scale ii) Nano technology

iii) Nano manufacturing **[9]**

b) Describe the characteristics of ULTRA precision machines. **[7]**

OR

Q4) a) Describe important Nano manufacturing Technique. **[6]**

b) Explain with neat sketch following fine finishing processes. (any two)

i) AFM ii) MAF

iii) MFP **[10]**

P.T.O

Q5) Explain the following with reference to group technology. **[16]**

a) Part classification and coading.

b) Cell formation technique.

c) Product flow analysis.

OR

Q6) a) Explain with example Rapid Prototyping technique. **[6]**

b) Describe computer aided quality control and inspection technique. **[5]**

c) Describe enterprise resource planning. **[5]**

SECTION - II

Q7) a) Explain various transfer mechanisms used in automated systems. **[6]**

b) Explain with neat sketch various types of feeders. **[6]**

c) Explain the types of AGVS. **[4]**

OR

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

a) Rotory transfer systems.

b) Design for automated assembly.

c) Toyota production systems.

Q9) a) Double acting cylinder is hooked in the regenerative circuit. The relief valve setting is 100 bars and the pump flow is 0.0016 cm^3/s. If the regenerative and retracting speed are equal to 0.25 m/s find the piston and rod dia. area and also load carring capacity for the **[8]**

i) Extending stroke.

ii) Retracting stroke.

b) What size of accumulator is necessary to supply 4197 cm^3 of fluid in a hydraulic system of maximum operating pressure of 207 bar, which drops to minimum 103.5 bar? Assume Nitrogen gas precharge of accumulator as 67 bar obtain both isothermal and adiabatic solution. **[6]**

c) Explain the design aspect of hydraulic reservoir. **[4]**

OR

Q10) a) Discuss with drawing the performance characteristics of gear pump. **[6]**

b) Classify the hydraulic fluid. What are desirable properties of a hydraulic fluid. **[6]**

c) Draw the sectional view of following pneumatic component

i) Time delay valve. ii) Quick exhaut valve. **[6]**

Q11) a) For a swash plate type pump following data operates :

Number of pistons = 4

Piston diameter = 20 mm

Pitch circle dia. of cylinder = 150 mm

Input power = 6 kW

Volumetric efficiency = 90%

Mechanical efficiency = 89%

Calculate theoretical pump displacement and angle of swash plate if maximum pressure and speed of which pump operates is 150 bar & 1400 rpm respectively. **[10]**

b) Draw only following pneumatic circuit by using

i) AND Valve ii) OR Valve **[6]**

OR

Q12) A 100 kN hydraulic press has a stroke of 1.2 m. The initial approach is 1 m. The speed during the next 0.2 m stroke is required to be between 1 m/min to 3 m/min. The load during return stroke is 40 kN and the speed is to be limited to 5 m/min. Provision is required to obtain uniform speed during working stroke and for holding the ram of the top most position.

Draw a circuit which will fulfill these requirements. Select different component you have used in the circuit from the data given. Mention the rating of the component in case it is not available in the given data. **[16]**

DATA

1. Suction Strainer :

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

2. Pressure Gauge :

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

3. Vane Pump :

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

4. Relief Valve :

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

5. Flow control Valve :

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

6. Directional Control Valve :

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

7. Check Valve :

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

8. Pilot Operated Check Valve :

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

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

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

10. Oil Reservoirs :

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

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

P1337 **[Total No. of Pages : 2**

[4264] - 719

B.E. (IT)

MOBILE COMPUTING

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

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

Instructions to the candidates:-

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

SECTION - I

Q1) a) Draw and Explain basic PCs Architecture. **[8]**

b) Explain concept of Hard Handoff and Soft Handoff. **[8]**

OR

Q2) a) What is frequency reuse channels? **[8]**

b) Explain step by step Inter system Handoff. **[8]**

Q3) a) Explain GSM call procedure. **[8]**

b) How mobility database is maintained in GSM. **[8]**

OR

Q4) a) Explain GSM burst structure and logical channel classification. **[8]**

b) Explain Protocol hierarchy of MAP. **[8]**

Q5) a) Explain SMS Architecture of GSM. **[6]**

b) Explain International GSM call setup. **[8]**

c) What is Mobile number portability. **[4]**

OR

Q6) Write short notes on the following :

a) HLR and VLR databases. **[6]**

b) Mobile number portability mechanism. **[6]**

c) VLR Overflow. **[6]**

P.T.O

SECTION - II

Q7) a) Discuss any four functional groups of GPRS. **[8]**

b) Explain WAP caching model. **[8]**

OR

Q8) a) Explain different interfaces used in GPRS. **[8]**

b) Discuss Improvements on Core Networks in 3G. **[8]**

Q9) a) What is requirement of Mobile IP layer? **[8]**

b) Explain Dynamic source routing in MANET. **[8]**

OR

Q10) a) Explain how tunneling is done at Mobile Network layer. **[8]**

b) Explain destination sequence distance vector routing in MANET. **[8]**

Q11) Write short notes on the following :

a) Bluetooth. **[6]**

b) Wireless local loop. **[6]**

c) UMTS. **[6]**

OR

Q12) Write short notes on the following :

a) WiMAX **[6]**

b) RFiD **[6]**

c) W - LAN **[6]**

Total No. of Questions : 12]

SEAT No. : ____

P1386

[Total No. of Pages : 4

[4264] - 603

B.E. (Chemical)

CHEMICAL ENGINEERING DESIGN - II

(2008 Pattern) (Semester - I)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) A Jacketed reactor with agitator has a diameter of 1.5 m and has a hemispherical bottom and flat top. Jacket is fitted to the cylindrical section and extends to a height of 1.2 m. The spacing between the jacket and the wall is 75 mm. The jacket is fitted with a spiral baffle with a pitch of 200 mm. Cold water at 10ºC is used as a coolant @ 32000 kg/h with an exit temperature of 20ºC. Estimate the heat transfer coefficient at the outside wall of the reactor and the pressure drop in the jacket. ρ_{water} = 998 kg / m^3, μ_{water} = 1.136 m Ns/m^2, P_r = 7.9 K_f = 0.59 w/mk, j_f = 0.0032. **[10]**

b) Give the function of baffles in an agitated reactor and its effect on power consumption. **[6]**

OR

P.T.O.

Q2) A 500 mm agitator, turbine type, with 6 flat blades of 75 mm width and 8 mm thickness is agitating liquid in a 1500 mm diameter tank, at a speed of 200 rpm. Sp. gr. of the liquid is 1.1 and viscosity 550 cp. Overhang of the agitator is 1300 mm. The tank has 4 baffles. Shaft material is cold rolled steel which has a permissible shear stress of 52 N/mm^2 and elastic limit in tension 240 N/mm^2 and modulus of elasticity 18.5×10^4 N/mm^2. Permissible stress for CS is 95 N/mm^2. Which is the MOC for stuffing box. Permissible shear stress for MOC for key is 65 N/mm^2 and permissible crushing stress is 130 N/mm^2. Studs and bolts are made of hot rolled carbon steel with a permissible stress of 58 N/mm^2. If the vessel has standard geometry and the power number is 4.2, design the agitator. **[16]**

Q3) a) Give the procedure for designing a plate. **[8]**

b) Give the Van Winkle's correlation for predicting plate efficiency. **[6]**

c) Using O' connell's correlation find the overall column efficiency for the following system. **[4]**

Component	mol-fr.	$\mu(mNm/s^2)$
Propane	0.05	0.03
i - butane	0.15	0.12
n - butane	0.25	0.12
i - pentane	0.20	0.14
n - pentane	0.35	0.14

$\alpha_{LK} = 2.0$

OR

Q4) a) Find the diameter of the plate column used for separating a feed containing 10% MVC in water by wt. @ 12500 kg/h (maximum). The minimum flow rate handled is 65% of the maximum. No. of ideal stages required is 15 for achieving a top mole fraction of 0.92 and a residual concentration of 50 ppm. The reflux ratio used is 1.35. The slopes of top and bottom operating lines are 5 and 0.57 respectively. Column efficiency is 0.6. Properties of liquid and vapour are : ρ_v bottom = 0.72 kg/m^3 ρ_L bottom = 960 kg/m^3, σ_L bottom = 0.055 N/m, ρ_v top = 2 kg/m^3 ρ_L top = 760 kg/m^3, σ_L top = 0.023 N/m. M. W. of MVC = 55 K_1 top = 0.075 K_1 bottom = 0.09. **[10]**

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

i) Effect of hw and how on column performance.

ii) Effect of plate spacing on column performance.

iii) Effect of downcorner backup on column performance.

iv) Constituents of total plate pressure drop.

Q5) a) Compare plate and packed columns. **[6]**

b) Find the diameter of the column for absorption of SO_2 from an air - SO_2 mixture using water. The feed contains 8% SO_2 and 95% SO_2 is to be recovered. The feed rate is 4500 kg /hr. The equilibrium data: **[10]**

% W/W solution	0.05	0.2	0.3	0.5	0.7	1.0
P.P. mm Hg	1.2	8.5	14.1	26	39	59

Design data:

$\frac{mGm}{Lm}$	0.5	0.6	0.7	0.8	0.9	1.0
NoG	4.8	5.3	6.5	8	10.8	19

K_4 at operating conditions = 0.35

K_4 at flooding conditions = 0.8

Packing factor = 170 m^{-1}

Assume a pressure drop of 20 mm of H_2O / m. Give a clear explanation for choice of value of mGm / Lm.

OR

Q6) a) Estimate HOG using the following data: **[8]**

$D_L = 1.7 \times 10^{-9}$ m^2/s, $D_V = 1.45 \times 10^{-5}$ $\frac{m^2}{s}$

$\mu_V = 0.018 \times 10^{-3}$ Ns/m^2

$L_W^* = 16.67$ kg / m^2 - s; $K_3 = 0.85$

$\Psi_h = 80$, $\phi_n = 0.1$, $Z = 8$ m

Diam. of column = 1.03 m

$\mu_L = 0.001$ Ns/m^2, $\rho_L = 1000$ kg/m^3.

Liquid phase is essentially water.

b) Explain briefly: **[4]**

i) Effect of packing size on column performance.

ii) Function of packing support.

c) Give the procedure for designing packed columns. **[4]**

SECTION - II

Q7) a) What are safety values, relief values safety relief values and rupture discs? **[8]**

b) Design a horizontal separator for separating 9500 kg/h of liquid of density 960 kg/m^3 from 12000 kg/h of vapour of density 22 kg/m^3 at an operating pressure of 21 bar. **[10]**

OR

Q8) a) What are material hazards and process hazards? **[6]**

b) What are the two design criteria in cyclone design? **[6]**

c) What are knockout drums? **[6]**

Q9) a) Describe the three cases in design of pipelines based on fluid dynamic parameters. **[10]**

b) Explain water hammer-causes and prevention measures. **[6]**

OR

Q10) a) What are the reasons for resistance to fluid flow in fittings and values? How is the head loss across fittings considered? **[6]**

b) From a drinking water pumping station a straight pipeline of NB 300 mm is to be laid for 1 km water is required at the rate of 500 m^3/h at 4 kg /cm^2 at the end. Find the pumping pressure. Take friction factor = 0.027. **[4]**

c) Give the importance of purging and venting in pipelines. **[6]**

Q11) a) What are the material selection considerations for pipes? **[6]**

b) Why are standards required? Name a few standards followed in piping design. **[6]**

c) What are the functions of gasket? **[4]**

OR

Q12) a) Describe different types of gaskets. **[8]**

b) What are the desirable properties of piping materials. **[8]**

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Total No. of Questions : 12]

SEAT No. : ____

P1401

[Total No. of Pages : 2

[4264] - 435

B.E. (Mechanical)

PRODUCT DESIGN AND DEVELOPMENT

(2008 Pattern) (Elective - I) (Semester - I)

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

Instructions to the candidates:

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

SECTION - I

UNIT - I

Q1) a) Explain the concept of Design by Evolution & Design by Innovation with example. **[8]**

b) Explain Product Design versus Product Development. **[8]**

OR

Q2) a) Explain different types of designs with appropriate examples. **[8]**

b) Discuss Modern Product Development Process with detailed steps. **[8]**

UNIT - II

Q3) What are different types of customers? Explain the various customer need gathering methods in detail. **[17]**

OR

Q4) a) What do you mean by 'House of Quality'? Explain with neat sketch. **[9]**

b) Explain the concept of Economic Analysis with reference to product development. **[8]**

P.T.O.

UNIT - III

Q5) a) What is Numerical Concept Scoring? Explain. **[9]**

b) Explain generalized concept selection process. **[8]**

OR

Q6) a) Explain Subtract & Operate procedure with suitable example. **[9]**

b) Explain Function Analysis System Technique. **[8]**

SECTION - II

UNIT - IV

Q7) Explain the process of Product Teardown in detail. Explain Force Flow diagram with suitable example. **[16]**

OR

Q8) a) What are objectives of Benchmarking? Explain with Procedure. **[8]**

b) Explain different Product Portfolio Architectures. **[8]**

UNIT - V

Q9) a) Explain the guidelines of Design for Assembly. **[9]**

b) Explain the guidelines for Design for Manufacturing. **[8]**

OR

Q10) What is need of Design for Environment? Explain guidelines. Discuss various local & Global issues related to environment. **[17]**

UNIT - VI

Q11) Explain the concept of Product Lifecycle Management in detail. What is need of PLM? Discuss components of PLM. **[17]**

OR

Q12) a) Explain Product life cycle with suitable example. **[9]**

b) Explain the concept of Product data & product workflow. **[8]**

❄❄❄

Total No. of Questions : 12]

SEAT No. :

P1402

[Total No. of Pages : 4

[4264] - 455

B.E. (Mechanical S/W)

FINITE ELEMENT METHOD

(2008 Pattern) (Sem. - I) (Elective - 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 electronic calculator is allowed.***
5) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Write short note on (Any 3): **[9]**

i) General applications of FEM.

ii) The Rayleigh-Ritz Method.

iii) The Galerkin Method.

iv) Plane stress and plane strain problem.

v) Sources of errors in FEM.

b) Determine the displacements of nodes of the spring system as shown in Fig.Q.No.1(b). Use Principle of minimum potential energy. **[7]**

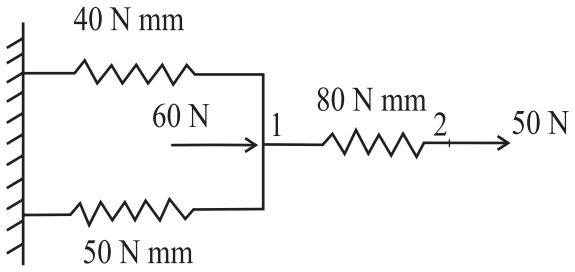

Fig. Q.No.1(b)

OR

Q2) a) Explain in brief Finite Element Method. **[5]**

b) Explain the principle of minimum potential energy used in deriving element stiffness matrix and equations. **[5]**

P.T.O.

c) Derive and plot shape functions. **[6]**

$N_1 = \left[1 - \frac{x}{L}\right]$ and $N_2 = \frac{x}{L}$ for a linear spring element of length 'L'. Use direct equilibrium approach.

Q3) a) Explain the following terms in brief (Any 2): **[6]**

i) Penalty Approach.

ii) Characteristics of Global stiffness matrix.

iii) Elimination Approach.

iv) Quadratic shape functions.

b) A bar consists of two steps as shown in Fig. Q.No.3(b) below. An axial load F = 200 kN is applied as shown. Model the bar with two finite elements. Determine. **[10]**

i) Element stiffness matrix

ii) Global stiffness matrix

iii) Global load vector

iv) Nodal displacements

v) Stresses in each bar

Sr.No.	Items	Elements	
		1	2
1	Length (mm)	200	100
2	Area (mm^2)	1000	2000
3	Modulus of Elasticity (GPa)	200	83

(Use Elimination Approach)

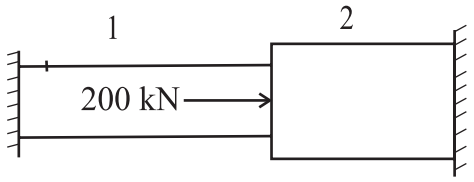

Fig. Q.No.3(b)

OR

Q4) a) For the truss element. Write an equation for element stiffness matrix in global coordinate system and element stress equation. Find the element stiffness matrix for the two bar truss as shown in Fig. Q.No. 4(a) below. **[10]**

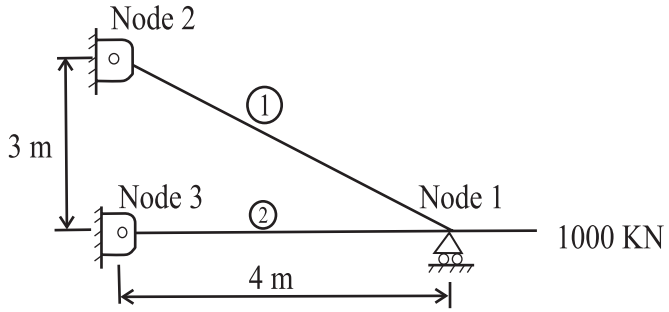

Fig. Q.No.4 (a)

b) For a one - dimensional bar element with two nodes 'i' and 'j' along x-direction, assuming linear behavior of bar element, derive bar element stiffness equation based on Potential Energy approach. Use the shape functions Ni and Nj as, **[6]**

$Ni = \left[\frac{xi - x}{L}\right]$ at node 'i' and $Nj = \left[\frac{x - xi}{L}\right]$ at node 'j'.

'L' be the length of the bar element.

Q5) a) What is CST element? Explain natural coordinates and shape functions for CST element. **[6]**

b) Draw four noded quadrilateral element both in Cartesian coordinates and in natural coordinates for a quadrilateral plate with following data, **[12]**

Vertices	Cartesian coordinates (mm)	Displacements (mm)
1	10, 10	0.1
2	50, 20	0.6
3	60, 50	0.8
4	30, 70	0.5

The Point 'M' within the element has Cartesian coordinates (30, 40). For this point 'M', determine

i) The nodal coordinates

ii) The shape functions

iii) The displacements

OR

Q6) a) Draw and write shape functions for four noded quadrilateral elements. **[4]**

b) Model the triangular plate of thickness 8 mm as a CST element. The coordinates of three vertices of the plate are as shown in table below. Take $E = 2.05 \times 10^5$ N/mm^2, and Poisson's ratio = 0.25 for the plate material. **[14]**

Vertices	Cartesian coordinates (mm)	Deflections (mm)	
		u(mm)	v(mm)
1	10, 10	$u_1 = 0.01$	$v_1 = -0.04$
2	70, 35	$u_2 = 0.03$	$v_2 = 0.02$
3	25, 75	$u_3 = -0.02$	$v_3 = 0.05$

Determine:

i) The deflections at the point N (40, 30) within the element.
ii) Element stress-strain matrix.
iii) Element strain nodal displacement matrix.
iv) Element strains
v) Element stresses

SECTION - II

Q7) a) State and explain stiffness matrix for frame element. **[8]**
b) Write a note on beam on elastic support. **[8]**

OR

Q8) a) The beam of 5.5 m length is fixed at each end. A downward force of 10kN and moment of 12kN–m (ccw) act at the center of the beam. Let E = 200 GPa and $I = 5 \times 10^{-4}$ m^4 throughout the beam. Determine the displacement and rotation under applied loads. **[10]**
b) With neat diagram explain the frame element. **[6]**

Q9) a) Explain in detail the Galerkin's approach for heat conduction. **[8]**
b) Write a short note on Point Sources in heat transfer problems. **[8]**

OR

Q10) a) Write a short note on boundary conditions in heat transfer problem. **[8]**
b) Formulate the one-dimensional heat transfer equations. **[8]**

Q11) a) Write a short note on NVH analysis. **[6]**
b) What are the advantages of modal analysis? **[6]**
c) Explain the effect of mashing on results of analysis. **[6]**

OR

Q12) a) Write a short note on time domain and frequency domain? **[6]**
b) What are different FEA software available in market? Also explain their application areas. **[6]**
c) What are the inputs and outputs of dynamic and fatigue analysis. **[6]**

❄❄❄

Total No. of Questions : 12]

SEAT No. :

P875

[Total No. of Pages : 3

[4264] - 680

B.E. (Polymer)

PRODUCT DESIGN AND POLYMER TESTING

(2008 Pattern) (Sem. - 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) ***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) Explain why permeation or barrier properties are necessary for polymers. For which all products will one require to check this property. Also explain method used to test this property. **[10]**

b) Explain what is the significance of specific gravity and bulk density. Give the experimental method used to find specific gravity of granules as well as powder. **[8]**

OR

Q2) a) Why particle size analysis is necessary and how is it done. **[3]**

b) Give list of non-destructive testing methods and explain any one in detail. **[10]**

c) Why acoustic properties are to be tested. Give list of all those properties and explain any one in detail. **[5]**

P.T.O.

Q3) a) Explain what is meant by following terms: **[6]**

i) Refractive Index ii) Luminous transmittance

iii) Haze iv) Photo elastic properties

b) Why optical properties are necessary to be found. Give any 2 applications where the optical property is necessary. **[5]**

c) What is meant by surface resistivity and how can it be found? **[5]**

OR

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

i) Dielectric strength ii) Volume Resistivity

iii) EMI shielding iv) Arc resistance

b) What draw backs can arise due to static charge accumulation in polymers. **[4]**

c) How to measure Luminous transmittance and haze in a polymer. **[6]**

Q5) a) Explain the necessity to measure chemal wheathering and flammable properties of any polymer. Give any one test method to explain any one property. **[10]**

b) Explain any one test carried on product form and its relevance according to ASTM. **[6]**

OR

Q6) a) Give the significance of stain resistance of plastics and how can it be found. **[6]**

b) Give justification as to why testing of polymers is required and if not done, what are the disadvantages. Also explain the testing required at all three stages ie. monomer, polymer & product. **[10]**

SECTION - II

Q7) a) Write a note on designing of hinges in injection molded products. **[6]**

b) Explain "end use requirement analysis" carried out during plastic product design. **[6]**

c) Explain isometric curves. State how they are used in plastic product design. **[6]**

OR

Q8) a) Write a note on pseudoelastic design method for designing of plastic products. **[9]**

b) Write a note on parallel engineering approach for product design. **[9]**

Q9) a) Describe friction welding and hot plate welding. **[8]**

b) Write a note on press fit technique used for plastic assembly. **[8]**

OR

Q10) a) Discuss spin welding and laser welding . **[8]**

b) Write a note on mechanical fastners used for plastic product assembly. **[8]**

Q11) a) Explain in details the test method used to determine flexural strength and modulus for plastics. **[8]**

b) Explain th test method for determining hardness and abrass ion resistance. **[8]**

OR

Q12) a) Discuss the method for determining compressive properties of plastics. **[8]**

b) Explain in short the significance of rate of straining in tensile testing. **[4]**

c) Write a note on - sample preparation prior to clamping out for tensile test. Illustrate the geometry of a tensile test specimen. **[4]**

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Total No. of Questions : 12]

SEAT No. :

P1017

[Total No. of Pages : 2

[4264] - 618

B.E. (Chemical)

CHEMICAL PROCESS SAFETY

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

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

SECTION - I

Q1) a) Explain safety, hazard, risk in chemical plants. State types of hazards with examples. **[8]**

b) Explain how toxicants enter Biological Organisms. **[8]**

OR

Q2) a) Explain three statistical methods to characterize accident and loss performance. **[8]**

b) State definitions for relative toxicity and for threshold limit values (TLVs). **[8]**

Q3) a) Explain Material Safety Data Sheets (MSDSs) with the format during an industrial hygiene study. **[8]**

b) How will you evaluating exposures to volatile toxicants by Monitoring. **[8]**

OR

Q4) a) Determine the eight hour TWA worker exposure if the worker is exposed to toluene vapours as follows :-

Duration of exposure (hours)	Measured Concentration (PPM)
2	110
2	330
4	90

[6]

P.T.O.

b) State typical projects involving industrial hygiene. Describe identification in industrial hygiene project. **[10]**

Q5) a) Explain Fire Triangle. Distinction between fires and explosions. **[10]**

b) Define flammability Limits (LFL and UFL). Explain types of Explosions. **[8]**

OR

Q6) a) Explain in detail Unconfined Vapour Cloud Explosion (UVCE). **[10]**

b) Explain flammability characteristics of liquids and vapours. **[8]**

SECTION - II

Q7) a) What bonding and grounding procedures must be followed, to transfer a drum of flammable solvent into a storage tank? **[8]**

b) Describe in brief storage and handling of flammable and toxic chemicals. **[8]**

OR

Q8) a) Explain working of Ventilation and Sprinkler systems for preventing fires and Explosions. **[8]**

b) Describe in brief Explosion proof equipment and instruments. **[8]**

Q9) a) Explain the concept of HAZOP study and state guide words used for the HAZOP procedure. **[8]**

b) Describe an informal safety review process for using a cylinder of phosgene to charge gaseous phosgene to a reactor. Review up to the reactor only. **[10]**

OR

Q10) a) Explain Event Tree analysis for reactor with high temperature alarm and temperature controller. **[10]**

b) Explain Review of probability theory for Risk Assessment. **[8]**

Q11) a) Explain objectives of Risk Management. How will Risk in case of leakage of chlorine carried out? **[8]**

b) Explain Emergency shutdown systems. **[8]**

OR

Q12) a) State and describe protective devices for operators while working in chemical process plant. **[8]**

b) Write a short note on :-
Prevention of hazard human element. **[8]**

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Total No. of Questions : 12]

SEAT No. :

P1019

[Total No. of Pages : 8

[4264] - 447

B.E. (Mechanical)

INDUSTRIAL HEAT TRANSFER EQUIPMENTS

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

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

Instructions to the candidates:

1) ***Answer both sections on separate answer books.***
2) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10, Q11 or Q12.***
3) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) How heat exchangers are classified according to its arrangement. **[5]**

b) Explain construction and working of hairpin heat exchanger. **[5]**

c) State general steps for thermal design of heat exchanger by NTU method. **[6]**

OR

Q2) a) Explain series arrangement of hairpin heat exchangers with figure and state advantages of arrangement. **[5]**

b) State applications of plate heat exchangers. **[5]**

c) What will be the hydraulic diameter of an annulus with longitudinal finned tube with following specifications? **[6]**

Inner diameter of shell 0.0525m

Outer diameter of tube 0.0266m

Number of tubes 1

Thickness of fin 0.9 mm

Axial height of fin from outer periphery of tube is 0.0127m

Number of fins per tube 30

P.T.O.

Q3) a) Determine the tube side heat transfer coefficient at 30 cm from the inlet of a heat exchanger where engine oil flows through tubes with a diameter of 12.5mm. Oil flows with a velocity of 0.5 m/s and at a local bulk temperature of 30ºC, with local tube wall temperature of 60ºC. (Use correlations attached) **[8]**

Properties of oil :

$\rho = 882$ kg/m^3

Cp = 1922 J/kg.K

$\mu = 0.41$ Ns/m^2

k = 0.14 W/mK

Pr = 5550

$\mu_w = 0.074$ Ns/m^2 at 60ºC

b) What are baffles? State its use and type. **[4]**

c) Define Tube layout angle. Draw tube layout pattern with tube layout angle of 90º and 45º. **[4]**

OR

Q4) a) Explain in short : Contents in TEMA standard. **[5]**

b) Write note on : Selection of tube thickness in heat exchanger. **[5]**

c) Explain stepwise process of heat exchanger analysis by Kern's method. **[6]**

Q5) a) State factors by which choice of compact heat exchanger is made. **[5]**

b) State limitations of compact fin Heat Exchangers. **[5]**

c) A cross flow heat exchanger with both fluids unmixed is used to heat water flowing at a rate of 20 kg/s from 25ºC to 75ºC using gases available at 300ºC to be cooled to 180ºC. The overall heat transfer coefficient has a value of 95 W/m^{2}K. Determine the area required using LMTD method. For gas Cp = 1005 J/kgK, For water Cp = 4180 J/kgK. (Graphs attached can be used) **[8]**

OR

Q6) a) Explain any four geometries of PFHE (Plate Fin Heat Exchangers). **[6]**

b) What are Tube-Fin Heat Exchangers? Describe with figure. **[6]**

c) Explain how multi-pass exchangers are to be designed? **[6]**

SECTION - II

Q7) a) Which typical parameters are to be considered during selection and design of condenser compared to S&T HEX? **[5]**

b) How condensers are classified? **[5]**

c) Draw sketch and explain in brief spiral condenser. **[6]**

OR

Q8) a) Explain air cooled evaporator with its disadvantages. **[5]**

b) State main features of cross flow condensers with figure. **[5]**

c) 'Extra tube support plate is provided near nozzle', justify. **[6]**

Q9) a) Describe Psychometric Analysis of Air Passing Through Cooling Tower. **[5]**

b) How cooling tower is to be maintained in good working condition? **[5]**

c) Explain Indirect-Contact or Closed-Circuit Evaporative Cooling Tower. **[6]**

OR

Q10) a) Compare wood and metal as cooling tower material. **[5]**

b) Explain induced draft cross flow cooling tower. **[5]**

c) Enlist factors to be considered for locating cooling tower. **[6]**

Q11) a) State use of different materials for better cooling in cabinets. **[6]**

b) State need of cooling in electrical applications. **[6]**

c) State advantages of forced electronics cooling. **[6]**

OR

Q12) a) Write note on : Wick structure of heat pipe. **[6]**

b) Explain liquid cooled PCB. State its advantages and disadvantages. **[6]**

c) State advantages of natural electronics cooling. **[6]**

Equations.

Eq. 1

$$Nu = 3.9\,(Re \cdot Pr)^{1/2}\left(\frac{d}{L}\right)^{1/2}\left(\frac{\mu}{\mu_w}\right)^{0.01}$$

for – 1) Laminar flow

2) $\left[\frac{\mu}{\mu_w}\right] > 9.75$

Eq. 2

$$Nu = 1.86\,(RePr)^{1/3}\left(\frac{d}{L}\right)^{1/3}\left(\mu/\mu_w\right)^{0.14}$$

for 1) Laminar flow

2) $\left[\left(Re \cdot Pr \cdot \frac{d}{L}\right)^{1/3}\left(\frac{\mu}{\mu_w}\right)^{0.14}\right] > 2$

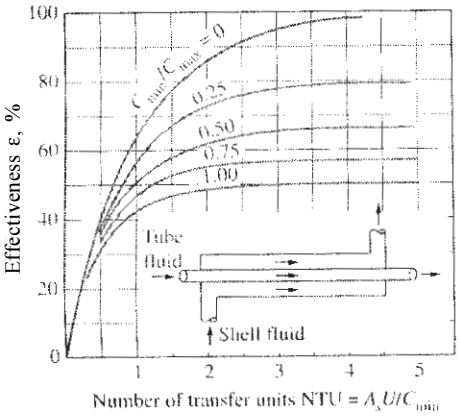
3) $\left[\frac{\mu}{\mu_w}\right] < 9.75$

Eq. 3

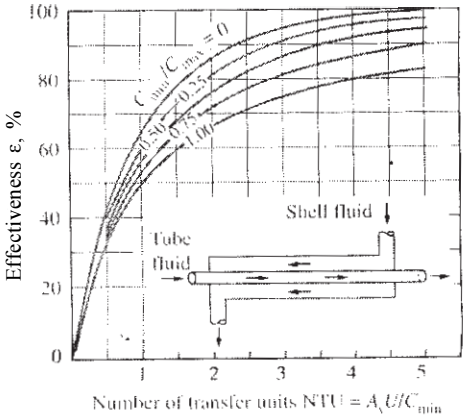
$$Nu = \frac{(f/2)\,Re \cdot Pr}{1.07 + 12.7(f/2)^{1/2}(Pr^{2/3} - 1)}$$

& $f = (1.58 \ln Re - 3.28)^{-2}$

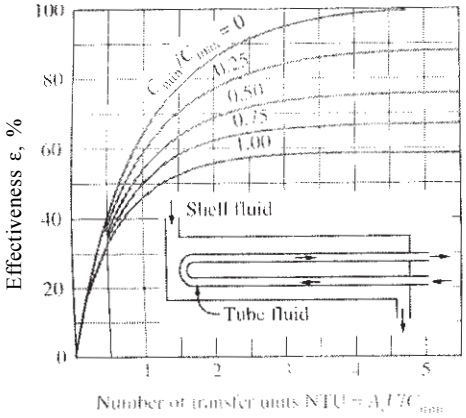
1) for turbulent flow.



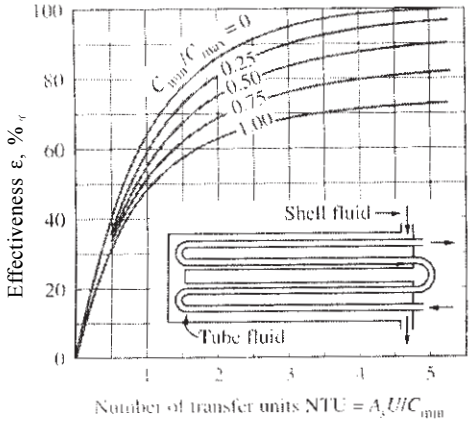
(*a*) Parallel-flow



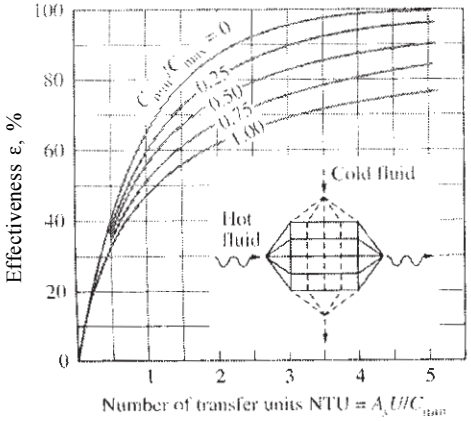
(*b*) Counter-flow



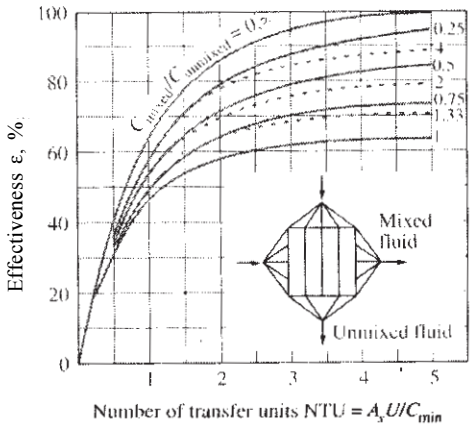
(*c*) One-shell pass and 2, 4, 6, ... tube passes



(*d*) Two-shell passes and 4, 8, 12, ... tube passes



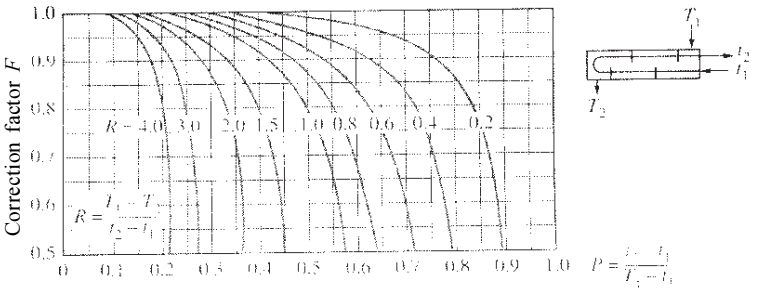
(*e*) Cross-flow with both fluids unmixed



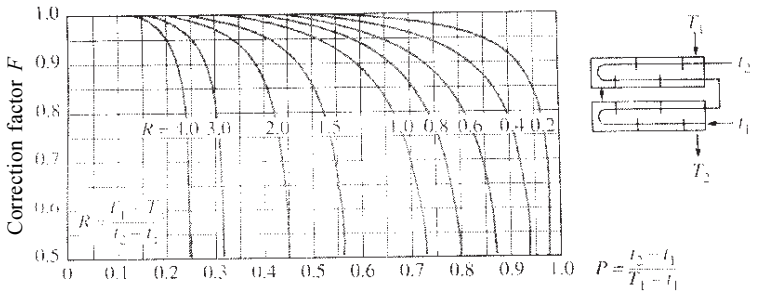
(*f*) Cross-flow with one fluid mixed and the other unmixed

FIGURE

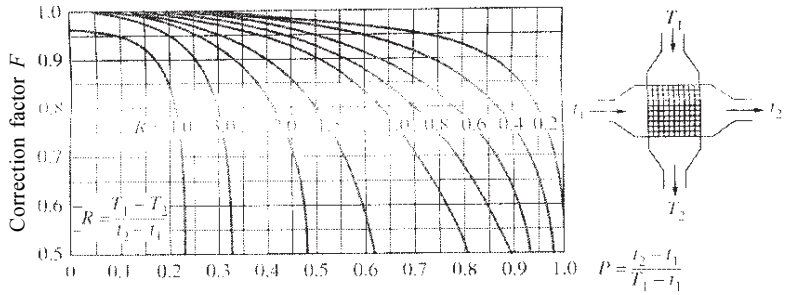
Effectiveness for heat exchangers (from Kays and London, Ref. 5).



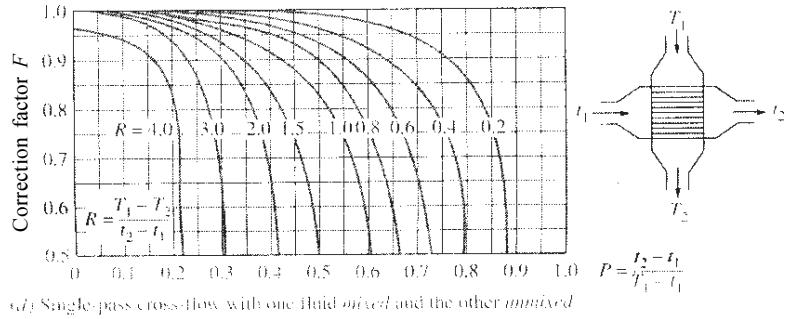
(*a*) One-shell pass and 2, 4, 6, etc. (any multiple of 2), tube passes



(*b*) Two-shell passes and 4, 8, 12, etc. (any multiple of 4), tube passes



(*c*) Single-pass cross-flow with both fluids *unmixed*



(*d*) Single-pass cross-flow with one fluid *mixed* and the other *unmixed*

FIGURE
Correction factor F charts for common shell-and-tube and cross-flow heat exchangers (from Bowman, Mueller, and Nagle, Ref. 2).

[4264]-447

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TABLE A2
Water at Sea-Level Atmospheric Pressure

Temp. T		Density ρ	Coef. Exp. $\beta \times 10^3$	Specific Heat c_p	Thermal Cond. k	Absolute Viscosity $\mu \times 10^6$	Kinematic Viscosity $\nu \times 10^6$	Prandtl Number Pr
°F	°C	kg/m³	1/K	J/kg K	W/m K	N s/m²	m²/s	–
32	0	999.9	−0.068	4217.5	0.5580	1794	1.794	13.56
41	5	1000	0.018	4202.7	0.5677	1530	1.530	11.33
50	10	999.7	0.095	4192.4	0.5774	1296	1.296	9.410
59	15	999.1	0.16	4185.8	0.5870	1136	1.137	8.101
68	20	998.2	0.22	4181.7	0.5967	993	0.995	6.959
77	25	997.1	0.26	4179.5	0.6064	880.6	0.883	6.069
86	30	995.7	0.31	4178.6	0.6155	792.4	0.796	5.380
95	35	994.1	0.35	4178.5	0.6243	719.8	0.724	4.818
104	40	992.2	0.39	4179.0	0.6325	658.0	0.663	4.348
113	45	990.2	0.42	4179.9	0.6401	605.1	0.611	3.951
122	50	988.1	0.45	4181.1	0.6472	555.1	0.562	3.586
131	55	985.8	0.48	4182.6	0.6536	512.6	0.520	3.280
140	60	983.5	0.51	4184.5	0.6594	470.0	0.478	2.983
149	65	980.8	0.54	4186.8	0.6643	436.0	0.445	2.748
158	70	978	0.57	4189.5	0.6686	402.0	0.411	2.519
167	75	974.9	0.60	4192.9	0.6724	376.6	0.386	2.348
176	80	971.7	0.63	4196.6	0.6753	350.0	0.361	2.175
185	85	968.5	0.66	4201.0	0.6778	330.5	0.341	2.048
194	90	965	0.69	4205.7	0.6797	311.0	0.322	1.924
203	95	961.7	0.72	4210.6	0.6811	294.3	0.306	1.819
212	100	958.4	0.75	4215.5	0.6822	277.5	0.290	1.715

[4264]-447

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TABLE A1
Air at Sea-Level Atmospheric Pressure

Temp. T °F	Temp. T °C	Density ρ kg/m³	Coef. Exp. $\beta \times 10^3$ 1/K	Specific Heat c_p J/kg K	Thermal Cond. k W/m K	Absolute Viscosity $\mu \times 10^6$ N s/m²	Kinematic Viscosity $\nu \times 10^6$ m²/s	Prandtl Number Pr –
32	0	1.293	3.664	1003.9	0.02417	17.17	13.28	0.7131
41	5	1.269	3.598	1004.3	0.02445	17.35	13.67	0.7127
50	10	1.242	3.533	1004.6	0.02480	17.58	14.16	0.7122
59	15	1.222	3.470	1004.9	0.02512	17.79	14.56	0.7118
68	20	1.202	3.412	1005.2	0.02544	18.00	14.98	0.7113
77	25	1.183	3.354	1005.4	0.02577	18.22	15.40	0.7108
86	30	1.164	3.298	1005.7	0.02614	18.46	15.86	0.7103
95	35	1.147	3.244	1006.0	0.02650	18.70	16.30	0.7098
104	40	1.129	3.193	1006.3	0.02684	18.92	16.76	0.7093
113	45	1.111	3.142	1006.6	0.02726	19.19	17.27	0.7087
122	50	1.093	3.094	1006.9	0.02761	19.42	17.77	0.7082
131	55	1.079	3.048	1007.3	0.02801	19.68	18.24	0.7077
140	60	1.061	3.003	1007.7	0.02837	19.91	18.77	0.7072
149	65	1.047	2.957	1008.0	0.02876	20.16	19.26	0.7067
158	70	1.030	2.914	1008.4	0.02912	20.39	19.80	0.7062
167	75	1.013	2.875	1008.8	0.02945	20.60	20.34	0.7057
176	80	1.001	2.834	1009.3	0.02979	20.82	20.80	0.7053
185	85	0.986	2.795	1009.8	0.03012	21.02	21.32	0.7048
194	90	0.972	2.755	1010.3	0.03045	21.23	21.84	0.7044
203	95	0.959	2.718	1010.7	0.03073	21.41	22.33	0.7041
212	100	0.947	2.683	1011.2	0.03101	21.58	22.79	0.7038

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

P1021 **[Total No. of Pages : 4**

[4264] - 576

B.E. (Instrumentation and Control)

PROCESS MODELLING AND OPTIMIZATION

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

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

Instructions to the candidates:

1) ***Answer 3 questions from Section-I and 3 questions from Section-II.***
2) ***Answers to the two sections should be written in separate answer books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***You 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) For the system below write equcations for above system, pipe ID = 0.9144 m A_p = 0.6559 m^2, L = 914.4m and for **[18]**

Tank - ID = 3.6576 m

A_T = 10.4977 m

h = 2.1336 m

steady state values are,

F_o = 35.1 ft^3/sec = 3.2608 m

h_o = 4.72 ft = 1.4387 m

V_o = 4.97 ft/s = 1.5149 m/s

$K_F = 2.81 \times 10^{-2} = 0.1371$ N/(ft /sec)^{2}m find v and h at t = 1 sec take step of 0.2 where

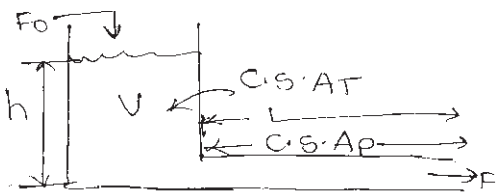
F_o - Inlet flow

A_T - Area of tank

A_p = Area of pipe

L - length of existpipe

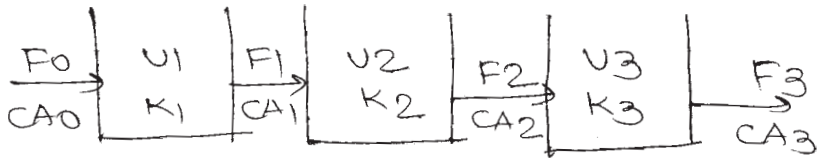
K_F - Frictional coefficient



P.T.O.

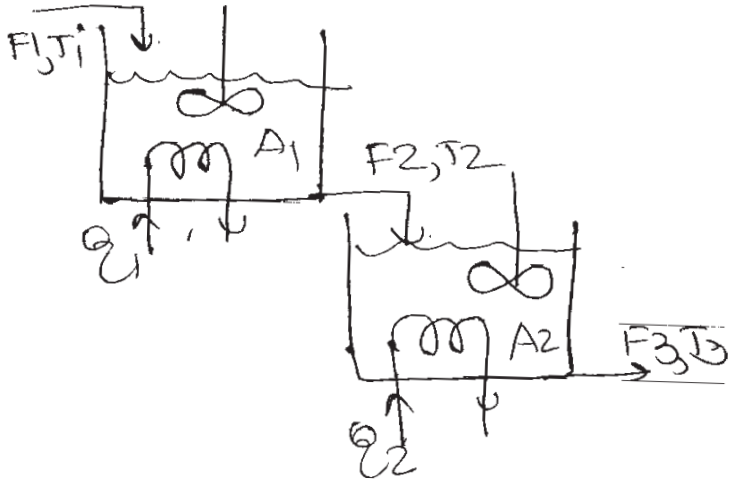
OR

Q2) a) Three CSTRs are connected in series of $r \times n$ $A \xrightarrow{K} B$ is taking place in each reactor. Each reactor is maintained at different temperature and rate const in each reactor is K_1, K_2, K_3 volume of reactor is V_1, V_2, V_3 respectively. A reactant A is Fed to first reactor at aflow rate of f_o at concentration of CAo Derive the mathematical model of the system. **[10]**



b) Using least square method fit the model $y = B_0 + B_1 x$ to the following data (x = independent variable & y = measured response) **[8]**

Q3) Develop the state model that describes the dynamic behavior of system for two stirred tank heaters shown below. Flow rates of the streams are assumed to be porportional to the liquid static pressure that causes the flow of the liquid. The cross sectional areas of Tanks are A_1 & A_2 (m^2) and flow rates are volumetric. No vapour is produced either in the first and second tank. At_1 and At_2 are heat exchange areas for the two stream coils. Use suitable assumptions. **[16]**



OR

Q4) Develop the model equations of double pipe heat Exchanger where in the resistance to heat transfer from a condensing fluid to inner fluid can be represented by convective heat transfer coefficient on both sides of the heat transfer wall. Assume that.

a) Resistance of wall is negligible but the wall has finite heat capacity.

b) Assume that velocity remain constant throughout the pipe. State the assumptions made. **[16]**

Q5) a) What are the advantages OR disadvantages of "ONline" and "OFFline" identification method? Justify. **[8]**

b) Explain "Auto Tune variation" identification method for process identification. Comment on dead time estimation from the waveforms.**[8]**

OR

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

a) Time domain fitting of step data.

b) Pulse testing.

SECTION - II

Q7) A distilation column is described by the following linear ODEs. **[18]**

$$\frac{dx_D}{dt} = -4.74x_D + 5.99x_B + 0.708R - 0.472V$$

$$\frac{dx_B}{dt} = 10.84x_D - 18.24x_B + 1.28R - 1.92V + 4Z$$

a) Use state variable matrix method to derive the open loop transfer function matrix.

b) What are the open loop eigen values of the system.

c) If the open loop steady state gain matrix is $K_p = \begin{bmatrix} 0.958 & -0.936 \\ 0.639 & -0.661 \end{bmatrix}$

Calculate RGA, niederlinski index and morari resiliency index.

OR

Q8) Write short notes on : **[18]**

a) Bristol arrary as an index loop interaction.

b) Skogestad-morari method.

Q9) Determine the convexity or concavity of the following objective functions.**[16]**

a) $F(x_1, x_2) = e^{x} + e^{x_2}$

b) $F(x) = 2x_1^2 + 2x_1x_2 + 1.5x_2^2 + 7x_1 + 8x_2 + 24$

c) $F(x_1, x_2) = (x_1 - x_2)^2 + x_2^2$

d) $2x_1^2 - 3x_1x_2 + 2x_2^2$

OR

Q10) a) Determine whether following function is concave or convex **[8]**

$$f(x) = \frac{x_1^2}{4} + \frac{2}{x_1 x_2} + 4x_2$$

b) Determine optimum values of y for **[8]**

$$y = \frac{x_1}{x_2} + \frac{1}{x_1 x_3} + \frac{1}{2}x_2^2 + \frac{x_3}{16}$$

Q11) a) Minimize $f(x) = \frac{x}{\log e^x}$ using Quasi newton method with $x_1 = 2$ and n = 0.01, ε = 0.01. **[8]**

b) Using Eulers method, find an approximate value of y corresponding to $x = 1$ given that

$$\frac{dy}{dx} = x + y \text{ and } y = 1 \text{ when } x = 0.$$ **[8]**

OR

Q12) a) Write short note on linear programming. **[8]**

b) Fit the model $y = a_0 + a_1 x$ for the data. By using lagrange interpolation method. **[8]**

x	2	5
y	4	7

Total No. of Questions : 12]

SEAT No. :

P1026

[Total No. of Pages : 2

[4264]-577

B.E. (Instrumentation & Control)

BUILDING AUTOMATION - II

(2008 Pattern) (Elective - III) (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) ***Figures to the right indicate full marks.***
3) ***Use of electronic calculator is allowed.***

SECTION - I

Q1) a) What is Human comfort? Explain Human comfort zone, List different factors affecting to Human comfort, and explain any four factors in details. **[12]**

b) Explain the terms Relative Humidity and Absolute Humidity. **[6]**

OR

Q2) a) Explain Psychometric chart with neat sketch show all the specification. **[10]**

b) Explain different process of Air Conditioning. **[8]**

Q3) a) Explain steam heating system with steam pressure and system piping. **[10]**

b) What do you mean steam traps? List and explain steam traps. **[6]**

OR

Q4) a) Explain Vapor Compression Cycle with respect to each device involved in it. **[12]**

b) Sketch commonly used symbols that represent air conditioning systems components. **[4]**

Q5) a) Draw a block diagram of Direct Digital Controller. Explain each block in detail. Enlist various advantages and disadvantages of DDC. **[10]**

b) Explain the features of primary controller and secondary controller. **[6]**

OR

Q6) a) Explain different analog and digital output devices used in HVAC control systems. **[12]**

b) Explain the terms optimum start and Night cycle. **[4]**

P.T.O.

SECTION - II

Q7) a) Discuss the term Motor Control Centre, Draw neat sketch of Momentary Push - button Start - Stop Circuit. **[10]**

b) Explain the LON Bus protocol. **[8]**

OR

Q8) a) Explain the BACnet protocol in detail. **[10]**

b) Explain the Modbus protocol with ASCII and RTU transmission mode. **[8]**

Q9) a) Draw various Regulatory Control Symbols, Analog and Digital Input - Output Symbols used in HVAC. **[8]**

b) Define the term Energy Management. Explain various energy measurement devices in HVAC. **[8]**

OR

Q10) a) What do you mean Green Building; explain the goals of Green Building. **[8]**

b) Explain the different features of Central Graphic Operators Workstation. **[8]**

Q11) a) What is Energy optimization? Explain features and benefits of IBMS. **[8]**

b) What are subsystems to be included if integrated Home Automation system is to be design, justify your answer with example. **[8]**

OR

Q12) a) Explain BMS verticals for Healthcare, Industry, Hotels, Airport and Datacenters. **[10]**

b) What different components are required if Integrated Building Management System is to be provide for commercial building. **[6]**

♦♦♦♦

Total No. of Questions : 11]

SEAT No. :

P1035

[Total No. of Pages : 3

[4264]-513

B.E. (Electrical)

INDUSTRIAL DRIVES & CONTROL

(2008 Pattern) (Semester - II)

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

Instructions to the candidates:

1) ***Answer 3 questions from Section I and 3 questions from Section II.***
2) ***Answers to the two sections should be written in separate books.***
3) ***Figures to the right indicate full marks.***
4) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***

SECTION - I

Q1) a) Draw basic block diagram of electric drive and explain function of each block. **[8]**

b) Explain four quadrant operation of drive with example of hoist. **[8]**

OR

Q2) a) What is steady state stability of drive? Explain with suitable example. **[8]**

b) A motor develops a torque by the relationship $T_m = a\omega + b$, where a and b are positive constants. This motor is used to drive a load whose torque is expressed as $T_L = c\omega^2 + d$, where c and d are positive constants. The total inertia of the rotating masses is J. Calculate the equilibrium operating speed? Will the drive be stable at this operating point? **[8]**

Q3) a) What are advantages of electric braking over mechanical braking? **[4]**

b) Explain Regenerative braking of dc shunt motor. Draw speed torque characteristic and explain its advantages. **[8]**

c) A 230V 870 rpm 100 A separately excited dc motor has an armature resistance of 0.05 ohm. It is coupled to an overhauling load with load torque of 400 N-m. Determine the speed at which motor can hold the load by regenerative braking. **[6]**

OR

Q4) a) Explain DC dynamic braking of 3 phase induction motor with circuit and characteristic. **[8]**

P.T.O.

b) A 3 phase, 440 V, 50 Hz, 6 pole, star connected induction motor has following parameters referred to stator. R_s : 0.5 Ω, R_r' = 0.6 Ω; $X_s = X_r'$ = 1 Ω
Stator to rotor turns ratio is 2. If the motor is used for the regenerative braking,
Determine
i) Maximum overhauling torque it can hold and the range of the speed in which it can safely operate.
ii) The speed at which it will hold a load with a load torque of 160 N-m. **[10]**

Q5) a) Explain with neat circuit diagram 3 phase fully controlled converter fed separately excited dc motor drive. Draw output voltage and current waveform. Explain switching sequence of devices. **[8]**

b) A 220 V, 1500 rpm, 10 A separately excited dc motor is fed from single phase fully controlled rectifier with an ac source voltage of 230 V, 50 Hz, Ra = 2 Ω, Assume continuous conduction. Calculate firing angle for
i) half the rated motor torque and 500 rpm
ii) rated motor torque and (–1000) rpm.

[8]

OR

Q6) a) Explain chopper fed dc series motor drive. **[8]**

b) Explain with block diagram the operation of a closed loop speed control scheme with inner current control loop. Also explain function of each block. How control below and above speed is obtained. **[8]**

SECTION - II

Q7) a) Compare stator voltage control of three phase induction motor with V/f control. **[8]**

b) A star connected squirrel cage induction motor has following ratings and parameters; 400 V, 50 Hz, 4 pole, 1370 rpm, Rs = 2 Ω, Rr' = 3 Ω, Xs = Xr' = 3,5 Ω, Xm = 55 Ω It is controlled by a current source inverter at a constant flux. Calculate motor torque and stator current when operating at 30 Hz and rated slip speed. **[8]**

OR

Q8) a) Explain operation of variable frequency control of three phase induction motor. What happens when it is operated from PWM fed inverter instead of six step inverter to its performance? **[8]**

b) Explain static Kramer drive. **[8]**

Q9) a) What are different ways of energy savings in electric motor drives? How energy can be saved during starting and braking operation. **[8]**

b) Explain effect of harmonic current on operation of motor, size of motor and power of motor. **[8]**

OR

Q10) a) How variable speed drives can be useful in energy saving of pumps. **[8]**

b) What are different criterions for selection of motor. **[8]**

Q11) Write short notes on any three **[18]**

a) Vector control of Induction motor.

b) Application of drive in Sugar mill

c) Application of drive in Textile mill

d) Application of drive in machine tool application

e) BLDC Motor

♦♦♦♦

Total No. of Questions : 12]

SEAT No. :

P1105

[Total No. of Pages : 3

[4264]-402
B.E. (Civil)
DAMS & HYDRAULIC STRUCTURES
(2008 Pattern) (Semester - I)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) What are the different types of arch dams? Explain with the help of a neat sketch variable radius arch dam. **[4]**

b) Write briefly on : **[8]**

i) Inspection of dams

ii) Dam instrumentation

c) What are the factors that govern the selection of site for a dam construction? **[4]**

OR

Q2) a) Explain - classification of the dams according to the hydraulic conditions, use and materials used for dam construction. **[8]**

b) What is economic height of dam and how it is determined? **[4]**

c) Explain method of strengthening of dams. **[4]**

Q3) a) Check the stability of a gravity dam 35m high. Water stands on the upstream side of dam of triangular section upto its full height. The base width of the dam is 20m. Assume

i) Specific weight of dam material = 24 kN/m^3

ii) Coefficient of friction between base and foundation $\mu = 0.8$.

iii) Sheat strength, q = 1200 kN/m^2 **[12]**

b) Write a note on galleries in a gravity dam with respect to location, size, shape and function. **[6]**

OR

P.T.O.

Q4) a) Differentiate between low and high gravity dam and derive an equation for limiting height of gravity dam. **[6]**

b) Enumerate the forces acting on a gravity dam. Explain the load combinations as specified by Bureau of Indian Standards. **[6]**

c) Explain curtain grouting and consolidation grouting. **[6]**

Q5) a) Enumerate the two different methods which are adopted for constructing earthen dams. **[4]**

b) Briefly discuss the checks that are required to be made to investigate the stability of an earthen dam **[8]**

c) What are the causes of failure of earth dam. **[4]**

OR

Q6) a) Explain swedish slip circle method of stability analysis of earth dam. **[8]**

b) Write short notes on any three of the following : **[8]**

i) Rock toe,

ii) Chimney drain,

iii) Relief well

iv) Cut - off ,

v) Horizontal drainage blanket.

SECTION - II

Q7) a) Explain any one type of spillway gate with the help of neat sketch. **[6]**

b) Write two differences between each of the following : **[4]**

i) Weirs - Barrages

ii) Piping - Uplift (or Undermining; both are reasons for failure of a floor due to subsurface water flow)

c) Explain creep theories by Bligh and lane for the hydraulic design of weir on a permeable foundation. State advantages of Khosla's theory over these theories. Draw relevant sketches. **[8]**

OR

Q8) a) Draw three simple profiles considered by Khosla for determining the uplift pressures at the key points for floor of a weir. Briefly explain the corrections to be applied for obtaining these pressures accurately for a complex (actual) weir profile. **[6]**

b) Explain Bligh's creep theory with the help of neat sketch. State two limitations of Bligh's theory for design of impervious floor. **[4]**

c) What is meant by 'diversion head - work'? State four purposes of such works. Explain any three essential components of a typical diversion head- work with sketch/sketches. **[8]**

Q9) a) Write notes on : **[8]**

i) Types (classification) of canals

ii) Types of canal falls

b) Check whether following canal parameters conform to Kennedy's Theory of canal design : **[8]**

- Full supply discharge = 45 m^3/s
- Full slope depth = 1.8 m
- Bed slope of channel = 1 in 4500
- Side slopes = 1 H : 2 V
- Bed width = 30 m
- Critical Velocity Ratio = 1.17
- Manning's constant 'N' (or 'n') = 0.0225

OR

Q10) a) Write notes on : **[8]**

i) Lacey's theory for design of alluvial canals.

ii) Losses in irrigation canals

b) What is meant by 'Cross Drainage (CD) Works'? State the types of CD works and explain <u>any one</u> with the help of neat sketch/sketches. **[8]**

Q11) a) Give the classification of hydropower plants based on different criteria. Explain <u>any one</u> type with neat sketches. **[8]**

b) Write notes on : **[8]**

i) Necessity of river bank protection and types of work for such protection.

ii) Spurs or Groynes as types of river training works.

OR

Q12) a) Explain clearly the term 'assessment of power potential of a hydropower plant'. Why is it necessary? **[8]**

b) Draw neat sketches and explain the types of 'guide banks' for river training works. **[8]**

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Total No. of Questions : 12]

SEAT No. :

P1107

[Total No. of Pages : 4

[4264]-404
B.E. (Civil)
STRUCTURAL DESIGN OF BRIDGES
(2008 Pattern) (Elective - I) (Semester - I)

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

Instructions to the candidates:

1) ***Answer Que. 1 or Que. 2, Que. 3 or Que. 4, Que. 5 or Que. 6 from Section - I and Answer Que. 7 or Que. 8, Que. 9 or Que. 10 and Que. 11 or Que. 12 from Section - II.***
2) ***Answers to the two sections should be written in separate answer books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Assume suitable data if necessary & mention it.***
6) ***Use of cell phones is prohibited in examination hall.***
7) ***Use of Non - programmable Electronic pocket calculator is allowed.***
8) ***Use of I.S. 456, I.S. 800, I.S. 875, I.S. 1343 & Steel table is allowed.***

SECTION - I

Q1) a) Give the Classification of bridges according to material used for Construction and forms of Super structure. **[8]**

b) Explain the various loads considered in the Design of highway bridges. **[8]**

OR

Q2) a) Explain Pigeaud's Method for the analysis of deck slab. **[8]**

b) Explain Role of Impact factor in the design of Highway Bridge & how it is Calculated. **[8]**

Q3) Design an interior panel of a R.C.C T - beam deck slab bridge for a two lane highway with following data. **[18]**

a) Span of bridge = 27 m
b) Foot path on either side = 1.2 m
c) Width of carriage way = 7.5 m
d) Three longitudinal girders are provided at 3.3 m c/c
e) Cross girder spacing = 3.0 m c/c
f) Thickness of wearing coat = 75 mm
g) Loading IRC class AA tracked vehicles.
h) Use m1 = 0.038 and m2 = 0.031 for D.L and
m1 = 0.08 and m2 = 0.059 for L.L

Use M30 and Fe 415, Sketch the Details of Reinforcement.

OR

P.T.O.

Q4) The following Data is referred for Proposed Highway Bridge. **[18]**

a) Span of bridge – 30 m

b) Width of carriage way – 7.5 m

c) Width of foot path on either side – 1.2 m

d) Spacing of Main girder = 3 m c/c.

e) Spacing of cross - girders = 5 m c/c

f) Material M40 & High tensile steel strands with loss ratio 0.85. Design the intermediate Post tensioned pre - stressed main girder.

Q5) a) Design the cantilever of R.C.C T – beam Deck Bridge for Que – 3 above & Draw the details of Reinforcement. **[10]**

b) Explain economic span of highway bridge. **[6]**

OR

Q6) Design an electrometric pad bearing for following data. **[16]**

a) Span of main girder = 20 m

b) Live load on bearing = 900 kN

c) Dead load on bearing = 350 kN

d) Longitudinal frictional force on bearing = 45 kN

e) Rotation on bearing = 0.0025 rad

f) Concrete grade – M 30

g) Shear Strain = 5×10^{-4}

SECTION - II

Q7) a) Explain in brief the various forces acting on Railway Bridge. **[8]**

b) Classify railway steel bridges according to cross section, span and type of connection. **[8]**

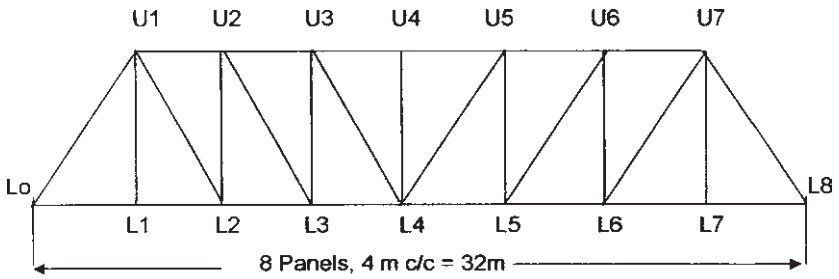
OR

Q8) a) Explain in brief arrangement of deck & through type truss girder bridges with sketches. **[8]**

b) Explain in brief dynamic effect & impact effect for the design of railway truss steel bridges. **[4]**

c) Describe Hudson's formula. **[4]**

Q9) A truss girder through type railway steel bridge consist of two pratt trusses as shown in fig (1) the span of truss in 32 m c/c of bearings, the bridge supports EUDL of 100 kN/m the D.L transmitted to each truss including self wt is 20 kN/m. Considering impact factor as 0.35 Design member U_3U_4 and U_3L_4. Spacing of truss is 6.00 m and height of truss is 5.00 m **[18]**



(Fig 1)

OR

Q10) Using channel section, design the members $U_2 - U_3$, $U_2 - L_3$, $U_3 - L_3$ for the railway truss bridge if height of truss is 6.00 m shown in fig (2) also draw the neat sketch of connection details of joint U_3. **[18]**

a) weight of stock rail – 0.68 kN/m.

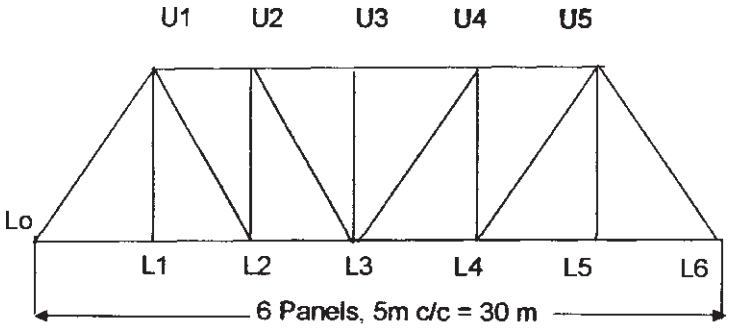
b) Weight of check rail – 0.48 kN/m

c) Timber Sleeper of size – 0.25 × 0.25 × 2.5 m @ 0.45 m c/c

d) Unit weight of timber – 7.6 kN/m^3

e) Spacing of truss - 6.00 m c/c.

f) The bridge supports a EUDL of 2950 kN.



(Fig 2)

Q11) Design the rocker bearing for 30 m span truss girder Railway Bridge with following data.

The reaction due to D.L, L.L & Impact load is 1500 kN, Vertical reaction due to overturning effect of wind at each end of girder is 120 kN. The lateral load due to wind effect of each bearing is 60 kN. The tractive force and braking force are 981 kN and 686 kN respectively. **[16]**

OR

Q12) Design the top & bottom lateral bracing for the through type truss girder railway steel bridge for single B.G track as shown in fig (1) the height of girder between C.G to C.G of chord member is 6.0 m the spacing between main girder is 7.0 m the rail is 800 mm above the C.G of bottom chord. The chord members are 600 mm deep and 650 mm wide. The end post is 600 mm deep and 660 mm wide. The Inner web members are 600 mm deep & 600 mm wide. **[16]**

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Total No. of Questions : 12]

SEAT No. :

P1108

[Total No. of Pages : 4

[4264]-405
B.E. (Civil)
SYSTEMS APPROACH IN CIVIL ENGG.
(2008 Pattern) (Elective - I) (Semester - I)

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

Instructions to the candidates:

1) ***Answer any 3 questions from each section.***
2) ***Answers to the two sections should be written in separate books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
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) Maximize $Z = 2x_1 + 3x_2 + 4x_3$ **[12]**

S.t. $3x_1 + x_2 + 4x_3 \leq 600$

$2x_1 + 4x_2 + 2x_3 \geq 480$

$2x_1 + 3x_2 + 3x_3 = 540$

$x_1, x_2, x_3 \geq 0$ Use Big - M method

b) Explain the significance of sensitivity analysis in L.P.P. **[4]**

OR

Q2) a) Solve the problem in Q.1 above by Two - Phase Method. **[12]**

b) Explain the following terms : **[4]**

i) Artificial variables,

ii) Slack variables,

iii) Surplus variables

Q3) The following table gives the unit cost of transporting coarse aggregates from three crushing plants to four sites. The quantity of aggregates available at the plants and that required at the work sites are indicated below. **[18]**

Plants	**Sites**				**Quantity Available**
	1	**2**	**3**	**4**	
A	13	7	19	0	200
B	17	18	15	7	500
C	11	22	14	5	300
Demand	180	320	100	500	

a) Find initial feasible solution by VAM

b) Find the optimal solution which will minimize the distribution policy.

OR

P.T.O.

Q4) a) Five contractors have submitted their bids for 5 projects. Contractor A and C has not bid for project 3 and 4 resp. Find the optimal assignment for minimum cost, if the cost bid by each contractor for the projects is given below in crore rupees. **[12]**

Contractors	**Projects**				
	1	**2**	**3**	**4**	**5**
A	7	7	-	4	6
B	9	6	4	5	6
C	11	5	11	-	5
D	9	4	8	9	4
E	8	7	9	11	3

b) What is degeneracy in transportation problem? How is it resolved? **[6]**

Q5) In an irrigation project, 6 million m3 of water is to be allotted to 3 irrigation districts. The net returns depending upon the quantity of water supplied are given below. Using dynamic programming; **[16]**

a) Determine the allotment of water to each district so that the returns are maximum. Write the recursive equation at each stage.

b) If Quantity available is only 4 million m3, then suggest the distribution policy.

Quantity of water in million m3	**Returns from Districts**		
	1	**2**	**3**
0	0	0	0
1	5	6	4
2	9	11	9
3	14	15	13
4	17	19	18
5	21	22	20
6	25	26	23

OR

Q6) a) Explain a the Bellman's principle of optimality. **[4]**

b) A pipe line is to be laid from point 1 to point 8. The unit cost of laying the pipeline considering various routes from place i to place j are given below. Use dynamic programming to find the route which will be cheapest. **[12]**

From i to j	1-2	1-3	1-4	2-5	2-6	3-6	3-7	4-7	5-8	6-8	7-8
Unit Cost in Thousand of Rupees	6	5	6	8	4	9	10	7	6	3	5

SECTION - II

Q7) a) Maximize $f(X) = 6X_1 - 2X_1^2 + 4X_2 - 2X_2^2 - 2X_1X_2$ with initial value (1, 1) using gradient method. **[8]**

b) Use Lagrange Multiplier Technique to Minimize $Z = 5X_1 + X_2 - (X_1 - X_2)^2$ Subject to $X_1 + X_2 = 4$,

And $X_1, X_2 \geq 0$ **[8]**

OR

Q8) a) Maximize $f(X) = 6X_1 - 2X_1^2 + 4X_2 - 2X_2^2 - 2X_1X_2$ with initial value (1, 1) using gradient method. **[8]**

b) Use Fibonacci method to maximize $Z = X^3(12 - X)$ in the range of (0, 12) with 10% accuracy. Carry out five stages. **[8]**

Q9) a) A workshop has six machines A,B,C,D,E, and F. Two jobs have to be processes through each of these machines. The processing time on each machine and technological sequence of jobs is given below : **[12]**

Job 1: $A \rightarrow C \rightarrow D \rightarrow B \rightarrow E \rightarrow F$

Job 2 : $A \rightarrow C \rightarrow B \rightarrow D \rightarrow F \rightarrow E$

jobs	A	B	C	D	E	F
job 1	20	30	10	10	25	15
job 2	10	15	30	10	20	15

In which order should the jobs be done on each of the machines to minimize the total time required to process the jobs? Solve graphically, Also find the idle times.

b) What is sequencing? What are the assumptions in sequencing problem?**[4]**

OR

Q10) a) A sample of 200 arrivals of customers in a super - market is according to the following distribution; **[12]**

Time between arrivals in Min	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5
Frequency	4	12	22	48	38	28	22	12	8	4	2

The time taken for service, follows the distribution;

Time in Min.	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0
Frequency	12	18	38	60	32	16	14	10

Estimate the average % waiting time and idle time of a customer by simulation for next 10 arrivals. Use the following random numbers.

Arrivals : 9, 73, 25, 33, 76, 53, 01, 35, 86, 34

Service : 54, 20, 48, 05, 64, 89, 47, 42, 96, 24

b) What are practical applications of simulation for civil engineering. **[4]**

Q11) a) Explain theory of replacement and list the applications of replacement model. **[6]**

b) The purchase price of a machine is Rs. 52,000. The installation charges amount to Rs. 15000 and its scrap value is only Rs. 6500. The maintenance cost in various years is given below; **[12]**

Year	1	2	3	4	5	6	7	8
Maintenance cost	1000	3000	4000	6000	8400	11600	16000	19200

After how many years should the machine is replaced? Assume that the machine replacement can be done only at the year ends.

OR

Q12) a) What do you understand by strategy, dominance and saddle point? **[6]**

b) Solve the following game by using the principle of dominance : **[12]**

Player B

Player A	**Strategies**	**I**	**II**	**III**	**IV**	**V**	**VI**
	1	4	2	0	2	1	1
	2	4	3	1	3	2	2
	3	4	3	7	-5	1	2
	4	4	3	4	-1	2	2
	5	4	3	3	-2	2	2

♦♦♦♦

Total No. of Questions : 12]

SEAT No. :

P1109

[Total No. of Pages : 2

[4264]-406
B.E. (Civil)
AIR POLLUTION AND CONTROL
(2008 Pattern) (Elective - I) (Semester - I)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) Explain the concept of plume rise. What are the factors considered in calculating plume rise? Write any two formulae for calculating plume rise. **[8]**

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

i) Sub - adiabatic

ii) Neutral

iii) Isothermal

iv) Superadiabatic

OR

Q2) a) A thermal power plant burns 100 tonnes of coal with 5.5% sulphur content. Calculate minimum stack height required. The particulate concentration in flue gases is 8000 mg/m^3 and the gas flow rate is 20 m^3/sec. **[8]**

b) What is inversion? Explain in brief radiation and subsidence inversion. **[8]**

Q3) a) Explain any one method of sampling ambient SO_x in detail. **[8]**

b) Discuss in brief basic considerations in air sampling and air pollution survey. **[8]**

OR

Q4) a) Explain a procedure of an ambient air quality monitoring in detail. **[8]**

b) What is iso kinetic sampling? Explain with a neat sketch. Why it is required? **[8]**

P.T.O.

Q5) a) Explain following methods of control of odour pollution : **[9]**

i) Modification of the process

ii) Adsorption and

iii) Chemical oxidation

b) What are the causes of indoor air pollution? Explain. **[9]**

OR

Q6) a) Explain chemical and physical changes in indoor air quality. **[9]**

b) Explain about determination of the type and intensity of odours. **[9]**

SECTION - II

Q7) a) Explain working principle of a cyclone with a neat sketch. Also state advantages and disadvantages of a cyclone. **[8]**

b) Design a tubular ESP to treat 10,000 m^3/hr of a gaseous stream from a paper mill for an efficiency of a) 90% b) 99% and c) 99.9%. Assume an effective migration velocity of 0.075 m/sec. **[8]**

OR

Q8) a) Enlist pollutants emitted due to automobiles. Explain any two methods of control of automobile emission. **[8]**

b) Explain the principle of scrubber with a neat sketch. What are the advantages and disadvantages of scrubber? **[8]**

Q9) a) Write emission standards for stationary and mobile sources of air pollution. **[8]**

b) Explain the important provisions made in "The Air(Prevention and Control of pollution) Act 1981". **[8]**

OR

Q10) a) Consider breeze from west and explain land use planning to control air pollution with a neat sketch. **[8]**

b) Explain economics of air pollution control with an example. **[8]**

Q11) a) Explain the methodology for preparing Environmental Impact Assessment of Thermal Power Plant. **[9]**

b) Discuss the role of regulatory agencies and control boards in obtaining environmental clearance for project. **[9]**

OR

Q12) a) Explain method of Environmental Impact Assessment. **[9]**

b) Discuss the Environmental Rules 1999 for sitting of industries. **[9]**

♦♦♦♦

Total No. of Questions : 12]

SEAT No. :

P1110

[Total No. of Pages : 2

[4264]-407
B.E. (Civil)
ARCHITECTURE AND TOWN PLANNING
(2008 Pattern) (Elective - I) (Semester - I)

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

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 from section I. and Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12 from section - II.***
2) ***Use separate answersheets for section - I and section - II.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Explain how the principles of architecture and composition support for Quality of architecture. **[8]**

b) Elaborate the importance of "creating and conserving the water bodies" in todays context. **[8]**

OR

Q2) a) "Integration is an important aspect of any activity". Explain the thought in the view of planner. **[8]**

b) What are the objectives of Landscaping? Explain in detail any one type of garden style. **[8]**

Q3) a) What is the need of Built Environment? Elaborate the concept giving suitable example. **[8]**

b) "Effectivity of urban areas is based on the design of urban areas". – Explain. **[8]**

OR

Q4) a) "Byelaws enrich the spaces" – How? Give a suitable example from your area. **[8]**

b) The Quality of life is one way dependant on livebility created because of renewal of the areas. – Elaborate & explain. **[8]**

Q5) a) What are the advantages of sustainable materials? **[6]**

b) Explain in detail any one sustainable technology. **[6]**

c) Elaborate the green building concept. **[6]**

OR

P.T.O.

Q6) a) "Sustainable materials use benefit the construction". – Support the statement, you being a builder. **[6]**

b) State different rating systems and explain the details of any one of the same. **[6]**

c) Give the details of any case study of a commercial building which is rated. **[6]**

SECTION - II

Q7) a) Write a short note on – "Growth of towns". **[6]**

b) Explain the concept of new towns by giving a suitable example. **[6]**

c) Write a short note on "Sir Ebenzar Howard" 's contribution in planning. **[6]**

OR

Q8) a) Write notes on **[6]**

i) Ribbon development

ii) Concentric development

b) Write a note on TP schemes. **[6]**

c) Write a note on Role of Neighborhood in urban development. **[6]**

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

i) Surveys for D.P.

ii) Traffic Management

b) Explain the legislative support through MRTP Act. **[8]**

OR

Q10) a) Write a note on special planning agencies & the work carried out. **[8]**

b) Write a note on Levels in planning and common threads for them. **[8]**

Q11) a) Write a note on UDPFI Guidelines. **[8]**

b) Write a note on Remote sensing technique and its application in Town planning. **[8]**

OR

Q12) a) What is SEZ? Explain various aspects for SEZ promotion in specific areas. **[8]**

b) Elaborate GIS & GPS utility for development of any area. **[8]**

♦♦♦♦

Total No. of Questions : 12]

SEAT No. :

P1111

[Total No. of Pages : 3

[4264]-408
B.E. (Civil)
ADVANCED GEOTECHNICAL ENGG.
(Semester - I) (Elective - I) (2008 Pattern)

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

Instructions to the candidates:

1) ***Answer 3 questions from Section - I and 3 questions from Section - II.***
2) ***Answers to the two sections should be written in separate books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Your answers will be valued as a whole.***
5) ***Use of logarithmic tables electronic pocket calculator is allowed & IS codes are not allowed.***
6) ***Assume suitable data, if necessary.***

SECTION - I

Q1) Explain the following:

a) Textural classification. **[4]**

b) HRB classification. **[4]**

c) USCS classification. **[4]**

d) Clay minerals. **[4]**

OR

Q2) a) Compare the following two sites, for foundation construction, **[9]**

		Site 'A'	Site 'B'
i)	PL	18%	21%
ii)	LL	35%	57%
iii)	IF	15	09
iv)	%W	35%	43%

and state which site's soil is

1) More plastic
2) Better foundation material
3) Better shear strength
4) Toughness Index.

b) Enlist different 'Clay minerals' & explain the role of 'Montmorillonite'.**[7]**

P.T.O.

Q3) a) A vertical retaining wall 5 m. high, supported a backfill with horizontal ground surface. The soil has $\gamma = 18$ kN/m^3, $\phi = 35°$, $\delta = 20°$. A footing running parallel to the retaining wall & carrying a load intensity of 18 kN/m, is to be constructed. Find the safe distance of the footing from the face of the wall, so that there is no increase in lateral pressure on the wall due to the load of footing. **[10]**

b) While digging for foundation, A vertical excavation in clay deposit caved in after reaching 4 m depth. Assuming $\gamma = 20$ kN/m^3, $\phi = 0$, determine the value of cohesion. If the same clay is used as back fill for the retaining wall upto a height of 8.5m. Calculate **[7]**

i) TEP (active)

ii) TEP (passive)

OR

Q4) a) Design a gravity retaining wall, 6 m. high with vertical back to retain a dry sand with $\gamma = 18$ kN/m^3 & $\phi = 30°$. Find also the FOS against sliding assuming $\mu = 30°$. The wall is made up of bricks with $\gamma = 20$ kN/m^3 & top width 1 m, Use Rankine's theory. **[9]**

b) Compute the embedment depth & pull in the anchor rod for the sheet pile, retaining 6 m. high backfill, with anchor rod 1 m. below the top. The back fill soil & the soil below D.L. is same, having following properties, $\phi = \phi^1 = 30°$, C = 0 , $\gamma_{sat} = 22$ kN/m^3, $\gamma = 18$ kN/m^3, GWT = 3 m above D.L. Use 'Free earth support' method. **[8]**

Q5) a) Explain the different types of Geosynthetics, along with functions. **[6]**

b) Discuss the properties & functional requirements of geogrid. **[6]**

c) Discuss the applications of Geosynthetics in geoenvironment. **[5]**

OR

Q6) a) Discuss 'Binquet & Lee' theory for reinforced soil foundations. **[6]**

b) Draw a sketch of 'Reinforced earth wall' & explain its components. **[6]**

c) What is 'soil nailing'? Under which situations it's applicable? **[5]**

SECTION - II

Q7) Explain the following :

a) Forced vibrations. **[4]**

b) Braken's method. **[4]**

c) Pauw's Analysis. **[4]**

d) Elastic half space method. **[4]**

OR

Q8) a) Resonance occurred at a frequency of 22 cycles/second, in a vertical block vibration test of block 1 m × 1 m × 1m. Determine C_u if the weight of oscillator is 620 N & the force produced by it at 12 cycles / sec is 1000 N. **[8]**

b) Discuss the design criteria for impact type machines as per IS - 2974 (pt - II) - 1966. **[8]**

Q9) Explain the following:

a) Bored compaction piles. **[4]**

b) Sand drains. **[4]**

c) Grouting. **[4]**

d) Vibroflotation. **[5]**

OR

Q10) a) A clay layer 5 m thick is consolidated with the help of sand drains of dia 30 cm & spaced at 2.7 M C/C. Determine the influence of the drain wells on the Av. degree of consolidation at the time when the degree of consolidation in the clay without wells would be 20%.
The drain wells may be arranged in a square pattern, with following data, **[9]**

i) Kr = Kz

ii) for U_z = 20%, T_v = 0.031

b) Explain the stages of inserting reinforcement in vibro - expanded pile. **[8]**

Q11) Discuss the following,

a) Saint - Venant's model. **[4]**

b) Reissener's model. **[4]**

c) Bingham's model. **[4]**

d) Rheological models & its utility. **[5]**

OR

Q12) a) Discuss the basic & composite Rheological models. **[7]**

b) Explain 'secondary consolidation' with the help of Rheological model. **[5]**

c) Explain 'creep' with the help of Rheological model. **[5]**

♦♦♦♦

Total No. of Questions : 12]

SEAT No. :

P1115

[Total No. of Pages : 4

[4264]-432

B.E. (Mechanical) (Common to Mechanical Sandwich)

DYNAMICS OF MACHINERY

(2008 Pattern) (Semester - I)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) What do you mean by primary & secondary unbalance in reciprocating engines? **[6]**

b) Four masses A,B,C & D are completely balanced masses C & D makes angles of 90° & 210° respectively with B in the same sense. The planes containing B & C are 300 mm apart. masses A, B, C & D can be assumed to be concentrated at radil of 360, 480, 240 & 300 mm respectively. The masses B,C & D are 15 kg, 25 kg & 20 kg respectively. **[12]**

Determine the

i) Mass A & its angular position.

ii) Positions of planes A & D.

OR

Q2) a) The six - cylinder of a single acting two stroke diesel engine are pitched 1 m apart and the cranks are spaced at 60° intervals. The crank length is 300 mm and the ratio of C.R. length to crank radius is 4.5. The reciprocating mass per line is 1350 kg & the rotating mass is 1000 kg. The speed is 200 rpm. Show with regard to primary & secondary balance that the firing order 1 - 5 - 3 - 6 - 2 - 4 gives balance in primary moment only & the order 1 - 4 - 5 - 2 - 3 - 6 gives secondary moment unbalance only. **[14]**

b) Explain partialy primary balancing in reciprocating engine. **[4]**

Q3) a) Explain what are free, damped & forced vibrations? **[4]**

b) What is logarithmic decrement? Derive the relations. **[6]**

P.T.O.

c) A spring mass system has spring constant of K kg/cm of the weight of mass W kg. It has natural frequency of vibration as 12 cps. An extra 2 kg weight is coupled to W & natural frequency reducer by 2 cps. Find K & W. **[6]**

OR

Q4) a) In a spring mass - damped system, m = 10 kg, k = 16 kN/m & c = 1600 N - s/m. The mass is displaced 0.1 m & released with a velocity of 2 m/ sec. in the direction of return motion. Find : **[12]**

i) The circular frequency

ii) Damping factor

iii) Displacement after 1/ 100 sec.

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

i) Critically damping coefficient

ii) Damping coefficient

iii) Damping factor

iv) Coloumb damping

Q5) A machine weighing 100 kg is supported on 4 - springs. It has 80 mm stroke & it runs at 1000 rpm. If the springs are symmetrically placed with respect to C.G. of the machine, neglecting damping. Determine the combined stiffness of the spring such that the force transmitted to the foundation is 1/25 times the impressed force. **[16]**

If it is found that the damping, however small, reduces the amplitude of successive vibrations by 25%, determine.

a) The force transmitted to foundation at 1000 rpm.

b) The force transmitted to foundation at resonance.

c) The amplitude of vibration at resonance, if weight of the reciprocating parts is 2 kg.

OR

Q6) a) Explain frequency response curve & phase frequency curve. **[6]**

b) Explain the following terms. **[6]**

i) Vibration Isolation

ii) Force transmissibility

c) Explain the term magnification factor & obtain expression for it. **[4]**

SECTION - II

Q7) a) Determine the natural frequencies of the system shown in figure **[10]**

Given : $K_1 = K_2 = 40$ N/m

$K = 60$ N/m

$m_1 = m_2 = 10$ kg

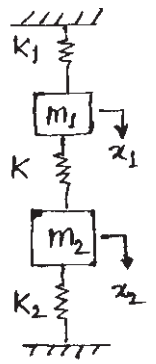

Fig.: Q7(a)

b) Explain the torsional vibrations of a geared system by **[8]**

i) neglecting inertia of gears &

ii) Considering inertia of gears.

OR

Q8) a) Explain Dunkerley's method to determine the natural frequency of shaft carrying number of point loads. **[4]**

b) Explain the concept of torsionally equivalent shaft. **[4]**

c) A rotor of 10 kg mass is mounted midway on a 2 cm diameter, horizontal shaft supported at the ends by two bearings. The bearing span is 80 cm, because of certain manufacturing defect, the centre of gravity of the rotor is 0.01 mm away from it's geometric centre. If the system rotates at 3000 rpm, determine the amplitude of the steady. state vibration and dynamic force transmitted to the bearing. Take $E = 2 \times 9.81 \times 10^{10}$ N/m^2 **[10]**

Q9) a) Derive an equation which gives the relation between sound intensity level and sound pressure level. **[6]**

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

i) Sound power level

ii) Sound intensity level

iii) Sound pressure level

iv) Sound reflection coefficient

v) Sound absorption coefficient

vi) Sound transmission coefficient

c) Determine the maximum pressure of a sound with a sound pressure level of 112 dB. **[4]**

OR

Q10) a) Show that as the distance from a point source doubles, the sound intensity level decreases by 6 dB. Assume that sound propagates in the form of spherical waves. **[6]**

b) What are the various types of sound fields in the vicinity of a sound source? Explain. **[4]**

c) When operating independently in the presence of back ground noise, measurement at a given location of the sound pressure level for machines 1, 2 & 3 are respectively 88 dB, 90 dB, & 87 dB. When the machines are turned off, the sound pressure level at the same point is 86 dB. Determine the overall sound pressure level (SPL) of the three machines independent of the background noise. **[6]**

Q11) a) A vibrometer, having the amplitude of vibration of the machine part as 4 mm and damping factor (γ) = 0.2, performs harmonic motion. If the difference between the maximum and minimum recorded values is 10 mm, determine the natural frequency of vibrometer if the frequency of vibration part is 12 rad/sec. **[6]**

b) Explain with neat sketch the working principle of a centrifugal pendulum absorber. **[6]**

c) Describe the various sources of noise. **[4]**

OR

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

a) Sound level meter.

b) Frequency measuring instruments.

c) Condenser microphone.

d) FFT spectrum analyzer.

e) Noise control at the source.

f) Vibration isolators.

♦♦♦♦

Total No. of Questions : 12]

SEAT No. :

P1117

[Total No. of Pages : 3

[4264]-434
B.E. (Mechanical)
ENERGY AUDIT AND MANAGEMENT
(2008 Pattern) (Elective - I) (Sem. - I)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) What are the principles of energy management and need of managerial skills in energy management? **[8]**

b) Discuss different aspects of Energy Policy and strategy in Energy conservation systems. **[8]**

OR

Q2) a) Explain the need of Renewable energy sources and how do an Industry, nation and globe would benefit from energy efficiency? **[8]**

b) List all the requirements of energy action planning? **[8]**

Q3) a) Give a typical energy audit reporting format? **[8]**

b) Write in brief the ten steps to be carried out in Detailed Energy Audit? **[8]**

OR

Q4) a) With the help of different examples elaborate the importance of Analysis and Recommendations of Energy Audit? **[8]**

b) Write various energy conservation opportunities in Furnace and DG sets. **[8]**

Q5) a) Illustrate the need of Financial analysis and explain the method of Simple Payback Period, its advantages and disadvantages? **[8]**

b) Differentiate between Returns on Investment (ROI) and Internal rate of return (IRR)? **[4]**

P.T.O.

c) What is the NPV of a project, (life 2 years) which requires an investment of Rs. 50000 and yield Rs. 30000 in the 1st year and Rs. 40000/- in the next year, if the Interest rate is 10%. **[6]**

OR

Q6) a) What is Time value of money and Net present value? **[8]**

b) Referring to different types of cash flows explain Sensitivity and Risk analysis? **[4]**

c) Explain Internal Rate of Return (IRR). What are advantages and disadvantages of IRR? **[6]**

SECTION - II

Q7) a) List different types of Steam traps and explain any one of them with neat sketch? **[8]**

b) Explain the opportunities for improving an energy efficiency in the boiler. **[8]**

OR

Q8) a) Explain merit and demerits for Direct and Indirect methods used for calculating Boiler Efficiency? **[8]**

b) Find the furnace efficiency required to melt one ton of steel from ambient temperature of 30°C. Following data is given : Specific heat of steel = 0.682 kJ/kg/°C, Latent heat for melting of steel = 272 kJ/kg, Melting point of steel = 1650°C. The melting furnace consumed 625 kWh to melt one ton of steel. **[8]**

Q9) a) Explain the energy saving opportunities in Electrical systems? **[8]**

b) Explain the selection and location of transformer for improving power factor. **[8]**

OR

Q10) a) Discuss various factors which constitutes the billing amount for a medium scale industry. **[8]**

b) Highlight various ways of how the light can be controlled efficiently in a facility? **[8]**

Q11) a) Describe suitable factors influencing selection of cogeneration plant? **[8]**

b) What are the direct and indirect benefits of waste heat recovery? **[6]**

c) How does a shell and tube heat exchanger work? Give typical examples. **[4]**

OR

Q12) a) Define Waste Heat Recovery? Describe its benefits and potentials of savings in Industry? **[8]**

b) Write short notes on **[6]**

i) CDM projects and

ii) Carbon credit calculations

c) How does a plate heat exchanger work? Give typical examples. **[4]**

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Total No. of Questions : 12]

SEAT No. :

P1118

[Total No. of Pages : 3

[4264]-437
B.E. (Mechanical)
TRIBOLOGY
(Elective - I) (2008 Pattern) (Sem. - I)

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

Instructions to the candidates:

1) ***Answers to the two sections should be written in separate answer books.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of electronic pocket calculator is allowed.***
5) ***Assume suitable data, if necessary.***
6) ***Your answers will be valued as a whole.***

SECTION - I

Unit - I

Q1) a) Explain any three modes of lubrication. **[6]**

b) Explain different types of additives used to improve the properties of lubricating oils. **[6]**

c) State the desirable properties of lubricating oils. **[4]**

OR

Q2) a) Write a note on "Effect of Temperature on Viscosity". **[6]**

b) State the importance of recycling of used oils. Explain various method of disposal of used oils. **[6]**

c) Explain the following terms in short. **[4]**

i) Kinematic Viscosity

ii) Absolute viscosity

iii) Viscosity Index

iv) SUS

Unit - II

Q3) a) Explain the method of friction measurement by pin - on - disk apparatus. **[4]**

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

i) Stick - slip phenomenon

ii) Modified Adhesion theory of friction

iii) Tomlinson theory of molecular attraction

OR

P.T.O.

Q4) a) What are the factors affecting wear rate **[4]**

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

i) Fretting

ii) Erosive wear

iii) Archard's wear theory

Unit - III

Q5) a) Derive the two dimensional Reynolds equation for hydrodynamic lubrication. Also state the assumptions in derivation. **[12]**

b) State and explain any three parameters to be considered in hydrodynamic journal bearing design. **[6]**

OR

Q6) a) Derive the equation for pressure distribution and load carrying capacity of infinite width tapered pad bearing. **[12]**

b) List different types of Hydrodynamic thrust bearing. Explain in short tilting pad thrust bearing. **[6]**

SECTION - II

Unit - IV

Q7) a) Derive the equation for flow rate and pressure distribution in hydrostatic step bearing. What are the assumptions made? **[8]**

b) The following data is given for the hydrostatic step bearing : **[10]**

- Thrust load = 450 kN
- Shaft Speed = 750 RPM
- Shaft Diameter = 400 mm
- Recess Diameter = 250 mm
- Viscosity of the lubricant = 30 cP
- Specific gravity of lubricant = 0.86
- Specific heat of lubricant = 2 kJ/kg°C

Calculate :

i) The optimum oil film thickness for minimum power loss;

ii) The frictional power loss

iii) The pumping power loss

iv) Total power loss

v) The temperature rise; assuming the total power loss in the bearing is converted into the frictional heat.

OR

Q8) a) Derive an equation for load - carrying capacity for given instantaneous velocity of approach and film thickness in case of rectangular plate approaching a plane. **[8]**

b) A plate of 25 mm length and infinite width is separated from the plane by an oil film of 25 μm thickness and having viscosity of 0.05 N-s/m^2. If the normal load per unit width of 20 kN/m is applied on the plate, determine : **[6]**

i) The time required to reduce the film thickness to 2.5 μm

ii) The maximum pressure.

c) Give the examples of squeeze film action. **[4]**

Unit - V

Q9) a) What are applications of Elastohydradynamic lubrication? **[6]**

b) What is the purpose of providing oil grooves in bearings? Explain different types of grooves in bearings. **[6]**

c) Give advantages and limitations of gas lubricated bearings. **[4]**

OR

Q10) a) Write short notes on any two of the following : **[8]**

i) Lubricants used in cold metal working

ii) Lubricants used in hot metal working

iii) Gaskets

b) What are the desirable properties of bearing materials? **[4]**

c) Explain Hertz theory of elasto - hydrodynamic lubrication. **[4]**

Unit - VI

Q11) a) Explain in detail the techniques used for surface measurement. **[6]**

b) Give the classification of surface engineering processes. **[4]**

c) Explain in detail concept and structure of Superficial layers. **[6]**

OR

Q12) a) Explain general characteristics of superficial layers. **[6]**

b) Explain in detail Cladded Coating technique. **[6]**

c) What is plasma arc spraying? How it differs from the flame spraying? **[4]**

♦♦♦♦

Total No. of Questions : 12]

SEAT No. :

P1120

[Total No. of Pages : 7

[4264] - 440

B.E. (Mechanical)

QUANTITATIVE AND DECISION MAKING TECHNIQUES

(Semester - I) (2008 Pattern) (Elective - II) (Theory)

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

Instructions to the candidates:

1) ***All the questions are compulsory.***
2) ***Two separate answer books are used for Section I and Section II.***
3) ***Figures to the right indicate full marks.***
4) ***Use of calculator is permitted.***
5) ***Assume suitable data, if necessary.***

SECTION - I

Unit - I

Q1) a) Explain : **[6]**

i) Pure and Mixed Strategies

ii) Dominance Rules

b) Solve the following 2 x 5 game by graphical method and find the optimum strategies and value of game. **[10]**

		Player B				
		1	**2**	**3**	**4**	**5**
Player A	**1**	–5	5	0	–1	8
	2	8	–4	–1	6	–5

OR

Q2) a) Define Operations Research. Describe briefly its functions. **[6]**

b) Solve the following 4 x 4 game using dominance property. **[10]**

		Player B			
		1	**2**	**3**	**4**
Player A	**1**	6	4	8	0
	2	6	8	4	8
	3	8	4	8	0
	4	0	8	0	16

P.T.O.

Unit - II

Q3) a) Define following terms of Linear Programming **[6]**

i) Degenerate solution

ii) Optimum basic feasible solution

b) Solve LPP by Suitable Method **[10]**

Maximize:

$$Z=2X_1 +5X_2$$

Subject to:

$$X_1 + 4X_2 \leq 24$$

$$3X_1+ X_2 \leq 21$$

$$X_1+X_2 \leq 9$$

$$X_1, X_2 \geq 0$$

OR

Q4) a) Define Linear Programming. Give applications of Linear Programming.**[4]**

b) A factory has decided to diversify its activities. The data collected for the sales and production departments are summarized below: **[12]**

Potential demand exists for two products A and B. Market can absorb any quantity of A, whereas the share of B for this organization is expected to be not more than 400 units per month. Contribution per unit of products A and B is expected to be Rs. 6 and Rs. 8 respectively. These products require three different processes and the time required per unit of product is given in the table below :

Process	Product A	Product B	Available Hours
1	2	3	900
2	1	2	600
3	2	2	1200

Find the product mix to optimize the contribution.

Unit - III

Q5) a) Discuss the traveling salesman problem as an assignment problem with sub-optimal solution. **[6]**

b) A company has three production shops supplying a product to five warehouses. The cost of production varies from shop to shop and so does the unit transportation cost from shop to warehouse. Each shop has a specific production capacity and each warehouse has certain amount of requirement. The unit transportation costs are given below: **[12]**

		Warehouse					Capacity
		1	**2**	**3**	**4**	**5**	
Shop	**A**	6	4	4	7	5	100
	B	5	6	7	4	8	125
	C	3	4	6	3	4	175
	Demand	60	80	85	105	70	

The cost of manufacturing the product at different production shops is

		Variable cost (Rs.)	**Fixed Cost (Rs.)**
	A	14	7000
Shop	**B**	16	4000
	C	15	5000

Find the optimum quantity to be supplied from each shop to different warehouses at minimum total cost.

OR

Q6) a) Discuss the similarities and differences between the transportation and assignment problem. **[6]**

b) A Municipal Corporation has decided to out road repairs on four main arteries of the city. Municipal Corporation has granted Rs. 50 Lakh for this work with a condition that the repair must be done at the lowest cost and quickest time. The Municipal Corporation has floated tenders and five contractors have sent in their bids. In order to expedite work, one road will be awarded to only one contractor. **[12]**

i) Find the best way of assigning the repairs to the contractors and associated cost.

ii) If it is necessary to seek supplementary grant, what should be the amount sought.

iii) Which of the five contractors will be unsuccessful in his bid?

		Cost of repairs on road (Rs. Lakhs)			
		1	2	3	4
Contractors	C1	9	14	19	15
	C2	7	17	20	19
	C3	9	18	21	18
	C4	10	12	18	19
	C5	10	15	21	16

SECTION - II
Unit - IV

Q7) a) Classify Inventory Models. & Define Deterministic Model. **[6]**

b) Derive the Economic Order Quantity Relation with instantaneous Stock Replenishment. **[10]**

OR

Q8) Attempt Any Two : **[8]**

a) A Manufacturer has to supply his customer 3600 units of his product per year. Shortages are not permitted. Inventory carrying cost amounts Rs. 1.2 per unit per annum. The set-up cost per run is Rs. 80.

Find : -

i) Economic order quantity.

ii) Optimum number of orders per annum.

iii) Average annual inventory cost (minimum).

iv) Optimum period of supply per optimum order.

b) A dealer supplies you the following information with regard to a product dealt - in by him : **[8]**

Annual demand : 10,000 units

Ordering cost : Rs 10 per order

Inventory carrying cost : 20% of value of inventory per year.

Price : Rs 20 per unit.

The dealer is considering the possibility of allowing some back-order (stock out) to occur. The dealer has estimated that the annual cost of back-ordering will be 25% of value of inventory.

i) What should be the optimum number of units of products he should buy in one lot?

ii) What quantity of product should be allowed to be back ordered, if any?

iii) What would be the maximum quantity of inventory at any time of the year?

iv) Would you recommend to allow back-ordering? If so, what would be the annual cost of saving by adopting the policy of back ordering?

c) Workers come to tool store room to receive special tools for accomplishing a project. The average time between two arrivals is 60 seconds and the arrivals are in Poisson distribution. The average service time is 40 seconds. Determine. **[8]**

i) average queue length.

ii) average length of non-empty queues.

iii) average number of workers in system including the worker being attended.

iv) mean waiting time of an arrival.

v) average waiting time of an arrival (worker) who waits and.

vi) the type of policy to be established. Determine whether to go in for an additional tool store room attendant which will minimize the combined cost of attendant's idle time and the cost of workers waiting time. Charge of worker is Rs. 4 per hour and that of tool store room attendant is Rs. 0.75 per hour.

Unit - V

Q9) a) ABC company plans to sell an article at a local market. The articles are purchased at Rs. 5. On the condition that all unsold articles shall be returned. The rent for the space is Rs 2000. The article will be sold at Rs 9. Determine the number of articles which must be sold. **[8]**

i) To break even

ii) To earn Rs. 400 as profit.

iii) If the company sells 750 articles. Calculate margin of safety and profit.

b) Explain the Payback Period Method. **[4]**

c) Differentiate between Payback Period Method and IRR Method. **[4]**

OR

Q10) A manufacturer is offered 2 machines A & B. A has cost of Rs. 2500, its running cost is Rs. 400 for each of the first 5 years and increases by Rs. 100 every subsequent year. Machine B having the same capacity as A, costs Rs. 1250, has running cost of Rs. 600 for 6 years increasing by Rs. 100 per year there after. If money is worth 10% per year. Which machine should be purchased? Scrap value of both machines is negligibly small. **[16]**

Unit - VI

Q11) The time estimates (in weeks) for activities of a PERT network are given below. **[18]**

Activity	t_o	t_m	t_p
1 - 2	1	1	7
1 - 3	1	4	7
1 - 4	2	2	8
2 - 5	1	1	1
3 - 5	2	5	14
4 - 6	2	5	8
5 - 6	3	6	15

Given that for.
$Z = 1.33$; $P = 0.9082$
$Z = 0.67$, $P = 0.7486$
$Z = 1$, $P = 0.8413$.

a) Draw the project network and identify all paths through it.

b) Determine the expected project length.

c) Calculate the standard deviation and variance of project length.

d) What is the probability that the project will be completed

i) at least 4 weeks earlier than expected time.

ii) no more than 4 weeks later than expected time.

e) If the project due date is 19 weeks. What is the probability of not meeting the due date? Completion time is 20 weeks.

f) What should be the scheduled completion time for the probability of completion to be 90%.

OR

Q12) Write short note on (Any three) : **[18]**

a) Differentiate PERT and CPM.

b) Types of Floats.

c) Dynamic Programming.

d) Goal Programming.

✪✡✪✡

Total No. of Questions : 12]

SEAT No. :

P1121

[Total No. of Pages : 3

[4264]-453

B.E. (Mechanical - Sandwich)

REFRIGERATION AND AIR CONDITIONING

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

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

Instructions to the candidates:

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

SECTION - I

Q1) a) Write a note on "Vortex Tube Refrigeration". **[6]**

b) What is the necessity of air - craft refrigeration? Explain Boot Strap system with the help of T-S diagram. Mention the function of each component with the help of a neat sketch. **[10]**

OR

Q2) a) Explain the concept of DART. **[4]**

b) With the help of T-S diagram for simple air refrigeration system explain the following terms. **[12]**

i) Ram efficiency

ii) Compressor efficiency

iii) Heat exchanger effectiveness

iv) Turbine efficiency

Q3) a) Write a note on desirable properties of refrigerants. **[6]**

b) Explain the following terms : **[12]**

i) Ozone Depletion Potential

ii) Global Warming Potential

iii) TEWI

OR

P.T.O.

Q4) a) Write note on refrigerant recovery, recycling and reclaiming. **[6]**

b) Discuss the classification of refrigerants used in refrigeration plants. **[6]**

c) Write a note on "Refrigerant Piping and Design" **[6]**

Q5) a) What is the necessity of multi - staging? Explain Cascade system with the help of a sketch and P-h diagram. **[8]**

b) Explain two stage compressions with flash gas removal with the help of a sketch and P-h diagram. **[8]**

OR

Q6) a) Discuss the desirable properties of absorbent and refrigerant - absorbent mixture of a vapour absorption system. **[8]**

b) Explain Electrolux system with a neat sketch. **[8]**

SECTION - II

Q7) a) Explain the role of in - filtration and ventilation load during air - conditioning of air. **[4]**

b) Compare : Unitary air conditioning and central air conditioning. **[4]**

c) Explain the following with hand drawn psychrometric chart **[8]**

i) ADP
ii) RSHF
iii) ERSHF
iv) GSHF

OR

Q8) a) Write short notes on **[10]**

i) Automobile air conditioning system
ii) All water system

b) Explain the various industrial applications of air - conditioning. **[6]**

Q9) a) Write short notes on : **[8]**

i) Low and high pressure cutoff
ii) Humidi stat

b) Describe any two expansion devices used in refrigeration systems. **[8]**

OR

Q10) a) What are the methods for determination of duct size? Explain Static Regain Method in detail. Also state its advantages over other methods. **[8]**

b) Prove that the equivalent circular diameter of a rectangular duct is given by

$$De = 1.265 \{(ab)^3/a + b\}^{0.2}$$

Where a and b are longer and shorter sides of a rectangular duct. **[8]**

Q11) a) Explain the factors which are responsible for the spoiling food and vegetables? What are the methods for preservation of food and vegetables? **[12]**

b) Write a note on Cold Storage. **[6]**

OR

Q12) a) What is cryogenics? Explain different methods for liquefaction of air. **[10]**

b) What are the different applications of cryogenics? Discuss in detail. **[8]**

♦♦♦♦

Total No. of Questions : 12]

SEAT No. :

P1123

[Total No. of Pages : 3

[4264]-462
B.E. (Production)
MANUFACTURING AUTOMATION
(Semester - I) (2008 Pattern)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) Explain primary functions and quality properties of a hydraulic fluid. **[4]**

b) Which parameters need to be consider for the analysis of pump performance. **[4]**

c) Explain with neat sketch the unbalance variable displacement vane pump also derive an expression for its flow. **[8]**

OR

Q2) a) Define filter and strainer and state the guidelines for selection of filters used in hydraulic circuit. **[8]**

b) A pump has displacement of 14 cm^3/rev. Runs at 2000 rpm. It operates against a maximum system pressure of 150 bar. The volumetric efficiency of the pump are 0.90 and 0.80 respectively. Determine **[8]**

i) Actual flow rate delivered in litre/min

ii) Input power required driving the pump

iii) The drive torque at the pump shaft.

Q3) a) Draw with neat sketch of Fail - safe circuit and explain its features. **[8]**

b) Explain hydraulic circuit for punching operation using intensifier. **[8]**

OR

Q4) a) Draw a neat sketch and explain the working of sequencing circuit. **[8]**

b) With the help of sketches explain different types of actuators with industrial applications. **[8]**

P.T.O.

Q5) Draw a neat sketch and explain working of (any three) **[18]**

a) Bridge network

b) Characteristics of meter in and meter out circuit.

c) Regenerative circuit.

d) FRL unit in pneumatic systems.

OR

Q6) a) Draw a pneumatic circuit to actuate the two cylinder in following sequence **[10]**

i) Cylinder 1 extend

ii) Cylinder 2 extend

iii) Cylinder 1 retract

iv) Cylinder 2 retract

b) Explain the concept of fluidic logic gates also explain the reciprocating air compressors with neat sketch. **[8]**

SECTION - II

Q7) a) Explain pin diagram of 8085 microprocessor. **[8]**

b) Explain briefly internal architecture of 8085 microprocessor. **[8]**

OR

Q8) a) Write an assembly program for addition, subtraction of two numbers. **[8]**

b) State the programming languages used for PLC programming and explain ladder logic diagram. Also Construct a ladder diagram for following boolean equations. **[8]**

i) $y = (x1 + x2).(x3 + x4)$

ii) $y = (x1.x2)$

Q9) a) Find the digital word that results from a 3.127 V input to 5 bit ADC with 5 V reference. **[8]**

b) Draw a ladder diagram to actuate a motor control relay. When the motor is "ON" a red lamp glows and when the motor is "OFF" green lamp glows. Explain various logic gates used in ladder diagram. **[8]**

OR

Q10) a) What is meant by PI control? Explain with the help of a diagram the working of PI control used in machine tools. **[8]**

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

i) Linear feedback control system

ii) Optimal control system

Q11) a) Explain concept of automated transfer lines, also explain the different system configurations used in automated system. **[6]**

b) Derive an expression for transfer lines with no internal storage, performance measure and workstation breakdown analysis. **[6]**

c) Describe the factors in deciding types of transfer devices to be used in automated system. **[6]**

OR

Q12) Short notes on any three : **[18]**

a) Indexing mechanism.

b) Continuous transfer system.

c) Feeders used in factory automations.

d) Synchronous and non-synchronous material transfer.

♦♦♦♦

Total No. of Questions : 12]

SEAT No. :

P1125

[Total No. of Pages : 3

[4264]-465
B.E. (Production)
INDUSTRIAL ROBOTICS
(2008 Pattern) (Elective - I) (Semester - I)

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

Instructions to the candidates:

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

SECTION - I
Unit - I

Q1) a) Define Robot and with neat sketch explain the robot anatomy. **[8]**

b) Explain six degrees of freedom associated with the robot manipulator. **[8]**

OR

Q2) a) The population of robots worldwide is increasing. What are the factors contributing to this growth? **[8]**

b) Explain the following terms associated with robot : **[8]**

i) Accuracy

ii) Robot Work Envelope

iii) Repeatability

iv) Payload.

Unit - II

Q3) a) For the pick and place type of robot, the gripper is initially at location (60, 50, 80) and the following movements are in sequence. **[8]**

i) Rotation about x axis by 90°

ii) Translation along z by 30 units. Find the position of gripper with respect to the original system by using transformation matrix method.

b) List the steps involved in DH convention. **[8]**

OR

Q4) a) Explain the forward kinematics associated with planar 3R manipulator. **[8]**

P.T.O.

b) For a pick and place type of robot, the link parameters table is given below :

i	α_{i-1}	a_{i-1}	d_i	θ_i
1	0	2	0	10°
2	– 60	0	–3	0°
3	0	0	0	90°

Determine the location of the end point of the link 3 with respect to the base. **[8]**

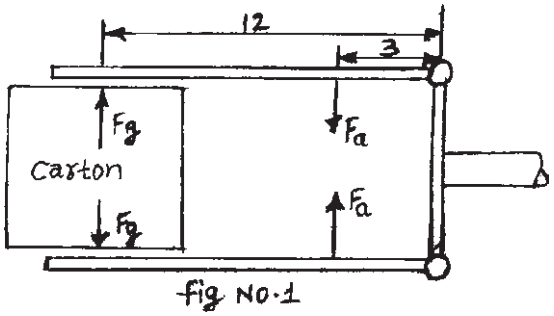
Unit - III

Q5) a) Discuss the various considerations in gripper design and selection. **[8]**

b) With neat sketch explain in detail any two types of gripper mechanisms. **[10]**

OR

Q6) a) Suppose a stiff cardboard carton weighing 10 kg is held in a gripper using friction against two opposing fingers as shown in fig. No.1. The coefficient of friction between the finger contacting surfaces and the carton surface is 0.25. Assuming a g - factor of 3.0 calculate the required gripper force. The gripper is to be actuated by a piston device to apply an actuating force F_a. The corresponding lever arms for the two forces are shown in fig. Also calculate the actuating force. **[8]**



b) Describe **[10]**

i) Vacuum gripper.

ii) Ultrasonic gripper.

SECTION - II

Unit - IV

Q7) a) Explain the concept of low vision and high vision associated with the robot vision system. **[8]**

b) With neat sketch explain any two sensors used in robot. **[8]**

OR

Q8) a) Explain the major uses of sensors in industrial robotics. **[8]**

b) The given data represents 8 × 8 arrays of pixels. Each element in the array indicates the grey level value of the pixels. **[8]**

i) Construct histogram for the array and obtain appropriate threshold value.

ii) Convert the picture into a black and white image. The data is as :

10	11	10	11	12	12	12	12
13	15	17	17	17	17	15	13
14	17	19	19	19	19	18	14
13	17	19	20	20	19	18	13
12	17	19	20	21	19	18	12
12	17	19	19	19	19	18	12
11	15	18	18	18	18	15	11
12	11	10	11	12	12	12	12

Unit - V

Q9) a) Explain : **[8]**

i) Manual mode of programming.

ii) Lead through mode of programming.

iii) Textual robot language.

iv) Off - line programming mode.

b) Explain generations of Robot programming Language. **[8]**

OR

Q10) a) Explain 'WAIT', 'DELAY', 'SIGNAL', 'DEPART' commands with suitable example. **[8]**

b) Explain the hydraulic system used for robot system with advantages & Limitations. **[8]**

Unit - VI

Q11) a) How is software and hardware of robot, handshaking with PC done? **[9]**

b) Explain the working of RS232C interface used in Robotics system. **[9]**

OR

Q12) a) Describe the following applications of robot stating their configurations. **[9]**

i) Spray painting.

ii) Machine loading and unloading.

b) Write a note on : **[9]**

i) Walking Robot.

ii) Under water Robot.

♦♦♦♦

Total No. of Questions : 12]

SEAT No. :

P1126

[Total No. of Pages : 3

[4264]-466
B.E. (Production Engg.)
POWDER METALLURGY
(2008 Pattern) (Elective - I) (Semester - I)

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

Instructions to the candidates:

1) ***Answer Q 1 or Q2, 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.***

SECTION - I

Q1) a) Describe the commercial process for the electrodeposition of Copper along with a neat diagram and explain any 2 factors affecting the characteristics of electrodeposit. **[6]**

b) Explain Hoganas process with a neat diagram. **[6]**

c) Write short notes on : **[6]**

i) Hydrogen loss test

ii) Acid insoluble test

OR

Q2) a) Describe the configurations of a rotating ball mill which is loaded. **[6]**

b) Explain the influence of Specific surface area, flow rate and compression ratio on the behaviour of powders. **[6]**

c) With the help of a neat sketch, explain the working of the vertical gas atomizer. **[6]**

Q3) a) Describe in details the phenomena of compaction. **[6]**

b) How can we avoid the large variation of green density of compact? **[6]**

c) State the purpose of adding binders and lubricants giving examples of each. **[4]**

OR

P.T.O.

Q4) a) What are the means to avoid rejection due to fracturing of green compacts. **[6]**

b) Compare hydraulic press with mechanical press. What are the essential compacting tools and state the steel from which they are made. **[6]**

c) Explain the slip casting of metal powders. **[4]**

Q5) a) State the different types of sintering furnaces and explain any one furnace with the help of a sketch. **[6]**

b) Explain the several mechanisms of material transport in Sintering with the help of a diagram. **[6]**

c) Write short note on Infiltration. **[4]**

OR

Q6) a) What are the advantages and limitations of Liquid phase sintering. **[6]**

b) How does particle size, particle shape, particle structure and green density affect solid state sintering. **[6]**

c) State and explain the purpose of different atmospheres in sintering furnaces. **[4]**

SECTION - II

Q7) a) State the advantages and disadvantages of isostatic compacting over die compacting. **[8]**

b) Write shortnotes on : **[8]**

i) Explosive compaction

ii) Powder forging

OR

Q8) a) Explain in details Hot Isostatic Pressing (HIP) with a neat diagram. **[8]**

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

i) Injection moulding

ii) Roll Compaction

Q9) a) What are the different heat treatments done on P/M parts? Explain steam treatment. **[8]**

b) State the advantages and limitations of powder metallurgy. **[8]**

OR

Q10) a) What are nanosize particles? What are the problems associated with handling such particles? **[8]**

b) Explain sizing, coining and impregnation. Where is impregnation used? **[8]**

Q11) With the help of a neat flow chart explain production details of the following : **[18]**

a) Electrical Contact Materials

b) Cemented Carbide tools

c) Brakes and clutch lining material

OR

Q12) With the help of a neat flow chart explain production details of the following: **[18]**

a) Diamond Impregnated tools.

b) Porous bearings

c) Refractory metal components

♦♦♦♦

Total No. of Questions : 12]

SEAT No. :

P1131

[Total No. of Pages : 3

[4264]-482
B.E. (Production Sandwich)
MECHATRONICS AND ROBOTICS
(2008 Pattern) (Semester - I)

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

Instructions to the candidates:

1) ***Answer any three questions from Section I and any three questions from Section II.***
2) ***Answers to the two sections should be written in separate answer - books.***
3) ***Use of calculator is allowed.***
4) ***Figures to the right indicate full marks.***

SECTION - I

Q1) a) What do you mean by Control System Compare Open Loop and Close Loop System in detail. Along with example. **[10]**

b) Define Mechatronics explain importance and scope of it. **[8]**

OR

Q2) a) Define System Response explain along with Example first order system in. In detail and mathematical expression for same. **[10]**

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

i) Operation Amplifier.

ii) ADC-DAC Converter.

Q3) Draw the architecture of 8085 Explain all the pins used in Microprocessor In detail. **[16]**

OR

Q4) Explain the following. **[16]**

a) TTL and CMOS.

b) Application of Microprocessor.

c) Basic Structure of Microcomputer.

d) Register used in 8085 Microprocessor.

Q5) a) Explain along with example Various Commands used in Assembly Language (Any four). **[8]**

b) Write an assembly language programme to measure the minimum pressure for pressure measuring device. **[4]**

c) Write an assembly language programme to addition of 1 to 10 Numbers. **[4]**

P.T.O.

OR

Q6) a) What do you mean by interfacing explain importance of it also explain Serial and parallel interfacing. **[10]**

b) Write a short note on Hand Shaking. **[6]**

SECTION - II

Q7) a) Explain the basic structure of PLC with neat figure. **[6]**

b) A motor is put on by START Switch which is NO.A pump is started after delay of 25 second after starting the motor. The motor is switched off by a STOP Button the pump is switched off after a delay of 10 second . An emergency STOP switched provided which stops the motor and Pump simultaneously. **[10]**

OR

Q8) a) Explain in detail application of PLC in filling of mineral Water bottle. **[10]**

b) Write a short note on various types of Sensors. **[6]**

Q9) a) Explain the mechanical aspect of Motor Selection. **[4]**

b) Write a short note on application of Steeper Motor. **[4]**

c) Explain the different Mechanical Actuator system. (Type. Fig, Application) **[8]**

OR

Q10) a) Explain different types Grippers used in Robotics along with neat sketch. **[8]**

b) Define Control Action Explain the following. **[8]**

i) On - Off Control.

ii) Proportional Control

iii) Integral Control

Q11) a) Define the Robot. Explain the following with reference to Robot. **[6]**

i) Accuracy.

ii) Repeatability.

iii) Resolution

iv) Spatial Resolution

b) Write a short note on Generation of Robot. **[6]**

c) Explain role of Robot in Manufacturing Industry. **[6]**

OR

Q12) a) List out different application of Robot and explain the in detail application Robot in spot welding and Spray Painting. **[8]**

b) Explain the following in detail **[10]**

i) Factors affecting the selection of Robot.

ii) Modular Design (Building block) concept in robotics

♦♦♦♦

Total No. of Questions : 12]

SEAT No. :

P1136

[Total No. of Pages : 3

[4264]-502
B.E. (Electrical)
POWER SYSTEM OPERATION & CONTROL
(2008 Pattern) (Sem. - I)

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

Instructions to the candidates:

1) ***Answers to the two sections should be written in separate books.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of electronic pocket calculator is allowed.***

SECTION - I

Q1) a) Explain the equal area criterion for determination of transient stability. **[8]**

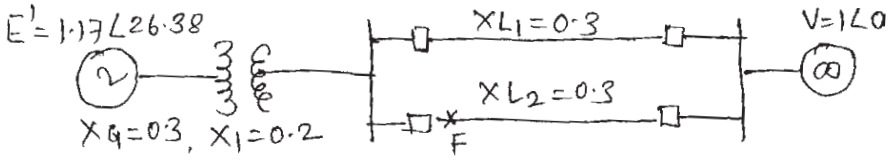
b) What do you mean by a swing curve? What is its significance in stability studies? **[4]**

c) Derive the swing equation. **[6]**

OR

Q2) a) Compare steady state, transient state and dynamic state stability in respect of loading of the power system, time duration of study, stability limit, definition. **[9]**

b) A 60 Hz. synchronous generator having inertia constant H = 5 MJ/MVA and a direct axis transient reactance $X'_d = 0.3$ p.u is connected to an infinite bus through a purely reactive circuit as shown in fig. (2b). The induced emf of generator is $1.17\angle 26.38$ p.u. and is delivering real power $p_e = 0.8$ p.u. to infinite bus at $V = 1\angle 0$ p.u. A temporary three phase fault occurs at the sending end of the line at point F. When the fault is cleared both the lines are intact. Determine the critical clearing angle and fault clearing time. **[9]**



Q3) a) What is the necessity of reactive power control. **[8]**

b) Explain the loading capability curve of synchronous generator. **[8]**

OR

P.T.O.

Q4) a) Explain the concept of subsynchronous resonance in detail. **[7]**

b) What are different types of compensations used in power system. **[9]**

Q5) a) What are problems of A.C. transmission system causes the thought of FACTS controllers. **[6]**

b) Write the short note on : **[10]**

i) SVC

ii) STATCOM

OR

Q6) Explain in detail principle of operation, draw circuit diagram, and give the applications of **[16]**

a) TCSC

b) UPFC

SECTION - II

Q7) a) Explain the concept of Area Control Error (ACE). With the help of neat block diagram, explain the proportional plus integral load frequency control of two area control case. **[10]**

b) Explain the concept of 'Generator rate constraint' and 'Speed governor dead - band' with reference to automatic generation control. **[8]**

OR

Q8) a) With mathematical formulation and complete block diagram representation explain load frequency control of an isolated power system. **[12]**

b) With schematic diagram, explain the working of turbine speed governing system. **[6]**

Q9) a) Define unit commitment. Explain the necessity of unit commitment task. **[4]**

b) Explain following terms related to unit commitment. **[12]**

i) Minimum up time & minimum down time.

ii) Spinning reserve.

iii) Must run constraint.

iv) Fuel constraint.

v) Hydro constraint.

vi) Constraints associated with renewable energy sources.

OR

Q10) a) With proper example, explain 'priority list method'. Also state other methods for unit commitment. **[8]**

b) Derive the objective of minimization of operating cost of thermal units for economic load dispatch without including transmission loss and considering constraint of meeting the load demand. **[8]**

Q11) Explain following concepts regarding exchange of power **[16]**

a) Energy banking.

b) Capacity interchange.

c) Diversity interchange.

d) Emergency power interchange.

OR

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

a) Multi - utility interchange transactions.

b) Inter utility economy energy evaluation.

c) Power pools.

d) Inadvertent power exchange.

♦♦♦♦

Total No. of Questions : 12]

SEAT No. :

P1140

[Total No. of Pages : 3

[4264]-507
B.E. (Electrical)
PROJECT MANAGEMENT
(2008 Pattern) (Elective - I) (Semester - I)

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) ***Figures to the right indicate full marks.***
4) ***Use of scientific calculator is allowed.***

SECTION - I

Q1) Explain various characteristics of project management. How is project appraisal carried out? **[16]**

OR

Q2) What is the need for project management? Explain various phases of project life cycle. **[16]**

Q3) What costs are associated with a project and how are they estimated? How will you carry out the financial evaluation of a project? **[16]**

OR

Q4) What is the importance of project selection? Explain the probable causes of project failure. **[16]**

Q5) Explain the importance of Gantt charts with special reference to scheduling. How is a PERT network developed? Explain its applications in practice. **[18]**

OR

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

a) GERT

b) Resource allocation

c) Project crashing.

SECTION - II

Q7) a) What are the different components of capital cost of a project? Describe in detail the "Margin money for working capital" and its importance. **[10]**

b) What are the probable factors for cost escalation? How to take care of them in planning stage? **[6]**

P.T.O.

OR

Q8) a) What are the different cost factors? Define direct cost & Indirect cost and prime cost. **[6]**

b) What is the importance of a budget? What are the elements to be considered for making a budget? Describe the advantages of budgetary control. **[10]**

Q9) a) Define Quality. What are the importance of quality planning, assurance and control. **[6]**

b) What are the different methods for maintaining the quality of procured items? Describe in detail. **[10]**

OR

Q10) a) Name the factors which are important for international project management and how to control them? **[8]**

b) Describe the different techniques for quality assurance & control. **[8]**

Q11) a) Define Risk from the investment point of view. Why certainty equivalent coefficient is better than Risk - adjusted discount rate method? **[6]**

b) Define correlation coefficient what are the different types of correlation - describe. **[6]**

c) Explain in detail the diversifiable & Non - diversifiable risk. **[6]**

OR

Q12) a) What is "Beta" coefficient? What does it measure? **[4]**

b) Datas are given for two companies as below :

For Company A : Manufacturing Electric Motors

State of Economy	Probability of Occurrence	Return on Investment
Strong Boom (SB)	0.20	45%
Mild Boom (MB)	0.15	20%
Average Economy (AE)	0.30	15%
Mild Recession (MR)	0.15	10%
Strong Recession (SR)	0.20	5%

For Company B : Manufacturing Transformer

Strong Boom (SB)	0.20	50%
Mild Boom (MB)	0.15	25%
Average Economy (AE)	0.30	15%
Mild Recession (MR)	0.15	10%
Strong Recession (SR)	0.20	(–)3.75%

Now ascertain which one of these two companies is better from return on investment point of view, if the expected return from both the companies (project) is same. **[14]**

♦♦♦♦

Total No. of Questions : 12]

SEAT No. :

P1147

[Total No. of Pages : 3

[4264]-526
B.E. (Electronics)
BIOMEDICAL INSTRUMENTATION
(2008 Pattern) (Elective - I) (Semester - I)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) Explain the basic components of medical instrumentation system with the help of block diagram. **[8]**

b) With help of two electrode equivalent circuit explain measurement of biopotential and half cell potential. **[8]**

c) Give the full expanded form of the following : **[2]**

i) EKG

ii) EMG

iii) EOG

iv) ERG

OR

Q2) a) Discuss 10 most important factors to be considered in the design of medical instrumentation. **[8]**

b) Explain the meaning of action potential, resting potential, depolarization and repolarization of cell with necessary diagrams. **[8]**

c) Give classification of transducer with proper examples. **[2]**

Q3) a) What are the different components of central nervous system? Explain in detail. **[8]**

b) Name different types of EMG. Explain procedure to perform EMG with help of neat block diagram. **[8]**

OR

P.T.O.

Q4) a) What is EEG? Explain 10 - 20 electrode placement. **[10]**

b) Explain various types of EEG electrodes. **[6]**

Q5) a) Lead I amplitude is 4 mm, lead III amplitude is 7 mm what is lead II amplitude. If intensity is 100 mm/mv calculate aVR, aVL, aVF **[8]**

b) Explain concept of phonocardiography with help of basic heart sounds and primary signal characteristics. **[8]**

OR

Q6) a) Draw ECG waveforms. Label critical parts of waveform. Show amplitude and time duration for normal ECG. Briefly explain the waveform. **[8]**

b) Explain the different chambers of heart. Explain an electrical conduction system of heart and the process of ECG genesis. **[8]**

SECTION - II

Q7) a) Explain two important techniques used in sphygmometric blood pressure measurement. Distinguish between direct and indirect B.P. measurement. **[8]**

b) Explain any two types of cardiac pacemakers in detail with necessary waveforms. **[8]**

c) What is Systolic and Diastolic blood pressure. **[2]**

OR

Q8) a) Explain block diagram of bedside patient monitoring system. **[8]**

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

i) Plethysmography

ii) Echocardiography

iii) Defibrillators

c) Enlist various preamplifiers used in bio - signal conditioning. **[2]**

Q9) a) What are the components of pulse oximeter probe? Explain analog signal processing by pulse oximetry. **[8]**

b) What is pH of blood? Explain electrodes used in blood pH measurement. **[8]**

OR

Q10) a) Explain vitro oximetry and vivo oximetry in detail. **[8]**

b) Name different methods of cell counting. Explain any one in detail. **[8]**

Q11) a) Explain operation of X - Ray machine with the help of neat block diagram. **[8]**

b) Name the detectors used in CT scanners. Explain each of them with their features. **[8]**

OR

Q12) a) Explain working principle of MRI machine with the help of block diagram. **[8]**

b) State the three processes to form laser beam. Explain any one in detail with help of diagram. **[8]**

♦♦♦♦

Total No. of Questions : 12]

SEAT No. :

P1152

[Total No. of Pages : 2

[4264]-542
B.E. (E & TC)
VLSI DESIGN AND TECHNOLOGY
(2008 Pattern) (Semester - I)

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

Instructions to the candidates:

1) ***Answer any 3 questions from each section.***
2) ***Answers to the two sections should be written in separate books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
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) Draw Schematic and Explain various types of CMOS Differential Amplifiers. **[16]**

OR

Q2) a) With Schematic Diagram and I-V Characteristics Explain Current Sink and Current Source. **[10]**

b) Write short note on Cascode Amplifier. **[6]**

Q3) a) Explain CMOS Inverter with Transfer Characteristics. **[10]**

b) Write Short note on Hot Electron Effect. **[6]**

OR

Q4) a) Explain Different Power Dissipation in CMOS circuit designs. **[10]**

b) List Different Design Rule Checks. **[6]**

Q5) a) With VHDL Code Explain Synthesizable and Non Synthesizable Test Bench. **[12]**

b) Write short note on Configuration. **[6]**

OR

Q6) a) With VHDL Code Explain Function and Procedure. **[12]**

b) Write short note on Metastability. **[6]**

P.T.O.

SECTION - II

Q7) a) Explain the limitation of CPLD and FPGA Devices. **[6]**

b) Explain different types of Memories. **[10]**

OR

Q8) Draw the Block Diagram and explain the Architecture of CPLD. **[16]**

Q9) a) Why there is Need of Design for Testability? Explain Controllability and Predictability. **[10]**

b) Explain Partial and Full Scan check. **[6]**

OR

Q10) a) Explain Different types of Faults. **[6]**

b) Draw state diagram and explain Test Access Port. **[10]**

Q11) a) List different Signal Integrity issues. **[6]**

b) What is Clock Skew and Clock Jitter? Explain different Techniques of Clock Distribution. **[12]**

OR

Q12) a) Explain Interconnect Routing Techniques. **[6]**

b) Explain Power Distribution and Power Optimization Techniques. **[12]**

♦♦♦♦

Total No. of Questions : 12]

SEAT No. :

P1156

[Total No. of Pages : 4

[4264]-546
B.E. (E & TC)
INDUSTRIAL DRIVES AND CONTROL
(2008 Pattern) (Elective - I) (Semester - I)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) Draw the circuit diagram of a three - phase semi - converter feeding a highly inductive (level) load and the following waveforms for firing angle $\alpha = 60°$. **[12]**

i) Supply phase voltages

ii) Supply line voltages.

iii) Output voltage

iv) Phase A line current

Also derive an expression for the average output voltage.

b) A three - phase semi - converter operates from the 415V, 50Hz mains and feeds a highly inductive (level) active load having $R = 20\Omega$. If the firing angle is 45°, calculate : **[6]**

i) Average (DC) load voltage

ii) Average (DC) load current.

OR

Q2) a) With the help of a neat circuit diagram, waveforms and relevant equations, explain the operation of a step - down chopper feeding : **[12]**

i) a resistive load

ii) a highly inductive (level) load

P.T.O.

b) A step - down chopper operating from a 100 V DC supply feeds a resistive load with a duty cycle of 50% Calculate : **[6]**

i) The average load voltage

ii) The value of the load resistance if the input power is 1 kW (assume a lossless chopper).

Q3) a) With the help of a neat circuit diagram, relevant waveforms and mode equivalent circuits, explain the operation of a three-phase ASCSI feeding an induction motor load. **[10]**

b) A single - phase full bridge inverter operating from a 100V DC supply uses single pulse width modulation for output voltage control. If the rms output voltage is 50 V, calculate the rms values of the fundamental and third harmonic output voltages. **[6]**

OR

Q4) a) With the help of a neat circuit diagram and relevant waveforms, explain the operation of a 3 - phase voltage source bridge inverter operating with 120° conduction mode. Assume 3 - phase star connected balanced resistive load. Derive the expression for the output power in terms of the supply voltage and load resistance. **[12]**

b) Compare resonant converters with switched - mode converters. **[4]**

Q5) a) A 400 V, 1500 rpm, 10 A separately excited DC motor with $R_a = 0.25\,\Omega$, $R_f = 200\,\Omega$, $K_v = 1.2653$ V/A - rad/sec is fed from a three - phase full converter operating from the 415 V, 50 Hz mains. The field circuit is fed from a three - phase semi - converter. Speed variation below base speed is obtained by armature voltage control with the field converter set at $V_f = 400$ V, whereas speed variation above base speed is obtained by field voltage control with the armature converter set at $V_a = 400$ V. Calculate: **[8]**

i) the armature converter firing angle for a motor speed of 1200 rpm if the motor torque is 12.653 N/m.

ii) the field converter firing angle for a motor speed of 1800 rpm if the motor current is 5 A.

b) Compare dynamic and regenerative braking for DC machines. Can regenerative braking be used in all cases? Justify your answer. **[8]**

OR

Q6) a) With the help of a neat circuit diagram and quadrantal operating diagram, explain the operation of a 4 quadrant DC chopper drive. **[10]**

b) Draw a neat block diagram of under and over voltage protection circuit for a DC motor drive and explain its operation. **[6]**

SECTION - II

Q7) a) With the help a neat circuit diagram and torque speed characteristics explain stator voltage control for three - phase induction motors. What are the types of loads for which this type of control is suitable? **[12]**

b) Explain, with the help of a neat block diagram, the operation of a phase failure protection circuit for AC motor drives. **[6]**

OR

Q8) a) A three phase, 6 pole, 1160 rpm, 60 Hz induction motor is operating under constant V/f control. Assuming the speed-torque curves for various frequencies for low slips to be parallel straight lines, calculate : **[12]**

i) speed for a frequency of 20 Hz and 75% full load motoring torque.

ii) frequency for a speed of 1000 rpm and 60% full load braking torque.

iii) motor torque as a percentage of full load torque if the speed is 575 rpm at a frequency of 30 Hz.

b) Briefly explain vector control of induction motors. **[6]**

Q9) a) With the help of a phasor diagram briefly explain the operation of a salient pole synchronous motor. Derive expressions for the torque angle and the developed torque and also plot the torque versus torque angle characteristics. **[10]**

b) A three - phase 415 V, 50 Hz, 4 pole salient pole synchronous motor has $X_d = 3\ \Omega$ and $X_q = 0.5\Omega$. Assuming the armature resistance to be negligible, calculate the torque angle if the motor power is 15 kW at 0.8 lagging power factor. **[6]**

OR

Q10) Write short notes on (Any Two) : **[16]**

a) Constant volts/hertz closed loop control of synchronous motors.

b) Load - Commutated Inverter (LCI) control of synchronous motors.

c) Brushless AC motor drives.

Q11) a) What are the different methods used in AC traction employing polyphase AC motors? Explain any one such method. **[8]**

b) State the sources of various types of power line disturbances. What measures are to be taken to prevent or nullify these disturbances? **[8]**

OR

Q12) a) Explain the operation of a fuzzy logic based wind generation system. **[10]**

b) Briefly explain Energy Audit. **[6]**

♦♦♦♦

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

P1159 **[Total No. of Pages : 4**

[4264] - 549
B.E. (E&TC)
JOINT TIME FREQUENCY ANALYSIS
(2008 Pattern) (Elective - II) (Semester - I)

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

Instructions to the candidates:

1) ***Answers to the two sections should be written in separate books.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume suitable data, if necessary.***
4) ***Figures to the right indicate full marks.***

SECTION - I

Q1) What is Uncertainty Principle? Calculate time-bandwidth product (TB1) of Haar 2-band analysis low pass filter? Calculate time-bandwidth product (TB2) of two sequentially cascaded stages of Haar 2-band analysis low pass filters? Compare TB1 and TB2 and clearly state which is better from the perspective of time-frequency isolation? **[16]**

OR

Q2) Given Haar wavelet $\psi(t)$ function as follows : **[16]**

a) Find its Fourier Transform $\hat{\psi}(\Omega)$

b) Sketch spectrum of $\psi(2t - 1)$

c) Sketch spectrum of $\psi(t / 2)$

d) Prove that this function is orthogonal with its corresponding scaling function by finding out $< \phi(t).\psi(t) >$

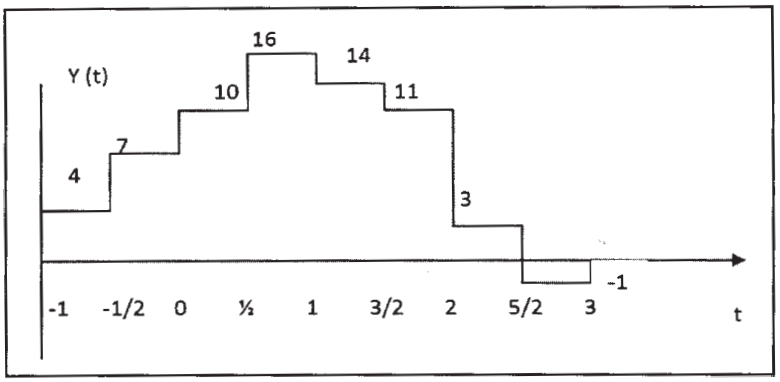
Q3) a) Verify graphically: Mexican hat wavelet function using wavelet dilation equation. Assume compact *support* of [0,2) for the roof scaling function. State clearly if this pair of scaling and wavelet functions can produce MRA? **[12]**

b) Write and explain difference between X(Z) and X(-Z)? Elaborate the difference using $X(z) = 1 + z^{-1}$. **[6]**

OR

P.T.O.

Q4) For given signal y(t) do following :



a) State which V subspace y(t) belongs to and why? **[4]**

b) Calculate y_{V_0} and y_{W_0} *?* **[4]**

c) Using Haar $\phi(t)$ plot projections and span of y(t) on V0 and using Haar ψ(t) plot projections and span of y(t) on W0 ? **[5]**

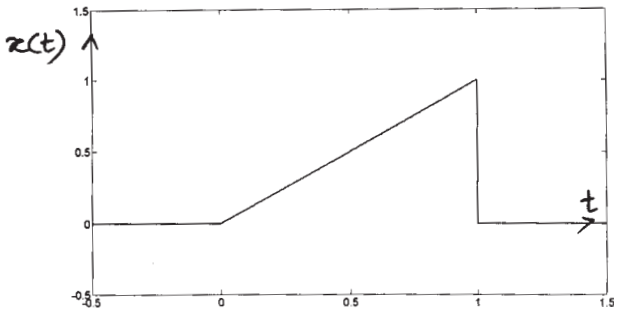
d) Reconstruct the original signal using y_{V_0} and y_{W_0} and prove

$$V_1 = V_0 \oplus W_0$$ **[5]**

Q5) a) State Axioms of Multiresolution Analysis? **[5]**

b) State Multiresolution Theorem? **[3]**

c) Find the projections of given signal x(t) on the spaces V0, V1 and V2 using approximations? Use Haar scaling function as kernel for deriving the projections? **[8]**



OR

Q6) a) Mathematically prove that analysis low-pass and high-pass filters of two-band Haar filter bank are magnitude and power complements of one another? State how this will be useful for perfect reconstruction of signal to be analyzed? **[10]**

b) Write the effect of downsampling by factor of 2 using z-domain relationship between input and output? **[6]**

SECTION - II

Q7) a) Explain the relationship between analysis HPF and analysis LPF with following mathematical formula.

$$H_1(Z) = Z^{-D}\ H_0(-Z^{-1})$$

Explain why this is called as conjugate quadrature relationship? **[8]**

b) Using perfect reconstruction condition of conjugate quadrature filter banks, determine analysis low pass filter coefficients of Daub-4? Using the alias cancellation condition also find out the analysis HP and synthesis LP and HP coefficients of Daub-4? **[8]**

OR

Q8) Draw and explain complete structure of Haar 2-band filter bank? Write and explain scaling dilation equation? Write and explain wavelet dilation equation? Derive scaling dilation equation in **frequency domain** and wavelet dilation equation in **frequency domain**? **[16]**

Q9) Using modified perfect reconstruction condition of conjugate quadrature filter banks determine the analysis filter coefficients for JPEG 2000 popular 5/3 bi-orthogonal tap? **[18]**

OR

Q10) Given $x[n] = \{1, 0, -3, 2, 1, 0, 1, 2\} \in V_3$

Develop complete Wavelet Packet tree till V 0 and Calculate the coefficients along with bases $\{W_{o,k}^{[0]}, W_{o,k}^{[1]}, ..., W_{o,k}^{[7]}\}$

Prove perfect reconstruction using the leaves from 0^{th} subspace? **[18]**

Q11) Given $x[n] = \{9, 7, 4, 6\} \in V_2$

Develop wavelet lifting scheme, using MRA framework decompose the signal to the 0^{th} subspace. Show perfect reconstruction. Clearly show 'split', 'update' and 'predict' stages and their outputs. Show how the computations happen *in place*? Explain how lifting operations help achieve compression? **[16]**

OR

Q12) a) Explain any two of the following : **[8]**

i) Need for joint time frequency analysis

ii) Application of wavelets in signal denoising

iii) Scalograms

b) Sketch and explain time-frequency tilings of any two of the following: **[8]**

i) Discrete Short term Fourier Transform

ii) Discrete Wavelet Transform

iii) Discrete Wavelet Packet Transform

Total No. of Questions : 12]

SEAT No. :

P1164

[Total No. of Pages : 2

[4264]-564

B.E. (Instrumentation & Control)

BIOMEDICAL INSTRUMENTATION

(2008 Pattern) (Semester - I) (Elective - I)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) Enlist electrodes used for ECG., EMG, and EEG signals with their material and suitable diagrams. **[10]**

b) Explain Ergonomic consideration in medical equipment design for Dental chair. **[8]**

OR

Q2) a) What is mean by Biosensor? Explain any one with selection criteria & specifications. **[10]**

b) Define Half Cell potential, Evoked Potential, electrode offset potential, Action Potential **[8]**

Q3) a) Why analog signal processing of bio-signal are required? Explain averaging & integrator circuits used in analog signal processing. **[8]**

b) Why transient protection is necessary in designing biomedical equipments? Explain transient protection circuits. **[8]**

OR

Q4) a) What is mean by vector cardiograph? Explain Einthoven triangle. **[8]**

b) Explain various types of ECG recorders. **[8]**

Q5) a) Explain ultra sonic blood flow meter which actually measure the velocity of the blood stream. **[8]**

b) What is mean by cardiac output? Explain principle of dilution method with suitable graphs. **[8]**

P.T.O.

OR

Q6) a) Discuss is phonocardiography. **[8]**

b) Explain the principle of Electromagnetic blood flow meters? **[8]**

SECTION - II

Q7) a) Explain Electromyography in detail. **[10]**

b) Explain the various parts of CNS **[8]**

OR

Q8) a) Explain electroencephalogram with 10 - 20 electrode placement system as well as electrode configurations. **[10]**

b) Explain types of electrodes used in EEG **[8]**

Q9) a) Define hearing threshold. Explain pure tone Audiometer. **[8]**

b) Explain block diagram of hearing aid. **[8]**

OR

Q10) a) Enlist errors in vision and explain way of correcting the same. **[8]**

b) Explain working of slit lamp **[8]**

Q11) a) Explain different methods of accidents prevention. **[8]**

b) Draw and Explain lung volume capacities graph **[8]**

OR

Q12) a) When Ventilator should be used? Explain various parts of Ventilator. **[10]**

b) What are the physiological Methods of electric current on body? **[6]**

♦♦♦♦

Total No. of Questions : 10]

SEAT No. :

P1179

[Total No. of Pages : 3

[4264] - 634

B.E. (Petroleum)

PETROLEUM EXPLORATION

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

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

Instructions to the candidates:

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

SECTION - I

Q1) a) Explain the concept of half anomaly width for a sphere and a horizontal slab with vertical fault in the interpretation of gravity data. **[5]**

b) Explain with suitable diagram VES using Schlumberger technique. What are the limitations of this technique over VES using Wenner arrangement? **[10]**

OR

Q2) a) What are the different corrections applied to magnetic survey. Explain in brief any two of them. **[5]**

b) Explain the construction of Scintillation Counter. How it is used in radioactivity survey? **[10]**

Q3) a) What are different field parameters used to design a seismic reflection survey? What are the various constrains to decide these parameters.**[10]**

b) What is a static correction applied to seismic data? **[5]**

OR

P.T.O.

Q4) a) Plot X^2 - T^2 for offsets and reflection times given below in a table. Fit a straight line to the plotted points and estimate velocity, V, and zero-offset time, T_0. Give plausible interpretation for the plot **[10]**

Offset X(m)	Time, T(S)	Offset X(m)	Time, T(S)
100	2.251	3300	2.460
500	2.255	3700	2.500
900	2.265	4100	2.575
1300	2.287	4500	2.620
1700	2.300	4900	2.700
2100	2.338	5300	2.760
2500	2.380	5700	2.830
2900	2.410		

b) What is cross well seismic? **[5]**

Q5) Answer the following in brief (any five) **[20]**

a) Seismic impedance
b) Time lapse Seismic
c) Direct Hydrocarbon Indicators
d) Amplitude Versus Offset
e) 3 D seismic imaging
f) Gravity anomaly
g) V_{RMS}, V_{Stack},
h) Isochronopach maps

SECTION - II

Q6) a) Describe with the help of a flow diagram steps involved in the modeling of sedimentary basins during the search of hydrocarbons. **[10]**

b) What are surface geochemical expressions of petroleum seepage? **[5]**

OR

Q7) a) What is a frontier basin? Explain systematic way of analysis of a frontier basin. **[10]**

b) Explain the difference between proven and probable reserves. **[5]**

Q8) a) Calculate the risk involved from the given data. **[8]**

EVENT	***PROBABILITY***
Existence of source rock	0.90
Effective trapping mechanism	0.80
Migration path to reservoir	0.85
Reservoir rock with porosity and permeability	0.80
Existence and persistence of seal	0.80

Explain whether the risk is low or high? What may be the reasons for increasing / decreasing risk?

b) Calculate the amount of oil present in a reservoir covering an area of 10 km^2 with an average thickness of 10m. The average porosity is 20 % and the water saturation is 30 %. Calculate in m^3. **[7]**

How much oil may be recovered from this reservoir if we assume an average recovery factor of 30 %? How is uncertainty addressed in the calculation of each parameter?

OR

Q9) a) Explain the volumetric method of reserves estimation for oil and gas. How is uncertainty reduced in the calculation of area and thickness? **[10]**

b) What are the advantages of using GIS in Petroleum exploration? **[5]**

Q10) Answer <u>any five</u> from the following with the help of suitable diagrams if necessary. **[20]**

a) Petroleum System and definition of critical moment

b) How is quality of a reservoir seal rock decided?

c) What is a pinch out of formation?

d) What are hydrocarbon plays and prospect?

e) NELP in India

f) Pattern recognition in seismic interpretation

g) Reserves auditing

h) Data structure in GIS

i) Development of multivariate maps from vector GIS

✪✡✪✡

Total No. of Questions : 12]

SEAT No. :

P1199

[Total No. of Pages : 3

[4264]-696

B.E. (Computer Engineering)

ARTIFICIAL INTELLIGENCE

(2008 Pattern) (Elective - I) (Semester - I)

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

Instructions to the candidates:

1) ***Attempt 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 the four approaches to Artificial Intelligence. **[8]**

b) What is Task Environment? Explain the properties of task environment with examples. **[8]**

OR

Q2) a) Explain the Artificial Intelligence Applications. **[8]**

b) Explain a general model of Learning Agents. **[8]**

Q3) a) What is Toy Problem? Formulate and solve the vacuum world problem assume it as a sensorless problem. **[8]**

b) Explain A - star search algorithm by minimizing the total estimated solution cost. **[8]**

OR

Q4) a) How to measure the problem solving performance. Explain the depth - limited search performance. **[8]**

b) Explain Greedy local Search algorithm and write the reasons for stoping the algorithms. **[8]**

Q5) a) Define game? Explain Optimal strategies for soling Tic - tac - Toe game. **[8]**

b) Explain the approaches for solving tree structured Constraint satisfaction problem with a suitable example. **[10]**

OR

Q6) a) What is horizon effect? How to design good Evaluation Functions in a game of chance explain with suitable example. **[8]**

b) Write the rule for generating propagating constraints for solving the given Cryptarithmetic problem : **[10]**

SEND + MORE = MONEY

P.T.O.

SECTION - II

Q7) a) Find the resolution proof that Curiosity killed the cat by using the following sentences. Convert all sentences into first - order logic and then convert to Conjunctive Normal Form. **[12]**

i) Everyone who loves all animals is loved by someone.
ii) Anyone who kills an animal is loved by no one.
iii) Jack loves all animals.
iv) Either Jack or Curiosity killed the cat, who is named Tuna.
v) Did Curiosity kill the Cat?

b) What is an action Schema? Write an action for flying a plane from one location to another. **[6]**

OR

Q8) a) Explain the following in the first order logic with a suitable example and convert into Conjunctive normal Form **[10]**

i) Terms
ii) Atomic sentences
iii) Complete Sentences
iv) Universal Quantifiers
v) Existential Quantifiers
vi) Nested Quantifiers
vii) Connection between Universal and Existential Quantifiers
viii) Equality

b) Solve the Blocks world problem using forward state-space search and Back ward state - space search. **[8]**

Q9) a) What are the axioms of Probability? Explain how to derive the useful facts from the basic axioms with a suitable example? Why the probability axioms are reasonable. **[8]**

b) A writer of romance novels. A movie company and a TV network both want exclusive rights to one of her more popular works. If she signs with the network, she will receive a single lump sum, but if she signs with the movie company, the amount she will receive depends on the market response to her movie. What should she do show using decision trees? The Movie company Payouts are follows :

Small box office - Rs. 2,00,000,

Medium box office - Rs. 10,00,000,

Large box office - Rs. 30,00,000

TV Network Payout : Flat rate - Rs. 9,00,000

Probabilities : P(Small Box Office) = 0.3, P(Medium Box Office) = 0.6, P (Large Box Office) = 0.1 **[8]**

OR

Q10) a) Explain Baye's rule and solve given problem using Baye's rule : **[8]**

The alarm system at a nuclear power plant is not completely reliable. If there is something wrong with the reactor, the probability that the alarm goes off is 0.99. On the other hand, the alarm goes off on 0.01 of the days when nothing is actually wrong. Suppose that something is wrong with the reactor only one day out of 100. What is the probability that something is actually wrong if the alarm goes off?

b) A householder is currently considering insuring the contents of his house against theft for one year. He estimates that the contents of his house would cost him Rs. 20,000 to replace. Local crime statistics indicate that there is a probability of 0.03 that his house will be broken into in the coming year. In that event his losses would be 10%, 20%, or 40% of the contents with probabilities 0.5, 0.35 and 0.15 respectively. An insurance policy from company A costs Rs. 150 a year but guarantees to replace any losses due to theft. An insurance policy from company B is cheaper at Rs. 100 a year but the householder has to pay the first Rs. x of any loss himself. An insurance policy from company C is even cheaper at Rs. 75 a year but only replaces a fraction (y%) of any loss suffered. Assume that there can be at most one theft a year. Draw the decision tree. **[8]**

Q11) a) Explain the four ways of interpreting the sentences with a suitable example. **[8]**

b) Write the role of Explanation in Expert System with suitable example. **[8]**

OR

Q12) a) Explain Lexical Processing and Sentence – level processing with a suitable example. **[8]**

b) How Knowledge Acquisition is useful for building the expert system? Explain the steps involved in Knowledge Acquisition with a suitable example. **[8]**

♦♦♦♦

Total No. of Questions : 12]

SEAT No. :

P1200

[Total No. of Pages : 3

[4264]-697

B.E. (Computer Engineering)

SOFTWARE ARCHITECTURE

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

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

Instructions to the candidates:

1) ***Answers to the two sections should be written in separate books.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***All questions carry equal marks.***
5) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Draw and explain the software 'architecture business cycle'. **[6]**

b) What are common module - based structures? Briefly explain each of them. **[6]**

c) What are architectural patterns? How are they different from design patterns? **[6]**

OR

Q2) a) How software architectures are influenced by the following : **[6]**

i) Stakeholders
ii) Developing organization.
iii) Technical Environment.
iv) Architect's experience

b) Explain '4 +1' views with the help of suitable diagram. **[6]**

c) The software architecture is compared with building architecture. What is correspondence of building architecture to software architecture structures and patterns? **[6]**

Q3) a) Compare faults and failures. **[4]**

b) State various reasons for modifying a software system. **[4]**

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

i) Confidentiality
ii) Testability
iii) Time-to-market
iv) Response time

OR

P.T.O.

Q4) a) Draw a neat labeled diagram to show summary of various runtime 'usability' tactics. **[6]**

b) Explain the following tactics with suitable example : **[10]**

i) Ping/echo
ii) Maintaining existing interface
iii) Introduce concurrency
iv) Limit access

Q5) a) What do you understand by the term 'design pattern'? What is the necessity of design patterns? **[6]**

b) What is intent and motivation for observer pattern? Give non-software examples of observer pattern. **[6]**

c) Write C++ declaration for singleton class. How this declaration ensures creation of single instance only? **[4]**

OR

Q6) a) Draw a relevant UML diagrams for mediator pattern and explain its working. **[6]**

b) Compare 'factory method' and 'abstract factory'. **[6]**

c) Explain the use of any two types of proxy pattern. **[4]**

SECTION - II

Q7) a) Compare application server and web server. **[6]**

b) State and explain the typical socket API's you have studied. **[6]**

c) What is Message oriented Middleware (MoM). Explain JMS as an example of MoM. **[6]**

OR

Q8) a) Draw a neat labeled diagram of J2EE architecture showing various technologies like JDBC, JMS etc. Explain any two technologies. **[6]**

b) Compare and contrast entity and session beans with suitable examples. **[6]**

c) Explain the working of JDBC. **[6]**

Q9) a) Design a UI screen for personal information of a student applying for first year engineering admission. design a HTML form for this admission system and list necessary validations. **[6]**

b) What is AJAX technology? What constitutes AJAX? Explain each constituent of AJAX in brief. **[6]**

c) Explain n-tier architecture with suitable example. **[4]**

OR

Q10) a) Write short note on mobile client - server technology. **[6]**

b) Compare use of HTML, DHTML and XML at client - side. **[6]**

c) Draw a diagram to show life-cycle of a JAVA applet. **[4]**

Q11) a) Compare applet and servlet. What are advantages of servlet for developing web-applications? **[8]**

b) Draw a neat diagram to show MVC pattern. **[4]**

c) Enlist the advantages of JSP over servlet. **[4]**

OR

Q12) a) Write short note on Web-services. **[6]**

b) How server - side technology can be used to make website dynamic, customizable for user and capable of data handling? **[6]**

c) What is JSF technology? **[4]**

♦♦♦♦

Total No. of Questions : 12]

SEAT No. :

P1207

[Total No. of Pages : 3

[4264]-714
B.E. (IT)
ADVANCED DATABASE MANAGEMENT
(2008 Pattern) (Elective - I) (Semester - I)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) Write a static embedded SQL code (Pro*C) to insert a record into PRODUCT table having following structure : (do not create table) Product_id integer, product_type_code varchar2, supplier_id integer, product _name varchar2, product_price number, other_product_details varchar2.

You need to do the following : **[9]**

i) Connect to database,

ii) Insert the record and

iii) Trap exception if any

b) Explain any four cursor attributes. Explain the usage of %TYPE and %ROWTYPE. You may explain it with the help of code fragments. **[9]**

OR

Q2) a) What do you mean by SQLCA? How do you declare SQLCA and use different sqlca. sqlcode values in embedded SQL programs? **[9]**

b) Write a function to get lab marks from student marks for a given roll no and subject name. Trap exceptions, if any. **[9]**

Q3) a) With diagram explain the detailed structure of TP monitors. **[8]**

b) Explain main - memory databases. **[8]**

OR

Q4) a) Explain long duration transaction systems. **[8]**

b) Explain shared locks and exclusive locks. **[8]**

Q5) a) Which limitations of RDBMSes are removed by OO databases? **[8]**

b) Explain the structure of XML with one example. **[8]**

P.T.O.

OR

Q6) a) Write a note on persistent programming languages. **[8]**

b) Explain the query transformation techniques in XML. **[8]**

SECTION - II

Q7) Draw a neat diagram of typical architecture of data warehouse. State four clauses in Data Warehouse definition. Explain how architecture supports them. Explain metadata and the need for detailed data, lightly summarized data and highly summarized data. **[18]**

OR

Q8) Suppose that XYZ Engineering University wants to build data warehouse that consists of four dimensions time, college, year and branch and the two measures 'appeared count' and 'highest total marks' in each year where year is FE, SE, TE and BE. **[18]**

a) Enumerate three classes of schemas that are popularly used for modeling data warehouse. Explain them. Do they store normalized data?

b) Draw a schema diagram for the above data warehouse using one of the schemas listed above. Show facts clearly.

Q9) a) Define support and confidence. Apply apriori association rule mining algorithm for the following data and find out frequent itemsets. Consider support = 2 i.e. 50%. **[8]**

TID	Items
10	a,c,d
20	b,c,e
30	a,b,c,e
40	b,e

b) Differentiate between OLTP and OLAP. **[8]**

OR

Q10) a) What is roll - up, drill down, slicing and dicing? What is ROLAP and MOLAP? **[8]**

b) Explain classification and clustering. Explain how they are different. **[8]**

Q11) a) Explain the meaning of cascading authorizations. Suppose a person Y grants access to person A (with grant option) to resource A at t = 20. Person Z grants access (with grant option) to person A again to the same resource at t = 50, Person A grants access to person B at t = 30 and to person C at t = 60. If later Y revokes A's access to resource R, comment about the status of B's and C's access. State reasons. Draw required diagram. **[8]**

b) Write a note on statistical databases. **[8]**

OR

Q12) a) Explain GRANT and REVOKE. What is GRANT with GRANT OPTION? **[8]**

b) Write a note on tracker attacks. **[8]**

♦♦♦♦

Total No. of Questions : 12]

SEAT No. :

P1208

[Total No. of Pages : 2

[4264]-715

B.E. (Information Technology)

ARTIFICIAL INTELLIGENCE

(2008 Pattern) (Elective - I) (Semester - I)

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

Instructions to the candidates:

1) ***Assume suitable data wherever necessary.***
2) ***Separate answer books must be used for the sections.***
3) ***Draw proper diagrams wherever necessary.***

SECTION - I

Q1) a) Define Artificial Intelligence? Give any five applications of AI. **[8]**

b) What is an Intelligent Agent? Give a typical structure of an Intelligent Agent. **[8]**

OR

Q2) a) Define Swarm Intelligence? Where can we apply it? Elaborate with example. **[8]**

b) Describe the Turing test. If the Turing test is passed, does this show that computers exhibit intelligence? State your reasons. **[8]**

Q3) a) Give a state space approach to solve the following problem,
"Three cannibals and three missionaries are standing on west bank of the river. A boat is available that will hold either one or two people. If the missionaries are ever outnumbered - on either bank of the river the cannibals will eat them. Design a sequence to get everyone to the east bank of the river". **[10]**

b) Explain Minimax search procedure with example. **[8]**

OR

Q4) a) What is Hill Climbing? Explain in detail the phenomenon of Local Maxima, Plateau and Ridge. **[10]**

b) What is Constraint satisfaction? Explain with example. **[8]**

Q5) a) Give the complete procedure to convert wff into clause form. **[9]**

b) Explain Syntax Analysis phase of Natural Language Processing. **[7]**

OR

P.T.O.

Q6) a) Explain Unification algorithm in detail with example. **[8]**

b) Write a detailed note on Conceptual Dependency? **[8]**

SECTION - II

Q7) a) What is Goal Stack planning? Explain with example. **[10]**

b) Write and explain Waltz's algorithm. **[8]**

OR

Q8) a) What is the significance of Planning? Which are the various components of typical Planning system? **[10]**

b) Write a note on Hierarchical planning. **[8]**

Q9) a) Write notes on , **[8]**

i) Explanation based learning

ii) Induction learning

iii) Learning by taking advice

iv) Rote learning

b) Discuss any case study of an expert system. **[8]**

OR

Q10) a) Draw and explain the typical architecture of Expert System. **[8]**

b) What is Artificial Neural Network? Explain with example. **[8]**

Q11) a) Write a PROLOG program to print 7^{th} Fibonacci number using recursion. **[8]**

b) Write a note on Genetic Algorithm. **[8]**

OR

Q12) a) Explain with example how does PROLOG implement backtracking? **[8]**

b) Write short notes on Parallel and Distributed AI. **[8]**

♦♦♦♦

Total No. of Questions : 12]

SEAT No. :

P1209

[Total No. of Pages : 4

[4264]-716

B.E. (Information Technology)

COMPILER DESIGN

(2008 Pattern) (Elective - I) (Semester - I)

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) Compare Compiler and Interpreter. **[4]**

b) Define Cross compiler and Incremental compiler. **[4]**

c) Explain various compiler construction Tools. **[8]**

OR

Q2) a) What are the following system programs and what is their relation with compiler. **[6]**

Preprocessor, Assembler, Linker and loader.

b) What are various phases of compiler? Explain the functions of each phase with input and output for the code.

```
Main ()
{
int x, y;
float z;
x = x*y + z;
}
```

list out the possible errors that encountered in each phase of compilation. **[10]**

Q3) a) Describe the role of lexical analysis phase of compiler in compilation process of the program. How the finite automata use in lexical analysis phase. **[6]**

P.T.O.

b) Write regular definitions for the following languages. **[10]**

i) All string of letters that contain the five vowels in order.

ii) All strings of letters in which the letters are in ascending lexicographic order.

iii) Comments consisting of a string surrounded by /* and */ without an intervening */unless it appears inside the quotes "and".

iv) All string of digits with no repeated digits.

OR

Q4) a) What lexeme, token and pattern? What is their role in lexical analysis phase of compiler? **[6]**

b) Give Thompson's construction algorithm. Explain the process of constructing an NFA from regular expression. **[10]**

Ex : (0)*11(0|1)(00)*

Q5) a) Construct LALR parser table for the following CFG **[12]**

$S \rightarrow A = B$

$S \rightarrow B$

$B \rightarrow A$

$A \rightarrow *B$

$A \rightarrow I$

Where I is identifier, * and = are terminal symbols, S is start Symbol and A & B are non - terminal.

b) What is left recursion? How can it be eliminated? Give suitable example. **[6]**

OR

Q6) a) Construct LALR parser table for the following CFG **[12]**

$D \rightarrow L : T$

$L \rightarrow L, id \mid id$

$T \rightarrow int \mid real$

Symbols D,L,T are non - terminals and symbol ':", "id" int" real' are terminal.

b) What is left factoring? Explain with suitable example. **[6]**

SECTION - II

Q7) a) What is activation record? Describe the significance of various fields of activation record with suitable illustration. **[10]**

b) What do meant by a procedure parameter? Explain the run time mechanism needed to provide such a facility. **[8]**

OR

Q8) a) Discuss the importance of symbol table in compiler design. How is the symbol table manipulated at various phases of compilation? **[6]**

b) Give the output of the following program using the following parameter passing methods. **[12]**

i) pass by value

ii) pass by reference

iii) pass by name

iv) pass by value result

```
#include <stdio.h>
int i = 0;
int j = 0;
Void p(int x, int y)
{
x + = 1;
i + = 1;
y + = 1;
}
Void swap(int x, int y)
{
x = x + y;
y = x-y;
x = x-y;
}
Main()
{
int a[2] = {1, 1}
int b[3] = {1,2,0};
p(a[i],a[i]);
printf("%d%d\n", a[0],a[1]);
swap(j, a[j]
printf("%d %d %d\n", b[0],b[1],b[2]);
Return 0;
}
```

Q9) Consider the following three address code statements **[16]**

a) PROD = 0;

b) I = 1;

c) T2 = addr(A)-4

d) T4 = addr(B)-4

e) T1 = 4*I

f) T3 = T2[T1]
g) T5 = 4[T1]
h) T6 = T3*T5
i) PROD = PROD + T6
j) I = I + 1
k) If I <= 20 GOTO(5)

Compute the basic blocks and draw the flow graph. Eliminate induction variable and draw the modified flow graph.

OR

Q10) a) Generate triple, indirect triple and quadruple for following C program fragment **[12]**

i)
```
Switch (a + b)
{
Case 1 : x = x + 1;
Case 2 : y = y + 2;
Case 3 : z = z + 3;
Default : c = c - 1;
}
```

ii)
```
If (a < b)
While (c > d)
        x = x + y;
else
        do
        p = p + q;
while (e <= f)
```

b) What is type systems and type checking? What are the type checking functions? **[4]**

Q11) a) How are the object layout is maintain in Multiple inheritance? Why do we say c + + supports multiple programming language features? How compiler handle this inheritance. **[10]**

b) What is multiple and multilevel inheritance? Explain with example. **[6]**

OR

Q12) a) What is inheritance in object oriented programming languages? What are their different types? What are the changes do you suggest in traditional two phase compiler to handle these inheritance? **[10]**

b) What is constructor and destructor of the class? What is the purpose of constructor and destructor in object oriented programming languages? **[6]**

♦♦♦♦

Total No. of Questions : 12]

SEAT No. :

P1213

[Total No. of Pages : 2

[4264]-734
B.E. (Biotechnology)
ENVIRONMENTAL BIOTECHNOLOGY
(2008 Pattern) (Elective - I) (Semester - I)

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

Instructions to the candidates:

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

SECTION - I

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

a) What is BOD? Derive the equation for BOD? What are the limitations of BOD?

b) Sample was prepared by 5% dilution of waste water and following observations were made : (K = 0.2)

i) D.O of original sample is = 0.6 mg/lit.

ii) D.O of aerated water used for dilution = 6.0 mg/lit

iii) D.O of diluted sample after 5 days incubation = 1 mg/lit

Calculate B.O.D. of 5 days and ultimate B.O.D. of the sample.

OR

Q2) Answer the following : **[18]**

a) Discuss the physical, chemical and biological characteristics of waste water?

b) Explain briefly the treatment sequence in wastewater treatment plant?

Q3) A trickling filter plant has the following : **[16]**

a) A primary clarifier with 17 m diameter, 2.5 m side water depth, and a single peripheral weir.

b) A trickling filter 25 m diameter, 2.5 m deep stone filled bed.

c) Final settling tank with 15 m diameter, 2.5 m side water depth and single peripheral weir.

d) Normal operating recirculation ratio = 0.5

e) The daily W/W flow = 6.2 m/d

f) Average BOD of W/W = 180 mg/lit

Calculate the loading on Weir loading of clarifier, Hydraulic loading, BOD/ Organic loading, final settling tank weir loading?

P.T.O.

OR

Q4) Write a short note on : **[16]**

a) Photo catalytic reactor.

b) Packed bed reactor.

Q5) Discuss the characteristics and treatment of the following industrial wastes : **[16]**

a) Dairy industry

b) Paper and pulp industry

OR

Q6) Write the note on characteristics of industrial waste water. Discuss in brief various treatment processes adopted for treating industrial waste water like proportioning, neutralization, biological, chemical? **[16]**

SECTION - II

Q7) Write a short note on : **[16]**

a) Basic design and operating principle of settling chamber.

b) CO_2 Sequestration by algae

OR

Q8) Discuss the different types of air pollutants and their effect on human health? Explain different types of air quality control techniques? **[16]**

Q9) Write short notes on : **[16]**

a) Solid waste Management

b) Biological detoxification of phenols

c) Waste minimization.

d) Hospital waste management.

OR

Q10) What is hazardous waste management? Enlist various methods of hazardous waste management and describe various waste disposal methods? **[16]**

Q11) Define Biodegradation? Explain the Biodegradation of the following wastes : **[18]**

a) Herbicides and pesticides.

b) Hydrocarbons.

OR

Q12) What is Bioremediation? Explain Ex - situ and Insitu bioremediation? Enlist its advantages and disadvantages? **[18]**

♦♦♦♦

Total No. of Questions : 12]

SEAT No. :

P1214

[Total No. of Pages : 2

[4264]-736

B.E. (Biotechnology)

BIO - THERAPEUTICS TECHNOLOGY

(Elective - I) (2008 Pattern) (Semester - I)

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

Instructions to the candidates:

1) ***Answer Q.No. 1 or Q.No. 2. Answer Q 3 or Q. No. 4. Answer Q.No. 5 or Q.No. 6 from Section I and Answer Q.No. 7 or Q.No. 8 Answer Q.No. 9 or Q.No. 10 Answer Q.No. 11 or Q.No. 12.***
2) ***Answer to the two sections should be written in separate answer books.***
3) ***Neat diagrams must be drawn wherever necessary.***

SECTION - I

Q1) What is Recombinant protein production? Elaborate the technique, giving examples. **[18]**

OR

Q2) Describe the Principles and Mechanisms of Mammalian Cell Transfection. **[18]**

Q3) Answer the following - **[16]**

a) What are Biopharmaceuticals? Explain the Science of Biopharmaceuticals.

b) What are the different types of cloning vectors? Why filamentous phages are ideal in many ways for use as cloning vehicles and for display.

OR

Q4) Explain : **[16]**

a) Transgenic Plants as biofactories for the production of Biopharmaceuticals.

b) Transgenic animals are poised to become Biopharmaceutical factories.

Q5) Answer the following : **[16]**

a) Why are reliable analytical characterisation data required throughout all stages of the biotech drug development pipeline?

b) Give an overview of Protein - based drugs developed through biotechnology.

OR

P.T.O.

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

a) Baculovirus expression system

b) The biopanning procedure

c) Posttranslational Modifications

d) The production of antisera for therapeutic use to induce passive immunization.

SECTION - II

Q7) Delivering a biologic to the market can be a challenging process. Explain. **[18]**

OR

Q8) Intellectual property law : a primer for scientists. Elaborate. **[18]**

Q9) Answer the following **[16]**

a) Enlist the Water purification methods and give the general requirements for biopharmaceutical water systems.

b) Documentation is the key to operating a biopharmaceutical company. Explain.

OR

Q10) Answer the following : **[16]**

a) What are the different methods for delivery of a drug, explain one briefly?

b) A clinical trial is a investigational research study. Justify.

c) Define the term 'validation' in biopharmaceuticals. Enlist the types and phases.

d) What is the guiding principle of GMP? Describe.

Q11) Diagrammatically/Schematically explain : **[16]**

a) Parental Drug Administration

b) Building a cell bank

OR

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

a) Facilities and design of a General Cleanroom

b) Drug absorption and degradation

c) Sustained release preparations

d) Hierarchal structure in Indian biotechnology.

♦♦♦♦

Total No. of Questions : 12]

SEAT No. :

P1325

[Total No. of Pages : 7

[4264]-481

B.E. (Production Engg.) (Production S/W)

OPERATIONS RESEARCH AND MANAGEMENT

(2008 Pattern) (Semester - I)

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

Instructions to the candidates:

1) ***Answers to the two sections should be written in separate books.***

2) ***Neat diagrams must be drawn wherever necessary.***

3) ***Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam table is allowed.***

4) ***Assume suitable data, if necessary.***

5) ***Answer 3 questions from Section - I and 3 questions from Section - II.***

6) ***You are advised to attempt not more than 3 questions.***

SECTION - I

Q1) a) Solve the following LP problem using by two phase method. **[10]**

$$Z_{Min} = -3X_1 + X_2 + X_3$$

Subject to $X_1 - 2X_2 + X_3 \leq 11$

$$-4X_1 + X_2 + 2X_3 \geq 3$$

$$-2X_1 + X_3 = 1,\ X_1, X_2, X_3 \geq 0$$

b) Explain the scope of operation research in modern management. **[8]**

OR

Q2) a) Solve the following LP problem by Big - M method. **[12]**

$$Z_{Max} = X_1 + 2X_2 + 3X_3$$

Subject to $X_1 + 2X_2 + 3X_3 = 15$

$$2X_1 + X_2 + 5X_3 = 20,$$

$$X_1 + 2X_2 + X_3 = 10 \qquad X_1, X_2, X_3 \geq 0$$

P.T.O.

b) Write the dual for following problem **[6]**

i) $Z_{Max} = 6X_1 + 4X_2 + 6X_3 + X_4$

Subject to $4X_1 + 4X_2 + 4X_3 + 8X_4 = 21$,

$3X_1 + 17X_2 + 80X_3 + 2X_4 \leq 48$

$X_1, X_2 \geq 0$, X_3, X_4 are unrestricted

ii) $Z_{Min} = 20X_1 + 40X_2$

Subject to $2X_1 + 20X_2 \geq 40$, $20X_1 + 3X_2 \geq 20$,

$4X_1 + 15X_2 \geq 30$, $X_1, X_2 \geq 0$

Q3) a) Explain Hungarian method for solving the assignment problem. **[6]**

b) The following table gives the cost of transportation material from supply points P,Q,R,S to demand points E,F,G,H,J the present allocation is as follows A to E 90, A to F 10, B to F150, C to F10,C to G 50, C to J 120, D to H 210, D to J 70. **[10]**

i) Check if this allocation is optimum. If not, find an optimum schedule.

ii) If in the above problem the transportation cost from A to G is reduced to 10, what will be the new optimum schedule?

	To				
From	E	F	G	H	J
A	8	10	12	17	15
B	15	13	18	11	9
C	14	20	6	10	13
D	13	19	7	6	12

OR

Q4) a) Consider the problem of assigning five persons to five different machines. The assignment cost are given in following table. Person A can not be assign to machine M3 and person C can not be assigned to machine M4. Find the optimum assignment schedule and also find alternative solution if there. **[8]**

	Machine				
Person	I	II	III	IV	V
A	7	7	-	4	8
B	9	6	4	5	6
C	11	5	7	-	5
D	9	4	8	9	4
E	8	7	9	11	3

b) Solve the following transportation problem **[8]**

	Destinations				available
		S1	S2	D1	D2	
Source	S1	0	2	3	4	5
	S2	2	0	2	4	25
	D1	3	2	0	1	
	D2	4	4	1	0	
requirement				20	10	

Q5) a) There are seven jobs, each of which has to go through the machine A and B in the order AB. Processing times in hours are given as

Job	1	2	3	4	5	6	7
Machine A	3	12	15	6	10	11	9
Machine B	8	10	10	6	12	1	3

Determine a sequence of these jobs that will minimize the total elapsed time T. **[8]**

b) Compare Demand rate uniform & production rate infinite with Demand rate non uniform & production rate infinite of inventory models with deterministic demand. **[8]**

OR

Q6) a) A manufacturing company processes 6 different jobs on two machines A and B. Number of units of each job and its processing times on A and B are given in table below. Find the optimal sequence, the total minimum elapsed time and idle time for each machine. **[8]**

Job No.	No. of units of each jobs	Processing time	
		Machine A	Machine B
1	3	5	8
2	4	16	7
3	2	6	11
4	5	3	5
5	2	9	7.5
6	3	6	14

b) i) Compute the E.O.Q. and the total variable cost for the following :

Annual demand : 25 units

Unit price : Rs. 2.50

Order cost : Rs. 4.00

Storage rate : 1% per year

Interest rate : 12% per year

Obsolescence rate : 7% per year

ii) Compute the order quantity and the total variable cost that would result if an incorrect price of Rs. 1.60 were used for the item. **[8]**

SECTION - II

Q7) a) On average 96 patients per 24 hours day require the service of an emergency clinic. Also on average, a patient requires 10 minutes of active attention. Assume that the facility can handle only one emergency at a time. Suppose that it costs the clinic Rs. 100 per patient treated to obtain an average servicing time of 10 minutes, and that each minute of decrease in this average time would cost Rs. 10 per patient treated. How much would have to be budgeted by the clinic to decrease the average size of the queue from 1.333 patients to ½ patients? **[8]**

b) Differentiate pure strategy and mixed strategy in game theory with suitable example. **[8]**

OR

Q8) a) The milk plant at a city distributes its product by trucks, loaded at the loading dock. It has its own fleet of trucks plus trucks of a private transport company. This transport company has complained that some times its trucks have to wait in line and thus the company loses money paid for a truck and driver that is only waiting. The company has asked the milk plant management either to go for a second loading dock or discount prices equivalent to the waiting time. The following data are available :

Average arrival rate (all trucks) = 3 per hours

Average service rate = 4 per hour.

The transport company has provided 40% of the total number of trucks. Assuming that these rates are random according to Poisson distribution, Determine : **[8]**

i) The probability that a truck has to wait.

ii) The waiting time of a truck that waits.

iii) The expected waiting time of company truck per day.

b) Determine the optimum strategies and value of the game given below **[8]**

	B				
A	10	4	2	9	1
	7	6	5	7	8
	3	5	4	4	9
	6	7	3	3	2

Q9) a) Explain with flow chart fixed time increment simulation model of a single server queuing system. **[8]**

b) An auto rickshaw driver finds from his previous records that the cost per year of running an auto rickshaw whose purchase price is Rs. 7,000 is as given below **[8]**

Year	1	2	3	4	5	6	7	8
Running Cost (Rs.)	1100	1300	1500	1900	2400	2900	3500	4100
Resale Price (Rs.)	3100	1600	850	475	300	300	300	300

At what age is the replacement due?

OR

Q10) a) Discuss with appropriate flow chart next event increment simulation model of a single server queuing system. **[8]**

b) The typing pool of a large organization employs 100 copy typists. The distribution of the length of service is given in the following table : **[8]**

Duration of employee in years	1	2	3	4	5 or more
Proportion of staff employment	30%	40%	20%	10%	0%

Assuming that an employee leaving is replaced by another at the end of the year, Determine

i) The number of staff who leave in each of the first 8 years of the departments existence, assuming it started with 100 employees and this total number does not change.

ii) The number leaving each year when the steady state situation is reached.

Q11) a) Discuss Heuristic program for resource allocation with suitable example. **[9]**

b) The utility data for a network is given below. The activity durations are in days and the cost in rupees. The indirect cost per day is Rs. 250. Determine the optimum project schedule. **[9]**

Activity	Normal		Crash	
	Time (days)	Direct Cost (Rs.)	Time (days)	Direct Cost (Rs.)
1-2	4	600	2	800
1-3	2	500	1	900
2-4	6	1000	3	1750
2-5	4	1200	4	1200
3-5	5	1000	3	1200
3-7	10	2500	5	3500
4-5	5	1300	5	1300
5-6	8	2000	6	2100
5-7	0	0	0	0
6-8	7	2000	7	2000
7-8	8	1600	5	1780

OR

Q12) a) The utility data for a network is given below. The activity durations are in weeks and the cost in rupees. The indirect cost per day is Rs. 1000 per week. Determine the optimum project schedule. **[9]**

Activity	Normal		Crash	
	Time (days)	Direct Cost (Rs.)	Time (days)	Direct Cost (Rs.)
1-2	8	7000	3	10000
1-3	4	6000	2	8000
2-3	0	0	0	0
2-5	6	9000	1	11500
3-4	7	2500	5	3000
4-6	12	10000	8	16000
5-6	15	12000	10	16000
5-7	7	12000	6	14000
6-8	5	10000	5	10000
7-8	14	6000	7	7400
7-9	8	6000	5	12000
8-9	6	6000	4	7800

b) Explain the complexities of project scheduling with limited resources. **[9]**

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Total No. of Questions : 12]

SEAT No. :

P1333

[Total No. of Pages : 3

[4264]-601
B.E. (Chemical)
PROCESS DYNAMICS & CONTROL
(Sem. - I) (2008 Pattern)

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

Instructions to the candidates:

1) ***Answers to the two sections should be written in separate books.***

2) ***Neat diagrams must be drawn wherever necessary.***

3) ***Figures to the right indicate full marks.***

4) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Discuss the history and incentives for Chemical process control. **[8]**

b) Derive the Input - output model for CSTR. **[8]**

OR

Q2) a) Derive the time domain equation for a first order system subjected to unit step input. Sketch the dynamic response of the same. **[8]**

b) A thermometer showing steady state temperature of 40° C is suddenly immersed into a hot bath at 140° C. If the time constant of thermometer is 5 sec, determine the following; **[8]**

i) Thermometer reading after 5 sec.

ii) Time required reading 90°C on Thermometer.

iii) Time required for 90% response.

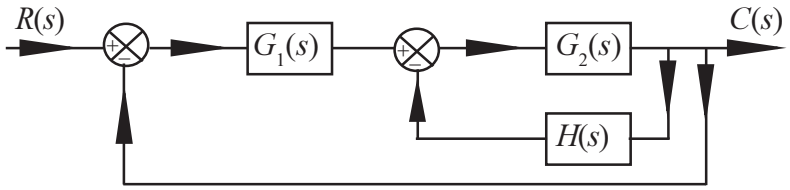
Q3) a) Derive the transfer function for U-tube manometer system. Comment on type of dynamic response of the system. **[8]**

b) Discuss the characteristics of underdamped response. Sketch the overshoot and decay ratio versus damping factor ξ if damping factor ξ is varied from 0 to 1. **[8]**

OR

P.T.O.

Q4) a) Reduce the following block diagram and obtain the transfer function C(s)/R(s); **[8]**



b) A first order process with following transfer function is controlled by P controller. Assuming servo problem and neglecting the dynamics of final control element and measuring instrument i.e. Gf(s) = Gm(s) = 1;

The open loop process is $Gp(s) = \frac{1}{s+1}$ **[8]**

Determine the following;

i) Closed loop transfer function.
ii) Order of response.
iii) Closed loop gain, time constant.
iv) Offset.

Q5) a) Define stability of the process and discuss Characteristic equation and Routh - Hurwitz criteria for stability. **[8]**

b) Draw the root locus diagram for the system with following transfer function; **[10]**

$$Gp(s) = \frac{Kp}{s(s+1)(s+2)}$$

OR

Q6) Write short notes on; **[18]**

a) Selection of feed - back controller.

b) Controller tuning.

c) ISE, IAE, ITAE.

SECTION - II

Q7) a) Sketch the Bode diagram for the given first order system **[9]**

$$Gp(s) = \frac{1}{(2s+1)}$$

b) Sketch the Nyquist diagram for PD controller. **[9]**

OR

Q8) a) Derive the response of general first order system to sinusoidal input. Define amplitude and phage lag. **[9]**

b) Discuss the following; **[9]**

i) Ziegler Nicholes Tuning technique.

ii) Gain margin & phase margin.

iii) Bode stability criteria.

Q9) Discuss in detail with a neat sketch of following; **[16]**

a) Cascade Control system for CSTR.

b) Inverse - response systems.

OR

Q10) Draw a neat sketch of following and explain with suitable examples; **[16]**

a) Adaptive control.

b) Auctioneering control system.

Q11) Draw the instrumentation diagram for Plant wide control for plants involving compressor and discuss in detail about its functioning. **[16]**

OR

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

a) DCS.

b) Model Predictive control.

c) Data Bus concept.

d) Role of digital computers in control.

♦♦♦♦

Total No. of Questions : 8]

SEAT No. :

P1335

[Total No. of Pages : 3

[4264]-651
B.E. (Petrochemical)
REACTION ENGINEERING - II
(2008 Pattern) (Sem. - I)

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

Instructions to the candidates:

1) ***Attempt any three questions from each section.***
2) ***Answers to the two sections should be written in two separate answer books.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data wherever necessary.***
5) ***Use of steam tables and electronic calculator is allowed.***

SECTION - I

Q1) a) Discuss Langmuir - Hinshelwood mechanism. **[6]**

b) Write reaction statement for steam reformation of methane. Suggest an appropriate kinetic equation assuming surface reaction on catalyst to be rate controlling. **[10]**

Q2) a) Derive the expression giving generalized Thiele Modulus which can work for any arbitrary kinetics. Also, comment on how arbitrary shape of catalyst particle can be taken into account. **[10]**

b) We want to design a fluidized bed reactor filled with 2.0 - cm porous catalyst particles (catalyst density is 2800 kg/m^3 and effective diffusivity is 2.7 $\times 10^{-6}$ m^3/m cat.s) to treat 5 m^3/s of feed gas (1/3 A, 1/3 B, 1/3 inert) at 450 C and 8 bar to 90% conversion of A. Experiments with fine catalyst particles, which are free from diffusional resistance, show that the gas phase reaction $A \rightarrow R + S$ is first order with rate constant based on weight of catalyst given as 0.05 SI units. Calculate the mass of catalyst needed. **[8]**

Q3) a) Derive time conversion relationship for the case of first order reaction on a deactivating catalyst if deactivation kinetics is also first order in catalyst activity. Assume mixing patterns for solids and fluid as batch and CSTR respectively. **[8]**

b) Discuss difference between poisoning and deactivation. Also discuss the mechanisms responsible for both. **[8]**

P.T.O.

Q4) Second order decomposition reaction $A \rightarrow B + C$ is carried out in a fixed bed reactor packed with catalyst pellets that are 0.5 cm in diameter. The reaction is known to operate in the strong pore diffusion regime. Feed to the reactor is pure A entering with superficial velocity of 4 cm/s at 200 C and 5 bar. Reaction rate constant when pore diffusion is absent is given as 60 m^3/g.s.mol. Calculate length of the bed required to attain 90% conversion of feed. **[16]**

DATA ON CATALYST PELLET :

Effective diffusivity : $3 \times 10^{-8} m^2/s$

Bed porosity : 30%

Pellet density : $2.5 \times 10^6 g/m^3$

Internal surface Area : 500 m^2/g

SECTION - II

Q5) With reference to process design of an absorption column, derive the following : **[16]**

a) Design equation

b) Expression for global rate when gas undergoes

i) instantaneous reaction in liquid film and

ii) very slow reaction in bulk liquid

Q6) An acidic impurity A in a gaseous stream is to be removed so as to reduce its partial pressure from 350 Pa to 50 Pa (total pressure is 100 kPa) by reacting it with a base B dissolved in water in a packed tower operated in a counter - current manner. Overall gas side mass transfer coefficient is 0.008 mol/hr.m^3.Pa. Gas side resistance to mass transport in absence of the reaction is 10% whereas the liquid film contributes the remaining 90% resistance. Henry's constant is 15 Pa.m^3/mol. L/G ratio is 5 times the minimum required for plain absorption. Calculate minimum concentration of B needed at the top of the tower to ensure minimum height of the tower. Also calculate this minimum height. **[18]**

Q7) a) Derive time - conversion relationship for a spherical particle reacting with a gas in a uniform atmosphere when diffusion to gas transport through the ash layer is controlling the overall rate. State the limitations of the model clearly. **[10]**

b) Spherical particle of ZnS with initial diameter of 3 cm is subjected to roasting in presence of air. Roasting reaction yields SO_2 as also the layer of ZnO. Molar density of solid may be assumed to be 0.05 mol/cm^3. Diffusivity of gas through the product layer is 0.07 cm^2/s. Calculate the time required to convert the particle by 85%. **[6]**

Q8) Give a brief account of pertinent reactions, catalysts used, operating conditions and reactors employed in platforming, fluid catalytic cracking and hydrogen production. **[16]**

♦♦♦♦

Total No. of Questions : 12]

SEAT No. :

P1383

[Total No. of Pages : 2

[4264]-720
B.E. (IT)
MULTIMEDIA SYSTEMS
(Semester - I) (2008 Pattern) (Elective - 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) ***From section I answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and From Section - II answer Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***

SECTION - I

Q1) a) What are the characteristics of multimedia presentation? Explain in brief. **[8]**

b) What is multimedia document architecture? What is its relevance in this era of internet? Explain in brief. **[10]**

OR

Q2) a) What is hypertext? What is the architecture of hypertext document? **[6]**

b) What are doc, rtf and pdf text formats. **[6]**

c) With the help of an example, explain Huffman Coding as text compression technique. **[6]**

Q3) a) In the context of digital images, what is pixel dimension, image resolution, file size, color depth, image representation? **[10]**

b) What is the need of image compression? Elaborate vector quantization compression technique of image compression. **[6]**

OR

Q4) a) Elaborate JPEG image file format. **[8]**

b) What is fractal compression technique for image compression? **[8]**

Q5) a) Write a short note on characteristics of sound. **[8]**

b) Write a short note on delta modulation of AUDIO. **[8]**

OR

Q6) a) Draw a block diagram of sound card and explain how it works. **[8]**

b) Write a short note on WAV and AIFF file format. **[8]**

P.T.O.

SECTION - II

Q7) a) Write short note on EDTV and HDTV **[6]**

b) Write short note on VHS **[6]**

c) Write short note on AVI video file format **[6]**

OR

Q8) a) Write a short note on digital video, MiniDV and DVCAM **[8]**

b) Write a short note on H261, H263. **[10]**

Q9) a) Elaborate on usage of virtual reality in an application of your choice. **[8]**

b) What is virtual reality? Write a short note on forms of Virtual Reality. **[8]**

OR

Q10) a) Write a short note on Hand gloves as a Virtual Reality device. **[8]**

b) Write a short note on 3d sound system. **[8]**

Q11) a) Elaborate on any four principles of animation. **[8]**

b) Elaborate on onion skinning and motion cycling. **[8]**

OR

Q12) a) Elaborate on atmospheric effects and particle systems in animation. **[8]**

b) Elaborate on morphing, masking in the context of animation. **[8]**

♦♦♦♦

Total No. of Questions : 12]

SEAT No. :

P941

[Total No. of Pages : 3

[4264]-614

B.E. (Chemical)

PROCESS MODELING & SIMULATION

(2008 Pattern) (Semester - II)

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

Instructions to the candidates:

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

SECTION - I

Q1) Write the classification of models in details with proper examples. **[16]**

OR

Q2) a) What is the difference between continuous Vs discrete model? Discuss with proper example.

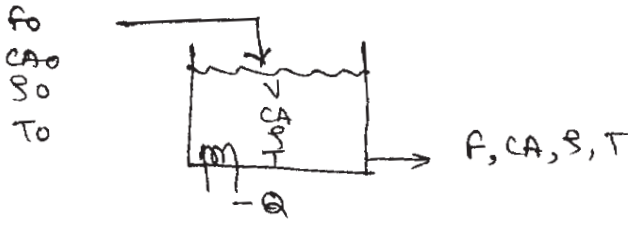
b) Draw a neat flowchart of model building.

[16]

Q3) a) Why differential equations are used in model building?

b) Write energy equation for CSTR in which consecutive first order reaction occurs with exothermic heats of reaction λ_1 & λ_2. **[18]**

$$A \xrightarrow[\lambda_1]{K_1} B \xrightarrow[\lambda_2]{K_2} C$$



OR

Q4) What are the fundamental laws involved in process modeling? Discuss each with suitable example. **[18]**

Q5) Develop a model for Agitated vessel. Assume suitable notations. **[16]**

OR

P.T.O.

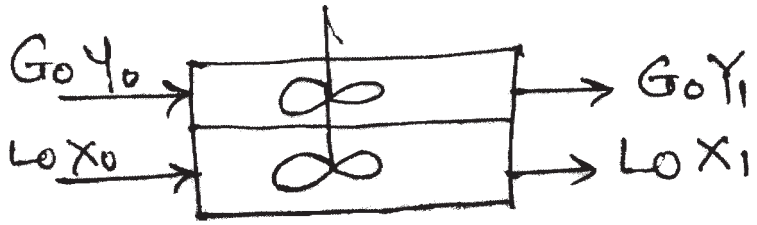
Q6) Develop a model for shell & Tube Heat Exchanger. **[16]**

SECTION - II

Q7) Derive a model for direct heated counter current rotary dryer. **[18]**

OR

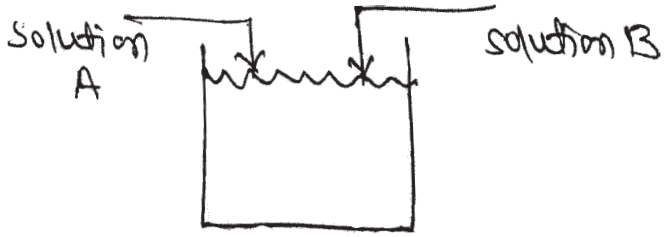
Q8) Develop a governing balance equation of continuous extraction process in a perfectly mixed stage for the following. **[18]**



Q9) Develop a model for the batch mixing of two solutions. Initially the tank is empty. The volume of the tank is 1 m^3. The flow rates are volumetric and the concentrations are in moles per volume.

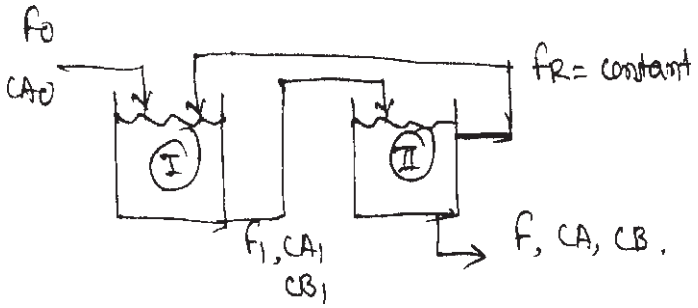
a) How long does it take to fill up the tank?

b) Show how would you find the concentration or the composition and the temperature of the mixture in the tank during the time that the tank is being filled up. Assume that the heat of solution depends on the concentration. **[16]**



OR

Q10) Develop a model for two CSTR. A simple reaction $A \rightarrow B$ with the first order kinetics takes place. Assume isothermal conditions. Flow rates f_1 & f_2 are determined by variable speed pumps and thus independes of liquid levels. **[16]**



Q11) a) Classify and explain the methods of treatment of non linear models.

b) List out the softwares available for simulation of process plant. Explain any one in detail.

[16]

OR

Q12) a) Derive Newton Raphson method.

b) Derive 4^{th} order Runge Kutta method.

[16]

♦♦♦♦

Total No. of Questions : 6]

SEAT No. :

P942

[Total No. of Pages : 2

[4264]-590

B.E. (Printing)

PACKAGE DESIGN AND TECHNOLOGY

(2008 Pattern) (Semester - II)

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

Instructions to the candidates:

1) ***Answers to the two sections should be written in separate books.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume suitable data, if necessary.***

SECTION - I

Q1) **Answer any Two :** **[18]**

a) Explain the role and importance of Flexible packaging today.

b) Differentiate between Flexible and Rigid Packaging.

c) State types of substrates used for paper packaging in detail with properties.

Q2) **Answer any Two :** **[16]**

a) Explain the manufacturing process of Duplex board in brief.

b) Explain conventional offset method for printing in brief.

c) What is fluting? Write in detail types and properties of corrugation fluting.

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

a) Explain various types of machines used in the manufacturing of Universal carton in brief.

b) Explain the advantages, disadvantages and applications of Universal carton in detail.

c) Describe in detail corrugation process.

SECTION - II

Q4) **Answer any Two :** **[18]**

a) Explain the Laser die making process in detail.

b) Explain the punching process in detail along with diagram.

c) Explain the process of preparing the Jigged die in detail.

P.T.O.

Q5) **Answer any Two :** **[16]**

a) Draw Universal type carton and label the same.

b) For Universal type carton, calculate the paper requirement, when-

The size of the carton : 14" × 10" × 14"

Quantity of the carton : 2000 Nos.

Size of paper to be used : 23" × 36

c) Draw the neat diagram of STE type of carton and label the parts.

Q6) **Answer any Two** **[16]**

a) Explain the method of measuring the Cobb value of paper in brief.

b) Explain the method of checking the Bursting strength of paper in brief.

c) Write notes :

i) Drop test

ii) Vibration test

iii) Bursting factor

iv) Grain direction

♦♦♦♦

Total No. of Questions : 12]

SEAT No. :

P943

[Total No. of Pages : 3

[4264]-552

B.E. (Electronics & Telecommunication)

TELECOMMUNICATION & SWITCHING SYSTEMS

(2008 Pattern) (Semester - II)

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

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Answer 3 questions from section I and 3 questions from section II.***
3) ***Assume suitable data, if necessary.***
4) ***Figures to the right indicates full marks.***

SECTION - I

Q1) a) Draw the general Trunking Diagram for a Switching system. Explain various functional entities. **[8]**

b) Write a brief note on two dimensional switching. Draw the block diagram for TS Switch and explain various functional entities. **[8]**

OR

Q2) a) Explain operation of Input controlled time division space switching with a neat block diagram. **[8]**

b) Define and explain **[4]**
- Busy Hour Call Attempts/Rate
- Average Holding Time
- Call Completion Rate

c) Define Grade of Service and Blocking Probability. **[4]**

Q3) a) Explain the Principle of Grading to improve Trunking efficiency. Draw a neat diagram. **[6]**

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]**

c) Explain the concept of call packing. **[4]**

OR

Q4) a) Define and explain the terms "Availability" and "Unavailability" of a dual processor system with necessary equations. **[4]**

b) Calculate availability of a dual processor system for a period of 20 years if its MTBF = 3300 Hrs. and MTTR = 6 Hrs. **[4]**

c) Write a brief note on Signaling Systems in a Telecommunication Network. **[6]**

d) Explain the principle of Grading to improve trucking efficiency. **[4]**

P.T.O.

Q5) a) With the help of neat diagrams

- In-band signaling
- Out -band signaling **[8]**

b) Explain the Principle of Grading to improve trunking efficiency. **[4]**

c) With respect to Grading what is **[2 × 2 = 4]**

- Limited Availability
- Full Availability

OR

Q6) a) Define Graded Groups. Explain the procedure for designing a grading to provide access to 'N' trunks from switches with availability 'k'. Which is the best grading? **[8]**

b) State and explain in detail sequence of operations for a telephone call. **[8]**

SECTION - II

Q7) a) What is Pulse stuffing? Give an example. **[4]**

b) Explain the Mutual synchronization approach for Network Synchronization. **[6]**

c) Explain the flow control in Network management. **[8]**

OR

Q8) a) Explain the need of synchronization in a network containing analog/digital transmission/switching systems. **[8]**

b) What is jitter? What are the different types of Jitter? With help of a neat diagram discuss use of Elastic Store to remove accumulated Jitter. **[2+4+4=10]**

Q9) a) Explain different services supported by ISDN. Draw neat diagrams. **[8]**

b) Explain the terms

- Basic Rate Access
- Primary Rate Access
- Functional Grouping
- R,S,T,U Reference Points with the help of a diagram. **[8]**

OR

Q10) a) Explain and Compare Pure ALOHA with Slotted ALOHA scheme. **[8]**

b) Discuss various LAN topologies. **[8]**

Q11) a) Write a note on 'Co-channel Interference Reduction Factor'. **[8]**

b) Explain "CDMA is having better security than GSM". **[8]**

OR

Q12) a) What is Handoff? Explain the terms **[4 × 2 = 8]**

- Hard Handoff
- Soft Handoff
- Mobile Assisted Handoff

b) Draw block diagram for the GSM system architecture. Explain various functional entities. **[8]**

♦♦♦♦

Total No. of Questions : 12]

SEAT No. :

P948

[Total No. of Pages : 2

[4264]-721

B.E. (Information Technology)

DISTRIBUTED SYSTEMS

(2008 Pattern) (Sem. - II)

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

Instructions to the candidates:

1) ***Answer Question 1 or 2, 3 or 4, and 5 or 6 from Section - I and Question 7 or 8, 9 or 10, and 11 or 12 from Section - II.***
2) ***Answers to the two sections should be written in separate 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) Show an example of transparency that may not be desirable in distributed systems. **[8]**

b) Why is a process pool an attractive model from the view point of distributed computation and transparency? **[8]**

OR

Q2) a) What are the advantages and disadvantages of using diskless work stations in a distributed system? **[8]**

b) What is distributed system? Explain different examples of distributed system. **[8]**

Q3) a) What is RPC? Explain role of client and server stub procedures in RPC in the context of a procedural language. **[8]**

b) What is socket? Explain the difference between connection oriented socket and connectionless socket? **[8]**

OR

Q4) a) What is pipe? How pipe is used for inter-process communication? **[8]**

b) Explain CORBA callback and polling model for asynchronous method invocation. **[8]**

Q5) a) What is Election algorithm? Suppose that two processes detect the demise of the coordinator simultaneously and both decide to hold an election using Bully algorithm. What happens? **[10]**

b) Explain global state? What are the different types of global states? **[8]**

OR

P.T.O.

Q6) a) What do you understand by logical time and logical clocks? What is Lamport's contribution for it? Discuss. **[10]**

b) What are advantages and drawbacks of multi-version timestamp ordering in comparison with the ordering timestamp ordering? **[8]**

SECTION - II

Q7) a) What file sharing semantics is used in your network or distributed file system? **[8]**

b) Compare : Coda and xFS distributed file systems. **[8]**

OR

Q8) a) What is naming service X.500? **[8]**

b) How does mounting of a remote file system take place in NFS? Describe the functionality of an auto-mounter in NFS. **[8]**

Q9) a) Why is it difficult to implement the casual memory consistency model for DSM system? **[8]**

b) What is difference between the unit of replication and the granularity of coherence? What are the advantages of small granularity? **[8]**

OR

Q10) a) Discuss the relative merits and demerits of write - update and write - invalidate protocols. **[8]**

b) Discuss design and implementation issues of distributed shared memory. **[8]**

Q11) a) Define the following : **[10]**

i) Arbitrary Failures.
ii) Timing Failures.
iii) Backward Recovery
iv) Forward Recovery
v) Check pointing

b) What is use of stable storage? How stable storage technique is used in recovery. **[8]**

OR

Q12) a) What is process resilience? Explain different design issues of process resilience. **[10]**

b) What is recovery line? Draw and explain domino effect in detail. **[8]**

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Total No. of Questions : 6]

SEAT No. :

P1000

[Total No. of Pages : 2

[4264] - 581
B.E. (Printing)
TECHNOLOGY OF GRAVURE
(2008 Pattern) (Semester - I)

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

Instructions to the candidates:

1) ***Answer any three questions from each section.***
2) ***Answers to two sections should be written separately.***
3) ***Draw neat diagram wherever necessary.***

SECTION - I

Q1) a) Explain in detail the gravure cylinder making process. **[10]**

b) Compare Etching and Engraving process of gravure cylinder. **[8]**

OR

Explain in detail making of indirect laser engraving of a Gravure cylinder.

Q2) Write Notes on: **[16]**

a) Base Copper Technique.

b) Corrections in Copper and Chrome in cylinder making.

OR

Explain the factors that affect the plating of copper in cylinder making.

Q3) Explain in detail unit configuration of a Gravure press. **[16]**

OR

Explain the solvent and water based inks used in gravure printing.

P.T.O.

SECTION - II

Q4) Explain in detail the factors that influence the viscosity of an ink. **[18]**

OR

Explain with diagram the doctor blade system of gravure press.

Q5) Write Notes on: **[16]**

a) Moving Cylinder Impression System.

b) Moving Roller Impression System.

OR

Explain the impact of pressure on gravure print quality.

Q6) Explain in detail register control system for a Gravure press. **[16]**

OR

Write notes on (Any Four):

a) Idle Rollers.

b) Surface Treatment.

c) Roller Balancing.

d) Dancer roller.

e) ELS.

Total No. of Questions : 6]

SEAT No. :

P1001

[Total No. of Pages : 2

[4264] - 595
B.E. (Printing)
FLEXIBLE PACKAGING
(2008 Pattern) (Elective - IV) (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 separately.***
3) ***Draw neat diagram wherever necessary.***

SECTION - I

Q1) Explain in detail the norms to be followed for a package. **[18]**

OR

Write notes on:

a) Polyethylene.

b) PVC.

c) PET.

Q2) Explain the Flexography process for Flexible Packaging. **[16]**

OR

Explain the Rotary Letterpress process for Lami-tubes.

Q3) Explain in detail Extrusion lamination process. **[16]**

OR

Explain the process of making LDPE film.

P.T.O.

SECTION - II

Q4) Explain in detail Bag-in-Box technique for a product. **[16]**

OR

Explain in detail Retort packaging for a liquid product.

Q5) Closures play a vital role in a Package. Explain. **[16]**

OR

Describe the converting operations for a flexible pouch.

Q6) Explain the packaging methods for meat and dairy products. **[18]**

OR

Mention deterioration factors and packaging techniques for the following:

a) Horticulture.

b) Carbonated soft drinks.

c) Coffee.

Total No. of Questions : 12]

P1003

SEAT No. : ____

[Total No. of Pages : 3

[4264] - 683

B.E. (Polymer Engg.)

PROCESSING OF COMPOSITES

(Sem. - II) (2008 Pattern) (Elective - III)

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

Instructions to the candidates:

1) ***Answer Q.No. 1 or 2, Q.No. 3 or 4, Q.No.5 or 6 from Section - I and Q.No. 7 or 8, Q.No. 9 or 10 and Q.No. 11 or 12 from Section - II.***
2) ***Answers to the two sections must be written in separate answer books.***
3) ***Figures to the right indicate full marks.***
4) ***Use of scientific calculator and graph paper is allowed.***
5) ***Assume suitable data, if required.***

SECTION - I

Q1) a) Write in short about treatment given to glass fibers using coupling agents prior to its use in composites. **[7]**

b) Write expression to find out density of the composite knowing the densities of the individual components in the composites. **[4]**

c) Write in short about applications of polyolefin based thermoplastic composites from material, process and application point of view. **[7]**

OR

Q2) a) Write in short about applications of Polyphenelyne Sulphide based thermoplastic composites from material, process and application point of view. **[8]**

b) Discuss how Young's and shear modulus of discontinuous randomly oriented short fiber reinforced composite is calculated. **[4]**

c) Obtain an expression for maximum fiber volume fraction possible with hexagonal array of fiber packing assuming that the fibers have circular cross section. **[6]**

P.T.O.

Q3) a) Explain the process of hydro-thermoforming from processing, materials, and application point of view. **[6]**

b) Mention typical applications of roll wrapping process. **[4]**

c) Draw a neat sketch of die/mould for compression moulding of DMC and discuss design features of the die/mould. **[6]**

OR

Q4) a) Write in short about metal matrix composites. **[6]**

b) Write in short about diaphragm forming process. **[5]**

c) Explain the process of matched die forming with schematic sketch of the process and explain the applications of the same. **[5]**

Q5) a) Explain in short the process of resin transfer molding. **[8]**

b) Give design considerations for mould design in case of autoclave process. **[4]**

c) Analyze various reasons for voids in autoclave processing. **[4]**

OR

Q6) a) Discuss in detail various resin viscosity and kinetic models for autoclave processing. **[8]**

b) Write about the process, material and applications of structural reaction injection molding. **[8]**

SECTION - II

Q7) a) Discuss matrix flow modeling using a linearly tapered die in case of pultrusion. **[10]**

b) Draw a schematic sketch of pultrusion process and explain the process in general. **[6]**

OR

Q8) a) Discuss pulling resistance mathematical models proposed with reference to pultrusion and explain the usefulness of the same. **[12]**

b) Discuss pultrusion of thermoplastic - matrix composites and its application. **[4]**

Q9) a) Discuss various failure modes in the adhesive joints. **[6]**

b) Write a note on water jet cutting in case of composites. **[6]**

c) Discuss various type of bonded joints in composites. **[6]**

OR

Q10)a) Discuss various winding techniques used in filament winding and also discuss sequential compaction model. **[10]**

b) Discuss requirements of resin for good wetting of the fiber in case of filament winding. **[8]**

Q11)a) Write applications of carbon nano-tube composite. **[5]**

b) List types of carbon nano-tubes. Explain their structure. **[6]**

c) State advantages and disadvantages of nano- composites. **[5]**

OR

Q12)a) List different types of nano-clays used in polymer clay nano-composites. State the difference in their structure. **[8]**

b) Compare polymer nano-composites and ordinary composites with respect to morphology, processing techniques and process parameters. **[8]**

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Total No. of Questions : 12]

P1004

SEAT No. :

[Total No. of Pages : 3

[4264] - 704

B.E. (Computer Engg.)

PATTERN RECOGNITION

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

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

Instructions to the candidates:

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

SECTION - I

Unit - I

Q1) a) Explain features and feature vectors with suitable example? How feature vector is useful for pattern recognition? **[8]**

b) What are the learning and adaption methods in pattern recognition system? Explain. **[8]**

OR

Q2) a) What do you mean by patterns? How segmentation and grouping is important components of pattern recognition system? **[8]**

b) Explain Regression, Interpolation and Density estimation and Associative memory in brief. **[8]**

Unit - II

Q3) a) Explain Bayesian decision theory with example in detail. **[10]**

b) Explain the problem of Minimum-Error-rate classification. **[8]**

OR

P.T.O.

Q4) a) Explain Feature space, Loss function, Risk, Bayes risk and Decision rule in brief? **[10]**

b) Explain decision hyperplanes and perceptron with suitable examples. **[8]**

Unit - III

Q5) a) What are sample covariance, and absolutely unbiased estimator? Explain in detail. **[8]**

b) Explain Bayes Error, Model error and Estimation error in detail. **[8]**

OR

Q6) a) When does Maximum-Likelihood and Bayes methods differ? Explain in detail. **[8]**

b) Explain recursive Bayes incremental learning method with example. **[8]**

SECTION - II

Unit - IV

Q7) a) What is problem of finding the *best* direction? Explain how scatter matrix is useful to solve this problem. **[8]**

b) What is Overfitting problem? Explain in detail with suitable example. **[8]**

OR

Q8) a) Explain how Hidden Markov Model (HMM) is effective to solve the problem of multiple decision? **[8]**

b) Explain any one classical approach to fine effective linear transformation in detail. **[8]**

Unit - V

Q9) a) Explain non parametric technique for directly estimating the posteriori probabilities in brief. **[10]**

b) Explain batch perceptron algorithm for finding a solution vector in brief. **[8]**

OR

Q10)a) Explain Quadratic and Polynomial discriminant function in detail. **[10]**

b) Explain the steps involved in SVM training, in brief. **[8]**

Unit - VI

Q11)a) Explain the difference in Pruning and Joining with proper example.**[8]**

b) Justify the significance of Nominal data and String in a classification problem with suitable example. **[8]**

OR

Q12)a) Show that the computational complexity of k-Means clustering algorithm is $O(ndcT)$, where n is the number of d-dimensional patterns, c is the assumed number of clusters, and T is the number of iterations.**[8]**

b) Justify the significance of Nominal data and String in a classification problem with suitable example. **[8]**

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Total No. of Questions : 12]

P1005

SEAT No. : ____

[Total No. of Pages : 2

[4264] - 706
B.E. (Computer Engg.)
NEURAL NETWORKS
(2008 Pattern) (Elective - III) (Semester - II)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) What is a Neural Network? Explain the need of Neural Networks. **[8]**

b) Draw and Explain the structure of biological neuron. **[8]**

OR

Q2) a) What are the different types of Basic Learning Laws? Explain any one in detail. **[8]**

b) Explain Mc-Culloch pitts model of Neuron. **[8]**

Q3) a) Explain the benefits of Modular Neural Networks. **[8]**

b) What are the classes of Learning algorithms? Explain Supervised learning neural networks in detail. **[8]**

OR

Q4) a) Explain Radial Basis function networks. **[8]**

b) Explain multilayer perceptrons in detail. **[8]**

P.T.O.

Q5) a) Draw and Explain the architecture of Hopfield model. **[9]**

b) Write a detail note on Stimulated Annealing. **[9]**

OR

Q6) a) Write and Explain bidirectional associative memory. **[9]**

b) Explain analysis of linear auto associative feed forward networks. **[9]**

SECTION - II

Q7) a) Draw and explain the architecture of Feedback Neural networks. **[8]**

b) Draw and explain Boltzman's machine in detail. **[8]**

OR

Q8) a) What is stochastic process? Why is it necessary? Explain in detail. **[8]**

b) Explain the analysis of pattern storage networks. **[8]**

Q9) a) Explain Unsupervised Learning Neural Networks. **[8]**

b) What are the different steps in ART Algorithm. **[8]**

OR

Q10)a) Describe principal component analysis in detail. **[8]**

b) Write a note on Learning Vector Quantization (LVQ). **[8]**

Q11)a) Explain Pattern classification using neural networks. **[9]**

b) Explain in detail Associative Memories. **[9]**

OR

Q12)a) Describe how Optimization is achieved in Neural Networks. **[9]**

b) Explain Applications of neural networks in Decision Making. **[9]**

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Total No. of Questions : 12]

SEAT No. :

P1007

[Total No. of Pages : 2

[4264] - 711
B.E. (IT)
INFORMATION ASSURANCE AND SECURITY
(2008 Pattern) (Semester - I)

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

Instructions to the candidates:

1) ***Answer three questions from each section.***
2) ***Assume suitable data if necessary and justify.***
3) ***Figures to the right indicate full marks.***
4) ***Neat diagrams must be drawn wherever necessary.***

SECTION - I

Q1) a) Write the Extended Euclidian algorithm to compute the inverse. **[10]**
[Illustrate with proper variables and comments]

b) What are the security goals? Explain various types of Authentication. **[8]**

OR

Q2) a) In a Chinese remainder theorem, Let N = 210 and let $n_1 = 5$, $n_2 = 6$, $n_3 = 7$.
Compute $f^{-1}(3,5,2)$, i.e. given $x_1 = 3$, $x_2 = 5$, $x_3 = 3$, compute x. **[12]**

b) How AES encryption does not solve an integrity problem? If not, what is the solution? **[6]**

Q3) a) Compare ECB and Counter mode of operation. **[8]**

b) Draw block diagram of AES and state the general step in the process. **[8]**

OR

Q4) a) Cryptography is not enough for end to end security solution. Justify. **[8]**

b) We say that, it is computationally infeasible to derive plain text from cipher text without proper key. Justify the term 'computationally infeasible', with examples. **[8]**

Q5) a) Explain with diagram PKI working. **[8]**

b) Illustrate Diffie-Hellman key exchange with diagram. **[8]**

P.T.O.

OR

Q6) a) What improvements are given by Needham Schroeder Protocol? **[8]**

b) Explain evolution of authentication systems in theory and in products. **[8]**

SECTION - II

Q7) a) Illustrate Network level security solution for Peer to Peer chat application which should support authentication, integrity and secrecy. **[12]**

b) State three threats in Data link layer and Network Layer, each. **[6]**

OR

Q8) a) Explain SSL four protocols. **[12]**

b) State various categories of Intrusion Detection System. **[6]**

Q9) a) Explain any four domains of ISO 27001 standard. **[8]**

b) Explain any four benefits of ISO 27001 standard deployment. **[8]**

OR

Q10) a) List the Electronic payment systems. Explain any one method of online payment, Functionally, technically [Diagrams must]. **[8]**

b) Illustrate idea of Electronic Cash. **[8]**

Q11) a) Explain Man in the Middle Attack. **[8]**

b) Explain any four forensic features extraction leading to evidence retrieval. **[8]**

OR

Q12) a) Describe the term 'Industrial Espionage' in detail with example. **[8]**

b) Write short note on Indian IT law2000, 2008 amendments. **[8]**

Total No. of Questions : 11]

P1008

SEAT No. : ____

[Total No. of Pages : 3

[4264] - 724
B.E. (IT)
SOFTWARE ARCHITECTURE
(2008 Pattern) (Semester - II) (Elective - III)

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

Instructions to the candidates:

1) ***From Section - I, Answer (Q1 or Q2) and (Q3 or Q4) and (Q5 or Q6).***
2) ***From Section - II, Answer (Q7 or Q8) and (Q9 or Q10) and Q11.***
3) ***Answers to the two sections should be written in separate answer books.***
4) ***Figures to the right indicate full marks.***
5) ***Make suitable assumptions wherever relevant and appropriate.***

SECTION - I

Q1) a) What documentation would you need to do performance analysis of an architecture? **[4]**

b) Explain with suitable example : **[8]**

i) Architecture is high-level design.

ii) Architecture is the overall structure of the system.

iii) Behavior of each software element is part of the architecture.

iv) Architecture has components & connectors.

c) Explain : Architecture is the vehicle for stakeholder communication.**[6]**

OR

Q2) a) Explain Architecture Business Cycle. **[8]**

b) What is software architecture? Explain with example. How do the architectures affect the nature of the organization? **[10]**

Q3) Explain and illustrate the following concepts (in context of quality attribute) with examples, in brief. **[16]**

a) Maintaining data confidentially.

b) Quality attribute scenario.

c) Performance bottlenecks.

d) Non functional requirements.

P.T.O.

OR

Q4) Explain and illustrate the following concepts (in context of quality attributes) with examples. **[16]**

a) Following concern in context of modifiablity : "When is a change made and who makes it".

b) Any one quality attribute scenario for performance.

c) Measuring and specifying performance for a web site.

d) Usability aspects observed by you in a typical MS WINDOWS desktop software. (Hint : MS WORD/IE7).

Q5) a) List and explain important principles behind design patterns. **[8]**

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

i) Programming the interface.

ii) Concept of delegation.

OR

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

a) Singleton b) Adapter

c) Factory d) Facade

e) Observer f) Iterator

SECTION - II

Q7) a) Compare different architecture styles. **[10]**

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

i) Coupling in XML.

ii) Structure of XML.

OR

Q8) a) Explain three tier architecture with reference to presentation, business and persistence layers. **[10]**

b) Explain the concept of : **[8]**

i) Loose coupling.

ii) Addressing quality attributes through multi tier architecture.

Q9) a) Write a short note on Web servers and application Servers. **[8]**

b) Explain in detail the concept of "addressing Quality attributes through multi tier architecture". **[8]**

OR

Q10)a) What kind of responsibilities does a web client have? How can one make web client more dynamic. **[4]**

b) Explain with example : **[12]**

i) CGI . ii) Legacy Application.

iii) Web services. iv) EJB.

Q11)Write short note (Any four) : **[16]**

a) Components and Interfaces b) DLL.

c) .NET assemblies. d) .NET remoting.

e) .NET web services. f) IUNKNOWN.

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Total No. of Questions : 12]

P1009

SEAT No. : ____

[Total No. of Pages : 3

[4264] - 725

B.E. (IT)

ADVANCED GRAPHICS

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

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

Instructions to the candidates:

1) ***Answer question 1 or 2, 3 or 4, 5 or 6 from Section - I and question 7 or 8, 9 or 10, 11 or 12 from Section - II.***
2) ***Answers to the two sections should be written in separate answer books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Compare and contrast parallel projection and perspective projection 3D display methods. **[6]**

b) Explain following quadratic surfaces. **[6]**

i) Ellipsoid.

ii) Torus.

c) What is Spline? What are the major differences between Bezier curve and B-Spline. **[6]**

OR

Q2) a) Explain polygon table and geometric data representation with suitable example. **[6]**

b) Explain with mathematical model Bezier surface and B-Spline surface. **[6]**

c) What are the different Spline specification methods? Explain with suitable diagram and examples. **[6]**

P.T.O.

Q3) a) Explain various animation techniques. **[8]**

b) What is meant by key-framing, tweening and morphing with suitable example? **[8]**

OR

Q4) a) Which are the different animation software's? Explain any one animation software in detail. **[8]**

b) Explain briefly various real time animation techniques used in computer assisted animation. **[8]**

Q5) a) What are sweep surfaces? Discuss different methods of generating sweep surfaces. **[8]**

b) Explain in detail Spatial-partitioning representation along with its decomposition. **[8]**

OR

Q6) a) Compare and contrast primitive instancing and boundary representation. **[8]**

b) Differentiate various solid modeling methods on following points. **[8]**

i) Uniqueness.

ii) Compactness and efficiency.

iii) Accuracy.

iv) Domain.

SECTION - II

Q7) a) What is the necessity of a color model? Explain the following color models with necessary equations and applications. **[8]**

i) CMY ii) HSV

b) Explain CIE chromaticity diagram. How is RGB to CMY conversion done? Explain. **[6]**

c) Explain any one color selection system with its application. **[4]**

OR

Q8) a) Explain HLV & HLS color cones. **[8]**

b) Explain YIQ color model. How is YIQ to RGB conversion done? Explain. **[6]**

c) Write a short note on illumination model. **[4]**

Q9) a) Illustrate "Basic Ray tracing Algorithm". **[8]**

b) Define shading. What are the different methods used for shading? Explain Gouraud shading model. **[8]**

OR

Q10)a) What is rendering? Explain Monte-Carlo method for rendering. **[8]**

b) Compare Gauraud & Phong's method of shading. **[8]**

Q11)a) List and explain the factors affecting the design of a virtual reality system. **[8]**

b) What are the different popular virtual reality languages? Explain any one in detail. **[8]**

OR

Q12)a) What is meant by virtual reality system? Explain the applications of virtual reality system. **[8]**

b) Explain driving simulation application and different virtual reality devices used in it. **[8]**

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Total No. of Questions : 12]

P1010

SEAT No. : ____

[Total No. of Pages : 2

[4264] - 726

B.E. (IT)

ADVANCED COMPUTER NETWORKS

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

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

Instructions to the candidates:

1) ***Answers to the two sections should be written in separate books.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Explain the logical layers of ISO/OSI model in detail. **[8]**

b) Discuss in detail various principles of network design. **[8]**

OR

Q2) a) Explain Bluetooth with respect to features, frequency band, techniques used and protocol stack. **[8]**

b) Draw a neat diagram and explain network architecture. **[8]**

Q3) a) Explain ATM reference model. **[8]**

b) Explain what is Network Address Translator? How it is used? **[8]**

OR

Q4) a) Explain the ATM header with appropriate diagram. Explain the structure of the header. **[8]**

b) Explain mobility management issue in wireless networks. **[8]**

Q5) a) Discuss in detail Quality of Service parameters to measure performance of Networks. **[9]**

b) Explain in details various parameters specified in the Quality of Service. **[9]**

P.T.O.

OR

Q6) a) Explain the following terms: **[9]**

i) Propagation delay.

ii) Queuing delay.

iii) Processing delay.

b) What is meant by "Availability" of network? Explain the terms MTBF, MTTR and how these are useful for calculating "Availability". **[9]**

SECTION - II

Q7) a) Explain the architecture of MPLS. **[8]**

b) What are VPNs? Explain the significance of tunneling in VPNs. **[8]**

OR

Q8) a) Explain in detail CIDR. **[8]**

b) Explain how MPLS is better than traditional Routing. **[8]**

Q9) a) Explain the general characteristics of Mobile IP. **[8]**

b) Explain the types of IPv6 addresses? Also draw and explain IPv6 base header format. **[8]**

OR

Q10)a) Explain various features of IPv6. **[8]**

b) Explain in brief a protocol suit H.323 for IP telephony. **[8]**

Q11)a) Explain cluster based network architecture for ad-hoc networks. **[9]**

b) Explain DSR protocol for ad hoc networks. **[9]**

OR

Q12)a) What is ad hoc network? Explain its limitations and application areas. **[9]**

b) Explain the features of reactive and proactive routing protocols for MANETs. **[9]**

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Total No. of Questions : 12]

P1016

SEAT No. : ____

[Total No. of Pages : 4

[4264] - 441

B.E. (Mechanical Engineering)

POWER PLANT ENGINEERING

(2008 Pattern) (Semester - II)

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

Instructions to the candidates:

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

SECTION - I

Unit - I

Q1) a) Write a note on present status of power generation of India. **[6]**

b) Write a detailed note on carbon credits and its implications on clean technology. **[5]**

c) Two steam power plants each of 30MW capacity take a load of 45MW. The steam consumption rates in kg/hr for both plants are given by the equations : $S_1 = 2400 + 12L_1 - 0.00012L_1^2$

$S_2 = 1200 + 8.4L_2 - 0.00006L_2^2$

Where L represents the load in kW and s the steam consumption per hour. Find the most economical loading of the plants. **[5]**

OR

Q2) a) Discuss in details the various factors which must be considered in selecting a site for steam power plant. **[6]**

b) Discuss the role and participation of private sector in development of power sector in India. **[6]**

P.T.O.

c) The monthly electricity consumption of a residence can be approximated as under : **[4]**

Light load : 6 tube lights 40 watts each working for 4 hours daily.
Fan load : 6 fans 100 watts each working for 6 hours daily.
Refrigerator load : 2kWh daily.
Miscellaneous load : 2kWh for 2 hours daily.
Find the monthly bill at the following tariff:
First 20 units - Rs. 0.50/kWh
Next 30 units - Rs. 0.40/kWh
Remaining units - Rs. 0.30/kWh
Constant charge - Rs. 2.50 per month
Discount for prompt payment = 10 percent.

Unit - II

Q3) a) What do you understand by 'coal benefication'. **[5]**

b) Discuss the principle of operation of overfeed and underfeed stokers with the help of simple diagrams. **[5]**

c) The following observations were recorded during a trial on a steam condenser, **[6]**

Condenser vacuum - 680 mm Hg
Barometer reading - 764mm Hg
mean condenser temperature - 36.2°C
Hot well temperature - 30ºC
Determine :

i) Condenser vacuum corrected to standard barometer.
ii) Vacuum efficiency
iii) Condenser efficiency if cooling water inlet and outlet temperature is 20°C and 32°C respectively.

OR

Q4) a) Explain the principle of working of electro static dust collector with the help of a neat diagram. **[5]**

b) Explain construction and working of fluidized bed combustion system for power plant. **[5]**

c) In a single feed water heater, regenerative cycle, the steam enters the turbine at a pressure of 30 bar and 400°C. The exhaust pressure of steam is 0.1 bar. The feed water heater is direct contact type, which operates at a pressure of 5 bar. Find the thermal efficiency of the cycle and the specific steam consumption. Show the flow diagram, the regenerative cycle on h-s or T-s diagram. **[6]**

Unit - III

Q5) a) Draw a schematic layout of hydro-electric power plant and explain. **[6]**

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

$$r_p = \left(\frac{Tmax}{Tmin}\right)^{\frac{\gamma}{2(\gamma-1)}}$$

r_p - pressure ratio

γ = specific heat ratio

c) Compare the steam, hydro and gas power plant on the basis of site, initial cost, fuel cost, maintenance cost, cooling water requirement. **[6]**

OR

Q6) a) What are pumped storage peak load plants. Explain with the help of neat diagram. **[6]**

b) The heat energy absorbed by 20 kg/s of air passing through a gas turbine regenerator is 4200 kJ/s. If the air and products of combustion enters the regenerator at 123°C and 373°C respectively, determine the effectiveness of regenerator and exit temperatures of air and products of combustion. Take C_p for air and gas as 1.05 kJ/kgk. **[6]**

c) Write a note on 'Free piston engine plant'. **[6]**

SECTION - II

Unit - IV

Q7) a) Describe in brief giving neat sketch, the working of a pressurised water reactor plant. **[8]**

b) List the essential components of a diesel power plant and explain them briefly. **[8]**

OR

Q8) a) What is a CANDU - type reactor? Explain with a sketch its main features. What is a calandria? **[8]**

b) What are the advantages and disadvantages of diesel power plant? Which factors should be considered while selecting a site for a diesel power plant? **[8]**

Unit - V

Q9) a) What is a transformer? How are transformers classified? What are the advantages and disadvantages of the following 3 phase transformer :

i) The Y-y connection

ii) The Y-Δ connection **[8]**

b) Explain with the help of a neat diagram a solar pond electric power plant. **[6]**

c) State the advantages and disadvantages of fuel cell. **[4]**

OR

Q10) Write short notes on any three : **[18]**

a) A.C. exiters.

b) earthing of power system.

c) Circuit breakers.

d) geothermal power plant.

e) Magneto hydro dynamic system.

Unit - VI

Q11) a) Name important gaseous pollutants discharged by thermal power plants. How are they classified? **[8]**

b) What do you mean by 'Thermal pollution'? What is 'Thermal Discharge Index' (TDI). **[8]**

OR

Q12) a) What is 'Particulate emission'? How it is controlled? **[8]**

b) Write a short note on 'Pollution from nuclear power plant. **[8]**

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Total No. of Questions : 12]

SEAT No. :

P1020

[Total No. of Pages : 2

[4264] - 623
B.E. (Chemical Engg.)
PETROCHEMICAL ENGINEERING
(Elective - IV) (2008 Pattern) (Semester - II)

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

Instructions to the candidates:

1) ***Answer three questions from Section - I and three questions from Section - II.***
2) ***Answers to the two sections should be written in separate books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***

SECTION - I

Q1) a) What are the petrochemicals? Discuss the pathway from refinery to the petrochemical plants. **[8]**

b) What are the main basic building blocks of petrochemical industry explain with suitable examples? Give the details of petrochemical products that are produced from xylene? **[8]**

OR

Q2) a) What are the key issues and challenges for petrochemical industry in India? **[8]**

b) Discuss about the basic raw material for petrochemical synthesis along with their sources. **[8]**

Q3) Draw neat sketch and write in details about the manufacture of ethylene oxide from ethylene and oxygen along with major engineering problems? **[16]**

OR

Q4) a) Write in details along with neat diagram on oxidation dehydrogenation process for conversion of methanol to formaldehyde. **[10]**

b) Write a note on furnaces used in petrochemical plants. **[6]**

Q5) a) What is the purpose of solvent dewaxing? Describe with schematic diagram solvent dewaxing. **[8]**

b) Enlist various physical and chemical processes of separation of petroleum fraction and discuss briefly each process with suitable diagram. **[10]**

OR

P.T.O.

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

a) Modern crude distillation.

b) Catalytic cracking process.

c) Coking operations in petrochemical plants.

SECTION - II

Q7) Explain how glycol is produced by combining olefins and aromatics. Write all the details and draw neat schematic diagram. **[16]**

OR

Q8) Explain about the production of amines with suitable diagram and also discuss the major engineering problems. **[16]**

Q9) a) What is condensation polymerization? Describe steps and mechanism of condensation polymerization. **[10]**

b) Describe the various types of polymerization processes. **[6]**

OR

Q10) a) With neat sketches explain in detail about production of phenol formaldehyde along with its engineering problems. **[10]**

b) What are various polymeric products? Differentiate between different polymersation processes. **[6]**

Q11) a) Explain Pollution control aspects in the petrochemical plants. **[8]**

b) Describe the methodology for integration of refinery and petrochemical plants for power generation. **[10]**

OR

Q12) Write a note on following: **[18]**

a) Safety consideration in petrochemical plants.

b) Recent advances in petrochemical plants & refineries in India.

c) Origin of petrochemical industry.

Total No. of Questions : 12]

SEAT No. :

P1022

[Total No. of Pages : 3

[4264] - 615

B.E. (Chemical)

PROCESS ENGINEERING COSTING AND PLANT DESIGN

(2008 Pattern) (Semester - II)

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

Instructions to the candidates :

1) ***Answer three questions from Section-I and three questions from Section-II.***
2) ***Answers to the two sections should be written in separate 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) Assuming the suitable basis illustrate the concept of material balance with reaction. Based on the material balance, prepare the energy balance for the same. Draw a neat flow diagram for the reference. **[18]**

OR

Q2) a) Draw a model specification sheet for sieve-tray distillation column. **[9]**

b) Estimate the design procedure if a lab scale batch reactor has to be scale-up for pilot plant level. **[9]**

Q3) a) A heat exchanger has been designed for use in a chemical process. A standard type of heat exchanger with a negligible scrap value costs Rs.4000 and will have a useful life of 6 years. Another proposed heat exchanger of equivalent design capacity costs Rs.6800 but will have a useful life of 10 years and a scrap value of Rs.800. Assuming an effective compound interest rate of 8% per year, determine which heat exchanger is cheaper by comparing the capitalized costs. **[8]**

b) Write a note on types of taxes and insurances and explain them in detail. **[8]**

OR

Q4) a) The original value of piece of equipment is Rs.22,000, completely installed and ready for use. Its salvage value is estimated to be Rs.2000 at the end of service life estimated to be 10 years. Determine the asset (book) value of the equipment at the end of 5 years using : **[8]**

i) Straight-line method.

ii) Textbook declining balance method.

iii) Sinking fund method if rate of interest is 6% annually.

P.T.O.

b) Explain the methods for determining the depreciation and compare them. **[8]**

Q5) a) Write a method for calculating Total Product Cost (TPC) for unit price of a chemical. **[8]**

b) Write a note on cost indexes and explain their importance while estimating equipment costs such as six-tenths-factor rule. **[8]**

OR

Q6) a) Explain the mathematical methods for profitability evaluation with neat diagrams. **[8]**

b) A company must purchase on reactor to be used in an overall operation. Four reactors have been designed, all of each are equally capable of giving the required service. The following data apply to the four designs :

	Design 1	Design 2	Design 3	Design 4
Fixed-capital investment (Rs.)	10000	12000	14000	16000
Sum of operating and fixed costs per year (all other costs are constant)	3000	2800	2350	2100

If the company demands a 15% return on any unnecessary investment, which of the four designs should be accepted? **[8]**

SECTION - II

Q7) a) A project can produce 12000 units per year at 100% capacity. The variable cost per unit is Rs.3.00 at 100% capacity. Fixed costs are 10,000 per year. Find the break-even point if the selling price is Rs.5.00 per unit. Now the manufacturer finds that he can sell only 80% at Rs.5.00 per unit. How much he should charge for additional unit if he brings the production upto 100% capacity and increase profits after taxes by an additional amount of Rs.1000? Use tax rate for the above problem 52%. **[9]**

b) Write a note on - Optimum conditions in cyclic operations. **[9]**

OR

Q8) a) 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. **[9]**

b) Write a general procedure for one and more variables to determine the optimum conditions. **[9]**

Q9) a) Discuss the points in brief required while preparation of techno-economic feasibility report. **[8]**

b) Derive the following equation for the optimum outside diameter of insulation on 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. **[8]**

OR

Q10) a) Derive the equation for optimum cooling water flow rate in condenser. **[8]**

b) Explain the concept of pinch technology analysis by the illustration of hot side and cold side composite curves. Take the hot side temperatures are T_1, T_2 for heat exchanger - 1, T_3, T_4 for heat exchanger - 2, T_5, T_6 for heat exchanger - 3 and the cold side temperatures are - t_1, t_2 for heat exchanger - 1, t_3, t_4 for heat exchanger - 2, t_5, t_6 for heat exchanger - 3 respectively. **[8]**

Q11) a) What are the points that should be considered while deciding the plant location? Based on these points draw a suitable diagram for plant lay-out. Show direction arrows. **[8]**

b) Explain the steps needed for preparing entire PERT techniques. Based on the steps how will you evaluate expected total project duration? **[8]**

OR

Q12) a) Explain the essential preliminary data needed to construct the chemical project considering the constraint of budget. **[8]**

b) Construct the PERT network and estimate the expected time and variance for the following data table - **[8]**

Pre-event	Suc-event	Optimistic time (a)	Most likely time (m)	Pessimistic time (b)
1	2	7	8	9
1	4	8	10	13
1	7	3	5	7
2	3	4	5	6
3	5	6	7	8
5	9	6	10	14
4	6	9	10	12
6	9	9	13	19
7	8	7	9	12
8	9	5	8	11

Total No. of Questions : 12]

P1024

SEAT No. : ____

[Total No. of Pages : 2

[4264] - 573
B.E. (Instrumentation & Control)
INDUSTRIAL AUTOMATION
(2008 Pattern) (Semester - II)

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

Instructions to the candidates:

1) ***Answer 3 questions from Section - I and 3 questions from Section - II.***
2) ***Answers to the two sections should be written in separate books.***
3) ***Neat diagrams must be drawn wherever necessary.***

SECTION - I

Q1) a) User requirement specifications for any automation project. **[10]**

b) Define a term "Control System Audit" and explain the benefits of the same. **[6]**

OR

Q2) Explain various functional levels that are used in : **[16]**

a) Power plant
b) Process Industries
c) Manufacturing Industry

Q3) a) Explain the role of foundation field bus H1? Explain its advantages and limitations? **[8]**

b) Explain HART protocol? What are its advantages and limitations? **[8]**

OR

Q4) a) Compare between HART and Foundation Field bus. **[8]**

b) Explain MODBUS protocol? **[8]**

Q5) a) Explain basic principal of working of CNC machine? **[10]**

b) Explain development stages involved in PLC based automation system. **[8]**

P.T.O.

OR

Q6) a) Explain PLC programming methods using IEC 61131. **[10]**

b) Explain the use of action qualifiers in the SFC programming. **[8]**

SECTION - II

Q7) a) Explain in detail specifications of DCS system to any automation project. **[10]**

b) Explain the components of the DCS system. **[6]**

OR

Q8) a) Write a short note on Process Hazard Analysis? **[8]**

b) Explain DCS support for Enterprise resource planning? **[8]**

Q9) a) Explain in brief alarm management system in DCS. **[8]**

b) Write a short note on third party interfaces in automation. **[8]**

OR

Q10)a) Explain the role of DCS in data management system. **[8]**

b) Explain security and user access management in DCS? **[8]**

Q11)a) Explain the importance of process Hazard Analysis (PHA), Hazard and operability study (HaZOp)? **[10]**

b) Write a short note on safety integrity level. **[8]**

OR

Q12)a) What are IEC61511 standards for functional safety. **[10]**

b) Explain safety life cycle system. **[8]**

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Total No. of Questions : 12]

SEAT No. :

P1027

[Total No. of Pages : 2

[4264] - 533
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) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***

SECTION - I

Q1) a) Explain importance of control system in process industry? With the help block diagram, explain process control system. **[8]**

b) What are the different categories of signals? Write standard ranges of signals. **[8]**

OR

Q2) a) What are the types of control system. Explain with the help of block diagram significance of each type in detail. **[8]**

b) Explain discontinuous mode and composite mode of controller? Write importance of each mode. **[8]**

Q3) a) Why need of tuning in controllers? Explain the Zeigler-Nichols method used for tuning a controller. **[8]**

b) List different types of control valve. Draw and explain different parts of butter fly valve. **[8]**

OR

Q4) a) Draw and explain schematic diagram of a Proportional, Integral, and differentiator controller using OPAMPs. Write mathematical equations for P, I and D controller. **[8]**

b) Write down comparisons of electronic, pneumatic and hydraulic control systems. **[8]**

P.T.O.

Q5) a) What is control valve noise? How it affects performance of control valve? Write sources of valve noise. **[9]**

b) Explain in detail Valve positioner, cavitation and flashing with respect to control valve. **[9]**

OR

Q6) a) Draw and explain proportional and integral hydraulic controller. **[8]**

b) Explain with schematic diagram pneumatic PI controller. **[5]**

c) Explain inherent characteristic of a valve. **[5]**

SECTION - II

Q7) a) What is cascade control systems? With the help of block diagram explain cascade control of heat exchanger. **[8]**

b) What is self tuning controller? Explain explicit and implicit self tuning controller. **[8]**

OR

Q8) a) Explain with the help of block diagram Feedback Control System. Write advantages and disadvantages of feedback control system. **[8]**

b) What is ratio control system? Explain with block diagram direct approach to ratio control. **[8]**

Q9) a) Explain cascade and ratio control schemes for boiler in detail. **[8]**

b) What is evaporator? Explain control scheme for evaporator. **[8]**

OR

Q10) a) What is model predictive control? Discuss model predictive control on the basis of Forward Prediction. **[8]**

b) Discuss with examples application of robotics in automobile industry. Explain different applications. **[8]**

Q11) a) Why needs supervisory control system in process industry. Draw the block diagram of a SCADA and explain the function of each block. **[10]**

b) Explain different recorders used in process instrumentation. **[8]**

OR

Q12) a) Why need of digital controls in process industry? With the help of block diagram explain direct digital control system used in industry. **[10]**

b) Write a note on Industrial Robots. **[8]**

Total No. of Questions : 12]

SEAT No. :

P1132

[Total No. of Pages : 2

[4264] - 485

B.E. (Production Sandwich)

AUTOMOBILE ENGINEERING

(2008 Pattern) (Elective - I) (Semester - I)

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

Instructions to the candidates :

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

SECTION - I

Unit - I

Q1) a) Explain the working of four stroke petrol engine with the help of diagram. **[10]**

b) Classify the vehicles on the basic of different aspects. **[8]**

OR

Q2) a) What is the principle of working of a mechanical governor? **[9]**

b) Explain working of simple carburettor with the help of *diagram*. **[9]**

Unit - II

Q3) a) Explain in detail the components used in water cooling system with neat diagram. **[9]**

b) Write short note on antifreeze solutions. **[7]**

OR

Q4) a) What are the problems encountered with liquid cooling? **[8]**

b) Explain the working of centrifugal type pump with the help of diagram. **[8]**

Unit - III

Q5) a) What are the functions of the lubrication system in an automobile. **[8]**

b) Explain Battery ignition system. **[8]**

OR

P.T.O.

Q6) a) Explain pressure lubrication system with the help of diagram. **[10]**

b) Discuss the various properties of lubricants. **[6]**

SECTION - II

Unit - IV

Q7) a) What can go wrong in clutch? **[6]**

b) What is the function of gear box in an automobile? **[8]**

c) Why the clutch pedal "free play" important? **[4]**

OR

Q8) a) With the help of neat sketch, explain the construction and operation of constant mesh gear box. **[12]**

b) Explain the working of differential. **[6]**

Unit - V

Q9) a) What are the objectives of suspension system? **[8]**

b) Explain with the help of diagram "Toe in" and "Toe out". **[8]**

OR

Q10) a) Indicate the different types of steering linkages. **[8]**

b) Write short note on self levelling suspension. **[8]**

Unit - VI

Q11) a) Write short notes on : **[10]**

i) Electric brakes.
ii) Air brakes.

b) What is mean by servicing? And explain different types of servicing. **[6]**

OR

Q12) a) Describe in brief the construction and working of drum brake. **[8]**

b) State the advantages and disadvantages of hydraulic brakes. **[8]**

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Total No. of Questions : 12]

SEAT No. :

P1133

[Total No. of Pages : 2

[4264] - 486

B.E. (Production Sandwich)

COMPUTER INTEGRATED MANUFACTURING AND INDUSTRIAL ROBOTICS

(2008 Pattern) (Elective - I) (Semester - I)

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

Instructions to the candidates :

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

SECTION - I

Q1) a) Explain ESPRIT - CIM OSA model with sketch. Compare it with IBM model. **[12]**

b) Discuss rapid product development and manufacture. **[4]**

OR

Q2) a) Explain steriolithography method of rapid prototyping. Also state its advantages and limitations. **[8]**

b) Explain the basic steps of rapid prototyping in deatil. **[8]**

Q3) a) Explain Dennavit - Hartenberg's convention for dynamic analysis of joints. **[8]**

b) Sketch and explain different configurations of robots. **[8]**

OR

Q4) a) Discuss advanced synthesis of planar mechanisms for ISP, MSP and FSP. **[12]**

b) Explain kinematics of open and closed loop mechanisms. **[4]**

Q5) a) Explain different types of sensors used in robots. **[10]**

b) Discuss the transmission systems required for functioning of a robot. **[8]**

OR

Q6) a) Explain the concept of power transfer. **[4]**

b) State different types of drives used in robots. Also list their advantages and limitations. **[8]**

c) Explain robot activation and feedback components. **[6]**

P.T.O.

SECTION - II

Q7) a) Discuss various considerations for gripper design. **[8]**

b) Explain hydraulic and pneumatic grippers. Also distinguish between them. **[8]**

OR

Q8) a) Explain finite element analysis in designing for gripper pressure for visco-elastic material. **[8]**

b) Write note on mechanical grippers. **[8]**

Q9) a) Explain the following : **[8]**

i) Piezo-electric contact sensors.

ii) Electro-optical sensors.

b) Explain the functioning of sensor. Also discuss the fields of applications of the sensor. **[8]**

OR

Q10) a) Discuss the factors to be considered for the selection of the sensor in Robot system. **[8]**

b) Explain the following related to robot vision system : **[8]**

i) Median filtering.

ii) Discretization.

iii) Smoothening.

Q11) a) Explain different programming languages used in robots. **[8]**

b) State and explain different techniques of obstacle avoidance in robotics. **[10]**

OR

Q12) Explain the following applications of robots (any three) : **[18]**

a) Walking robots.

b) Arc-Welding robots.

c) Machine-Mounted robots.

d) Telechirs.

☒☒☒☒

Total No. of Questions : 12]

SEAT No. :

P1138

[Total No. of Pages : 2

[4264] - 505
B.E. (Electrical)
POWER QUALITY
(2008 Pattern) (Elective - I) (Semester - I)

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

Instructions to the candidates :

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

SECTION - I

Q1) a) Explain various definitions of power quality with reference to each stake holders. Why power quality is called voltage quality? **[10]**

b) State and explain the relationship between immunity, emission and compatibility. **[8]**

OR

Q2) a) Define and explain the following terms as per IEEE Std. 1159. **[10]**

b) Explain various grounding practices as per IEEE standard for better operation of electronic equipments. **[8]**

Q3) a) Explain impact of reactive power management on voltage profile. **[8]**

b) Explain the following terms related with voltage flicker : **[8]**

i) Short term (P_{st}) and

ii) Long term (P_{lt}) voltage flicker.

OR

Q4) a) State and explain the causes and mitigation of over-voltage and under-voltages. **[8]**

b) Define flicker and explain various means to reduce voltage flicker. **[8]**

Q5) a) Define sag and interruptions and explain in detail following voltage sag mitigation measures : DVR, SMES and CVT. **[8]**

b) Explain voltage sag characteristics such as magnitude, phase angle jump, point on wave initiation and point on wave recovery. **[8]**

P.T.O.

OR

Q6) a) Explain the concept of an area of vulnerability. How fault location and fault level influences on voltage sags. **[8]**

b) Explain economic impact of voltage sag and its consequences. **[8]**

SECTION - II

Q7) a) Define harmonics, inter-harmonics and sub-harmonics. What are the effects of harmonics on all equipments? **[8]**

b) Explain stepwise procedure and various computer tools for harmonic analysis. **[10]**

OR

Q8) a) What is harmonic filtering? Explain active and passive filters. **[8]**

b) Explain series and parallel harmonic resonances. What are the consequences of harmonic resonances? **[10]**

Q9) a) Explain basic principles of over voltage protection. Which are the devices used for over voltage protection? **[8]**

b) Explain capacitor switching transients and its mitigation methods. **[8]**

OR

Q10) a) Explain load switching related transients problems and its mitigation measures. **[10]**

b) Define transients velocity and surge impedance. Explain the effects of line termination on it. **[6]**

Q11) a) Explain procedure for selection of monitoring equipments and use of various equipments required for power quality monitoring. **[8]**

b) Explain reactive and proactive approaches in power quality monitoring. **[8]**

OR

Q12) a) Explain selection procedure of transducers for power quality monitoring. **[8]**

b) What are the objectives and requirements of power quality monitoring equipments to monitor various power quality parameters? **[8]**

Total No. of Questions : 12]

SEAT No. :

P1139

[Total No. of Pages : 2

[4264] - 506
B.E. (Electrical)
ILLUMINATION ENGINEERING
(2008 Pattern) (Elective - I) (Semester - I)

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

Instructions to the candidates :

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

SECTION - I

Q1) a) State and explain the laws of illumination. **[6]**

b) Explain plain angle and solid angle. Derive the relation between them. **[4]**

c) Define : **[8]**

i) Luminous flux.
ii) Luminous intensity.
iii) M.H.C.P.
iv) Illumination.
v) Lamp efficiency.
vi) Depreciation factor.
vii) Reflection factor.
viii) Absorption factor.

OR

Q2) a) Explain the structure of eye. **[10]**

b) A small light with uniform intensity in all directions is mounted at a height of 10m above a horizontal surface. Two points A and B both lie on the surface with A directly beneath the source. How far is B from A if illumination at B is only $\frac{1}{10}^{th}$ as that of A? **[8]**

P.T.O.

Q3) a) Explain the working of fluorescent tube with neat diagram. **[6]**

b) Explain stroboscopic effect of fluorescent tube. **[6]**

c) Write short note on LEDS. **[4]**

OR

Q4) a) Explain the principle and working of Induction Lamp. **[8]**

b) Explain the principle and working of High Pressure Mercury vapour lamp. **[8]**

Q5) a) Explain the requirements for design of control gear. Explain different accessories for Gaseous Discharge Lamps. **[8]**

b) Explain Dimming. **[8]**

OR

Q6) a) Explain various optical control schemes. **[8]**

b) Classify the light fittings according to the way light reaches the object. **[8]**

SECTION - II

Q7) a) Explain zonal cavity method for general lighting design. **[10]**

b) State selection criteria for selection of lamps and luminaries for indoor lighting. **[8]**

OR

Q8) a) Explain the various factors that are to be considered while designing lighting. **[10]**

b) Write a short note on office lighting. **[8]**

Q9) a) State and explain road lighting code in India. **[8]**

b) Write a short note on Isolux diagram. **[8]**

OR

Q10) a) Explain the arrangement of luminaries with respect to the type of road. **[10]**

b) Discuss different problems in energy efficient lighting. **[6]**

Q11) a) Write a note on lighting with optical fibre. Explain the components of fibre optics system. **[8]**

b) Explain Emergency lighting. **[8]**

OR

Q12) a) Explain photovoltaic lighting. **[8]**

b) Write a note on Day Lighting. **[8]**

Total No. of Questions : 12]

SEAT No. :

P1144

[Total No. of Pages : 3

[4264] - 521
B.E. (Electronics)
ELECTRONICS SYSTEM DESIGN
(2008 Pattern)

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

Instructions to the candidates :

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

SECTION - I

Q1) a) Explain the Bath tub Curve. **[6]**

b) Write a notes on Enclosure. **[4]**

c) What are different Electronics product. Explain their classification. **[6]**

OR

Q2) a) Differentiate Quality and Reliability. **[6]**

b) Write a notes on documentation. **[4]**

c) Find out MTBF, MTTF **[6]**

Stage	Components	Type	Quantity	FR x 10–6 hr
Transformer	Winding	Step-down	01	4.4
Rectifier	Diodes	Si type	04	0.2
Filter	Capacitor	Electrolytic	02	0.3
Regulator	Capacitor	Ceramic	02	0.3
	Diode	Semiconductor	02	0.2
	Linear IC	ICLM317	02	0.6
Display	Linear	IC7107	02	0.6
	Resistors	Carbon comp	04	0.2

P.T.O.

Q3) a) Explain Design Guidelines for High-performance, Multi channel, Simultaneous-sampling ADC in Data-Acquisition-System (DAS). **[8]**

b) What are the factor affecting the choice of OPAMP in signal conditioning? Explain with the help of example. **[8]**

OR

Q4) a) Explain Main Sources of Noise and Interference Affecting Industrial Data-Acquisition Systems (DAS). **[8]**

b) Draw circuit of instrumentation amplifier and carry out error budget analysis for its parameters CMRR, Bandwidth, Offset. **[8]**

Q5) a) Explain the criteria/issue used for the identification of the preferred component technology for the development of Application Systems. **[8]**

b) Explain the different requirement of interfacing a touch screen. What are the different touch screen available? Explain typical interfacing technique with example. **[10]**

OR

Q6) a) Draw the typical wiring diagrams for each interface RS-485, RS-422, RS-232, 12C. Also state how many maximum device can interface with these buses. **[8]**

b) Interface four 7 - segment display in static mode and multiplex mode with micro controller. Draw its interfacing diagram. Calculate current consumption required for each mode (static and dynamic). Compare the performance. Justify the suitable mode. **[10]**

SECTION - II

Q7) a) Explain the water fall model for software development. **[8]**

b) What are the factors relevant to a language (Assembly vs. C) selection for the development of electronics product. **[8]**

OR

Q8) a) Explain the Assembly Language Coding Standards. **[8]**

b) Write a notes on Debugging tools and techniques for software. **[8]**

Q9) a) Explain the decupling of the negative power supply why it is necessary in case of amplifier. **[8]**

b) Write a notes on SHIELDING and GUARDING. **[10]**

OR

Q10) a) State and explain the causes of Losses Along Transmission Lines. Explain Circuitry required to Overcome Attenuation Problems. **[8]**

b) Name and explain the different parasitic present on the PCB. How to reduce the same give detail explain with the help of equations. **[10]**

Q11) a) Write a notes on EMI and EMC standards. **[8]**

b) What are the different hardware and software tools involves for the Electronics Product testing. Explain in detail. **[8]**

OR

Q12) a) Write a notes on electromagnetic compatibility of the product. **[8]**

b) Explain different environmental testing in detail. **[8]**

Total No. of Questions : 12]

SEAT No. :

P1148

[Total No. of Pages : 2

[4264] - 527
B.E. (Electronics)
MECHATRONICS
(2008 Pattern) (Elective - I) (Semester - I)

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

Instructions to the candidates :

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

SECTION - I

Q1) a) Define Mechatronics. What are the key elements of Mechatronics? Explain in detail. **[8]**

b) Explain the stepwise design procedure of any one Mechatronics system. **[8]**

OR

Q2) a) State the principle on which solenoid works? What are the different types of switches and springs? **[8]**

b) What are the common structures in Mechatronics? Explain any two. **[8]**

Q3) a) Explain variable frequency drives with neat block diagram. **[8]**

b) Explain the selection criteria for control valve. Draw and explain : 3/2 valve, 4/2 valve, 5/2 valve. **[8]**

OR

Q4) a) Compare hydraulic system and pneumatic system. **[6]**

b) Explain variable frequency drives with neat block diagram. **[10]**

Q5) a) Explain the principle of operation, specifications and selection criteria for temperature measurements. **[10]**

b) Explain brushed and brushless DC motors. **[8]**

P.T.O.

OR

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

a) Servo motors and DC motors.

b) Chains and Sprockets.

c) Pulleys and Belts.

SECTION - II

Q7) a) What is the role of control in Mechatronics? Give the key elements of controlled mechatronics system. **[8]**

b) What is design optimization? What are the types of optimization methods? And how to achieve design optimization? **[8]**

OR

Q8) a) Explain "Hill climbing" algorithms, Tabu search algorithms, Simulated annealing algorithms, and Genetic algorithms. **[8]**

b) Explain architecture of PLC with neat block diagram. **[8]**

Q9) a) Explain the block diagram of CNC Machines. **[8]**

b) What are the different communication protocols? Explain at least one in detail. **[8]**

OR

Q10) a) Describe IEEE 488 bus standard and its need. **[8]**

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

Q11) a) Explain multichannel Data logger with block diagram. **[8]**

b) Design a mechatronics system using strain gauge that will perform the task of weighing. **[10]**

OR

Q12) a) Discuss pick and place robot, with actuators and sensors. Give reasons for selection of these components. **[10]**

b) What are the basic elements of data logging system? **[8]**

Total No. of Questions : 12]

SEAT No. :

P1155

[Total No. of Pages : 2

[4264] - 545
B.E. (E & TC)
EMBEDDED SYSTEMS AND RTOS
(2008 Pattern) (Elective - I) (Semester - I) (Theory)

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

Instructions to the candidates :

1) ***Solve Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6, Q. 7 or Q. 8, Q. 9 or Q. 10, Q. 11 or Q . 12.***
2) ***Answers to the two sections should be written in separate books.***
3) ***Neat diagrams must be drawn wherever necessary.***

SECTION - I

Q1) a) List and define the main characteristics of embedded system that distinguishes from other system. **[8]**

b) With the help of design metrics explain the design challenges and optimization of embedded systems. **[10]**

OR

Q2) a) List the different processors available for embedded system applications. **[8]**

b) Explain the transceiver section of IrDA. **[4]**

c) Explain the concept of bit encoding in CAN. **[6]**

Q3) a) Draw the interfacing diagram between LPC 2148 and seven segment display. Write down the code in C language for displaying number 0 to 9 on seven segment displays. **[8]**

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

i) Banked Registers in ARM.

ii) CPSR Register and Processor modes.

OR

Q4) a) Explain the architecture of LPC 2148 with a neat block diagram. **[8]**

b) How the ARM instruction set differs from the pure RISC definition. **[8]**

Q5) a) Explain various message passing techniques of Inter Process/Task Communication. **[8]**

b) What do you mean by mutual exclusion and explain mutual exclusion through busy waiting/spin lock. **[8]**

P.T.O.

OR

Q6) a) Compare the following software architectures : **[8]**

i) Round - Robin.
ii) Round - Robin with interrupts.
iii) Function queue scheduling.
iv) Real - Time operating system.

b) Explain the term Task, process and Thread. List and explain various state of a task with diagram. **[8]**

SECTION - II

Q7) a) What is embedded LINUX? Explain Embedded Linux development set up. **[10]**

b) Explain the device driver with a simple application. **[8]**

OR

Q8) a) What are the file system supported by LINUX. **[8]**

b) Explain the following tool utilities in Embedded Linux system. **[10]**

i) Busy Box.
ii) Redboot.
iii) LIBC.

Q9) a) Explain various functional requirements that needs to be analyzed in the selection of an RTOS for an embedded design. **[8]**

b) Explain different stages of the embedded development process in waterfall model. **[8]**

OR

Q10) a) State important features of Vx works essential in a sophisticated embedded system design. **[8]**

b) State salient features of Win CE OS. **[8]**

Q11) a) State hardware requirement of digital camera. Suggest suitable processor, memories and I/O's for it. **[8]**

b) Explain the task scheduling model of adabtive cruise control system. **[8]**

OR

Q12) a) Explain the different software requirement (No. of tasks, RTOS services) for the smart card. **[8]**

b) Explain the features of processor, memory and I/O device required for implementation of ATM. **[8]**

Total No. of Questions : 12]

SEAT No. :

P1157

[Total No. of Pages : 3

[4264] - 547
B.E. (E & TC)
MICROWAVE COMMUNICATION AND RADAR
(2008 Pattern) (Elective - I) (Semester - I)

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

Instructions to the candidates :

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

SECTION - I

Q1) a) What do you understand by waveguide modes? What are dominant modes? **[8]**

b) Differentiate between group velocity and phase velocity as applied to waveguides. **[4]**

c) Determine the cut off wavelength for the dominant mode in a rectangular waveguide of breadth 10cm. For a 2.5 GHz signal propagated in this waveguide in the dominant mode; calculate the guide wavelength, the group velocity and phase velocity. **[6]**

OR

Q2) a) Compare rectangular waveguides with circular waveguides. **[6]**

b) Explain the need of coupling probes and loops alongwith diagrams. **[6]**

c) Explain the different power losses taking place in a rectangular waveguide. **[6]**

Q3) a) Explain directional coupler. Define : **[6]**

i) Coupling coefficient.
ii) Directivity.
iii) Isolation loss.

b) Explain the functioning of flap and vane attenuator. **[6]**

c) Define scattering matrix and state its properties. **[4]**

P.T.O.

OR

Q4) a) Explain operating principle of four port microwave circulator and how the same can be constructed using magic tees. **[8]**

b) Write short notes on the following : **[8]**

i) Microwave isolator.

ii) Matched terminations.

Q5) a) What do you mean by crossfield device? Explain the phase focussing effect in magnetron. **[8]**

b) Draw the construction of TWT and explain its operation. Also list the applications of TWT. **[8]**

OR

Q6) a) Explain bunching process in klystron tube. **[8]**

b) What is a slow wave structures? What are their types? Which one is most practical? How does it aid the performance of Travelling Wave Tube? **[8]**

SECTION - II

Q7) a) What do you mean by solid state microwave devices? Explain in short. **[6]**

b) Explain LSA mode of Gunn diode. **[4]**

c) Write short notes on the following microwave devices including applications. **[8]**

i) PIN diode.

ii) Microwave transistor.

OR

Q8) a) Discuss the amplification mechanism of parametric amplifier with the help of its equivalent circuit. **[6]**

b) Explain the principle of working of tunnel diode in brief. **[6]**

c) Explain in brief any one of the transit time devices. **[6]**

Q9) a) Explain in brief network analyser. **[6]**

b) Describe how can the power of a microwave generator be measured using. **[10]**

i) Bolometer.

ii) Calorimeter technique.

OR

Q10) a) Describe the set up for the measurement of Q of a cavity resonator. **[6]**

b) Write short notes on : **[10]**

i) Measurement of noise factor.

ii) Measurement of frequency and wavelength.

Q11) a) Explain the factors that affect the maximum range of a radar. **[8]**

b) Name the CW radar type capable of measuring both target range as well as target velocity. Briefly describe its principle of operation. **[8]**

OR

Q12) a) How do you distinguish stationary targets and moving targets. Explain the principle and working of an MTI radar. **[8]**

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

i) Blind speeds.

ii) Monopulse tracking.

iii) PRF.

iv) Duplexer.

Total No. of Questions : 12]

SEAT No. :

P1162

[Total No. of Pages : 2

[4264] - 561
B.E. (Instrumentation & Control)
PROCESS INSTRUMENTATION
(2008 Pattern) (Semester - I)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Answers to the two sections should be written in separate answer books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Use of logarithmic tables, electronic pocket calculator, steam table and Thermocouple table is allowed.***
6) ***Your answer will be valued as a whole.***
7) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Explain non self regulating process along with effect of P, I & D actions on it. **[8]**

b) List different process characteristics and explain any one in detail. **[8]**

OR

Q2) a) Explain flow process in detail. **[8]**

b) Explain effect of Period of oscillation and damping on process with example. **[8]**

Q3) Write short note on:

a) Variable time constant. **[8]**

b) Analysis of flow control. **[8]**

OR

Q4) a) Explain different features of MLPC. **[8]**

b) Explain process gain. **[8]**

Q5) a) Explain the different control performance measures. **[10]**

b) Explain Integral windup and corrective measures for same. **[8]**

P.T.O.

OR

Q6) a) Who do you select variables for control. **[8]**

b) What are the different control performance goals explain any one in details. **[10]**

SECTION - II

Q7) a) Explain Split Range control and its design criteria. **[8]**

b) What are different ways to improve the performance of nonlinear process. Explain any one in detail. **[8]**

OR

Q8) a) Justify "feedback feedforward and feedback controls are complementary'. **[8]**

b) Explain in brief velocity limiting and Backlash. **[8]**

Q9) a) What is effect of interaction on stability and tuning of multiloop control system. **[8]**

b) Explain Decoupling in detail. **[8]**

OR

Q10) a) Explain important multiloop issues in brief. **[8]**

b) Explain Relative Gain Array in detail. **[8]**

Q11) a) Explain with proper block diagram model predictive control. **[10]**

b) Explain Internal model control. **[8]**

OR

Q12) Write short note on: **[18]**

a) Dynamic matrix control.

b) Smith predictor.

Total No. of Questions : 12]

SEAT No. :

P1166

[Total No. of Pages : 2

[4264] - 567
B.E. (Instrumentation and Control)
BUILDING AUTOMATION - I
(2008 Pattern) (Elective - I) (Semester - I)

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

Instructions to the candidates :

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

SECTION - I

Q1) a) Discuss the necessity of Building Automation for residential buildings. **[8]**

b) Explain Building Life safety system with suitable diagram? **[10]**

OR

Q2) a) What is mean by fire? Explain following terms : **[10]**

i) Fire triangle.
ii) Fire signature.
iii) Fire stages.

b) Describe advanced building automation system. **[8]**

Q3) a) Explain FAS Design Procedure in brief with NFPA 72 standards. **[8]**

b) Discuss linear heat detectors with suitable applications. **[8]**

OR

Q4) a) List fire suppressions systems. Explain any one. **[8]**

b) Discuss cause effect matrix for FAS. **[8]**

Q5) a) Compare ADA and NFPA for FAS. **[8]**

b) Compare Style-4 and Style-7 loop wiring FAS. **[8]**

OR

Q6) a) Differentiate between addressable and conventional FAS. **[8]**

b) Discuss variable sensitivity and fixed sensitivity fire detectors. **[8]**

P.T.O.

SECTION - II

Q7) a) Explain communication between RFID card reader and TEMA server. **[8]**

b) Discuss the access control system components selection factors. **[10]**

OR

Q8) a) Draw and explain block diagram of security system. **[10]**

b) Explain working of magnetic lock with suitable diagram. **[8]**

Q9) a) Explain the working of digital camera with suitable block diagram. **[8]**

b) Compare lens mountings in Camera. **[8]**

OR

Q10) a) Explain the working of digital video streamer with block diagram. **[8]**

b) Discuss the video compression in CCTV system. **[8]**

Q11) a) What is perimeter intrusion? Explain importance of PIDS. **[8]**

b) Explain architecture of PIDS. **[8]**

OR

Q12) a) Compare various perimeter intrusion detection systems. **[8]**

b) Explain PIDS for educational buildings. **[8]**

Total No. of Questions : 12]

SEAT No. :

P1185

[Total No. of Pages : 4

[4264] - 655

B.E. (Petrochemical)

NOVEL SEPARATION PROCESSES

(2008 Pattern) (Elective - I) (Semester - I)

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

Instructions to the candidates :

1) ***Answer three questions from Section-I and three questions from Section-II.***
2) ***Answers to the two sections should be written in separate books.***
3) ***Neat 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) Classify separation processes by giving suitable example(s). Discuss the selection criteria for the same with suitable examples. **[10]**

b) Discuss the process principles involved in froth flotation. Give its industrial applications. **[8]**

OR

Q2) Classify the models for gas separation by membranes. Develop complete mixing model for membrane separation processes, mentioning important assumption. Discuss different design cases with solution strategies in this model. **[18]**

Q3) a) Discuss the various membrane modules used for membrane separation processes with neat sketches. **[8]**

b) Reverse osmosis of salt solution at 25ºC is tested with a 4.5×10^{-3} m^2 cellulose acetate membrane. On one side of the membrane is 1.25 mol NaCl/kg H_2O solution at 50 atmospheres (abs.) pressure, on the other is 0.025 mol NaCl/kg H_2O at atmospheric pressure. The permeation rate is 90 ml/hour.

Determine the following : **[8]**

i) The solvent permeability and

ii) The rejection rate.

OR

P.T.O.

Q4) A 9-micron tubular membrane is used to recover salt A from a dilute solution. The solutions to either side are at 0.028 and 0.004 kmol/m^3, with mass transfer coefficients of 3.5×10^{-5} and 2.25×10^{-5} m/s respectively. The distribution coefficient is 0.85 and the diffusivity of A in the membrane is 2.8×10^{-10} m^2/s.

a) Calculate the percentage of total resistance to mass transfer contributed by the membrane.

b) Calculate the membrane area needed to allow recovery at 0.015 kmol/hr.

c) Flow inside the tube is turbulent and mass transfer follows the Gilliland, Sherwood and Linton correlation. If the velocities of both solutions are doubled, estimate the membrane resistance in this case. **[16]**

Q5) a) Draw concentration profiles for membrane processes for following cases : **[8]**

i) Two liquid films and a solid and,

ii) Two gas films and a solid.

Write down the final flux equations for above cases.

b) Compare and contrast on Macroemulsions and Microemulsions with suitable examples. **[8]**

OR

Q6) a) A membrane is to be used to separate a gaseous mixture of P and Q in one of the petrochemical complex near one of MIDC area near Mumbai. The following data is known : **[10]**

Feed flow rate	$= 3.50 \times 10^5$ cm^3 (STP)/s
Feed composition of A	= 0.59 mole fraction
Desired composition of reject	= 0.28 mole fraction
Thickness of membrane	$= 2.35 \times 10^{-3}$ cm
Pressure on feed side	= 100 cm Hg
Pressure on permeate side	= 50 cm Hg
Permeability of A, P_A	$= 20 \times 10^{-10}$ cm^3 (STP) cm/(s.cm^2.cm. Hg)
Permeability of B, P_B	$= 10 \times 10^{-10}$ cm^3 (STP). cm/(s.cm^2 .cm. Hg)

Assuming complete mixing model, calculate the following :

i) The permeate composition.

ii) The fraction permeated.

iii) Membrane area.

b) Write a note on : Diffusion type model for Reverse osmosis. **[6]**

SECTION - II

Q7) Answer the following (any three) : **[18]**

a) Give classification of Chromatographic separations. State principles of HPLC.

b) Discuss in brief the adsorption isotherm models with equations.

c) Name five of the most important commercial adsorbents? What is the distinguishing feature of the molecular-sieve zeolites?

d) Write down Purnell equation for chromatographic separation. Explain different terms involved in it.

OR

Q8) a) A wastewater solution having a volume of 1.0m^3 contains 0.2 kg phenol/m^3 of solution. A total of 1.5 kg of fresh granular activated carbon is added to the solution, which is then mixed thoroughly to reach equilibrium. Using the isotherm data given below, determine the following : **[8]**

i) Final equilibrium values, and

ii) Percent of phenol extracted.

Equilibrium data

c, $\left(\frac{\text{kg phenol}}{\text{m}^3\text{ solution}}\right)$	**q, $\left(\frac{\text{kg phenol}}{\text{kg carbon}}\right)$**
0.322	0.150
0.117	0.122
0.039	0.094
0.0061	0.059
0.0011	0.045

b) Discuss in brief the process principles involved in Pressure Swing Adsorption (PSA) and Temperature Swing Adsorption (TSA) with industrial applications. **[10]**

Q9) A waste stream of alcohol vapour in air from a process was adsorbed by activated carbon particles in a packed bed having a diameter of 5 cm and length of 17 cm containing 79.2 g of carbon. The inlet gas stream having a concentration of c_o of 600 ppm and a density of 0.00115 g/cm^3 entered the bed at a flow rate of 750 cm^3/s. Data gives the concentration of the breakthrough curve. The break-point concentration is set at $c/c_o = 0.02$. **[16]**

Data : Breakthrough concentration

Time, h	c/c_o
0.0	0.0
3.0	0.0
3.5	0.002
4.0	0.030
4.5	0.155
5.0	0.395
5.5	0.600
6.0	0.900
6.2	0.935
6.5	0.975
6.8	0.990

a) Determine the break-point time, the fraction of total capacity used up to the break point, and

b) Determine the length of the unused bed. Also determine the saturation loading capacity of the carbon.

c) If the break-point time required for a new column is 6.5 hr, what is the new total length of the column required?

OR

Q10) a) Two solutes have a relative retention of $\alpha = 1.07$ and capacity factor, $k_1 = 5$ and $k_2 = 5.5$. The number of theoretical plates is nearly the same for both the compounds. How many plates are required to give a resolution of 1.5? and of 3? If the plate height is 0.25 mm, how long must the column be for a resolution of 1.5? **[8]**

b) Write down Van Deemter equation for Chromatography. Explain the meaning of each parameters involved in this equation. Derive an expression for optimum value of the mobile phase velocity and the plate height in terms of these parameters. **[8]**

Q11) a) Define the following terms in connection with chromatographic separations and give appropriate equations : **[8]**

i) Distribution coefficient (K)

ii) Retention Ratio (R)

iii) Capacity factor (k)

iv) Resolution (R_S)

b) Two amino acids, A and B were separated by liquid chromatography. The following data is available : **[8]**

Amino Acid	T_R, (minutes)	W (minutes)
A	4.25	0.55
B	5.15	0.65

i) Calculate the resolution of amino acids.

ii) Calculate the plate number for amino acid, A.

iii) Determine minimum numbers of plates needed to get a resolution of 1.5.

iv) How do you get this high plate number?

OR

Q12) Write short notes on (any three) : **[16]**

a) Reactive Distillation : Principles and applications.

b) Bioseparation.

c) Ion Exchange separations : Principles and applications.

d) Isoelectric Focusing.

e) Super Critical Fluid Extraction.

☒☒☒☒

Total No. of Questions : 12]

SEAT No. :

P1186

[Total No. of Pages : 4

[4264] - 656

B.E. (Petrochemical)

ELEMENTS OF FLUIDIZATION ENGINEERING

(2008 Pattern) (Elective - I) (Semester - I)

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

Instructions to the candidates :

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

SECTION - I

Q1) a) With help of neat diagram explain various regimes possible for a fluidized bed. Highlight the values of flow velocity for each of these regimes. **[6]**

b) Discuss various scenarios for which fluidized bed should be used-provide suitable examples. **[6]**

c) What is Quality of Fluidization? **[4]**

OR

Q2) a) Define superficial velocity. Discuss the effect of variation of superficial velocity through packed bed with help of proper graph. **[6]**

b) With help of diagrams explain - "The Fluidized bed behaves like fluid only". **[6]**

c) Write down various disadvantages of Fluidized Bed Systems. **[4]**

Q3) a) An industrial scale FCC unit with height 3.8m having H/D ratio of 0.8 is to be operated at superficial velocity of 0.85m/s. Average density of the bed can be considered to be 512kg/m^3. If the gas entering to reactor has density 0.7kg/m^3, at operating condition, design a suitable grid. Assume grid thickness to be 0.03m. **[12]**

b) Prove that the void fraction at minimum fluidization velocity can be represented by : **[4]**

$$\varepsilon_{mf} = 1 - \frac{M}{A_V L_{mf} \rho_p}$$

where all the symbols have their usual significances.

P.T.O.

OR

Q4) a) Discuss various advantages and disadvantages of perforated plates used as distributor for industrial scale fluidized bed system. Explain how these disadvantages can be tackled. **[8]**

b) Write a short note on Geldart's classification of particles and their important characteristics. Provides suitable examples as well. **[8]**

Q5) a) Briefly explain all important characteristics of intrusive multiphase flow meters. **[6]**

b) Write a short note on disengaging section of fluidized bed and its construction. **[6]**

c) With help of neat diagram explain Davidson Model for bubble movement. **[6]**

OR

Q6) a) Discuss three phase flow phenomena through fluidized bed with help of neat diagram. Explain all the interphase transport involved therein. **[8]**

b) With help of sketches explain radioactive tomography method for measurements of various parameters of fluidized bed. **[6]**

c) Write a short note on Coalescence and Splitting of bubbles inside fluidized bed system. **[4]**

SECTION - II

Q7) a) Discuss principle of operation of Fluidized Bed Boilers. Provide neat sketches. Highlight its advantages. **[8]**

b) How fluidization quality of difficult to fluidize particles can be enhanced-discuss in details with help of suitable diagrams. **[8]**

OR

Q8) a) How can fluidized bed be used as Heat Exchangers - Explain with help of suitable example. **[6]**

b) Briefly explain the principle of removal of moisture from food items in fluidized bed system. Highlight its advantages and disadvantages. **[6]**

c) Write down Ranz - Marshall correlation, discuss its usefulness. **[4]**

Q9) a) With help of all the important assumptions obtain Kuni-Levenspiel Model of flow through a Fluidized Bed Reactor. **[8]**

b) Obtain the overall rate constant for fluidized bed with all its mass transfer resistances for the following 1st order reaction : **[10]**

$$A \rightarrow Product$$

Prove that final rate expression can be represented by :

$$1 - X_A = \frac{C_{A,outlet}}{C_{A,\ inlet}} = \frac{C_{A0}}{C_{Ai}} = \exp\left[-k_f \frac{L_f}{u_b} \right]$$

In the above expression, overall rate constant k_f for the fluidized bed with all its mass transfer resistance can be represented by

$$k_f = \left[\gamma_b\, k_r + \cfrac{1}{\cfrac{1}{K_{bc}} + \cfrac{1}{\gamma_c\, k_r + \cfrac{1}{\cfrac{1}{K_{ce}} + \cfrac{1}{\gamma_c k_r}}}} \right]$$

where K_{bc} and K_{ce} are interchange coefficients and γ_b, γ_c and γ_e are solid distribution parameters in bubble, cloud and emulsion phase of the bed respectively, and k_r denotes homogeneous phase rate constant for the 1st order reaction.

OR

Q10) a) Distinguish between dynamics of flow for two Fluidized Beds one comprising of slow moving bubbles and the other with fast moving bubbles - provide neat diagrams. **[6]**

b) With help of neat figure explain the mechanism of Circulating Fluidized Bed. Provide its usage and applicability. **[8]**

c) What is sintering in fluidized bed? In this context discuss agglomeration also. **[4]**

Q11) a) What are the advantages of fluidized bed reactor over conventional types of reactor? **[5]**

b) Discuss Fluidized bed operation for synthesis of Acrylonitrile. **[6]**

c) Highlight the scale-up issues of Fluidized bed reactors. Briefly explain how these issues can be sorted out. **[5]**

OR

Q12) a) Highlight the new modifications of modern fluidized bed catalytic cracker with help of neat sketches. **[6]**

b) With neat diagram explain the operation of low pressure High Density Polyethylene (HDPE) Reactor. **[6]**

c) "Fluidized Bed Reactor is a must for Pulverized Coal Technology" - Elaborate and explain. **[4]**

Total No. of Questions : 12]

SEAT No. :

P1192

[Total No. of Pages : 3

[4264] - 676

B.E. (Polymer Engineering)

POLYMER REACTION ENGINEERING

(2008 Pattern) (Elective - I) (Semester - I)

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

Instructions to the candidates :

1) ***Answers to the two sections should be written in separate books.***
2) ***Draw neat diagrams wherever necessary.***
3) ***Numbers to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***
5) ***Use of logarithmic table, electronic pocket calculators is allowed.***

SECTION - I

Q1) a) Discuss the importance of molecular weight and Molecular weight distribution of polymer. **[8]**

b) Find the polydispersity Index of the mixture composed of 20 molecules of 1000 monomer lengths and 380 molecules of 1 monomer lengths. **[4]**

c) Discuss the Number and Weight Fraction, Number Average Degree of Polymerization, Molecular Weight Distribution terms used for the characterization of mixtures of polymer molecules. **[6]**

OR

Q2) a) Explain the characteristics of Chain Growth Polymerization and explain the distinctive features of Polymer Reaction Engineering. **[12]**

b) Discuss the Number Average Molecular Weight, First moment of Pj's Weight Average Molecular Weight terms used for the characterization of mixtures of polymer molecules. **[6]**

Q3) a) Discuss in detail all technical conclusions from Free Radical Kinetics Studies. **[6]**

b) Derive the necessary relationship obtained in giving Molecular Weight distribution in CSTR for free radical type polymerization. **[10]**

OR

P.T.O.

Q4) a) MMA is to be polymerized at 80ºC with Free Radical Polymerization in a batch reactor. The initial concentration of monomer is 8.135 gmole/lit, and the concentration of initiator is kept constant at 0.06 gmole/lit. Assume termination takes place only by combination. The rate constant are as $K_0 = 3* 10^{-6}$ sec^{-1}, $k_p = 176$ lit/gmole.sec, $k_c = 3.6*10^7$ lit/gmole.sec, f = 0.6. Find the number average molecular weight, weight average molecular weight and MWD for a reaction time of 200 min. **[10]**

b) Derive the necessary equation of the rate of Initiation (ri) in terms of Initiator concentration [I]. **[6]**

Q5) a) Discuss the necessary equation for the steady state population balance equation for the particles having 'n' radicals in the Emulsion polymerization. **[12]**

b) Write a note on Suspension Polymerization. **[4]**

OR

Q6) Derive the necessary equation of Overall rate of polymerization in emulsion Polymerization if

Case 1) Number of the free radicals per polymer particles small compared with unity.

Case 2) No transfer of polymer radicals out of the particle through diffusion and high rate of termination. **[16]**

SECTION - II

Q7) Give technology overview for the following polymer. **[18]**

a) SBR rubber.

b) Nylon 6.

c) Polystyrene.

OR

Q8) Write a short note on reactor systems used for PET, PVC, High Density Polyethylene polymers. **[18]**

Q9) a) Discuss the role of mass transfer in step growth polymerization. **[8]**

b) Discuss the necessary equation of the total rate of the disappearance of the monomer M via Initiation, Propagation, and the termination reaction by monomer transfer. **[8]**

OR

Q10) Derive the suitable model to understand the step growth kinetics at higher conversion. **[16]**

Q11) Write a short note on Reactor Selection for carrying out polymerization reaction and role of control engineering in polymerization reactor. **[16]**

OR

Q12) a) Discuss the choice between batch and continuous reactor for polymerization process. **[8]**

b) Explain the reactor design in terms of following factors Polymerization Mechanism, Stoichiometry Factors, Thermodynamics Factors, and Transport Limitations. **[8]**

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Total No. of Questions : 12]

SEAT No. :

P1197

[Total No. of Pages : 3

[4264] - 694
B.E. (Computer)
IMAGE PROCESSING
(2008 Pattern) (Elective - I) (Sem. - I)

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

Instructions to the candidates :

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

SECTION - I

Q1) a) What is Digital Image Processing? State applications and component of Image Processing. **[8]**

b) State and explain fundamental steps for digital image processing. **[8]**

OR

Q2) a) Write a note on digital imaging hardware and software. **[8]**

b) Explain Human Visual System in detail. **[8]**

Q3) a) What is mean by image digitization? Explain aliasing in the context of image sampling. How it can be avoided? **[8]**

b) Explain handamard and walsh transform. Determine the Hadamard matrix for order N = 8. **[8]**

OR

Q4) a) State and explain Image enhancement in spatial and frequency domain. **[8]**

b) Justify the statement "Median filter is an effective tool to minimize salt and pepper noise" through simple illustration. **[8]**

Q5) a) What is the difficulty of implementing Hough transform using slope-intercept representation of straight line? How this problem is solved using normal representation of line? **[10]**

b) Explain the principle of the following region-based segmentation procedures : **[8]**

i) Region growing.
ii) Region splitting.
iii) Split and merge.

State the difference between these methods.

OR

P.T.O.

Q6) a) Explain first derivative and second derivative method of detecting edges in the image. **[10]**

b) Explain use of motion in segmentation. **[8]**

SECTION - II

Q7) a) Explain Image degradation and restoration model. State application of Image restoration. **[10]**

b) The basis image of a 2D unitary transform of size 2 × 2 are : **[6]**

$$H_1 = 1/2\begin{bmatrix}1 & 1\\ 1 & 1\end{bmatrix}\ H_2 = 1/2\begin{bmatrix}1 & -1\\ 1 & -1\end{bmatrix}\ H_3 = 1/2\begin{bmatrix}1 & 1\\ -1 & -1\end{bmatrix}$$

$$H_4 = 1/2\begin{bmatrix}1 & -1\\ -1 & 1\end{bmatrix}$$

Determine the transform coeff. If the input image is $f(m, n) = \begin{bmatrix}6 & 4\\ 2 & 1\end{bmatrix}$

Also, reconstruct the image using the first two largest coeff.

OR

Q8) a) Write a note on Blind Deconvolution. **[8]**

b) What is the difference between image restoration and image enhancement? Give the mathematical expression for a wiener filter. Also, give advantage and drawback of wiener filter over an inverse filter. **[8]**

Q9) a) Define texture. What is co-occurrence matrix? How do you measure entropy from co-occurrence matrices? **[10]**

b) What is chain code? Explain with example, how can you make chain code based descriptor rotation invariant? **[8]**

OR

Q10) a) Explain Scalar and vector quantization. **[8]**

b) Consider the image strip of size 50 × 100 shown in fig.2 The image consists of five vertical stripes. The gray levels of the stripes from left to right are 128, 64, 32, 16 and 8 respectively. The corresponding widths of the stripes are 35, 30, 2, 10 and 5 pixels respectively. If the stripe image coded is by Huffman coding, determine its efficiency. **[10]**

Fig.2

Q11) a) What is sub-band coding? Explain image pyramids. **[8]**

b) What is the need and applications of image processing in multimedia? **[8]**

OR

Q12) a) Define WAVELET with their properties. Explain the need of wavelet transform in image processing. Explain the different image processing application using wavelet transform. **[8]**

b) Writes a note on Local Component Analysis for dimension reduction. **[8]**

Total No. of Questions : 12]

SEAT No. :

P1198

[Total No. of Pages : 3

[4264] - 695

B.E. (Computer Engineering)

DESIGN AND ANALYSIS OF COMPUTER NETWORKS

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

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

Instructions to the candidates :

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

SECTION - I

Q1) a) Comment on Erlang distribution function and its significance. **[6]**

b) Specify the interpretation of Kendall Notation (including 6 parameters). Also explain in short the meaning of M/M/1 and G/G/3/20/1500/SPF Specifications. **[6]**

c) Customers arrive at a watch repair shop according to a Poisson process at a rate of one per every 10 minutes, and the service time is an exponential r.v. with mean 8 minutes. Find the average number of customers L, the average time a customer spends in the shop W, and the average time a customer spends in waiting for service *Wq*,. **[6]**

OR

Q2) a) Describe λ, μ, L, Lq, W and Wq associated with M/M/1 Queue. **[6]**

b) Describe in short the Birth Death process and its significance in queuing theory. **[6]**

c) People arrive at a telephone booth according to a Poisson process at an average rate of 12 per hour, and the average time for each call is an exponential r.v. with mean 2 minutes. **[6]**

i) What is the probability that an arriving customer will find the telephone booth occupied?

ii) It is the policy of the telephone company to install additional booths if customers wait an average of 3 or more minutes for the phone. Find the average arrival rate needed to justify a second booth.

P.T.O.

Q3) a) Comment in short about the third generation switch architecture. How are they different compare to 2nd generation switches? Where they are used typically? **[8]**

b) Describe the term Degree of Parallelism. Write a mathematical expression to denote the same. If in a system on an average, 20 tasks complete in 10 seconds, and each task takes 3 seconds, what is the degree of parallelism? **[8]**

OR

Q4) a) What is switch fabric? Explain Crossbar and broadcast switch. **[8]**

b) Describe in short the various parameters that needs to be consider while designing a Backbone network. Also comment on the current available backbone technologies. **[8]**

Q5) a) Describe the working of Deficit Round Robin (DRR) scheduling. In which situation it is more likely be used compare with other techniques? **[8]**

b) Describe the significance of Traffic Descriptors in flow control technique with suitable example. **[8]**

OR

Q6) a) Describe the working of TCP Vegas. What are its advantages over TCP Tahoe. **[8]**

b) Differentiate between Open loop and Close loop flow control. What are the various Closed loop flow control schemes available? Classify them suitably. **[8]**

SECTION - II

Q7) a) Describe the terms Traffic class and QOS. Comment on various ATM Forum specified traffic subclasses. **[10]**

b) What is capacity planning? What are the general steps involved in capacity planning? Comment on Erlang B formula used in telephone networks. **[8]**

OR

Q8) a) What is signaling mechanism? Explain IETF Signaling (RSVP). **[10]**

b) What is admission control? Describe in brief CBR and VBR admission Control Policies. **[8]**

Q9) a) Explain random early detection scheme (RED) for packet scheduling. **[8]**

b) If fixed-length prefixes are easier to implement, what is the advantage of variable-length prefixes? Justify the answer. **[8]**

OR

Q10) a) Describe the various functions supported by Router. Also classify the routers based on these functionalities. **[8]**

b) Draw and explain a typical Router architecture. **[8]**

Q11) a) Discuss the various security principles. What are the security issues at network layer and comment on the possible solutions. **[8]**

b) Describe the process of subnetting with suitable example. Also comment on variable length subnet masking (VLSM). What are its advantages? **[8]**

OR

Q12) a) Describe the importance of bandwidth management. How it is achieved in a typical corporate network? **[8]**

b) Describe in short the significance of Firewall in a corporate network. What is UTM? **[8]**

Total No. of Questions : 12]

P1328

SEAT No. : ____

[Total No. of Pages : 4

[4264] - 510
B.E. (Electrical)
EXTRA HIGH VOLTAGE TRANSMISSION
(2008 Pattern) (Sem. - I) (Elective - II)

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

Instructions to the candidates:

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

SECTION - I
Unit - I

Q1) a) A power of 2000 MW is to be transmitted over 800 km. distance. Use 400 kV three phase ac line. Suggest the number of circuits required. With 50 percent series capacitor compensation, calculate power loss in a circuit and % power loss. Phase difference between sending end and receiving end voltage is 30°. The resistance and reactance of conductor are 0.031 ohm/km and 0.327 ohm/km respectively. **[8]**

b) Explain different types of winds causing vibrations and oscillations of transmission conductors and compare them on the basis of wind velocity, amplitude, frequency of oscillations and type of conductors affected. Also state the electrical causes which creat forces on the transmission conductors. **[8]**

OR

Q2) a) State the expressions for travelling wave equations and their solution and explain that travelling wave consists of incident and reflected components travelling in opposite directions. **[10]**

b) A transmission line is 300 km long and open at far end. The attenuation of surge is 0.9 over one length of travel at a velocity of light. The line is energized by step input of 1000kV. Find the reflected voltage and the resultant voltage at the receiving end. **[6]**

P.T.O.

Unit - II

Q3) a) Explain various steps of "Clarke Transformation method" for the diagonalization of inductance matrix [L] of transmission conductors of 3 phase ehv ac line. **[8]**

b) The spacing between the two bundled conductors of ± 400 kV line is 9 meter. Each conductor consists of two subconductors each of radius r = 1.75cm and bundle radius R = 0.225 meter. The height of all subconductors above ground is 12 meter. Find Maxwell's potential coefficient matrix. **[4]**

c) For the three phase ehv ac line with horizontal configuration. Write down following expressions. The conductors used are bundled conductors. **[4]**

i) Matrix for flux linkages of three conductors.

ii) Inductance matrix for untransposed line.

Draw the labelled sketch.

OR

Q4) a) The inductance matrix [L] of three phase ac line has diagonal elements denoted as "Ls" and off diagonal elements denoted as "Lm". Derive the expression for inductance offered by any conductor to zero and positive sequence components of currents. **[8]**

b) Self inductance Ls of 3 phase ehv ac line is 1.173×10^{-6} H/meter, Average value of mutual inductance Lm is 0.177×10^{-6} H/meter. Average value of ground inductance Lg is 0.39×10^{-6} H/meter. Find velocity of propagation of wave in line to ground mode (first mode) as percentage of velocity of light. **[4]**

c) State the advantages of bundled conductors. **[4]**

Unit - III

Q5) a) The two bundled conductors of ± 400 kV line are 12 meter above the ground. Each conductor consists of two subconductors each of radius r = 1.75 cm and bundle radius R = 0.225 meter. The charges of two conductors are $\pm 4.88 \times 10^{-12}$ coulomb/meter. Neglecting the charges of other conductors and of image conductors but considering the charge

of other subconductor find expression for maximum and minimum potential gradient. Show the location of maximum and minimum potential gradient. Also find values of maximum and minimum potential gradient. **[8]**

b) For horizontal configuration of phases of 3 phase ehv ac line, derive expressions for maximum surface voltage gradient on the outer phases and on central phase according to Mangolt formula. **[8]**

c) A line charge of conductor of radius r meter and length 1 meter is +q coulomb/meter. What is electric field strength on its surface. If the two points 1 and 2 are 'r_1' meter & 'r_2' meter away from line charge and are on the same side of the line. Write expression for potential V_{12} between these two points. **[2]**

OR

Q6) a) A sphere gap with spheres of radii R = 0.5 meter and center-to-center distance 1.5 meter are to be maintained with surface potentials 90 V and 0 volts. Calculate the charges required and their locations. Do calculations upto two charges in each sphere draw the labelled sketch. **[8]**

b) A point charge Q = 10^{-6} coulomb is kept at the center of sphere of radius 1 cm. Calculate field strength and potential on surface of sphere and also at distance 0.5cm from the surface of sphere. Also find capacitance of sphere. **[5]**

c) Compare line charge with point charge. **[5]**

SECTION - II

Unit - IV

Q7) a) Draw the labelled sketch of vehicle parked parallel to ehv line under it. If a = length of truck, v = height of truck body, b = width of truck, t = distance of truck body above ground, H = height of line conductor, d = diameter of conductor, L = distance of parking from line. Write expressions for capacitance of truck. **[6]**

b) Explain the terms primary shock current, secondary shock current and let-go current. **[6]**

c) Explain the various purposes served by insulated ground wire which type of conductor is used for insulated ground wire? **[4]**

OR

Q8) a) Derive the expression for voltages induced in the conductors of unenergized circuit of double circuit three phase line. **[8]**

b) Discuss the effects of electrostatic field on humans, animals, plants, vehicles etc. **[8]**

Unit - V

Q9) a) With neat diagram with negligible source inductance, no ignition delay explain operation of three phase six pulse bridge rectifier circuit. Derive expression for dc output voltage in terms of ac voltage. **[8]**

b) State and explain various components of HVDC system. **[8]**

OR

Q10)a) Discuss the operation of converter as inverter in HVDC system. What is transition value of ignition delay angle beyond which inversion takes place. Explain ignition advance angle and extinction advance angle. **[8]**

b) Derive the expression for converter transformer rating in terms of no load dc voltage and rated dc current. **[6]**

c) What is effect of commutation overlap on dc voltage of three phase, six pulse bridge rectifier circuit. **[2]**

Unit - VI

Q11)a) Write note on converter firing control system. State and compare the firing control systems. **[9]**

b) Discuss the problems associated with dc system when connected to weak ac system. **[9]**

OR

Q12)a) Explain the requirements for satisfactory operation of HVDC system. **[9]**

b) Explain the significant aspects of basic control system for the converter. **[9]**

❖ ❖ ❖ ❖

Total No. of Questions : 12]

P1330

SEAT No. : ____

[Total No. of Pages : 3

[4264] - 566

B.E. (Instrumentation and Control)

ADVANCED CONTROL SYSTEMS

(2008 Pattern) (Semester - I) (Elective - I)

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

Instructions to the candidates:

1) ***Answer any three questions from each section.***
2) ***Assume suitable data, if necessary.***
3) ***Figures to the right indicate full marks.***

SECTION - I

Q1) a) Compare linear and non-linear control systems. **[6]**

b) Define singular points. Find out the nature of second order system for singular point. **[12]**

$$\ddot{x} + 0.3\dot{x} + 4x + x^2 = 0$$

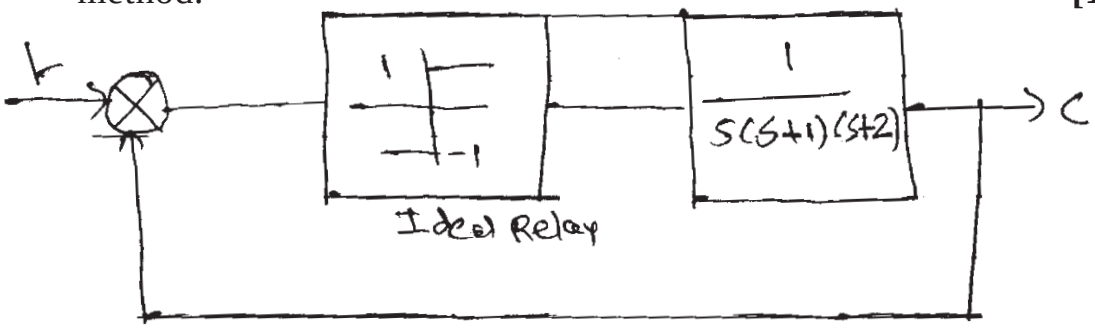
OR

Q2) a) Explain in brief phase plane method. **[6]**

b) Determine the describing function of the combined deadzone and saturation non-linearity. **[12]**

Q3) a) Explain in brief Jump resonance. **[6]**

b) Obtain the stability of a system shown in figure by describing function method. **[10]**



P.T.O.

OR

Q4) a) Explain in brief frequency domain stability criteria. **[6]**

b) A second order system represented by $\dot{x} = Ax$ where $A = \begin{bmatrix} -1 & -2 \\ 1 & -4 \end{bmatrix}$ by using Liapunov's direct method. Determine the stability of the system. Write the Liapunov function v(x). **[10]**

Q5) a) Explain with neat diagram basic configuration of adaptive control system. **[8]**

b) Explain in detail MIT Rule approaches for designing of model reference adaptive controller. **[8]**

OR

Q6) a) State the classification of model reference adaptive control system. Explain in detail direct model reference adaptive control system. **[8]**

b) Explain in detail stability and convergence studies of model reference adaptive control system. **[8]**

SECTION - II

Q7) a) Explain the different approaches to self tuning regulators. **[8]**

b) Explain in detail Recursive parameter estimation. **[8]**

OR

Q8) a) Explain implicit and explicit self tuning Regulators. **[8]**

b) Explain in detail LQG self tuning Regulators. **[8]**

Q9) a) Explain in detail general purpose adaptive regulator. **[8]**

b) Explain in detail adaptive control technique for temperature control in CSTR system. **[8]**

OR

Q10)a) Explain any one in detail different industrial products incorporating adaptive control system. **[8]**

b) Explain in detail robustness studies multivarible system. **[8]**

Q11)a) Explain the necessary conditions of optimality. **[9]**

b) Explain performance measures for optimal control problems. **[9]**

OR

Q12)Obtain the control law which minimizes the performance Index $J = \int_0^\infty (x^2 + u^2)dt$ for the system. **[18]**

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ 1 & 1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u$$

Explain in brief state Regulator problems.

❖ ❖ ❖ ❖

Total No. of Questions : 12]

SEAT No. :

P1376

[Total No. of Pages : 3

[4264]-438

B.E. (Mechanical)

AUTOMOBILE ENGINEERING

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

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

Instructions to the candidates :

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

SECTION - I

UNIT - I

Q1) a) What are vehicle specifications? Describe specification of any one light motor vehicle of your choice. **[8]**

b) What is chassis? Compare conventional chassis frame with frameless type chassis frame. **[8]**

OR

Q2) a) Explain with the help of neat sketch any one typical layout of an automobile. Also describe advantages and drawback over other layouts. **[8]**

b) Explain with neat sketches different types of vehicle bodies. **[8]**

UNIT - II

Q3) a) Describe working of synchromesh gear box with neat diagram. Also state its advantages and disadvantages. **[8]**

b) Explain fluid flywheel with neat sketch. **[8]**

OR

Q4) a) Explain continuous variable transmission with neat sketch. **[8]**

b) Draw a neat sketch of a non slip differential unit in the back axle of a vehicle and explain its working. **[8]**

P.T.O.

UNIT - III

Q5) a) Define front end geometry for steering including caster, camber, toe, steering axis inclination and turning radius. **[10]**

b) How the tyres are classified and rated? **[8]**

OR

Q6) a) Classify different types of steering gear boxes. Discuss salient features for each of them. Explain the construction and working of a recirculating type steering gear box. **[10]**

b) Explain with neat sketch construction and working of collapsible steering. **[8]**

SECTION - II

UNIT - IV

Q7) a) What is interconnected suspension? Sketch and describe briefly. **[10]**

b) Explain a hydraulic braking system with neat sketch. **[8]**

OR

Q8) a) Draw a neat sketch and explain of double-tube telescopic shock absorber. **[8]**

b) Explain ABS brake system in detail. Also state its advantages over other braking system. **[10]**

UNIT - V

Q9) a) Explain charging system used in automobile vehicle. **[5]**

b) Explain lighting system of any car. **[6]**

c) Explain in brief hybrid drives. **[5]**

OR

Q10) Write short notes on any four : **[16]**

a) Electronic stability control

b) Battery construction

c) Engine sensors

d) Wipers

e) Electric Horn

UNIT - VI

Q11) Write short notes on any four : **[16]**

a) Traction and tractive effort

b) Stability of vehicle

c) Vehicle road resistances

d) Seat belt

e) Vehicle safety

OR

Q12) a) Explain different vehicle body moments. **[6]**

b) A Leyland truck has a gross vehicle weight of 89026 N. Engine displacement is $10m^3$, power 77.3 kW at governed speed of 2400 rpm and maximum torque 345.8 Nm at 1400 rpm. Rear axle ratio is 6.166:1. Fourth speed reduction ratio in transmission is 1.605:1, drive line losses amount to 10.7 kW at 2400 rpm and 6.3 kW at 1400 rpm. Tyre size is 0.4572m × 1.016m (effective wheel diameter is 0.950m), frontal area of truck $6.95m^2$. Calculate the grades which the vehicle can climb in fourth gear in still air conditions. **[10]**

i) at governed engine speed,

ii) at speed of maximum torque in the equation

$R = kW + ka\ AV^2$

$k = 0.044$, $ka = 0.0462$ & V in km/h.

Over all gear ratio $G = 6.166 \times 1.605:1 = 9.9:1$

Total No. of Questions : 12]

SEAT No. :

P1377

[Total No. of Pages : 4

[4264]-452

B.E. (Mechanical Engineering) (Sandwich)

INDUSTRIAL HYDRAULICS AND PNEUMATICS

(2008 Pattern) (Semester - I)

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

Instructions to the candidates :

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

SECTION - I

Q1) a) Compare Hydraulic Pneumatic and Mechanical Systems. **[6]**

b) Explain with neat sketch Quick action coupling used in hydraulics. **[4]**

c) What are the types of filters and filtering methods? **[6]**

OR

Q2) a) What are the advantages and applications of fluid power system? **[4]**

b) State and explain different properties of hydraulic fluid. **[6]**

c) Write a note on sources of oil contamination and contamination control. **[6]**

Q3) a) Explain with the help of neat sketch, working of pressure compensated vane pump. How it differs from variable displacement vane pump? **[10]**

b) Find out the size of accumulator necessary to supply 8000 cm^3 of fluid in a hydraulic system of maximum pressure 180 bar to 80 bar minimum. Assuming the gas is precharged at 60 bar. **[6]**

Find :

i) Adiabatic solution &

ii) Isothermal solution.

OR

Q4) a) Draw and explain operating characteristics curves of Gear/Vane Pump. **[6]**

b) Explain types of reservoirs used in hydraulics with applications. **[6]**

c) Explain constructional details of Hydraulic Power Unit with neat sketch. **[4]**

P.T.O.

Q5) Write a note (any three) : **[18]**

a) Cartridge valve

b) Pressure compensated flow control valve

c) Sequence valve

d) Counter balance valve

OR

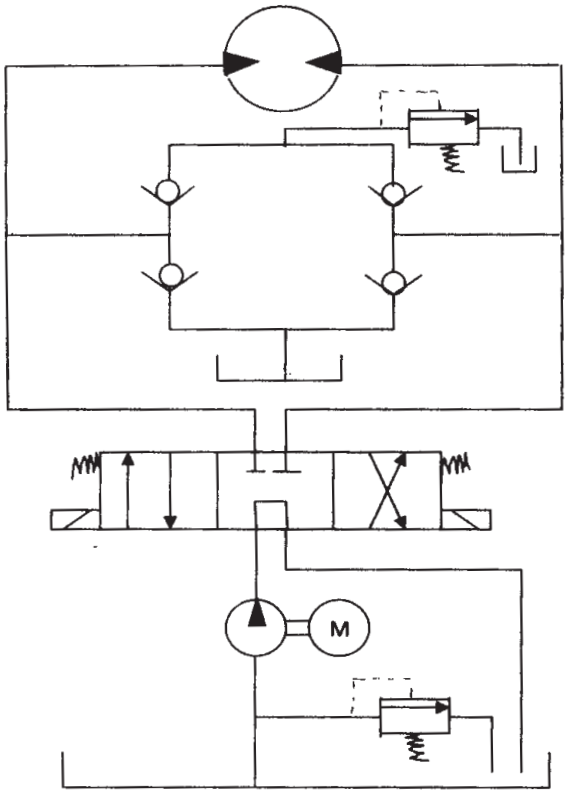
Q6) a) Explain with neat sketch different center positions of direction control valves. Also state advantages and disadvantages of each. **[6]**

b) Explain test procedure of Pressure relief valve or Double acting cylinder. **[6]**

c) Explain applications of accumulator with circuit diagrams. **[6]**

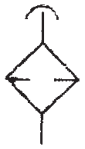
SECTION - II

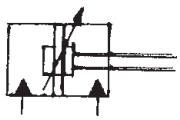
Q7) a) Analyze the circuit given below : **[10]**



b) Explain with neat sketch different actuation methods used in Direction control valves. **[4]**

c) Identify the components as shown below : **[2]**



OR

Q8) a) Explain Regenerative circuit and comment on velocity at the time of extension and retraction when Area of piston is equal to twice the area of rod. **[10]**

b) Draw and explain sequencing circuit for two actuators as per the following sequence : **[6]**

i) Actuator 1 Extends
ii) Actuator 2 Retracts
iii) Both actuators return to their original position.

Q9) a) Explain with neat sketch Compressed air generation and Distribution system. **[6]**

b) Describe with neat sketch **[4]**

i) Shuttle valve
ii) Quick exhaust valve

c) Explain FRL Unit used in pneumatics with neat sketch. **[6]**

OR

Q10) a) Draw a neat sketch and explain working of Time delay valve used in pneumatics. **[6]**

b) Why pneumatic system is termed as low cost automation? **[6]**

c) Draw a neat sketch of 5 way 2 position manual operated direction control valve. **[4]**

Q11) a) Draw and explain any pneumatic circuit used in manufacturing industry. **[8]**

b) Draw and explain two hand safety unit used in pneumatic circuit. **[10]**

OR

Q12) A machine is operated by a hydraulic system. The total stroke is 500 mm. first 400 mm is to be completed about 5 seconds against a load of 18 kN. The load during remaining 100 mm stroke is 38 kN, the speed during this part of stroke is about 2.4 m/min. After stroke is completed the actuator has to return at against a load of 18 kN in 6 seconds. A meter in circuit is used. Draw hydraulic circuit and select components from given data. **[18]**

DATA SHEET

1. SUCTION STRAINER:

Model	Flow capacity (lpm)
S1	38
S2	76
S3	152

2. PRESSURE GAUGE:

Model	Range (bar)
PG1	0-25
PG2	0-40
PG3	0-100
PG4	0-160

3. VANE PUMP:

Model	Delivery (lpm)		
	at 0 bar	at 35 bar	at 70 bar
P1	8.5	7.1	5.3
P2	12.9	11.4	9.5
P3	17.6	16.1	14.3
P4	25.1	23.8	22.4
P5	39	37.5	35.6

4. RELIEF VALVE:

Model	Flow range (lpm)	Max. working pressure (bar)
R1	11.4	70
R2	19	210
R3	30.4	70
R4	57	105

5.FLOW CONTROL VALVE:

Model	Max. working pressure (bar)	Flow range (lpm)
F1	70	0-4.1
F2	105	0-4.9
F3	105	0-16.3
F4	70	0-24.6

6. DIRECTION CONTROL VALVE:

Model	Max. working pressure (bar)	Flow capacity (lpm)
D1	350	19
D2	210	38
D3	210	76

7. CHECK VALVE:

Model	Max. working pressure (bar)	Flow capacity (lpm)
C1	210	15.2
C2	210	30.4
C3	210	76

8. PILOT OPERATED CHECK VALVE:

Model	Max. working pressure (bar)	Flow capacity (lpm)
PO1	210	19
PO2	210	38
PO3	210	76

9. CYLINDER (Max. working pressure -210):

Model	Bore Dia. (mm)		Rod Dia. (mm)
A1	25		12.5
A2	40		16
A3	50		35
A4	75		45
A5	100		50

10. OIL RESERVOIR:

Model	Capacity (lit)
T1	40
T2	100
T3	250
T4	400
T5	600

Total No. of Questions : 12]

SEAT No. :

P1378

[Total No. of Pages : 3

[4264]-525

B.E. (Electronics)

ADVANCED POWER ELECTRONICS

(2008 Pattern) (Elective -I) (Semester - I)

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

Instructions to the candidates :

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

SECTION - I

Q1) a) What are converters? Explain with diagram & waveforms working of 12 pulse converter & comment on p.f. **[8]**

b) What is power conditioning of diode rectifier? Explain. **[6]**

c) Explain in brief, EMI & power quality problems of Thyrister converter. **[4]**

OR

Q2) a) What are dual converters? Explain with circuit diagram & waveforms, working of 3 - phase dual converter working in circulating current mode operation with highly inductive load. **[10]**

b) 1 - phase dual converter is operated from a 120V 60 Hz Supply & Load resistance R = 10Ω, the circulating inductance is L_c = 40 mH. Delay angles are $\alpha_1 = 60^\circ$, $\alpha_2 = 120^\circ$. Calculate the peak circulating current. **[8]**

Q3) a) What is PLL? Explain with block diagram, speed control of DC Motor using PLL for varying load conditions. State its advantages & disadvantages. **[8]**

b) What is Soft start? Explain. **[4]**

c) What is the effect of source inductance on the performance of FCC? Explain. **[4]**

P.T.O.

OR

Q4) a) What is Cycloconverter? Explain with circuit diagram & waveforms working of 1ϕ Cycloconverter with suitable load. **[8]**

b) What are AC drives? Explain 3ϕ I.M speed control technique by using $\frac{v}{f}$ method. **[8]**

Q5) a) What are Multi level inverters? Explain with circuit diagram, switching of Multi-level inverters. State its advantages & disadvantages. **[10]**

b) What is the need of Harmonic elimination in Inverters? Explain any one method to improve p.f. **[6]**

OR

Q6) Write short notes on any <u>three</u> : **[16]**

a) μp based DC drives.

b) Field failure protection of Sep-Excited DC Motor.

c) Adaptive Control technique.

d) DC Link inverters.

e) Z-Source inverters.

SECTION - II

Q7) a) What is resonant converter? Explain with circuit diagram & waveforms working of ZCS. **[8]**

b) What are Low drop out regulators? Explain. **[4]**

c) Compare Linear, switched Mode & Resonant converter. **[4]**

OR

Q8) a) What is soft switching in Resonant converter? Explain with circuit diagram working of SLR. **[8]**

b) What is Synchronous rectifier? Explain. **[4]**

c) What is Hot Swappable Redundant Power Supply? Explain. **[4]**

Q9) a) Explain the need of brushless DC Motors in industries. **[6]**

b) What is Micro-stepping? Mention various types of Stepper Motor used in industries? Enlist the application of Stepper Motor with circuit diagram & specifications. **[10]**

OR

Q10) a) What are different types of Renewable energy sources? Explain the role of DC to DC converter in variable Wind energy conversion system. **[8]**

b) Explain in brief photovoltalic energy conversion system. **[8]**

Q11) a) Explain the operation of fuzzy logic based Ind. Motor wind generation system. **[8]**

b) What are different types of power line disturbances & suggest preventive & nullifying measures for the disturbances. **[10]**

OR

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

a) Energy audit.

b) HVDC.

c) Wind Power Plant (WPP).

d) Battery charges.

e) FACTS (Flexible AC Transmission System).

Total No. of Questions : 10]

SEAT No. :

P1379

[Total No. of Pages : 4

[4264]-640

B.E. (Petroleum Engineering)

NON CONVENTIONAL HYDROCARBON RESOURCES

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

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

Instructions to the candidates :

1) ***Answers to the two sections should be written in separate books.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume additional data, if necessary.***

SECTION - I

Q1) a) Write in brief on characteristics of continuous accumulation system and their resources. **[10]**

b) How is conventional oil and non conventional oil compared on chemical analysis? **[5]**

OR

Q2) a) Explain following terms: Heavy and extra heavy oil, Natural bitumen, Shale oil, Tar sand, and tight reservoirs. **[10]**

b) Describe the optimum conditions for shale gas exploration. **[5]**

Q3) a) Following mineralogical variation is observed during detailed petrophysical studies of the potential shale horizon. **[7]**

No.	Depth in meters	Mineralogy percent			
		Quartz	Carbonate	Clay minerals	Others
1	2200m	28	20	45	07
2	2210	24	17	49	10
3	2220	22	12	62	06
4	2230	24	10	61	05
5	2240	56	12	25	07
6	2250	58	10	27	05

Evaluate behavior of shale for given depths to understand brittleness. Give justification. What additional information is required to realize potential of this horizon?

P.T.O.

b) How is Langmuir isotherm used in the calculation of gas recovery in CBM? **[8]**

OR

Q4) a) How are hydrate plugs formed? **[5]**

b) Draw a Schematic diagram to explain heterogeneities in CBM reservoir. How does it different from Shale Gas? **[10]**

Q5) Answer **any four** from the following : **[20]**

a) Biodegradation of oil.

b) Reservoir modeling in shale gas reservoir.

c) Gas desorption and diffusion in recovery of CBM.

d) Simplified Process Schematic for Fischer-Tropsch Coal-to-Liquids Systems.

e) How is recovery factor calculated in CBM?

f) Draw a typical desorption isotherm as a function of coal rank.

g) Hydrate types and formers.

h) Carbon Capture and Sequestration.

SECTION - II

Q6) a) A homogeneous isotropic rock plate of width 40mm and length 500 mm, thickness 10mm with original unreformed volume $0.2 \times 10^6 mm^2$ has Young's modulus 5×10^{10} Pa and Poisson's ratio of 0.25. The plate is subjected to compressive force of 500N at the faces of its lateral end. Find out change in volume during loading. **[10]**

b) Describe the importance of different mechanical characteristics in shale gas development. **[5]**

OR

Q7) a) Discuss different pressures in fracturing operations. **[10]**

b) Calculate bottom hole treating pressure, wellhead pressure and HHP **[5]**
if P_{hyd} = 7000 ft @ 8.7 ppg,
friction pressure pipe 1000 psi,
$P_{perforation}$ = 300,
$P_{tortuosity}$ = 200,
Flow rate = 1100 gm

Q8) a) Describe environmental problems related to drilling and production operations. **[10]**

b) Write in brief on Deliverability and drainage efficiency in CBM. **[5]**

OR

Q9) Prepare a GTO for a CBM drilling using following tables **[15]**

Table 1: Lithology

	Description	Depth in m
1	Alluvium	0 – 27 m
2	Mudstone, sandstone and siltstone	27 – 127 m
3	Sandstone, shale and siltstone	127 – 640 m
4	Sandstone, shale and coal	640 – 1140 m

Table 2: Information on coal seams

Coal seam no		Depth from in m	Depth upto in m	Coal seam no		Depth from in m	Depth upto in m
7		659	660	4	T	878	880
6		698	700		B	902	905
5	T	784	785	3	T	1000	1003
	B	797	800		B	1062	1065
				1 & 2		1150	1155

Table 3: Directional Drilling Data

Well Name	EDTW 3A
TVD (meter)	900
TMD (meter)	1027
TMD + sump (meter)	1077
Φ (Degree)	38.5
BUR(deg/100 ft)	3.5
Drift (meter)	400

Give answers for the following problems.

1. Decide kick of point, give precise depth
2. Design two casing policies (CP), what may be approximate depths for casing and KOP
3. Design mud policy, give precise mud weight with proper justification

Q10) Answer **any four** from the following : **[20]**

a) Sources of liquid in a flowing gas well

b) NORM in shale

c) Treatment for produced water

d) Elastic properties of shale

e) Physical properties of hydrates

f) Explain with the help of schematic diagrams capillary pressure and relative permeability relationship in conventional and low permeability reservoir

g) Dual water system in shale

h) CBM in India

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

P1380 **[Total No. of Pages : 3**

[4264]-757
B.E. (Automobile)
AUTOMOTIVE SYSTEM DESIGN
(2008 Pattern)

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

Instructions to the candidates :

1) ***Answers to the two sections should be written in separate books.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

SECTION - I

Q1) Solve any three : **[3 × 6 = 18]**

a) Explain, 'Design for natural tolerances'.

b) Discuss, 'Adequate and optimum design'.

c) Significance of free variable, and constrained variable in Johnson's method of optimum design'.

d) Write note on, 'statistical considerations in design'.

e) Explain aspects of 'Aesthetic design'.

Q2) a) An engine develops 5.9 kW at 2100 rpm. Find the suitable size of clutch plate having the friction lining riveted on both sides to transmit the power, under the following conditions

i) Intensity of pressure on the surface not to exceed 6.87×10^4 Pa.

ii) Slip torque and losses due to wear is the 35% of engine torque.

iii) Coefficient of friction on contact surface is 0.3.

iv) Inside diameter of friction plate is 0.55 times the outside diameter.

[8]

b) Answer the followings : **[4 × 2 = 8]**

i) What causes the clutch to slip.

ii) What are the drawbacks with metallic lining

iii) List desirable properties of lining material.

iv) Why centrifugal clutch is more suitable for heavy duty applications.

P.T.O.

OR

a) Derive an expression for torque transmission capacity for single plate friction clutch under uniform wear condition and uniform pressure condition. **[8]**

b) Discuss in detail material and their properties as clutch frictional material. **[8]**

Q3) a) A four speed gearbox is to be constructed for providing the ratios of 1.0, 1.46, 2.28, and 3.93 to ⊥ as nearly as possible. The diametral pitch of each gear is 3.25 mm and the smallest pinion is to have at least 15 teeth. Determine the number of teeth of the different gears, and then the distance between the main and lay out shaft. **[12]**

b) Write note on gear train with types. **[4]**

OR

a) In a gear box the clutch shaft pinion has 14 teeth and low gear main shaft pinion 32 teeth. The corresponding lay shaft pinions have 36 and 18 teeth. The rear axle ratio is 3:7; ⊥ and the effective radius of the rear tyre is 0.355 m. Calculate the car speed for the above system at an engine speed of 2500 rpm. **[8]**

b) Enlist bearing types, parameters considered for selection of bearing. **[4]**

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

SECTION - II

Q4) a) An automobile engine develops a maximum torque of 162 N.m. the low gear ratio of transmission is 2.75, while the back axle ratio is 4.25. The effective wheel radius is 0.325m the coefficient of friction between the tyre and road surface is 0.6. If the permissible shear stress is 32370×10^4 Pa, determine the maximum shaft diameter, assuming that the load is nearly torsional. What is the maximum load permissible on each wheel. **[9]**

b) List basic types of universal joint and explain one in detail with diagram. **[9]**

OR

a) Discuss propeller shaft, draw relation for design torque of the shaft and list features of composite propeller shaft. **[10]**

b) An automobile engine develops 28 kW at 1500 rpm, and its bottom gear ratio is 3.06. If a propeller shaft of 40 mm outside diameter is to be used, determine the inside diameter of mild steel tube to be used, assuming a safe shear stress of 55×10^3 kPa for the MS. **[8]**

Q5) a) Explain the followings : **[6 × 2 = 12]**

i) Brake fade
ii) Brake torque
iii) Brake balance
iv) Braking efficiency
v) Properties of friction lining
vi) Components used in hydraulic brake system

b) The distance between the pads centre of pressure and the centre of disc rotation is 0.12m. The coefficient of friction between the rubbing faces is 0.35. Determine the clamping force required to produce a braking torque of 82 N.M. **[4]**

OR

a) Draw line diagram of hydraulic single line braking system and explain in detail. **[6]**

b) In a hydraulic single line braking system the force on foot pedal is 100N, pedal leverage ratio is 4. 4 cross sectional area of master cylinder is $4cm^2$, cross sectional area of front piston 20 cm^2. Cross sectional area of the rear piston is $5cm^2$. Distance moved by effort is 1cm. Calculate the followings : **[10]**

i) Front to rear brake ratio
ii) Total force ratio
iii) Distance moved by output
iv) Cylinder movement ratio
v) Total movement ratio

Q6) a) Explain design features of leaf spring.

b) Discuss vehicle dynamics.

c) Discuss forces on vehicle suspension system.

d) Write a note on air springs.

[4 × 4 = 16]

OR

a) A vehicle spring of semi elliptic type has leaves of 75 mm width and 10 mm thickness, effective length is 900 mm. If the stress is not to exceed 220725 kPa, when the spring is loaded to 4905N, estimate the required number of leaves and the deflection under this condition. If the spring is just flat under load, what is the initial radius take $E = 196.2 \times 10^6$ kPa. **[12]**

b) Discuss general design considerations of suspension system. **[4]**

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Total No. of Questions : 11]

SEAT No. :

P1381

[Total No. of Pages : 2

[4264]-759

B.E. (Automobile Engineering)

VEHICLE SAFETY

(2008 Pattern) (Elective - II B) (Theory)

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

Instructions to the candidates :

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

SECTION - I

Q1) a) Write the various characteristics of the vehicle structure. **[6]**

b) Why the safety systems are implemented in the Automobiles? **[6]**

c) What is the importance of the Ergonomics in Automotive safety? **[6]**

Q2) a) What is crash testing? Why the crash test is carried out? What are the instruments are necessary for crash test? Explain any two of them in brief. **[12]**

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

i) Crashworthiness
ii) Crumple Zone

OR

Q3) a) What is impact testing? Explain the various types of impact testing. **[8]**

b) Explain the general requirements on body structure. **[8]**

Q4) a) Explain - 'Dummies used in Vehicle Testing'. **[8]**

b) Define ergonomics & Explain the necessity of the ergonomics in automobile safety. **[8]**

OR

Q5) a) What is mean by Anthropometry? Explain the human impact tolerances. **[8]**

b) State the various locations of controls in the Automobile Vehicles. **[8]**

P.T.O.

SECTION - II

Q6) a) What is passive safety? Write various passive safety systems & explain any four of them in brief. **[12]**

b) Differentiate between Active safety systems & Passive safety systems. **[6]**

OR

Q7) a) Why the safety glasses are necessary? Explain the requirements of the safety glasses. **[8]**

b) What is Bumper? Write the necessity of the Bumpers. **[5]**

c) Explain the various types of Seats. **[5]**

Q8) a) Write the various types of Automotive lamps. Explain any one of them in brief. **[8]**

b) Write the various types of light signaling devices & Explain any two of them in brief. **[8]**

OR

Q9) a) Why the testing of Automotive lamp is necessary? How the testing is carried out? **[8]**

b) Write the necessity of lighting & signaling system in the vehicle & explain the requirements of the lighting systems. **[8]**

Q10) a) Draw & Explain any four traffic signal symbols. **[8]**

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

i) Transporter or the owner of the Good Carriage Vehicle

ii) Driver.

OR

Q11) Explain & Draw the classes of label with its symbol & color code for the following : **[16]**

a) Explosives

b) Gases

c) Inflammable liquid

d) Oxidizing substance & organic peroxide

Total No. of Questions : 12]

SEAT No. :

P1413

[Total No. of Pages : 3

[4264] - 454
B.E. (Mechanical S/W)
COMPUTATIONAL FLUID DYNAMICS
(2008 Pattern) (Elective - II) (Semester - I)

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

Instructions to the candidates :

1) ***Answer three questions from Section-I and three questions from Section-II.***
2) ***Answers to the two sections should be written in separate books.***
3) ***Neat 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) Obtain differential form of momentum equation using a suitable model of flow. **[10]**

b) Give any two applications of CFD in industry and list minimum three meaningful outputs expected from the simulation results of these problems. **[6]**

OR

Q2) a) Explain the concept of Substantial Derivatives, elaborate by giving a suitable practical example. **[8]**

b) Give four distinct advantages and some Limitation of CFD technique. **[8]**

Q3) a) Explain MacCormack method and give its advantages over Lax-wendroff technique. **[12]**

b) Give classification of equations used in CFD with suitable examples of each. **[6]**

OR

Q4) a) What are CFL conditions? Explain its importance in CFD analysis. **[10]**

b) Explain the concept of artificial viscosity. **[8]**

P.T.O.

Q5) a) What do you mean by transformation of Grid? **[6]**

b) Write few lines about : **[10]**

i) Adaptive grids.

ii) Unstructured mesh and hybrid mesh

OR

Q6) Obtain the solution procedure for a thermally developing fluid flow inside a circular pipe. **[16]**

SECTION - II

Q7) a) Solve one dimensional heat flow equation $\frac{du}{dt} = \frac{d^2y}{dx^2}$ $0 \le x \le 1$.

Subject to conditions

$u(0, t) = 0$, $u(l, t) = 0$

$u(x, 0) = 2x, \quad 0 \le x \le ½$

$= 2(1–x) \quad ½ \le x \le 1$

Taking $\delta x = 0.1$, $\delta t = 0.001$

Use explicit finite difference method to find u at t = 0.001, 0.002, 0.003. **[8]**

b) Explain Lax-wendroff technique with a comment on it. **[8]**

OR

Q8) Explain ADI scheme to solve the two dimensional heat flow equation. **[16]**

$$\frac{du}{dt} = K\left(\frac{d^2u}{dx^2} + \frac{d^2u}{dy^2}\right)$$

Compare the advantages of this method with explicit and fully implicit method.

Q9) Give solution procedure by using SIMPLE algorithm. **[16]**

OR

Q10) a) Write the algorithm for TDMA (Tridigonal Matrix Algorithm) solver. **[10]**

b) List advantages and disadvantages of finite volume method. **[6]**

Q11) Explain finite volume method to solve one dimensional steady state diffusion problem. **[18]**

OR

Q12) Write short notes on <u>any three</u> below : **[18]**

a) Flow models used to analyze the flow.

b) Finite volume method.

c) Staggered Grid.

d) Comparison of Explicit and Implicit method.

e) Grids in CFD.

Total No. of Questions : 12]

SEAT No. :

P854

[Total No. of Pages : 3

[4264] - 424

B.E. (Civil)

FINITE ELEMENT METHODS IN CIVIL ENGINEERING

(2008 Pattern) (Open Elective) (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) ***Answer to the two sections should be written in separate answer 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) Figure 1 shows a plane truss with three members. Cross-sectional area of all members 800 mm^2 Young modulus is 200 kN/mm^2.

a) Determine deflection at loaded joint.

b) Determine end forces of each member. **[16]**

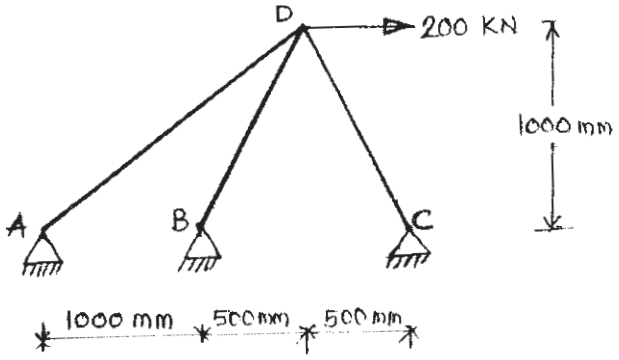


Figure 1

OR

Q2) Analyse the prismatic beam ABCD loaded and supported as shown in figure 2 using finite element approach. Draw SFD and BMD. **[16]**

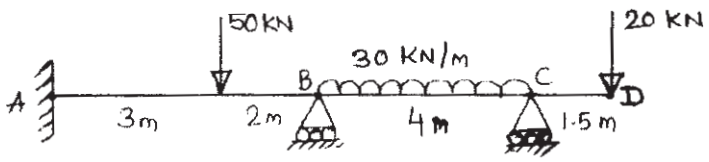


Figure 2

P.T.O.

Q3) a) When do you need transformation matrix? Write transformation matrix of frame element. **[6]**

b) Obtain overall stiffness matrix for the portal frame as shown in figure 3. Take AE = 400000 kN and EI = 1600 kN. m^2. **[12]**

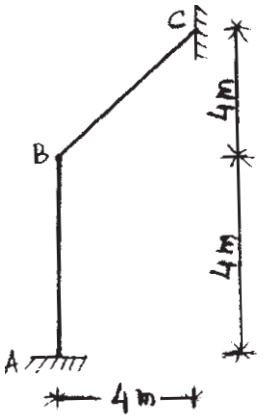


Figure 3

OR

Q4) A balcony grid ABC shown in figure 4 is in *xy* plane. Ends A and C are fixed. Member AB is subjected to uniformly distributed load of intensity 30kN/m and member BC is centrally loaded by 40 kN. Take EI = 1600 kN.m^2 and GJ = 800 kN.m^2 for both AB and BC, find unknown joint displacements at B. **[18]**

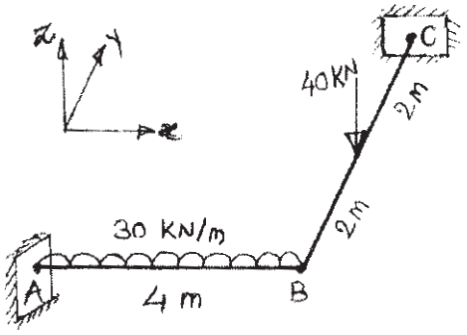


Figure 4

Q5) a) Derive the differential equations of equilibrium for three-dimensional problems and show that shear stresses are complimentary. **[10]**

b) State the convergence criteria for the choice of the displacement function in FEM. **[6]**

OR

Q6) a) Explain with example, plane stress and plane strain elasticity problem. **[8]**

b) Derive compatibility conditions in-terms of strain. **[8]**

SECTION - II

Q7) a) Explain principle of minimum potential energy with example. **[9]**

b) Derive stiffness matrix for 1D axially loaded bar element using principle of minimum potential energy. **[9]**

OR

Q8) a) Explain geometric isotropy using two dimensional Pascal's triangle. **[6]**

b) Derive stiffness matrix of two noded beam element with 2 DOF at each node. **[12]**

Q9) a) Distinguish between CST and LST elements. **[8]**

b) Obtain strain-displacement matrix for a CST elements. **[8]**

OR

Q10) a) State advantages of isoparametric formulation over the explicit formulation. **[8]**

b) Derive element stiffness matrix for plane stress three noded CST element. **[8]**

Q11) a) Derive shape functions for eight noded isoparametric rectangular element with four corner nodes and four mid-side nodes. Use natural coordinate system (ξ, η). **[8]**

b) State and explain three basic laws on which isoparametric concept is developed. **[8]**

OR

Q12) a) Derive necessary matrices for formulation of stiffness matrix of axisymmetric element of triangular cross-section. **[10]**

b) Explain importance of shape functions in finite element procedure. What are typical characteristics of shape function? **[6]**

Total No. of Questions : 12]

SEAT No. :

P855

[Total No. of Pages : 3

[4264] - 426
B.E. (Civil)
HYDROPOWER ENGINEERING
(2008 Pattern) (Open Elective) (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 logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
6) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Discuss the relative merits and demerits of hydropower as compared to other power resources. **[8]**

b) What are the principal components of a hydro-electric plants? Discuss the utility of each component in detail. **[8]**

OR

Q2) a) What are the different stages of planning for water power development? Explain with different guidelines all these stages in detail. **[8]**

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

i) Hydro power potential of India.
ii) Run off river plant.

Q3) a) Give the classification of hydropower plants. Explain valley dam plant in detail. **[8]**

b) How hydropower plants are classified according to different criteria? Explain all five criteria in detail. **[8]**

OR

Q4) Write notes on :

a) Micro hydro power plant. **[8]**

b) Tidal power plant. **[8]**

P.T.O.

Q5) a) What is load factor, capacity factor and Utilization factor? Explain in detail. **[8]**

b) A common load is shared by two stations, one being a base load plant with 20MW installed capacity and other being a stand by station with 25MW capacity. The yearly output of stand by station is 10×10^6 kWh and that of the base load plant is 125×10^6 kWh. The peakload taken by stand by station is 12MW and this station works for 2500 hours during the year. The base load station takes a peak load of 22.8 MW. Find out :

i) Annual load factors for both stations.
ii) Plant use factors for both stations.
iii) Capacity factors for both stations. **[10]**

OR

Q6) a) A run of stream station with installed capacity of 15,000 kW operates at 15% load factor when it serves as a peakload station. What should be lowest discharge in the stream so that the station may serve as the base load station? It is given that the plant efficiency is 75%. When working under a head of 20 m. Also calculate the maximum load factor of the plant when the discharge in the stream rises to 20 cumec. **[10]**

b) What is the importance of prediction of load? Explain in detail. **[8]**

SECTION - II

Q7) a) What is underground power station? Explain various ways of locating underground power houses in detail. **[8]**

b) What are the types of powerhouse? Explain surface powerhouse with its components and draw the neat sketch. **[8]**

OR

Q8) a) Explain in detail any four electrical equipments for the power house. **[8]**

b) What is instrumentation in powerhouse? How instrumentation and control is achieved in case of power house? **[8]**

Q9) a) Explain cavitation in turbines with Thoma's cavitation factor. **[8]**

b) A pelton wheel is to be designed for the following specifications : **[10]**

Shaft power = 11,772 kW
Head = 380 m
Speed = 750 rpm
Overall efficiency = 86%

Jet dia is not exceed one sixth of the wheel diameter. Determine :

i) The wheel diameter
ii) No of jets required.
iii) Diameter of jet.

Take $C_v = 0.985$ and $\Psi = 0.45$

OR

Q10) a) Explain the classification of turbines according to various criteria in detail. **[8]**

b) The internal and external diameters of an outward flow reaction turbine are 2 m and 2.5 m resp. The turbine is running at 250 rpm and rate of flow of water through the turbine is 6 m^3/sec. The width of runner is constant at inlet and outlet and is equal to 250 mm. The head on turbine is 100 m. Neglecting the thickness of vanes and taking discharge radial at outlet. Determine : **[10]**

i) Velocity of flow at inlet and outlet.

ii) Vane angle at inlet and outlet.

Q11) a) Write note on economic considerations of hydroelectric power plant. **[8]**

b) Explain carbon credit concept with its significance. **[8]**

OR

Q12) a) Explain the factors governing the pricing of electricity. **[8]**

b) What are the provisions regarding transmission of electricity as per electricity act 2003? **[8]**

Total No. of Questions : 12]

SEAT No. :

P856

[Total No. of Pages : 3

[4264] - 473
B.E. (Production)
PROCESS PLANNING & TOOL SELECTION
(2008 Pattern) (Semester - II)

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

Instructions to the candidates:

1) ***Answer 3 questions from Section - I and 3 questions from Section - II***
2) ***Answers to the two sections should be written in separate books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***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) List the responsibilities of product and process engineers in an organization. **[8]**

b) Draw and explain the diagram relating the operation classifications to the complete manufacturing sequence. **[8]**

OR

Q2) a) Explain the following terms: **[8]**

i) Process picture.
ii) Routing.
iii) Part.
iv) Specifications.

b) What is the significance of process planning in industry? **[8]**

Q3) a) Explain the following terms: **[8]**

i) Flaws. ii) Lay.
iii) Datum. iv) Surface roughness.
v) Tolerance. vi) Limits.
vii) Basic size. viii) Nominal size.

b) How to analyze part print? Discuss in detail. **[8]**

P.T.O.

OR

Q4) a) What is the purpose of grouping related surfaces or areas? Explain. **[8]**

b) What is mean by geometry of form? Define. **[8]**

i) Flatness,

ii) Angularities,

iii) Roundness,

iv) Concentricity.

Q5) a) Explain 3-2-1 principle of location. **[6]**

b) What is interchangeability? Discuss its importance. **[6]**

c) Explain dimensional control and mechanical control in relation to work - piece control. **[6]**

OR

Q6) a) Explain the alternate location theory. **[6]**

b) Discuss the causes of work-piece variations. **[6]**

c) Explain the purpose of tolerance chart. **[6]**

SECTION - II

Q7) a) Explain the steps involved in machine selection method with a neat flow chart. **[8]**

b) Why is milling better suited than shaping for producing flat surfaces in mass-production machining? What are the two common ways of classifying milling cutters. **[8]**

OR

Q8) a) Explain the prime accuracies & producible accuracies of an equipment. **[8]**

b) When should "Utilized Machines be used for automatic production"? **[8]**

Q9) a) Explain the concept of qualifying and re-qualifying operations with examples. **[8]**

b) Explain the benefits of CAPP, and discuss an approach of generative CAPP System. **[8]**

OR

Q10) a) Discuss the role of computer aided process planning (CAPP) in modern Manufacturing. **[8]**

b) In what situations operations are to be combined? What are the benefits of combining different operations. **[8]**

Q11) Write the process plan that describes the operations necessary to produce the part as shown in fig. 1. Use milling cutter of ½ inch diameter end mill with six teeth, select reasonable speed, feed and depth of cut. **[18]**

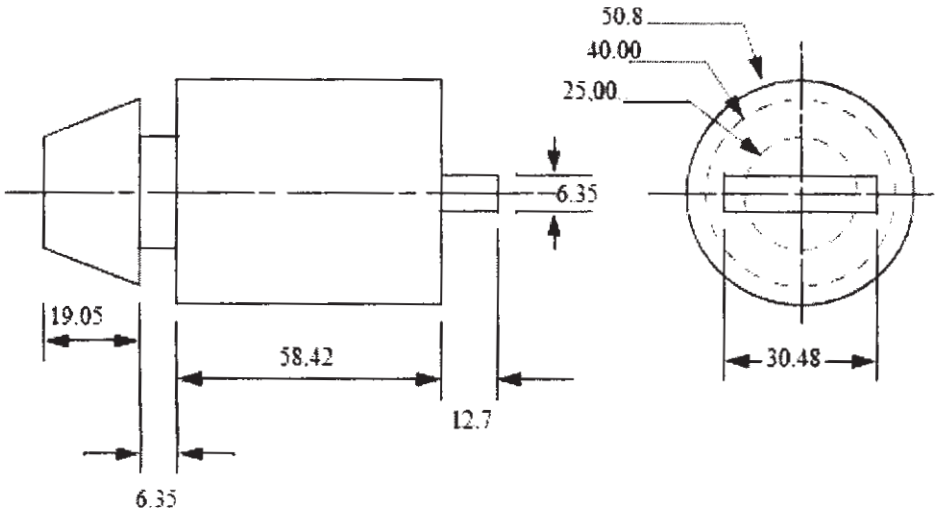


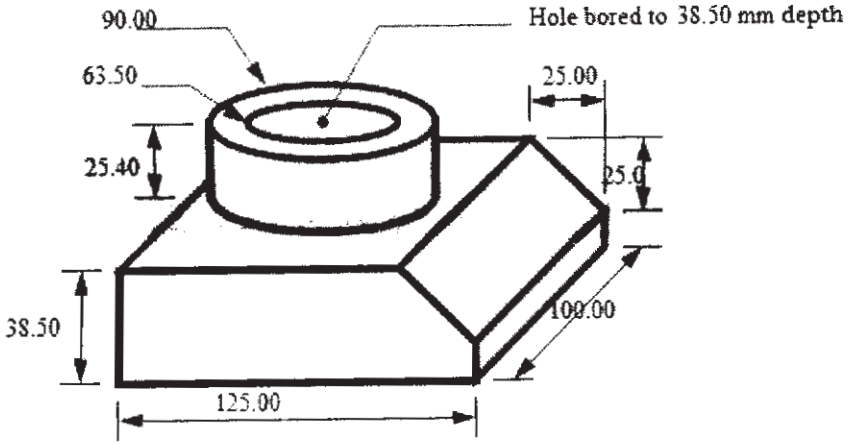
Fig. 1

All dimensions are in mm.

Material	Qty
Aluminium	1000/month

OR

Q12) Analyze the component drawing (as shown in fig. 2) made up of aluminium. Prepare the process sheet for mass production containing manufacturing plan with operation sequence, equipments, tooling, fixtures, process parameters and cycle time. **[18]**



All dimensions are in mm

Fig. 2

Total No. of Questions : 12]

SEAT No. :

P857

[Total No. of Pages : 2

[4264] - 519
B.E. (Electrical Engineering)
RENEWABLE ENERGY SYSTEM
(2008 Pattern) (Elective - IV) (Semester - II)

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

Instructions to the candidates :

1) ***Answers to the two sections should be written in separate answer books.***
2) ***Solve Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6, from section-I, and Solve Q. 7 or Q. 8, Q. 9 or Q. 10, Q. 11 or Q. 12, from section-II.***
3) ***Figures to the right indicate full marks.***
4) ***Neat diagrams must be drawn wherever necessary.***
5) ***Assume suitable additional data, if necessary.***

SECTION - I

Q1) a) Explain with neat sketch Solar Dish/Sterling Power Systems. **[8]**

b) Explain Proton Membrance Fuel Cell. **[8]**

OR

Q2) a) Explain with neat sketch Biomass for Electricity generation. **[8]**

b) Explain combined heat and power technology. **[8]**

Q3) a) Draw and explain wind farm layout showing the dimensions. **[8]**

b) Explain maximum rotor efficiency with the help of sketch and derivation. **[10]**

OR

Q4) a) Draw and explain various types of wind turbines. **[8]**

b) List the methods and explain how maximum power can be achieved by controlling speed. **[10]**

Q5) a) Write a short note on solar position at any time of day. **[8]**

b) Explain direct and diffused radiation and effect on power generation. **[8]**

OR

Q6) a) How the sun path diagrams can be used for shading analysis. **[8]**

b) Write short note on Monthly clear sky insolation. **[8]**

P.T.O.

SECTION - II

Q7) a) Explain the basic semiconductor physics used in photovoltaic to convert sun light into electricity. **[8]**

b) Explain the impacts of Temperature and Isolation on I-V curves. **[8]**

OR

Q8) a) How shading impacts on I-V curves? **[8]**

b) Explain Ribbon Silicon Technologies. **[8]**

Q9) a) Write note on, Major Photovoltaic System Types. **[8]**

b) Explain the grid-connected PV system economics. **[10]**

OR

Q10) a) Explain the grid-connected PV systems and its interfacing with the utility. **[10]**

b) Write a note on Grid Autonomy. **[8]**

Q11) a) Explain Nuclear energy power plant. **[8]**

b) Write a note on, Global warming and climate change. **[8]**

OR

Q12) a) Explain Biomechanical energy harvesting. **[8]**

b) Write a note on, Impact of renewable energy sources. **[8]**

Total No. of Questions : 12]

SEAT No. :

P860

[Total No. of Pages : 3

[4264] - 539
B.E. (Electronics)
AUTOMOTIVE ELECTRONIC SYSTEMS
(2008 Pattern) (Elective - IV) (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) ***Attempt not more than six questions of which at least three questions must be from each section.***
3) ***Answers to the two sections should be written in separate books.***
4) ***Neat diagrams must be drawn wherever necessary.***
5) ***Figures to the right indicate full marks.***
6) ***Use of electronic pocket calculator is allowed.***
7) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Explain in brief the basic Automotive System and System Components. **[8]**

b) Explain the Ignition System of IC Engine. **[6]**

c) List at least two important specifications of a battery and explain their significance in brief. **[4]**

OR

Q2) a) Compare petrol engine with Diesel Engine with proper examples. **[8]**

b) State and explain various modes of operation of Hybrid Electric Vehicle (HEV). **[6]**

c) What is Emission Control? Explain in brief. **[4]**

Q3) With the help of working principle, characteristics, limitations and use of following sensors in context with automotive systems. **[16]**

a) Position sensing.

b) Distance sensing.

c) Torque sensing.

d) Vibration sensing.

OR

Q4) Explain the working principles of different types of Actuators, their characteristics, limitations and applications in context with automotive systems. **[16]**

P.T.O.

Q5) a) With appropriate examples explain Analog and Digital control methods in automotive systems. **[8]**

b) Explain in brief the following control schemes in context with automotive systems : **[8]**

i) Lighting Control.
ii) Wipers Control.

OR

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

i) Traction Control.
ii) Anti-theft System.

b) Explain in brief different strategies of 'Engine Management System'. **[8]**

SECTION - II

Q7) a) Justify the selection of microprocessor, microcontroller, and digital signal processor with in the automotive context with suitable examples. **[12]**

b) State and explain hardware and software debugging techniques in context with automotive application. **[6]**

OR

Q8) a) How you will monitor the temperature of engine with the help of PIC? Explain with the interfacing diagram, algorithm and 'C' program. **[12]**

b) Explain in brief the 'Soft Real Time' and 'Hard Real Time' in context with automotive system. **[6]**

Q9) a) With the help of proper example, explain the relevance of Internet Protocols in automotive applications. **[8]**

b) Compare CAN, LIN and Flex Ray buses. **[8]**

OR

Q10) a) With the help of suitable example, explain how telematics can be effective in automotive applications. **[8]**

b) Justify the selection of ARM 9 and ARM 11 in automotive applications with proper examples. **[8]**

Q11) a) Write short note on 'Basic Wiring System' and 'Multiplex Wiring System' in context with automotive system. **[8]**

b) Explain 'on board diagnostic system'; in detail related to automotive system. **[8]**

OR

Q12) a) State and explain various safety norms and standards for Automotive Systems. **[8]**

b) Explain 'off board diagnostic system', in detail related to automotive system. **[8]**

☒☒☒☒

Total No. of Questions : 12]

SEAT No. :

P861

[Total No. of Pages : 4

[4264] - 553
B.E. (E & TC)
OPTICAL FIBER COMMUNICATION
(2008 Pattern) (Semester - II)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) With a neat block diagram, explain the features of the key elements of an optical fiber transmission link. **[6]**

b) The velocity of light in the core of a step index fiber is 2.01×10^8 m/s, and the critical angle at the core-clad interface is 80°. Determine the numerical aperture and the acceptance angle for the fiber in air, assuming it has a core diameter suitable for consideration by ray analysis. **[6]**

c) With reference to mode theory for optical propagation explain the terms: Phase velocity, Group velocity and Group delay. **[6]**

OR

Q2) a) A graded index fiber with a parabolic index profile supports the propagation of 742 guided modes. The fiber has a numerical aperture in air of 0.3 and a core diameter of 70 μm. Determine the wavelength of the light propagating in the fiber. Further, estimate the new maximum core diameter for single - mode operation at the same wavelength. **[6]**

b) State the advantages and drawbacks of vapour-phase deposition in the preparation of glasses for optical fibers. **[6]**

c) Describe the major reasons for the cabling of optical fibers which are to be placed in a field environment. Thus state the functions of the optical fiber cable. **[6]**

P.T.O.

Q3) a) Describe the important linear and nonlinear scattering losses in optical fibers. **[8]**

b) Calculate the pulse spreading caused by material dispersion for a graded-index multimode fiber working at $\lambda = 850nm$ if the fiber's length is 100 km and the light source is an LED whose rms spectral width is 70 nm. The given parameters are :

Dispersion slope, $S_0 = 0.097$ ps/nm^2. km and $\lambda_0 = 1343$ nm.

Is the dispersion value positive or negative in this example? State the interpretation of negative sign. **[8]**

OR

Q4) a) Explain the concept of critical bending radius for an optical fiber. A multimode fiber has a core and clad refractive indices of 1.46 and 1.45 respectively. The critical radius of curvature at which large bending losses occur is $84\,\mu m$ when the fiber is transmitting light of a particular wavelength. Determine the wavelength of the transmitted light. **[8]**

b) Describe the techniques employed and the fiber structures utilized in single-mode fibers to provide:

i) Dispersion - Shifted Fibers.

ii) Dispersion - Flattened Fibers. **[8]**

Q5) a) Explain the conditions necessary to attain lasing action in LASERs. Also state the advantages of LASER Diodes over LED, for use in context of fiber-optic communication. **[8]**

b) The radiative and non-radiative recombination lifetimes of minority carriers in the active region of a double hetero junction InGaAsP LED are 30 nsec & 100 nsec respectively. Determine the total carrier recombination lifetime and optical power generated internally if peak emission wavelength is 1310 nm and the LED drive current is 40mA. **[8]**

OR

Q6) a) Describe the various types of fiber misalignment which may contribute to insertion loss at: **[8]**

i) Multimode fiber joints and

ii) Single - mode fiber joints.

b) For experimentation, an engineer selects a GaAs Fabry-Perot LASER with following parameters:

Optical cavity of length = $500\,\mu m$.

Reflectivity at the two uncoated facets = 0.32 each.

Effective absorption coefficient = 10 cm^{-1}.

Calculate the threshold gain required for lasing to occur. **[8]**

SECTION - II

Q7) a) Explain and compare PIN photodiode with APD with suitable electric field diagram. **[6]**

b) An InGaAs avalanche photo-detector has a quantum efficiency of 90 % at a wavelength of 1310 nm. If an incident optical power of 0.5 μW produces a multiplied photocurrent of 15 μA, calculate the responsivity and multiplication factor. **[6]**

c) With reference to optical fiber communication systems, explain the terms: **[6]**

i) Thermal Noise.
ii) Dark Current Noise.
iii) Quantum Noise.

OR

Q8) a) Explain the terms quantum efficiency and responsivity of a photo-detector. How are these terms related to each other? **[6]**

b) Draw and explain the equivalent circuit for the front end of an optical fiber receiver. **[6]**

c) Comment on the relative merits and demerits of the three basic amplifier-configurations adopted for optical fiber communications. **[6]**

Q9) a) Following are the parameters of a point to point optical link: **[8]**

Optical power launched	:	+3 dBm
Sensitivity of detector	:	-32 dBm
Source / Detector connector loss	:	1dB each
Length of optical cable	:	60 km
Cable attenuation	:	0.3 dB/km
Jumper cable loss	:	3 dB
Connector loss at each fiber joint	:	1 dB

Assume two jumper cables and two cable joints at the two ends of transmission fiber. Compute the power margin of the link using spread sheet method.

b) Draw the block diagram of an analog optical fiber link and state the major noise contributors. **[8]**

OR

Q10) a) A lab setup of optical fiber demo-system is to be tested over an 8 km length. The rise times of the chosen components are:

LED	:	10 ns
p-i-n photodiode	:	6 ns
Intermodal pulse broadening	:	10 ns/km
Intramodal pulse broadening	:	5 ns/km

From system rise time considerations, estimate the maximum bit rate achievable on the link when using an NRZ format. **[8]**

b) Write a short note on: Performance analysis of analog optical fiber system. **[8]**

Q11) Write short notes on: **[16]**

a) Optical Amplifiers.

b) WDM Components.

OR

Q12) a) A student performs an experiment based on an EDFA setup with following settings:

Pump power	:	30 mW
Pump wavelength	:	980 nm
Signal wavelength	:	1550 nm
Gain at 1550 nm	:	20 dB

Calculate the maximum input power requirements and the maximum output power possible with this setup. **[8]**

b) Explain precisely: **[8]**

i) Major requirements of transmitters used in WDM systems.

ii) Performance parameters of fiber couplers.

Total No. of Questions : 12]

SEAT No. :

P862

[Total No. of Pages : 2

[4264] - 559
B.E. (E & TC)
AUTOMOTIVE ELECTRONICS
(2008 Pattern) (Elective - IV) (Semester - II)

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

Instructions to the candidates :

1) ***Attempt Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6 from Section-I.***
2) ***Attempt Q. 7 or Q. 8, Q. 9 or Q. 10, Q. 11 or Q. 12 from Section-II.***
3) ***Assume suitable data, if required.***

SECTION - I

Q1) a) Explain with suitable diagram working of 4 stroke petrol engine. **[8]**

b) State types of batteries used for automotive and various charging methods used. **[6]**

c) Explain concept of transmission system used in vehicle. **[4]**

OR

Q2) a) Explain Diesel engine working with suitable diagram. What are advantages over Petrol engine. **[8]**

b) What is hybrid technology? Explain various operating modes and compare advantages and disadvantages of each. **[6]**

c) Compare Manual and automatic transmission system. **[4]**

Q3) a) State selection considerations of sensors for automotive application. **[4]**

b) State specifications and signal conditioning of sensor used for measuring speed of vehicle. **[6]**

c) Explain working principle of throttle valve used for speed control. **[6]**

OR

Q4) a) Draw interfacing diagram of temperature sensor and design signal conditioning circuit for it. **[6]**

b) How crank shaft position is detected for fuel ignition. **[6]**

c) State various sensors used for stability control. Explain working of it. **[4]**

Q5) a) What is engine management system. Explain with block diagram how it works in various operating modes. **[10]**

b) With suitable block diagram explain automatic cruise control system. List sensors used in such system. **[6]**

P.T.O.

OR

Q6) a) How overall engine performance is achieved in various working conditions. **[8]**

b) Explain antilock brake system with block diagram. What are advantages of it over normal braking system. **[8]**

SECTION - II

Q7) a) List various 8/16 bit processors that are used for ECU in automotive Vehicle Describe architecture of any one in detail. **[10]**

b) With suitable sensor interfacing diagram, write C program using PIC controller for indicating speed of vehicle on LCD. **[8]**

OR

Q8) a) How timer/counters are used with interrupt in microcontrollers? **[4]**

b) Write C program using PIC microcontroller for displaying Engine temperature on LCD. **[8]**

c) State software debugging features of MPLAB IDE. **[6]**

Q9) a) Explain Bluetooth protocol features compare it with 802.11. **[8]**

b) State specifications of CAN and how it is used in automotive Vehicle for communication between ECU's? **[8]**

OR

Q10) a) Compare CAN & LIN protocol. **[4]**

b) What way Flex Ray is superior to CAN? State key features of it. **[6]**

c) What is need of MOST? List devices that can be connected and BW requirement of each. **[6]**

Q11) a) In automotive vehicle what is concept of multiplexed wiring? Explain with diagram how it is implemented. **[8]**

b) What is on board diagnostics system? How it indicate various faults? **[8]**

OR

Q12) a) State various methods of safety and security systems in automotive vehicle that can be implemented. **[8]**

b) What are the equipments used in off board diagnostics? **[8]**

Total No. of Questions : 12]

SEAT No. :

P865

[Total No. of Pages : 3

[4264] - 622
B.E. (Chemical Engineering)
FUEL CELL TECHNOLOGY
(2008 Pattern) (Elective - IV) (Theory) (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) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
5) ***Assume suitable data, if necessary.***
6) ***Figures to the right indicate full marks.***

SECTION - I

Q1) a) Explain electrochemical reaction and oxidation reduction reaction with suitable example. **[9]**

b) What does fuel cell indicates and explain its applications. **[9]**

OR

Q2) Compare among PEM fuel cell, phosphoric acid fuel cell, molten carbonate fuel cell and solid oxide fuel cell, on the basis of electrode, electrolyte, operating temperature, efficiency, advantages and disadvantages. **[18]**

Q3) Gibbs free energy for the formation of water vapor is – 56.74 kcal/mole at STP condition. In the typical SOFC, the partial pressures of hydrogen, oxygen and water vapor are 0.8, 0.21 and 0.3 atm. Assume that activities of the components are proportional to their partial pressures. The cell is operated at 975 deg C. Calculate : **[16]**

a) Standard open circuit potential.

b) Open circuit potential at the operating conditions.

Faraday's constant is 96487 J/V .mol.

OR

Q4) a) A current density of 9 A/m^2 is obtained when pure hydrogen in fed to SOFC at the pressure of 1.8 atm. Total pressure of gases on anodic side is observed to be 2.2 atm. Air is supplied at 1.5 atm. The cell is operated at 1000ºC. The diffusion factors for hydrogen, oxygen, water vapour are 95, 70 and 55 C/sm^2. atm respectively. Calculate concentration overpotential across cathode and anode. **[8]**

P.T.O.

b) Calculate fuel utilization factor, air ratio, power output and fuel efficiency of SOFC using following data : **[8]**

Average current density	:	11 A/m^2
Active anode surface area	:	0.3 m^2
Fuel Flow rate	:	20 mol/h
Fuel Composition	:	H_2 80% and CO 20%
Air Flow rate	:	20 mol/h
Output Potential	:	230 V
Lower Heating Value of fuel	:	25000 kcal/kg

Q5) Derive Nernst equation for calculating open circuit potential of SOFC using H_2 as a fuel and O_2 as an oxidize. **[16]**

OR

Q6) a) Explain various methods for production of Hydrogen. **[8]**

b) Explain schematically the working principle of Solid Oxide Fuel Cell. **[8]**

SECTION - II

Q7) a) Explain the mechanism of oxidative reforming of methane. **[9]**

b) What are the advantages and limitations of direct oxidation of hydrocarbons? How these limitations can be removed? **[9]**

OR

Q8) a) Illustrate and compare between planar and tubular design of SOFC. **[9]**

b) Explain different types defect structure in solids and Kroger Vink notations. **[9]**

Q9) a) Design a tubular SOFC to generate 200 kW power from methane as a fuel. Single tube has a anodic diameter 18 mm and active length of 1.8 m. **[8]**

b) Calculate mole fraction of defect at 80 and 975°C. Defect energy is 75 kJ/mol. Comment on the significance of results. **[8]**

OR

Q10) a) Design a planner SOFC to generate 250 kW power for ethanol as a fuel. **[8]**

b) What is steam reforming? What are the advantages of internal steam reforming. **[8]**

Q11) a) Explain charge transfer chemical reaction mechanism in SOFC. **[8]**

b) What are the recent advancements in the materials of anode, cathode, and electrolyte and interconnect? **[8]**

OR

Q12) Develop a mathematical model for SOFC system using the anodic system of Ni, H_2-H_2O/YSZ. Hydrogen is used as a fuel and air as an oxidizer. Explain the : **[16]**

a) Approach.

b) Assumptions.

c) Flow Chart and

d) Reactions.

Total No. of Questions : 8]

SEAT No. :

P866

[Total No. of Pages : 2

[4264] - 642

B.E. (Petroleum)

IMPROVED OIL RECOVERY AND RESERVOIR SIMULATION

(2008 Pattern) (Sem. - 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) ***Question No. 4 (four) and 7(seven) is compulsory.***
3) ***Figures to the right indicate full marks.***
4) ***Neat diagrams must be drawn wherever necessary.***
5) ***Use of a non-programmable calculator, log-log, semi-log paper is allowed.***
6) ***Assume suitable data if necessary.***

SECTION - I

Q1) Derive the fractional flow equation for two phase flow. How is it used for water flooding? **[16]**

Q2) Explain Thermal EOR. **[16]**

Q3) Explain Chemical EOR. **[16]**

Q4) a) State four elements of Polymer Design and Steam flooding. **[6]**

b) Name and explain any one model in Thermal EOR. **[6]**

c) Define MMP, CDC, Cosurfactant, Cosolvent, UL and LL phases. **[6]**

SECTION - II

Q5) $\frac{\partial^2 p}{\partial x^2} = \alpha \frac{\partial p}{\partial t}$ is the given equation for flow in porous media.

Formulate the discretised equation. Start with Taylors Series. **[16]**

P.T.O.

Q6) a) Given a one-dimensional reservoir, with the following data, set up the matrix using the Crank Nicolson method. L = 400 ft, ct = 5E-6, P(x,0) = 5000 psi, P (400,t) = 0 psi, P(0,t) = 5000 psi, viscosity = 5 cp, permeability = 5 md, porosity = 20%. **[12]**

b) Show the solution profiles for different times on a P-x diagram and the steady state solution. **[4]**

Q7) Explain steps in development of a reservoir. **[18]**

Q8) a) Use taylors series to derive the finite difference approximation formulas for the Diffusivity equation. **[8]**

b) Modify the above equation if the left boundary has a flow rate condition. **[4]**

c) Modify the above equation if the left boundary has a pressure condition. **[4]**

Total No. of Questions : 12]

SEAT No. :

P867

[Total No. of Pages : 3

[4264] - 643
B.E. (Petroleum)
PETROLEUM PRODUCTION ENGINEERING - II
(2008 Pattern) (Semester - II)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) Which type of separator you will recommend in following conditions? Explain the necessary features useful for this. **[9]**

i) Onshore processing facility, large amount of water expected.
ii) Cost effective for given spaceavailable.
iii) For better lgas liquid separation and to handle foaming Crudes.

b) Write and explain the four principal mechanisms governing the separation process inside a three phase separator. **[9]**

OR

Q2) a) Design a three phase horizontal separator using the following data: **[9]**

Gas flow rate (Qg) = 11 MMscf/day
Oil flow rate (Qo) = 2110 bbls/day for 42º API
Operating Pressure = 980 psia
Operating Temperature = 60ºF
Specific Gravity of Gas = 0.6
Gas Compressibility = Z = 0.87
From graph, value of k = 0.284 (Constant based on liquid gas properties)
Liquid drop to be separated = dm = 100 micron
Assume slenderness ratio of 3 & 4. Retention time 2, 2.5, & 3 minutes.

b) Draw the neat schematic sketch of a three phase separator. **[9]**

P.T.O.

Q3) Draw detail process flow diagram of GGS. Show various features. **[16]**

OR

Q4) a) Write the necessary elements required for an emulsion to exist. What is the role of an emulsifying agent in it? Explain. **[6]**

b) Draw the neat schematic sketch of a horizontal heater treater indicate various components and explain the working. **[10]**

Q5) a) Explain the chemistry of corrosion process. **[4]**

b) Write various causes of oil field corrosion. **[4]**

c) List the factors that prevent to corrosion process. **[8]**

OR

Q6) a) Describe in brief any one method to control the corrosion of subsea field equipments. **[10]**

b) Write a note on corrosion inhibitors. **[6]**

SECTION - II

Q7) a) Discuss the solution to Scale problem. **[8]**

b) Explain procedure to design sand control job. **[10]**

OR

Q8) a) What are the various ways and methods to know decline in well productivity? Also give solution in brief. **[12]**

b) Calculate pressure drop in the skin damaged zones for a vertical well and a 2100 ft long horizontal well and give your comments on it. Following reservoir properties are known. **[6]**

Skin factor = +6 for both the wells, Pay thickness = 70 ft, Horizontal well production rate = 3000 bbls/day, Vertical well production rate = 1100 bbls/day, Permeability, Kv = Kh = 40 md, Bo = 1.3 rbbl/STB, Oil viscosity = 2 cp.

Q9) a) Write the advantages of horizontal well technology. **[8]**

b) A 360 acre lease is to be developed using 10 vertical wells.

It was proposed to consider horizontal well application for this field development. If a vertical well effectively drains 40 acres, what will be the drainage area for a 1500 ft and 2600 ft long horizontal well in the same field? How many horizontal wells will be required to drain this sand effectively? **[8]**

OR

Q10) If the production of 'ABC' field is on its declining stage, discuss in detail your step by step approach and general strategy for the following field conditions to improve the overall productivity of 60 wells from two different productive formations. **[16]**

Other field properties are as given below.

a) Onshore deviated wells, high API gravity oil.

b) Anticline structure having solution gas drive.

c) Unconsolidated thick sand.

d) Depth around 9,000 ft, HPHT wells.

e) Low pressure, low permeability.

f) Low GOR, pressure less than bubble point.

g) High water cut along with some sand production.

h) Target of primary recovery component achieved.

Q11) a) Draw a neat schematic sketch and describe any one completion techniques for a horizontal well trajectory. **[8]**

b) Draw the schematic sketch and explain intelligent well completion. **[8]**

OR

Q12) Describe the objectives and challenges or field data in brief and discuss any one case study or field methodology of, **[16]**

a) CHOPS.

b) Onshore production.

Total No. of Questions : 8]

SEAT No. :

P870

[Total No. of Pages : 2

[4264] - 650
B.E. (Petroleum)
WELL CONTROL METHODS
(2008 Pattern) (Semester - II) (Elective - IV)

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

Instructions to the candidates :

1) ***Answer three questions from Section-I and three questions from Section-II.***
2) ***Question Nos. 1 and 5 are compulsory. Out of the remaining attempt 2 questions from Section-I and 2 questions from Section-II.***
3) ***Answers to the two sections should be written in separate books.***
4) ***Neat diagrams must be drawn wherever necessary.***
5) ***Figures to the right indicate full marks.***
6) ***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) Calculate mud required to fill hole to pull 5 stands of drill pipe 'dry' and mud required to fill hole to pull 10 stands of drill pipe 'Wet' Data. **[8]**

Drill pipe capacity = 0.0176 bbls/ft

Drill pipe metal displacement = 0.0082 bbls/ft

Average stand length = 92 ft.

b) Discuss leak off test procedure and uses in detail. **[8]**

c) Discuss normal pressure, abnormal pressure and subnormal pressure. **[2]**

Q2) a) Discuss soft shut off and hard shut off. Procedure while tripping out operation. **[8]**

b) What would be the effect of closed well gas migration on the following pressures at various locations. **[8]**

i) At any point above gas bubble.
ii) At any point below gas bubble.
iii) Gas bubble.
iv) SICP.
v) Bottom hole.
vi) SIDPP.

P.T.O.

Q3) Draw hydraulic system of BOP and discuss different functions of each component in brief. **[16]**

Q4) a) A BOP stack is configured as pipe ram blind - ram, pipe ram, annular BOP calculate required volume to close, open and close again all rams and annular with safety margin of 30% **[8]**

Component		Vol. to open (Gal)		Vol. to close (Gal.)
Annular BOP	→	30	→	32
Ram BOP	→	16	→	18

Describe

b) Use of diverter system in shallow gas hazard with suitable sketch. **[8]**

SECTION - II

Q5) a) Discuss wait and weight method graphically. **[8]**

b) Discuss following parameters. **[8]**

i) ICP.
ii) FCP.
iii) Kill mud weight.
iv) Slow Circulating Rate (SCR).

c) Discuss different causes of kick. **[2]**

Q6) a) The casing is set at 1500 ft and fracture gradient below the shoe is 0.68 psi/ft what is the maximum pressure that can be closed in, if a 9 ppg mud is being used to drill with? **[6]**

b) Discuss volumetric fluid lubrication method of well control in detail. **[10]**

Q7) a) Discuss symptoms of kick and prevention of kick while deep water drilling. **[8]**

b) Discuss in brief stripping operation. **[8]**

Q8) Write short notes on : **[16]**

a) MAASP.
b) FOSV.
c) Concurrent method.
d) Underground blow out.

☒☒☒☒

Total No. of Questions : 12]

SEAT No. :

P871

[Total No. of Pages : 4

[4264] - 663
B.E. (Petrochemical)
PLANT DESIGN AND PROCESS ECONOMICS
(2008 Pattern) (Semester - II)

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

Instructions to the candidates:

1) ***Answer 3 questions from Section - I and 3 questions from Section - II.***
2) ***Answers to the two sections should be written in separate books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***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) **Answer the following:** **[18]**

a) List down the various financial Institutions available in India to meet the requirements of industry for long-term finance.

b) List the factors to be considered in the evaluation of capital requirements for a process plant.

c) Discuss breakdown of Fixed Capital Investment (FCI) items for a chemical process.

d) Discuss incremental costs for economic analysis.

OR

Q2) a) Discuss in brief the various components of a balance sheet and Profit and loss account statements. State the economic ratios and their significance in brief. **[9]**

b) The annual production costs for a plant are Rs. 36.5 lakhs, while the sum of annual fixed charges; overhead charges and general expenses are Rs. 26 lakhs. Determine the break-even point, in units of production per year if the total annual sales are Rs. 72.8 lakhs and the product sells at Rs. 520 per unit. **[9]**

P.T.O.

Q3) a) A pump installation costing Rs. 95,000 has a salvage value of Rs. 4000. It requires Rs. 3000 for its annual maintenance. If the value of the money is 10% and the pump has a life of 4 years, what is the present worth of service rendered by the pump? What is the capitalized assuming perpetual operation. **[8]**

b) Discuss the types of cost indices available in the Chemical Engineering literature. Discuss the importance of these cost indices for cost estimation of chemical engineering equipment. **[8]**

OR

Q4) **Write Short notes on:** **[16]**

a) Taxes and Insurance.

b) Annuity and perpetuity.

c) Components of Total Product cost.

d) Methods used for evaluating investment proposals.

Q5) The following data presents the ratios pertaining to M/s ABC Petrochemicals Ltd., Pune for the ear ending 31st March 2012: **[16]**

a)	Annual sales	:	Rs. 40,00,000
b)	Sales to net worth	:	4 times
c)	Current liabilities	:	50%
d)	Total debt to net worth	:	80%
e)	Current ratio	:	2.2 times
f)	Sales to inventory	:	6 times
g)	Average collection period	:	45 days
h)	Fixed assets to net worth	:	75%

From the above information, prepare the balance sheet with as many details as possible. Assume on sales on credit.

OR

Q6) The following proposals are under consideration: **[16]**

Proposal	A	B	C	D	E
Initial outlay, Rs.	75,000	73,000	52,000	60,000	55,000
Annual cash flow Rs.	6,000	5,000	4,000	6,000	10,000
Life, years	10	6	8	9	12

Rank these proposals:

a) In the order of profitability after payback period, and

b) Net present value method assuming an interest rate of 10%.

SECTION - II

Q7) A company purchases a dilute mixture of ethanol (5%) in water, and processes it with simple distillation to recover the ethanol at a high concentration in which form it is then sold for industrial use. The distillation plant comprises: road tanker unloading bay, a raw material storage tank, with pumps, pipe work etc., a distillation column, with condenser reflux tank for ethanol pumps etc., a packaged boiler to provide heating to the distillation column reboiler via steam coils, storage tanks and pumps etc for the ethanol product, and road tanker load facilities. There has been an explosion of the distillation column, and after it is required you are asked to conduct an audit to determine whether it would be safe to restart operations.

You realize that you must approach this task systematically, and prepare a list of the general types of topic, which you need, investigation as part of the audit. Then for each type of topic, you prepare a list of specific questions you will ask, and features you will inspect. **[18]**

a) List the types of topic you will investigate.

b) For each general type of topic, list several questions you will ask of features you will inspect.

OR

Q8) a) Make a proforma for the specification Tray Dryer. **[10]**

b) Discuss the anatomy of Chemical Engineering Projects? What are the standard references / resources for Petro-chemical engineers working in Projects. **[8]**

Q9) a) Discuss in brief the following safety terms: **[8]**

i) HAZOP.

ii) Fault tree analysis.

iii) Trip and interlock system.

iv) HAZAN.

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

i) Piping Specifications.

ii) Pipeline network analysis.

iii) Piping layout and arrangements.

iv) Pipe fittings and auxiliaries.

OR

Q10) a) A project has the following activities, activity duration and predecessors. **[8]**

Activity	Duration (days)	Predecessor
P	6	-
Q	10	P
R	12	P
S	9	Q,R
T	8	R
U	5	S,T

i) Draw the CPM/PERT chart for this problem and determine the critical path.

ii) Indicate the critical path on the CPM/PERT chart.

b) Discuss the importance of pilot plant and scale up in plant design projects. **[8]**

Q11) a) Write a note on: Process Utilities in typical Petrochemical/Refinery Complex. **[8]**

b) Explain the plant-design project stages with suitable example. **[8]**

OR

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

a) Engineering flow diagram and P&I Diagram.

b) Plant Layout.

c) PERT and CPM.

Total No. of Questions : 12]

SEAT No. :

P874

[Total No. of Pages : 3

[4264] - 669
B.E. (Petrochemical)
CATALYST SCIENCE AND TECHNOLOGY
(2008 Pattern) (Sem. - II) (Elective - IV)

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

Instructions to the candidates :

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

SECTION - I

Q1) a) Discuss importance of Catalysis in Refinery and in Petrochemical Complexs - Provide suitable examples. **[8]**

b) With help of neat diagram explain why Catalyst enhances speed of reaction. **[8]**

OR

Q2) a) Define and explain : Homogeneous Catalysis, Functionality, Turnover Frequency, Active Site. **[8]**

b) Differentiate between Physical Adsorption and Chemisorption. Provide relevant examples. **[8]**

Q3) a) Discuss Langmuir Hinshelwood Model of Catalytic Reaction. Provide the mathematical expression also. **[8]**

b) Discuss the stepwise procedure of Catalytic reaction. Highlight the importance of rate limiting step in this context. **[8]**

OR

Q4) a) What are the period of operation of industrial catalysts? How are these getting deactivated. Explain the mechanism of deactivation with help of neat diagram. **[8]**

b) With help of suitable diagram differentiate between the processes of Semi-Regenerative and Conventional Reformer units. Discuss the mode of catalyst regeneration in both of the operations. **[8]**

P.T.O.

Q5) a) What are the novel techniques of synthesizing catalyst - discuss it in depth. **[6]**

b) Name the important techniques employed for Characterization of industrial catalysts. Discuss their utilities. **[8]**

c) What are Promoters - explain their importance and usage. **[4]**

OR

Q6) a) Discuss four important characteristics of supports of the commercial catalysts. Name 3 different supports and discuss any one of then depth. **[9]**

b) Spray drying produces spherical particles of 5.2 microns diameter. Calculate the external surface area considering nonporous particle. What size of particle will be needed to provide external surface area of 78 m^2/g? Assume density of particles to be 2.6 g/cm^3. **[9]**

SECTION - II

Q7) a) With help of neat diagram explain the phenomenon "Sintering". How can it be reduced. What are the evil effects of Sintering for Industrial Processes. **[8]**

b) What are dual functional catalysts? Discuss the method of dual functionality and its mechanism with help of suitable real life example. **[8]**

OR

Q8) a) How to synthesize Zeolites? Highlight its important characteristics. Discuss the shape selectivity of Zeolites and their industrial applications in details. **[10]**

b) "Supported metal Catalysts are very important" - Explain and elaborate with help of proper example. Discuss the mechanism of their function. **[6]**

Q9) a) Discuss the construction and operation of trickle bed reactor. Why it is very important in the Refinery Complex? **[8]**

b) With help of neat diagram explain the operation of a hydrocarcker. Provide the suitable operating conditions also. **[8]**

OR

Q10) a) Name the reactors to be used for isomerization reactions. Explain the catalyst employed and its nature along with operating conditions. **[6]**

b) With help of neat diagram discuss Fluidized Catalytic Cracking with proper emphasis on the catalyst used, operating condition, reaction time and regeneration of catalyst. **[10]**

Q11) a) What is GTL technology? What are its salient features. Discuss various multiphase reactors employed in this emerging technology. Discuss the various challenges to be overcomed for commercialization of the technology. **[9]**

b) With help of neat diagram explain the operation of Methanol Synthesis Reactor. Discuss all technical aspects associated with the design of the reactor. **[9]**

OR

Q12) Write short notes on (any four) : **[18]**

a) Shift Catalyst.

b) Ammonia Reactor.

c) Multi-tubular Multiphase Reactor.

d) Catalytic Reformer.

e) Industrial Process of Manufacturing Ethylene Oxide.

Total No. of Questions : 12]

SEAT No. :

P876

[Total No. of Pages : 4

[4264] - 681
B.E. (Polymer)
MOLD AND DIE DESIGN - II
(2008 Pattern) (Sem. - II)

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

Instructions to the candidates:

1) ***Answer question number 1 or 2, 3 or 4, 5 or 6 from Section - I. Answer question number 7 or 8, 9 or 10 and 11 or 12 from Section - II.***
2) ***Answers to the two sections should be written on separate answer books.***
3) ***Figures to the right indicate full marks.***
4) ***Draw neat sketches wherever required.***
5) ***Use of calculator, graph paper is allowed.***

SECTION - I

Q1) a) For ejection of the internally threaded component by unscrewing, explain the working principle of : **[5]**

i) Rotating core with extractor plate.

ii) Withdrawing rotating core.

b) Explain with an example, the design of the core used for manufacturing a plastic component with single interrupted thread. **[5]**

c) With only sketches indicate the collapse of collapsible core to relieve the internal threads. **[6]**

OR

Q2) a) With neat sketch, explain 'in-line' layout for withdrawing of threaded core for internally threaded component. **[6]**

b) Explain any 2 methods of retaining loose threaded cores in the molds for molding components with internal threads. **[5]**

c) Explain design the factors to be taken into consideration while desigining components with internal threads. **[5]**

Q3) a) Bring out the differences in the design of hot runner molds and 3 plates. **[6]**

b) Select and justify material of construction used for manifold and nozzles in hot runner molds. **[6]**

c) Explain the construction of rectangular manifold used in hot runner molds with a neat figure. **[6]**

P.T.O.

OR

Q4) a) Explain the antechamber nozzle design with a neat figure. **[6]**

b) With neat sketches, explain the various hot runner manifold designs. **[6]**

c) List the various types of valve systems used in hot runner molds. Explain any one in detail. **[6]**

Q5) a) With a neat sketch, explain semi-positive and flash type compression molds. **[8]**

b) Write a note on factors taken into considerations during designing of plug assist used in thermoforming. **[8]**

OR

Q6) a) Explain the various materials used in fabrication of blow molds. **[6]**

b) What are the various factors taken into consideration for core rod design in blow molds? **[5]**

c) Explain: **[5]**

i) Venting and

ii) Selection of gate location in transfer molds.

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. **[35]**

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. **[35]**

Q9) With a neat sketch, explain the constructional features of a coat hanger sheet die. **[10]**

OR

Q10) With a neat sketch, explain the constructional features of a fish tail die. **[10]**

Q11) For a family mold, why is runner balancing preferred over gate balancing? **[5]**

OR

Q12) Explain: **[5]**

a) Racetrack effect.

b) Jetting. Also suggest remedial actions to avoid the above phenomenon.

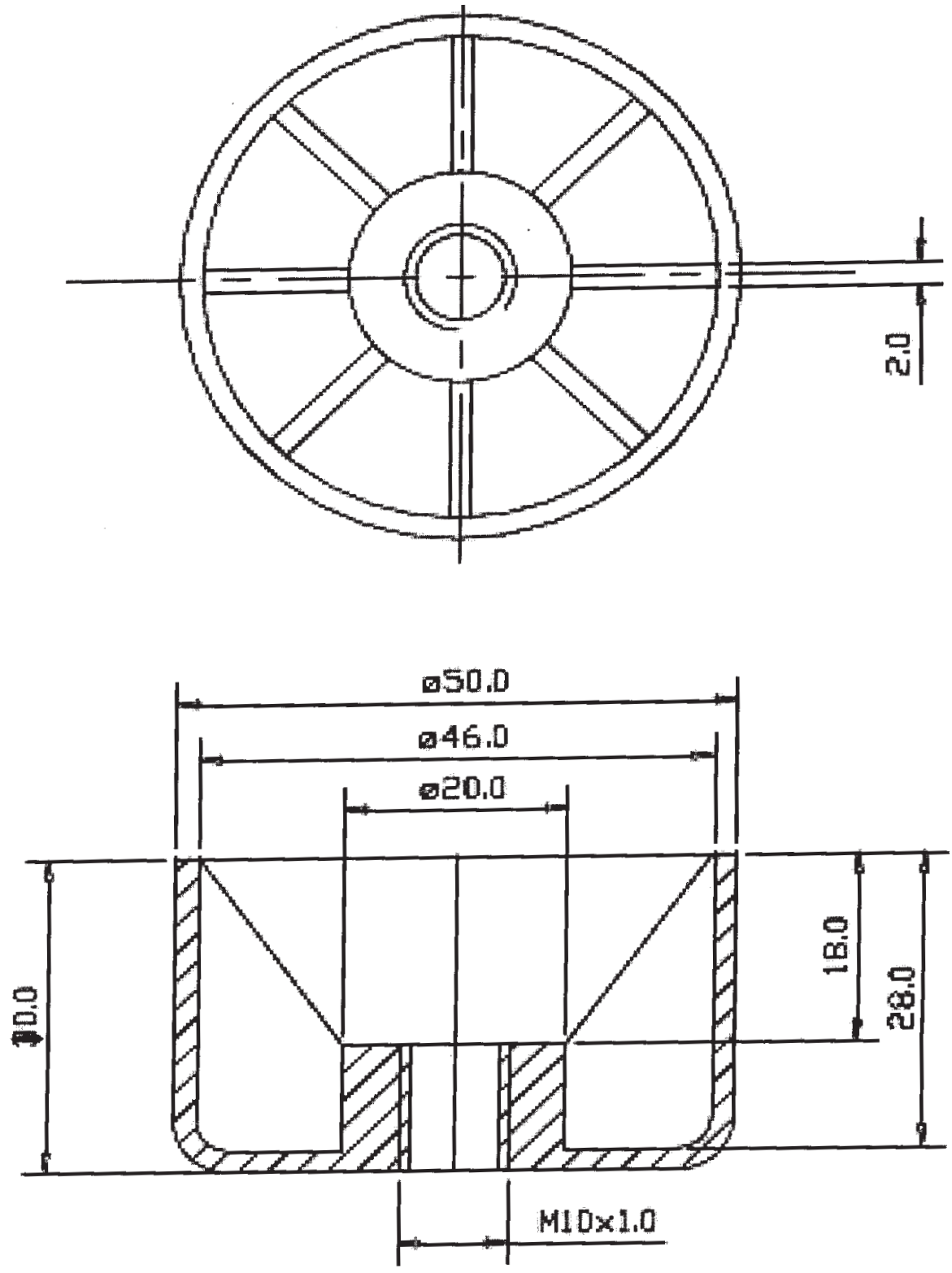
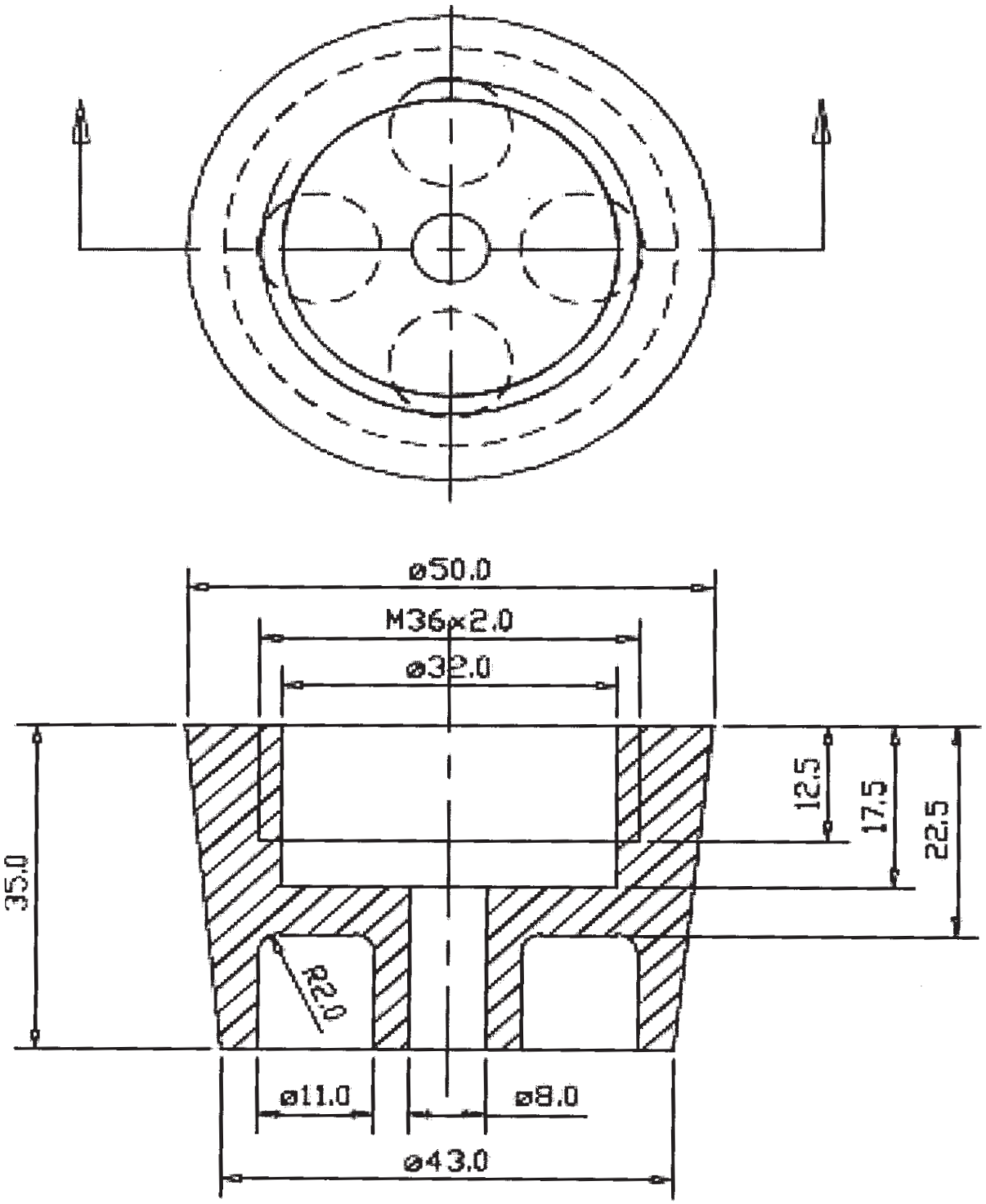


FIGURE 1

NOTES : ALL DIMENSIONS ARE IN mm.
MATERIAL : ABS
CAVITY PRESSURE : 400 Kg/cm2
SHRINKAGE : 0.5%
ASSUME SUITABLE DRAFT.



NOTES : ALL DIMENSIONS ARE IN mm.
MATERIAL : POLYPROPYLENE
CAVITY PRESSURE : 350 Kg/cm2

FIGURE 2

Total No. of Questions : 12]

SEAT No. :

P878

[Total No. of Pages : 3

[4264] - 686
B.E. (Polymer)
RUBBER TECHNOLOGY
(2008 Pattern) (Elective - IV) (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) Explain the thermodynamic theory for rubber elasticity. **[6]**

b) How are rubbers classified? What is the basis for their classification? Discuss any two rubbers w.r.t. their synthesis, properties and applications. **[8]**

c) Discuss "rebound resilience" w.r.t. rubbers. State the application where this property is important. How is it measured? **[4]**

OR

Q2) a) Explain a stress-strain graph for vulcanised and unvulcanised rubber. **[6]**

b) With the help of a flow chart explain the basic stages that occur in a raw rubber technology. **[6]**

c) Discuss any two rubbers on the basis of their structure, composition, properties, compounding and applications. **[6]**

Q3) a) Discuss the basic principles of compounding of rubbers. State and explain machinery used for compounding of rubbers. **[6]**

b) Discuss vulcanising agents, accelerators, activators, retarders w.r.t. rubbers. Give suitable examples of each one of them. **[6]**

c) State the various types of carbon blacks. How do they differ from one another. **[4]**

OR

P.T.O.

Q4) a) What is the role of the following additives w.r.t. rubbers. Explain their mechanism of functioning and give 2 examples of each (any two) : **[6]**

i) Peptizers.
ii) Tackifiers.
iii) Extender oils.

b) Discuss "Mastication" of Natural rubber with the help of a mastication curve. **[4]**

c) Write a short note on fillers used with rubbers and their effect on the properties of the rubber. **[6]**

Q5) a) What are the different vulcanising agents used to vulcanise rubbers? Give specific examples. **[6]**

b) What are the different factors affecting the rate of vulcanisation? **[6]**

c) With the help of a cure curve discuss the oscillating disc theometer. **[4]**

OR

Q6) a) Discuss briefly the different methods to carry out vulcanisation in rubbers. **[6]**

b) Write a short note on the "Mooneys viscometer" used in the rubber industry. **[6]**

c) With the help of chemical reactions discuss vulcanisation in Natural rubber and polychloroprene rubber. **[4]**

SECTION - II

Q7) a) Explain in brief the process of injection molding of rubbers. **[6]**

b) List the different types of extruders used with rubbers and discuss. **[6]**

c) Explain the different types of role arrangements used in a calendar what is "roll bending" in case of calendaring. **[6]**

OR

Q8) a) Explain the process of compression molding of rubbers. Which rubber articles are manufactured by this method? State the advantages of compression molding process. **[6]**

b) State the various ways to overcome the problem of roll bending in calendaring. **[6]**

c) What are the advantages and disadvantages of injection molding compared to compression molding in rubbers? **[6]**

Q9) a) List the various components forming a type structure and explain the function of each component. List the rubbers used in tyre manufacture. **[6]**

b) Draw a neat sketch and list the various constructional elements of a cable stating the function of each element. **[6]**

c) Explain the coagulant dipping process used for manufacture of rubber gloves. **[4]**

OR

Q10) a) State the three main classes of cellular rubber and differentiate between them. **[6]**

b) Explain the construction and manufacture of a conveyor belt and give its applications. List the rubbers used in manufacturing conveyor belts.**[6]**

c) Draw a neat sketch and explain the constructional elements of a rubber hose. What is the criteria for selection of material for hoses. **[4]**

Q11) a) Discuss the various tests carried out on unvulcanised rubbers. **[8]**

b) Discuss any two electrical tests carried out on rubbers. **[8]**

OR

Q12) a) Explain the procedure to carry out the abrasion test on rubbers. Give two applications on which this test is performed. **[8]**

b) Define the term "Permanent set". Explain the procedure to carry out permanent set in compression. **[8]**

Total No. of Questions : 12]

SEAT No. :

P879

[Total No. of Pages : 2

[4264] - 687

B.E. (Polymer Engineering)

POLYMER THERMODYNAMICS AND BLENDS

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

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

Instructions to the candidates :

1) ***Answers to the two sections should be written in separate books.***
2) ***Draw neat diagrams wherever necessary.***
3) ***Numbers to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***
5) ***Use of logarithmic table, electronic pocket calculators is allowed.***

SECTION - I

Q1) a) Discuss in detail with Limitations of different Laws of Thermodynamics. **[10]**

b) Explain the following terms : Intensive and Extensive Properties. **[6]**

OR

Q2) a) Explain in detail Heat of mixing and its role. **[8]**

b) Explain in detail Entropy of mixing and its role. **[8]**

Q3) a) Explain the thermodynamic conditions for Phase separations. **[8]**

b) Write a short note on Phase diagram. **[8]**

OR

Q4) a) Discuss with necessary diagram the effect of temperature on the Phase stability. **[8]**

b) Explain the importance of Molecular weight parameter with necessary diagram on the miscibility of polymer blend systems. **[8]**

Q5) a) Explain and derive 'Flory Huggins equation for polymer blends'. **[9]**

b) Explain the role of Hilderbrand solubility parameter. **[9]**

OR

Q6) a) Explain with one example : **[10]**

i) Effect of Hydrogen bonding interaction.

ii) Effect of specific interaction like dipole-dipole interaction.

b) Explain Mixing Theory for Polymer Blend Mixture. **[8]**

P.T.O.

SECTION - II

Q7) a) Draw and explain in detail the schematic representation of the steps to be taken when developing polymer alloys and blends with a specified set of desired performance characteristics. **[10]**

b) Discuss in detail all E's or advantages in employing polymer blend technology. **[8]**

OR

Q8) a) Discuss the significances related to processing via polymer blend technology. **[6]**

b) Explain the term Polymer alloy with its importance. **[4]**

c) Explain different Polymeric Modifier used to improve the following properties such as Impact Strength, Chemical Resistance, Heat Deflection Temperature, Flame Resistance. **[8]**

Q9) a) Define the term Spreading coefficient and Discuss with examples the method of Compatibilization via addition of block or graft copolymers. **[10]**

b) Write a note on Polymer Blend Morphology. **[6]**

OR

Q10) a) Discuss with one example the role of Maleic Anhydride grafted polymers in blend Technology. **[8]**

b) Discuss Toughening of polymers via polymer blend technology with two examples. **[8]**

Q11) a) Discuss in detail the applicable models to understand the Rheology of Immiscible Blend systems. **[8]**

b) Write a note on any one Commercial Polymer blend involving engineering polymer. **[8]**

OR

Q12) Write in detail classifications of Interpenetrating Polymer Network and discuss Semi-IPN, Sequential-IPN. one with suitable example. **[16]**

Total No. of Questions : 12]

SEAT No. :

P881

[Total No. of Pages : 2

[4264] - 740

B.E. (Biotechnology)

BIO PROCESS MODELING AND SIMULATION

(2008 Pattern) (Semester - II)

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

Instructions to the candidates:

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

SECTION - I

Q1) Define and explain: **[18]**

a) Process model.

b) Simulation of a model.

OR

Q2) What is model building? Explain the four phases of model building with a neat sketch? **[18]**

Q3) Write short notes on: **[16]**

a) Equation of state.

b) Activity coefficient.

OR

Q4) Write detailed notes on applications of mathematical modeling. **[16]**

Q5) Write short notes on: **[16]**

a) Rigid Process.

b) Stochastic Process.

OR

Q6) How do you classify models based on the state of the process? Explain in detail. **[16]**

P.T.O.

SECTION - II

Q7) What is a fed batch culture? Write the equations for microbial kinetics for a fed batch culture. **[18]**

OR

Q8) Write short notes on modeling of a continuous culture. **[18]**

Q9) Explain in detail the Biological treatment of waste water by using Biological film systems. **[16]**

OR

Q10) Write short notes on the following: **[16]**

a) Agitated bioreactor.

b) Sparged bioreactor.

Q11) Develop the model for a batch reactor where the following reactions take place. $A \rightarrow B \rightarrow C, A \rightarrow D$ with rate constants k_1, k_3 and k_2 respectively. All the reactions are endothermic and have first order kinetics. The reacting mixture is heated by steam which flows through a jacket around the reactor with a rate of Q (Kg/min). **[16]**

OR

Q12) Model a gravity tank system with proper assumptions and a neat sketch. **[16]**

Total No. of Questions : 12]

SEAT No. :

P882

[Total No. of Pages : 2

[4264] - 741
B.E. (Biotechnology)
PLANT ENGINEERING AND PROJECT COSTING
(2008 Pattern) (Semester - II)

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

Instructions to the candidates:

1) ***Answer any three questions from Section - I and any three questions from Section - II.***
2) ***Answers to the two sections should be written in separate books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Make necessary assumptions wherever necessary.***
6) ***Use of programmable calculator is not allowed.***

SECTION - I

Q1) a) Explain the basic considerations in Biochemical/chemical plant design. **[8]**

b) Discuss the importance of process flow diagram in plant design. **[8]**

OR

Q2) a) Justify 'Pilot plant data' is required even if 'laboratory data' is available. **[8]**

b) Differentiate between qualitative and quantitative type of process flow diagram. Explain the combined type of process flow diagram. **[8]**

Q3) a) Explain the criteria for location of different buildings and facilities in the drawing of plant layout. **[8]**

b) Explain factors to be considered for preparing plant layout with a suitable example. **[10]**

OR

Q4) a) Explain plant safety operation and maintenance. **[6]**

b) Explain the check list for safe plant design. **[6]**

c) Discuss the capacity estimation and economic factor for various utilities. **[6]**

P.T.O.

Q5) a) List various pipe supports. **[4]**

b) Draw symbols for following used in engineering line diagram. **[6]**

i) Flow indicator.

ii) Level Indicator.

iii) Flow recorder.

iv) Pneumatic lines.

c) Write short note on colour code of pipeline carrying utilities. **[6]**

OR

Q6) a) Draw utility diagram for batch reactor. **[4]**

b) State different types of thermal insulation for heating and cooling used in piping design. **[6]**

c) Write short note on pipe sizing. **[6]**

SECTION - II

Q7) a) Differentiate between CPM and PERT techniques in details. **[9]**

b) What are the factors affecting on fixed capital and working capital? **[9]**

OR

Q8) a) Discuss in details about plant testing and commissioning. **[9]**

b) Discuss about methods of raising finance. **[9]**

Q9) a) Discuss about the concept of marginal additional investment for expansion and diversification. **[8]**

b) Discuss the effect of inflation on profitability analysis. **[8]**

OR

Q10) State the methods of profitability evaluation technique. Explain any four. **[16]**

Q11) Write short note on straight line and sinking fund method for depreciation determination. **[16]**

OR

Q12) Define term: **[16]**

a) Current value

b) Salvage value and

c) Recovery period.

Total No. of Questions : 12]

SEAT No. :

P885

[Total No. of Pages : 3

[4264] - 747
B.E.(Biotechnology)
INDUSTRIAL ORGANISATION AND MANAGEMENT
(2008 Pattern) (Semester - II) (Elective - IV)

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

Instructions to the candidates :

1) ***Answer any three questions from section-I and any three questions from section-II.***
2) ***Answer to the two sections should be written in separate books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Make necessary assumptions wherever necessary.***
6) ***Use of programmable calculator is not allowed.***

SECTION - I

Q1) a) Explain management by objective. **[5]**

b) Differentiate between private limited and public limited types of companies. **[8]**

c) Explain Henry Fayol's theory of management. **[3]**

OR

Q2) a) Explain the following : **[8]**

i) Cooperative.
ii) Partnership deeds.

b) What is partnership organization? What are its advantages over single ownership? **[8]**

Q3) a) Explain the following : **[10]**

i) Job specification.
ii) Job description.
iii) Job analysis and
iv) Job evaluation.

b) What is performance appraisal and explain in detail. **[8]**

OR

Q4) a) Explain industrial Fatigue along with its causes. **[6]**

b) Write short note on trade union. **[6]**

c) Discuss the objectives and functions of wage and salary administration. **[6]**

P.T.O.

Q5) a) Write short note on : **[9]**

i) VED analysis.
ii) SDE analysis.
iii) Control policies for A and C

b) Explain the following : **[7]**

i) Inventory carrying cost.
ii) Ordering cost

and How they are calculated.

OR

Q6) a) Explain various steps necessary for effective purchasing. **[5]**

b) What are store record? Explain Bin card. **[5]**

c) State significance of material management. **[6]**

SECTION - II

Q7) a) Explain different function of sales department? **[4]**

b) Explain the importance of marketing management for the growth of industrial organization. **[12]**

OR

Q8) a) What is forecasting? Explain two types of forecasting. **[6]**

b) Define market research. What are the different methods of market research? Give your comment how to market pharmaceutical product in competitive market. **[10]**

Q9) a) Explain the following : **[6]**

i) Protective duty.
ii) Duty of Bounty fed articles and
iii) Expert duty.

b) Explain in detail import procedure in India. **[6]**

c) Write short note on let Export Order. **[6]**

OR

Q10) a) State and explain factors affecting International Trade. **[8]**

b) Write note on : **[6]**

i) VAT and
ii) MOD VAT.

c) Write note on ISO. **[4]**

Q11) a) Explain in detail the concept of contract act. **[8]**

b) What is the provision for penalty under payment of Gratuity Act? **[8]**

OR

Q12) a) Discuss the provisions in MRTP Act. **[8]**

b) What are the conditions for dependent to be the nominee according to the employee State Insurance? **[8]**

Total No. of Questions : 12]

SEAT No. :

P901

[Total No. of Pages : 2

[4264] - 419
B.E. (Civil)
ADVANCED ENVIRONMENTAL MANAGEMENT
(2008 Pattern) (Elective - III) (Sem. - II)

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

Instructions to the candidates :

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

SECTION - I

Q1) a) Write major requirements for obtaining ISO 14000 certification. **[6]**

b) Enlist ISO 14000 series. **[6]**

c) What is necessity of ISO 14000 standards? **[6]**

OR

Q2) a) Enlist Environmental Management System (EMS) principles and elements and explain any one. **[6]**

b) Write about links between ISO 14001 and ISO 9000 in tabular form. **[6]**

c) Write the background and development of ISO 14000 series. **[6]**

Q3) a) Explain functions and powers of the state boards set up under The Water (Prevention & Control) Act 1974. **[8]**

b) Explain the salient features of hazardous waste management handling rules 1989. **[8]**

OR

Q4) a) What is the purpose of Air (Prevention & Control) Act 1981? Explain in brief how this act helped the state pollution control board to control air pollution. **[8]**

b) Write a note on penalties and procedures under : **[8]**

i) The Water Act and

ii) The Air Act.

P.T.O.

Q5) a) Explain in detail tangible and intangible economic losses due to air pollution. **[8]**

b) Explain objectives of using air pollution control equipments. What data is required to be collected before selecting control equipment? **[8]**

OR

Q6) a) Write about management of air pollution in an industry? Explain. **[8]**

b) Write National Ambient Air Quality Standards in tabular form. **[8]**

SECTION - II

Q7) a) What are the principles of industrial waste water treatment? Explain. **[8]**

b) What are the applications in industrial water pollution control? Explain. **[8]**

OR

Q8) a) What are the technologies of industrial water pollution control? Explain any one. **[8]**

b) Write about "waste management in sulphuric acid plant". **[8]**

Q9) a) What are the classifications of solid waste? State the source categories of solid wastes? **[8]**

b) Explain the various methods of disposal of biomedical waste. **[8]**

OR

Q10) a) What is bio medical waste? Discuss the effects of biomedical wastes on human health and environment. **[8]**

b) Discuss suitable methods of collection and disposal of municipal solid waste. **[8]**

Q11) a) What is Environmental Impact Assessment (EIA)? Explain the purpose of EIA. **[9]**

b) Discuss the role of regulatory agencies and control boards in obtaining environmental clearance for project. **[9]**

OR

Q12) a) Explain any one method of Environmental Impact Assessment. **[9]**

b) Explain procedure for public hearing in India. **[9]**

Total No. of Questions : 12]

SEAT No. :

P903

[Total No. of Pages : 4

[4264] - 472

B.E. (Production)

COMPUTER INTEGRATED DESIGN AND MANUFACTURING

(2008 Pattern) (Semester - II)

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

Instructions to the candidates :

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

SECTION - I

Q1) a) Explain with suitable example the following concepts. Specify differences among them. **[6]**

i) Wire frame model.
ii) Surface model.
iii) Solid mode.

b) Write 3 × 3 transformation matrix for the following effects. **[10]**

i) Scale the X direction to be half as large and then rotate anticlockwise by 90º about the origin.
ii) Translate down 0.5 unit, right 0.5 unit and then rotate anticlockwise about origin by 45º.
iii) Rotate anticlockwise about origin by 90º and then scale Y direction by half as large.

OR

Q2) a) Explain the different technique for image generation on CRT. **[6]**

b) Find the concatenated homogeneous matrix (4 × 4 transformation) for the following operations, performed in the following sequence, **[10]**

i) Rotation through 60º about Z axis.
ii) Translation through 15 and – 25 units along X and Y direction respectively.
iii) Rotation about 40º about X axis.

Q3) a) State and explain various types of boundary conditions used in the engineering problems. **[6]**

P.T.O.

b) Figure 1 shows three springs connected in parallel. One end of the assembly is fixed and at the other end force of 700 N is applied. Determine the deflection of individual spring. **[12]**

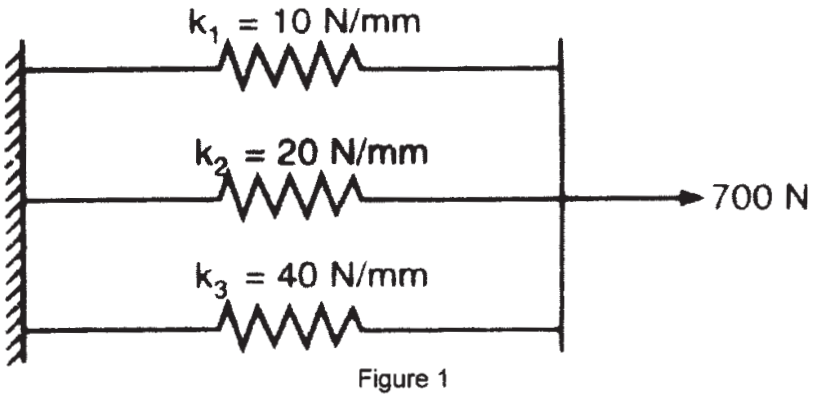


Figure 1

OR

Q4) a) Explain following with sketch related to FEA. **[6]**

i) Member.
ii) Local axis.
iii) Degree of freedom.

b) A stepped bar is as shown in the figure 2 determine the displacement in each of the sections. Given E_1 = 70 GPa and E_2 = 200 GPa. **[12]**

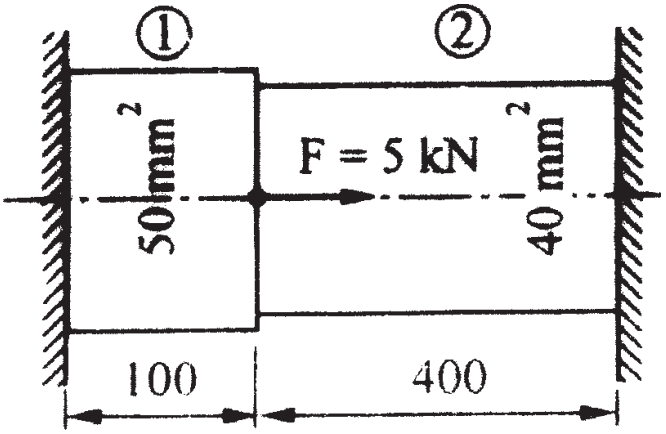


Figure 2

Q5) a) Write short note on Linear and Circular Interpolation in CNC. **[8]**

b) Write a CNC program in G and M codes for drilling the two holes in part as shown in the Figure 3 also write remark for each block. **[8]**

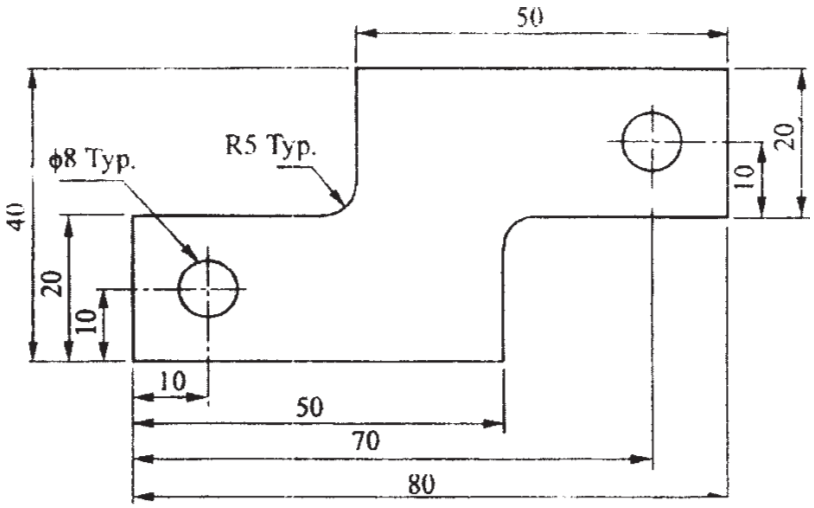


Figure 3

OR

Q6) a) Differentiate between Absolute & Incremental Positioning systems. **[8]**

b) Write a CNC program in G and M codes for milling the slot of 50mm × 100mm for the part shown in the Figure 4 also write remark for each block. **[8]**

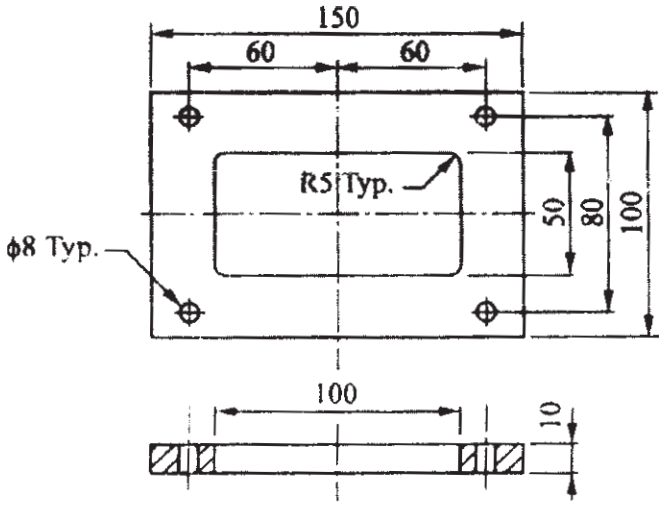


Figure 4

SECTION - II

Q7) a) Discuss MRP I & MRP II in modern manufacturing system with sketch. **[8]**

b) Explain following terms related to Robot technology. **[8]**

i) Work Volume.
ii) Spatial resolution.
iii) Accuracy.
iv) Repeatability.

OR

Q8) a) Explain in brief the following in relation with robot programming. **[8]**

i) Manual method.

ii) Walk through method.

iii) Lead through method.

b) Discuss various difficulties encountered in carrying out concurrent Engineering. **[8]**

Q9) a) Explain opitz part classification and coding system with suitable example. **[8]**

b) Five machines constitute a GT cell. The From/To data for the machines are shown in the table below, using From/To ratio determine the most logical sequence of machines for this data. Construct the network diagram, showing where and how parts enter and exists the cell. Also develop a feasible layout plan for the cell based on the solution. **[10]**

	To				
From	1	2	3	4	5
1	0	10	80	0	0
2	0	0	0	85	0
3	0	0	0	0	0
4	70	0	20	0	0
5	0	75	0	20	0

OR

Q10) a) Explain the neat sketch following system in group technology. **[8]**

i) Single machine cell.

ii) Group machine layout.

iii) Flow line design.

b) Compare the following NC machine system and find out which system is more cost effective. **[10]**

Machine	Production Rate parts/Hr.	Maintenance cost units/month	Arrival Rate Per hour	Inventory cost Unit/part/hr
I	25	140	15	1
II	30	200	20	1

Assume 180 working hours per month

Q11) a) Explain the scope of integration of CIM model of Digital Equipment corporation (DEC). **[8]**

b) What is Rapid Prototyping (RP)? List out different RP techniques. Write advantages of RP. **[8]**

OR

Q12) a) Explain with flow chart the concept of NIST-AMRF hierarchical model. **[8]**

b) What is 3D printing? Explain how product is manufactured from it. **[8]**

Total No. of Questions : 12]

SEAT No. :

P906

[Total No. of Pages : 2

[4264] - 494

B.E. (Production S/W)

INDUSTRIAL RELATIONS & HUMAN RESOURCE MANAGEMENT

(2008 Pattern) (Elective - III) (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 spearate 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

Unit - I

Q1) a) Explain in detail about the impact of globalization and information technology on industrial relations. **[9]**

b) What is trade union? Explain the problems faced by trade union. **[9]**

OR

Q2) a) What is Industrial Relation? Explain scope, objectives of industrial relations. **[9]**

b) Define collective Bargaining. Explain the reasons for its success and failure. **[9]**

Unit - II

Q3) a) Explain role of HR manager and structure of HR department. **[8]**

b) Discuss HR strategies and organizational strategies. **[8]**

OR

Q4) a) Explain Personnel Administration. State its objectives and principles. **[8]**

b) Describe elements of HRD systems. Also discuss their goals, elements. **[8]**

Unit - III

Q5) Write short notes (any two) : **[16]**

a) Objectives of manpower planning.

b) Succession planning.

c) Promotion.

P.T.O.

OR

Q6) Write short notes (any two) : **[16]**

a) Recruitment resources.

b) Reward and compensation strategies.

c) Job rotation.

SECTION - II

Unit - IV

Q7) a) Discuss various methods of training. **[9]**

b) Explain tools & aids used for effective training. **[9]**

OR

Q8) a) Discuss need & objectives of employee training. **[9]**

b) What are major procedures of training? **[9]**

Unit - V

Q9) a) Explain in detail competency Mapping. **[8]**

b) Explain how performance management system can be aligned with business strategies of an organization. **[8]**

OR

Q10) a) Discuss various methods of performance appraisal. **[8]**

b) Explain strategic importance of 360 degrees feedback. **[8]**

Unit - VI

Q11) Write short notes on (any two) : **[16]**

a) Industrial democracy.

b) Golden handshake.

c) Role of HRD in developing IR.

OR

Q12) Write short notes on (any two) : **[16]**

a) Retrenchment and layoff.

b) Employee Morale.

c) Downsizing and project based employment.

☒☒☒☒

Total No. of Questions : 12]

SEAT No. :

P908

[Total No. of Pages : 3

[4264] - 515
B.E. (Electrical)
HIGH VOLTAGE ENGINEERING
(2008 Pattern) (Elective - III) (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) Write short note on following : **[8]**

i) Townsend's first and second ionization coefficient.
ii) Townsend's breakdown criterion.

b) What is Paschen's law? How do you account for the minimum voltage for breakdown under a given p × d condition? **[8]**

OR

Q2) a) Discuss the breakdown of air in non-uniform fields and corona discharges. **[8]**

b) Compare Townsend's Theory and streamer theory of breakdown of gaseous dielectrics. **[8]**

Q3) Explain following breakdown phenomenon of solid insulating materials : **[18]**

a) Electromechanical breakdown.
b) Thermal breakdown.
c) Treeing and tracking phenomenon.

OR

Q4) Explain following breakdown phenomenon of liquid dielectric materials. **[18]**

a) Suspended particle theory.
b) Cavitations and bubble theory.
c) Stressed oil volume theory.

P.T.O.

Q5) a) Explain occurrence of over voltage due to Lightning Phenomenon. **[8]**

b) Explain various reasons for Switching surges. **[8]**

OR

Q6) a) Explain insulation co-ordination with probabilistic analysis. **[8]**

b) Explain use of insulation coordination for selection of protective device for high voltage power system and substation. **[8]**

SECTION - II

Q7) a) Define impulse waveform. What do you mean by a standard impulse waveform? Explain wave front time and wave tail time. **[8]**

b) A 10 stage Cockraft-Walton circuit has all capacitors of 0.06 μF. The secondary voltage of the supply transformer is 100 kV at a frequency of 150 Hz. If the load current is 1mA. Determine : **[8]**

i) Voltage regulation.
ii) The ripple.
iii) The optimum number of stages for maximum output voltage.
iv) The maximum output voltage.

OR

Q8) a) With a neat sketch explain Tesla coil. How high ac voltage of high frequency is generated with it? **[8]**

b) A 100 kVA, 250 V/200kV feed transformer has resistance and reactance of 1% and 5% respectively. This transformer is used to test a cable at 400 kV at 50 Hz. The cable takes a charging current of 0.5 A at 400 kV. Determine the series inductance required. Assume 1% resistance of inductor. Also determine input voltage to the transformer. Neglect dielectric loss of the cable. **[8]**

Q9) a) Explain how sphere gap is used for measurement of high voltage? Explain in detail various factors which affect on measurement. **[12]**

b) A Bakelite sample is tested by Schering Bridge method having a standard of 106μF. The balance was obtained with a capacitance of 0.35μF in parallel with non-inductive resistance of 318Ω. The Non-inductive resistance in the remaining arm of the bridge was 130Ω. Test voltage 20 kV, 50 Hz. Find the capacitance, the p.f. and equivalent series resistance of the specimen. **[6]**

OR

Q10) a) Explain resistance, capacitance and mixed potential dividers with their advantages and disadvantages. **[12]**

b) A generating voltmeter has to be designed so that it can have a range from 30 to 200 kV DC if the indicating meter reads a minimum current of 2 micro ampere what will be maximum current of meter? What should be the capacitances of generating voltmeter be? **[6]**

Q11) Explain any two tests on following : **[16]**

a) Insulators.

b) Bushings.

c) Isolators.

d) Circuit breakers.

OR

Q12) a) Explain various tests conducted on cables. **[8]**

b) Which type and routine tests are conducted on power transformers. Explain any two tests. **[8]**

Total No. of Questions : 12]

SEAT No. :

P909

[Total No. of Pages : 3

[4264] - 535

B.E. (Electronics)

IMAGE PROCESSING AND MACHINE VISION

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

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

Instructions to the candidates :

1) ***Attempt not more than 3 questions of which at least three questions must be from each section.***
2) ***Answers to the two sections should be written in separate books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
6) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) What are the steps in image digitization? Explain image quantization in detail. **[8]**

b) Explain monochrome vision model. **[10]**

OR

Q2) a) Explain one technique for Image Acquisition in detail. **[10]**

b) With the help of block diagram explain the fundamental steps in Digital Image Processing. **[8]**

Q3) a) With the help of example explain 2D spatial correlation and convolution. **[8]**

b) Give the arithmetic operations performed in Image Processing. Give example of each operation. **[8]**

OR

Q4) a) Give the masks for Average filter and Laplacian mask for Sharpening Filter. Compute the value of the pixel F (3, 3) if it is smoothened by 3×3 average filter. **[8]**

$$F(m,n)=\begin{vmatrix} 0 & 1 & 2 & 3 & 2 \\ 5 & 6 & 7 & 8 & 4 \\ 4 & 3 & 2 & 1 & 2 \\ 8 & 7 & 6 & 5 & 3 \\ 1 & 5 & 3 & 7 & 8 \end{vmatrix}$$

P.T.O.

b) What are order statistic filters? Explain with example. **[8]**

Q5) a) What is Freeman chain code? What is the application of first difference of the chain code. For the given chain code draw the boundary and also find the first difference. **[8]**

Code = 0 0 0 0 6 0 6 6 6 6 4 4 4 4 2 4 2 2 2 2

b) Discuss Hough transform with algorithm and its application. **[8]**

OR

Q6) a) Explain Median Axis Transformation (MAT) Algorithm. **[8]**

b) Compare Region Growing & Region Splitting and Merging algorithms. **[8]**

SECTION - II

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

i) Coding Redundancy.
ii) Interpixel redundancy.
iii) Fidelity Criteria.

b) With the help of block diagram explain Transform Coding System. Explain the terms forward and Inverse Transformation kernels. **[10]**

OR

Q8) a) Explain JPEG standard in detail. **[10]**

b) Find the set of codewords and average word length using Huffman coding scheme for a set of gray levels with probabilities given below : **[8]**

Input	G1	G2	G3	G4	G5	G6	G7	G8
Probability	0.03	0.1	0.02	0.1	0.05	0.15	0.25	0.3

Q9) a) Give the algorithm for 4-neighborhood and 8-neighborhood region identification. What is Label Collision? **[8]**

b) What are different descriptors for geometric border representation? **[8]**

OR

Q10) a) Define : **[8]**

i) Eulers's number.
ii) Projection.
iii) Eccentricity.
iv) Elongatedness.

b) What are moments? Where are they used? **[8]**

Q11) a) Discuss the use of graph theory in pattern Recognition. **[8]**

b) What is Iso-morphism? Describe its classes? **[8]**

OR

Q12) a) Explain : **[8]**

i) Foreshortening.

ii) Vanishing points in 3-D vision.

b) Explain how scene can be reconstructed from multiple views. **[8]**

Total No. of Questions : 12]

SEAT No. :

P911

[Total No. of Pages : 2

[4264] - 617

B.E. (Chemical Engineering)

ENERGY CONSERVATION IN CHEMICAL PROCESS INDUSTRIES

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

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

Instructions to the candidates :

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

SECTION - I

Q1) a) What is energy conservation and state its importance? **[6]**

b) Explain the duties of accredited energy auditor in industry. **[6]**

c) Explain the role of energy manager in the process industries. **[6]**

OR

Q2) Define the following terms with the examples of each : **[18]**

a) Primary and Secondary energy.

b) Commercial and Non-Commercial Energy.

c) Renewable and Nonrenewable energy.

Q3) a) What is co-generation? Explain the importance of co-generation in sugar industries? **[10]**

b) Enlist the parameters considered for the selection of optimum insulation thickness. **[6]**

OR

Q4) a) Discuss the functions of steam straps in steam line. **[6]**

b) Define the term energy audit? Explain briefly the difference between preliminary and detailed audit? **[10]**

Q5) a) State the advantages of air preheating in combustion process? **[8]**

b) Explain the improvements needed to reduce the available energy losses for fractionation process? **[8]**

P.T.O.

OR

Q6) a) Explain the procedure of thermodynamic analysis of any process equipment? **[8]**

b) Enlist the ideas for furnace efficiency improvement? **[8]**

SECTION - II

Q7) a) Explain the concept of process synthesis. What are the guidelines and recommendations for the improving the process conditions? **[10]**

b) Enlist the checklist for the energy conservation items in heat exchangers? **[8]**

OR

Q8) Explain the energy performance assessment of heat exchanger and discuss the steps involved in pinch analysis. **[18]**

Q9) a) What do you mean by energy audits and energy monitoring? Explain in brief. **[8]**

b) State the importance of energy conservation in mixing. **[8]**

OR

Q10) a) Explain the importance of good house keeping in a industry as a measure of energy conservation. Explain in detail. **[8]**

b) Explain the role of energy manager in a industry. **[8]**

Q11) a) State the four levels that deals with energy conservation in the design of complete processes? **[8]**

b) Explain waste heat utilization in process industries? **[8]**

OR

Q12) Write short notes on (any two) : **[16]**

a) Future energy savings.

b) Fluidized bed combustion.

c) Thermodynamic aspects of separation processes.

d) Process design for energy conservations.

Total No. of Questions : 8]

SEAT No. :

P913

[Total No. of Pages : 4

[4264] - 631
B.E. (Petroleum Engineering)
RESERVOIR ENGINEERING - II
(2008 Pattern)

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

Instructions to candidates :

1) ***Answer to the two sections must be written in separate answer books.***
2) ***Questions No. 2 (two) and 8 (eight) are compulsory.***
3) ***Figures to the right indicate full marks.***
4) ***Answer 3 questions from Section-I and 3 questions from Section-II.***
5) ***Neat diagrams should be drawn wherever necessary.***
6) ***Use of a non-programmable calculator, log-log, and semi-log paper is allowed.***
7) ***Assume suitable data if necessary.***

SECTION - I

Q1) a) Derive the continuity equation for a single phase fluid flowing through a one dimensional porous media. **[6]**

b) Write down the diffusivity equation, along with all types of initial, inner boundary and outer boundary conditions available for solving it. **[10]**

Q2) Following data is given : **[18]**

$q = 30$ stb/d

$h = 140$ ft

$B = 1.47$ RB/STB

$k = 0.2$ md

$c_t = 1.4 \times 10^{-5}$ psi^{-1}

$\mu = 0.72$ cp

$r_w = 0.5$ ft

$P_i = 3100$ psi

porosity = 20%

$r_e = 2800$ ft

Calculate the reservoir pressure at the radius of 1ft, 5ft, 10ft and 50ft after 3 hours of oil production.

P.T.O.

Q3) a) Explain the concept of Superposition in time, with appropriate figures. **[4]**

b) What are the different types of flow regimes that you see in a typical well test interpretation curve? Explain them with appropriate figures. **[4]**

c) A new oil well produced 400 stb/day for 2± days; then it was shut-in for a pressure buildup test, during which the data in Table below were recorded. The other data were : B_o = 1.25rb/stb, h = 20 ft, phi = 0.20, r_w = 0.29 ft, ct = 19.5 × 10^– 6, and viscosity = 1.1 cP. From these data, estimate the formation permeability, k, pi, ans skin factor s. Use the Semi-Log graph. **[8]**

Shut-in time, Del-t (hr)	**(tp + Del-t)/Del-t**	p_{ws} **(psia)**
0	-	1165
2	37.0	1801
4	19.0	1838
8	10.0	1865
16	5.5	1891
24	4.0	1905
48	2.5	1925

Q4) a) What do you mean by DST? How is it different from a PBU and DD test? **[6]**

b) Explain the various flow periods of a DST, along with appropriate figures. **[10]**

SECTION - II

Q5) a) What is pseudo pressure? **[16]**

b) Explain Isochronal and Modified Isochronal Well test.

Q6) Explain flow regimes in horizontal well test. **[16]**

Q7) Explain Type curves for Decline curves. **[16]**

Q8) Define and explain the pressure derivative plot. Draw and explain the diagnostic plot giving five examples. **[18]**

Formulas for the exam

For E (i) function values, refer to the table given with the examination paper

$$p = p_i + 70.6\frac{qB\mu}{kh}\text{Ei}\left(-\frac{948\phi\mu c_t r^2}{kt}\right)$$

$$t_D = \frac{0.000264kt}{\phi\mu_o c_t r_w^2}$$

$$p_{ws} = p_i - \frac{162.6\, q_o\, \mu_o\, \beta_o}{kh}\log\left[\frac{t_p + \Delta t}{\Delta t}\right]$$

$$p_D = -\frac{1}{2}Ei\left(-\frac{r_D^2}{4t_D}\right)$$

$$s = 1.151\left[\frac{p_{1\,hr} - p_{ws(\Delta t=0)}}{m} - \log\left(\frac{k}{\phi\mu_o c_t r_w^2}\right) + 3.23\right]$$

$$p_{wf} = p_i - \frac{162.6 q_o \mu_o \beta_o}{kh}\left[\log t + \log\left(\frac{k}{\phi\mu_o c_t r_w^2}\right) - 3.23 + 0.869s\right]$$

$$p = p_i + 70.6\frac{qB\mu}{kh}\left[\ln\left(\frac{1,688\phi\mu c_t r^2}{kt}\right)\right]$$

$$\frac{(3.975 \times 10^5)\phi\mu c_t r_w^2}{k} < t < \frac{948\phi\mu c_t r_e^2}{k}$$

$$p_{1h} = p_i + m\left[\log\left(\frac{k}{\phi\mu_o\beta_o c_t r_w^2}\right) - 3.23 + 0.869s\right]$$

$$p(r,t) = LS(r,t) = p_i - \frac{70.6\, Q\, \mu}{k\, h}\left[-E_i\left(-\frac{948.1\,\Phi\,\mu\, c_t\, r^2}{k\, t}\right)\right]$$

$$k = \frac{162.6\, q_o\, \mu_o\, \beta_o}{mh}$$

TABLE 1.1—VALUES OF THE EXPONENTIAL INTEGRAL, $-Ei(-x)$

$-Ei(-x)$, $0.000 < x < 0.209$, interval $= 0.001$

x	0	1	2	3	4	5	6	7	8	9
0.00	$+\infty$	6.332	5.639	5.235	4.948	4.726	4.545	4.392	4.259	4.142
0.01	4.038	3.944	3.858	3.779	3.705	3.637	3.574	3.514	3.458	3.405
0.02	3.355	3.307	3.261	3.218	3.176	3.137	3.098	3.062	3.026	2.992
0.03	2.959	2.927	2.897	2.867	2.838	2.810	2.783	2.756	2.731	2.706
0.04	2.681	2.658	2.634	2.612	2.590	2.568	2.547	2.527	2.507	2.487
0.05	2.468	2.449	2.431	2.413	2.395	2.377	2.360	2.344	2.327	2.311
0.06	2.295	2.279	2.264	2.249	2.235	2.220	2.206	2.192	2.178	2.164
0.07	2.151	2.138	2.125	2.112	2.099	2.087	2.074	2.062	2.050	2.039
0.08	2.027	2.015	2.004	1.993	1.982	1.971	1.960	1.950	1.939	1.929
0.09	1.919	1.909	1.899	1.889	1.879	1.869	1.860	1.850	1.841	1.832
0.10	1.823	1.814	1.805	1.796	1.788	1.779	1.770	1.762	1.754	1.745
0.11	1.737	1.729	1.721	1.713	1.705	1.697	1.689	1.682	1.674	1.667
0.12	1.660	1.652	1.645	1.638	1.631	1.623	1.616	1.609	1.603	1.596
0.13	1.589	1.582	1.576	1.569	1.562	1.556	1.549	1.543	1.537	1.530
0.14	1.524	1.518	1.512	1.506	1.500	1.494	1.488	1.482	1.476	1.470
0.15	1.464	1.459	1.453	1.447	1.442	1.436	1.431	1.425	1.420	1.415
0.16	1.409	1.404	1.399	1.393	1.388	1.383	1.378	1.373	1.368	1.363
0.17	1.358	1.353	1.348	1.343	1.338	1.333	1.329	1.324	1.319	1.314
0.18	1.310	1.305	1.301	1.296	1.291	1.287	1.282	1.278	1.274	1.269
0.19	1.265	1.261	1.256	1.252	1.248	1.243	1.239	1.235	1.231	1.227
0.20	1.223	1.219	1.215	1.210	1.206	1.202	1.198	1.195	1.191	1.187

$-Ei(-x)$, $0.00 < x < 2.09$, interval $= 0.01$

x	0	1	2	3	4	5	6	7	8	9
0.0	$+\infty$	4.038	3.335	2.959	2.681	2.468	2.295	2.151	2.027	1.919
0.1	1.823	1.737	1.660	1.589	1.524	1.464	1.409	1.358	1.309	1.265
0.2	1.223	1.183	1.145	1.110	1.076	1.044	1.014	0.985	0.957	0.931
0.3	0.906	0.882	0.858	0.836	0.815	0.794	0.774	0.755	0.737	0.719
0.4	0.702	0.686	0.670	0.655	0.640	0.625	0.611	0.598	0.585	0.572
0.5	0.560	0.548	0.536	0.525	0.514	0.503	0.493	0.483	0.473	0.464
0.6	0.454	0.445	0.437	0.428	0.420	0.412	0.404	0.396	0.388	0.381
0.7	0.374	0.367	0.360	0.353	0.347	0.340	0.334	0.328	0.322	0.316
0.8	0.311	0.305	0.300	0.295	0.289	0.284	0.279	0.274	0.269	0.265
0.9	0.260	0.256	0.251	0.247	0.243	0.239	0.235	0.231	0.227	0.223
1.0	0.219	0.216	0.212	0.209	0.205	0.202	0.198	0.195	0.192	0.189
1.1	0.186	0.183	0.180	0.177	0.174	0.172	0.169	0.166	0.164	0.161
1.2	0.158	0.156	0.153	0.151	0.149	0.146	0.144	0.142	0.140	0.138
1.3	0.135	0.133	0.131	0.129	0.127	0.125	0.124	0.122	0.120	0.118
1.4	0.116	0.114	0.113	0.111	0.109	0.108	0.106	0.105	0.103	0.102
1.5	0.100	0.0985	0.0971	0.0957	0.0943	0.0929	0.0915	0.0902	0.0889	0.0876
1.6	0.0863	0.0851	0.0838	0.0826	0.0814	0.0802	0.0791	0.0780	0.0768	0.0757
1.7	0.0747	0.0736	0.0725	0.0715	0.0705	0.0695	0.0685	0.0675	0.0666	0.0656
1.8	0.0647	0.0638	0.0629	0.0620	0.0612	0.0603	0.0595	0.0586	0.0578	0.0570
1.9	0.0562	0.0554	0.0548	0.0539	0.0531	0.0524	0.0517	0.0510	0.0503	0.0496
2.0	0.0489	0.0482	0.0476	0.0469	0.0463	0.0456	0.0450	0.0444	0.0438	0.0432

$-Ei(-x)$, $2.0 < x < 10.9$, interval $= 0.1$

x	0	1	2	3	4	5	6	7	8	9
2	4.89×10^{-2}	4.26×10^{-2}	3.72×10^{-2}	3.25×10^{-2}	2.84×10^{-2}	2.49×10^{-2}	2.19×10^{-2}	1.92×10^{-2}	1.69×10^{-2}	1.48×10^{-2}
3	1.30×10^{-2}	1.15×10^{-2}	1.01×10^{-2}	8.94×10^{-3}	7.89×10^{-3}	6.87×10^{-3}	6.16×10^{-3}	5.45×10^{-3}	4.82×10^{-3}	4.27×10^{-3}
4	3.78×10^{-3}	3.35×10^{-3}	2.97×10^{-3}	2.64×10^{-3}	2.34×10^{-3}	2.07×10^{-3}	1.84×10^{-3}	1.64×10^{-3}	1.45×10^{-3}	1.29×10^{-3}
5	1.15×10^{-3}	1.02×10^{-3}	9.08×10^{-4}	8.09×10^{-4}	7.19×10^{-4}	6.41×10^{-4}	5.71×10^{-4}	5.09×10^{-4}	4.53×10^{-4}	4.04×10^{-4}
6	3.60×10^{-4}	3.21×10^{-4}	2.86×10^{-4}	2.55×10^{-4}	2.28×10^{-4}	2.03×10^{-4}	1.82×10^{-4}	1.62×10^{-4}	1.45×10^{-4}	1.29×10^{-4}
7	1.15×10^{-4}	1.03×10^{-4}	9.22×10^{-5}	8.24×10^{-5}	7.36×10^{-5}	6.58×10^{-5}	5.89×10^{-5}	5.26×10^{-5}	4.71×10^{-5}	4.21×10^{-5}
8	3.77×10^{-5}	3.37×10^{-5}	3.02×10^{-5}	2.70×10^{-5}	2.42×10^{-5}	2.16×10^{-5}	1.94×10^{-5}	1.73×10^{-5}	1.55×10^{-5}	1.39×10^{-5}
9	1.24×10^{-5}	1.11×10^{-5}	9.99×10^{-6}	8.95×10^{-6}	8.02×10^{-6}	7.18×10^{-6}	6.44×10^{-6}	5.77×10^{-6}	5.17×10^{-6}	4.64×10^{-6}
10	4.15×10^{-6}	3.73×10^{-6}	3.34×10^{-6}	3.00×10^{-6}	2.68×10^{-6}	2.41×10^{-6}	2.16×10^{-6}	1.94×10^{-6}	1.74×10^{-6}	1.56×10^{-6}

Total No. of Questions : 12]

SEAT No. :

P916

[Total No. of Pages : 3

[4264] - 671
B.E. (Polymer Engg.)
POLYMER COMPOUNDING
(2008 Pattern) (Semester - I)

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

Instructions to the candidates :

1) ***Answer question number 1 or 2, 3 or 4, 5 or 6 from Section-I. Answer question number 7 or 8, 9 or 10 and 11 or 12 from Section-II.***
2) ***Answers to the two sections should be written in separate answer books.***
3) ***Figures to the right indicate full marks.***
4) ***Draw neat sketches wherever required.***
5) ***Use of calculator, graph paper is allowed.***
6) ***Assume suitable data if required.***

SECTION - I

Q1) a) Explain the term scale of scrutiny and its importance in mixing. **[5]**

b) Explain the following terms used in understanding kinetics of mixing : **[6]**

i) Molecular diffusion.
ii) Eddy diffusion.
iii) Bulk diffusion.

c) Explain mixing action in double cone blenders with neat figures. **[5]**

OR

Q2) a) Explain the mixing action in a eccentrically rotating drum tumbler blender. **[5]**

b) Explain with example mechanism of liquid/liquid mixing in polymers. **[6]**

c) Write a short note on paddle mixer. **[5]**

Q3) a) Explain in detail the role of compatibilizer in polymer blending and explain any one method of compatibilization. **[8]**

b) Discuss in details the mechanism and theory of surface modification of fillers. **[8]**

OR

Q4) a) Discuss characteristics of polymer blends, polymer formulations and filled polymers. **[8]**

b) Discuss the terms polymer blends, polymer alloys, compatible blends, miscible blends, immiscible blends with one example. **[8]**

P.T.O.

Q5) a) Write a note on photo-degradants used in polymer to prevent degradation due to exposure to light. **[9]**

b) Explain the action of plasticizers, softeners and flow promoters with suitable examples. **[9]**

OR

Q6) a) Indicate the mechanism of working of antioxidant and anti-ozonants. **[8]**

b) Write a note on particulate fillers used in polymer compounds. **[5]**

c) Explain the mechanism of working of UV stabilizers. **[5]**

SECTION - II

Q7) a) Write a note on selection of optimum configuration of modular elements for compounding of high aspect ratio fillers. **[6]**

b) Explain how chemical modification of existing polymer can be carried out using reactive extrusion process with a relevant example. **[6]**

c) Write down the formulations for PVC compounds used for flooring. Explain the significance of each ingredient. **[6]**

OR

Q8) a) Mention the advantages and disadvantages of reactive extrusion. **[6]**

b) Explain the various modular elements used in compounding of colorants in a twin screw extruder. **[6]**

c) Write a note on compounding of polychloroprene and synthetic polyisoprene. **[6]**

Q9) a) Explain important characteristics of distributive mixing sections. **[4]**

b) Explain in details the requirements of a good mixing section. **[6]**

c) Explain the mixing process in a "University of Twente" mixing ring with a neat figure. **[6]**

OR

Q10) a) Write a note on planetary gear extruders. **[8]**

b) Explain cross channel barrier - EVK and straight cross channel barrier (SCCB) dispersive mixing sections. **[8]**

Q11) a) Explain the terms conjugated and non-conjugated twin screw extruders. Compare them with respect to their mixing action and conveying characteristics. **[8]**

b) Explain the working of a two roll mill. Explain how dispersive and distributive mixing achieved in a two roll mill? **[8]**

OR

Q12) a) Explain with neat sketches, working principle of kneading blocks used in Twin screw extruders. **[8]**

b) Draw comparison between co-rotating and counter Twin screw extruder (TSE) with respect to propulsive action and mixing. **[8]**

Total No. of Questions : 12]

SEAT No. :

P917

[Total No. of Pages : 3

[4264] - 691
B.E. (Computer Engg.)
DESIGN AND ANALYSIS OF ALGORITHMS
(2008 Pattern) (Sem. - I)

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

Instructions to the candidates :

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

SECTION - I

Q1) a) What is divide and conquer strategy? Explain an algorithm for quick sort. State its time complexity. **[10]**

b) Define the following : **[6]**

i) Big "oh".
ii) Theta.
iii) Omega.

c) What is the difference between Prim's and Kruscal's technique for minimum spanning tree. **[2]**

OR

Q2) a) Solve the following job sequencing problem (maximizing the profit by completing jobs before their deadlines) using greedy algorithm.

N (Number of jobs) = 4

Profits associated with jobs $(P_1, P_2, P_3, P_4) = (100, 10, 15, 27)$. Deadlines associated with jobs $(d_1, d_2, d_3, d_4) = (2, 1, 2, 1)$. **[8]**

b) Explain the different ways of measuring the running time of an algorithm. **[6]**

c) Prove by contradiction that

"There exist two irrational numbers x and y such that x^y is rational. **[4]**

P.T.O.

Q3) a) Find a minimum-cost path from s to t in the multistage graph of Fig.1. Do this using the forward approach. **[8]**

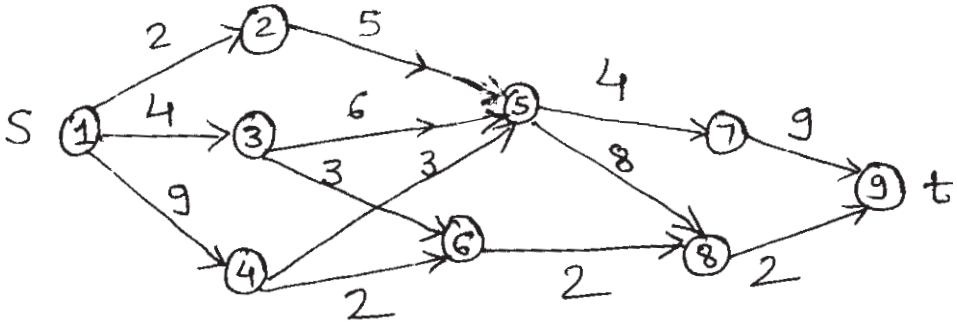


Fig. 1.

b) With respect to dynamic programming, explain in brief the following : **[8]**

i) Optimal Substructure.

ii) Overlapping Subproblem.

OR

Q4) a) Find the optimal binary search tree for the key and probabilities given below : **[8]**

Key	A	B	C	D
Probability	0.1	0.2	0.4	0.3

b) What is the flow shop scheduling problem? Explain how the principle of optimality holds for this problem. **[8]**

Q5) a) Write an algorithm to solve 8-Queens problem using backtracking method. **[8]**

b) Write a note on branch and bound method. **[8]**

OR

Q6) a) Compare the back tracking method with a depth first search technique. How is Hamiltonian cycle problem solved using back tracking. **[8]**

b) Solve 0/1 Knapsack problem using branch and bound method with an example. **[8]**

SECTION - II

Q7) a) State and explain Cook's theorem. **[8]**

b) Differentiate between deterministic and non deterministic algorithms. **[4]**

c) Prove that

(Nf - satisfiability α clique decision problem.)

(α : reduces to) **[6]**

OR

Q8) a) Define P, NP, NP-Hard and NP-Complete. Establish the relationship among them. **[10]**

b) Prove that **[8]**

Partition α minimum finish time preemptive job shop schedule ($m > 1$) [Where m = No. of processors].

Q9) a) Solve pointer doubling problem using parallel technique. **[8]**

b) Draw the expression **[8]**

7 * (4 + (64 / (10 – (3 * (13 – (6 + 5))))))

as an expression tree with the leaves numbered from left to right, and illustrate the operation of the parallel evaluation algorithm on this tree.

OR

Q10) a) Explain parallel computational models. **[8]**

b) Explain the odd-even merge technique for efficient parallelization of merging. **[8]**

Q11) a) Explain the sequential and parallel technique for solving the convex hull problem. **[8]**

b) Explain a deadlock detection and avoidance algorithm. Discuss the algorithmic strategy used. **[8]**

OR

Q12) a) Evaluate all options for implementing Huffman's problem. **[8]**

b) What is meant by heuristic algorithms? Discuss any one heuristic search algorithm. **[8]**

Total No. of Questions : 12]

SEAT No. :

P918

[Total No. of Pages : 3

[4264] - 703
B.E. (Computer Engineering)
DISTRIBUTED OPERATING SYSTEMS
(2008 Pattern) (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) What are the different elements involved in implementation of RPC mechanism? Explain role of each in RPC mechanism. **[6]**

b) Compare between multiprocessor operating system, Multicomputer operating system, network operating system and distributed operating system. **[10]**

OR

Q2) a) Why distributed operating systems more difficult to design than the operating system for centralized time sharing system? **[6]**

b) Explain the following with respect to distributed operating system. **[10]**

i) Message passing in RPC.
ii) Stub and skeleton in RMI.
iii) Buffering.
iv) Group communication.

Q3) a) Explain the following with respect to synchronization in distributed operating system. **[10]**

i) Clock skew.
ii) Drift rate.
iii) Causual ordering.
iv) Partial ordering.

b) Explain the vector clock in detail with implementation rules. **[6]**

OR

P.T.O.

Q4) a) Compare the following : **[10]**

i) Physical clock.
ii) Logical clock.
iii) Vector clock

in distributed operating system.

b) Why election algorithm is required in distributed operating system? Explain it with any one election algorithm. **[6]**

Q5) a) What is the basic difference between token based and non-token based algorithm for mutual exclusion? Explain any one algorithm from each category. **[12]**

b) What happen in the following approaches in distributed deadlock detection algorithms. **[6]**

i) Centralized Approach.
ii) Distributed Approach.
iii) Hierarchical Approach.

OR

Q6) a) What are the different issues in Deadlock detection and Resolution? How Ho-Ramamoorthy algorithm is used in deadlock detection and resolution. **[12]**

b) What is byzantine failure? Explain byzantine generals problems with possible solution. **[6]**

SECTION - II

Q7) a) Write short note on : **[12]**

i) Log structure file system.
ii) Google file system.

b) Discuss whether message passing or DSM is preferable for fault tolerant application. **[6]**

OR

Q8) a) Explain any distributed file system with respect to following : **[12]**

i) Architecture.
ii) Mechanism for building DFS.
iii) Design Issues.
iv) Performance.
v) Security.

b) What is granularity and page replacement in distributed shared memory. **[6]**

Q9) a) How the recovery mechanism achieved in distributed Operating System using rollback and shadow paging? Explain with suitable example. **[10]**

b) What is checkpoints? How does it help in recovery mechanism? **[6]**

OR

Q10) a) What is the voting protocol for fault tolerant system? Explain any 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. **[8]**

b) What is service oriented architecture? How web services used in service oriented architecture? How does it different than component based development architecture? **[8]**

OR

Q12) Explain the Grid with respect to the following : **[16]**

a) Middleware architecture of Grid.

b) Working of Grid.

c) Types of Grid.

d) Application of Grid.

Total No. of Questions : 12]

SEAT No. :

P919

[Total No. of Pages : 4

[4264] - 707
B.E. (Computer Engg.)
ADVANCED DATABASES
(2008 Pattern) (Elective - III) (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) Explain how the following operations can be parallelized using data partitioning. **[9]**

i) Scanning.
ii) Sorting.
iii) Join.

b) Explain any two parallel database architecture. **[6]**

c) Define Attribute - value skew, partition skew in parallel Databases. **[3]**

OR

Q2) a) What form of Parallelism (interquery, intraquery, intraoperation) is likely to be the most important for each of the following task. **[6]**

i) Increasing the throughput of a system with many small queries.
ii) Increasing the throughput of a system with a few large queries, when the number of disks and processors is large.

b) Describe and differentiate between following partitioning technique with examples. **[9]**

i) Round robin.
ii) Hash Partitioning.
iii) Range Partitioning.

c) Define pipeline parallelism. **[3]**

P.T.O.

Q3) a) Explain the following with respect to robustness of distributed databases. **[9]**

i) Read one write all available protocol.
ii) Coordinator Selection.
iii) Majority based approach.

b) What is the need of Directory access protocol. **[3]**

c) Explain "data transparency" with respect to Distributed Database. **[4]**

OR

Q4) a) Explain data fragmentation in distributed databases. **[6]**

b) Explain following w.r.to distributed database. **[8]**

i) Availability.
ii) Deadlock Handling.

c) What is heterogeneous distributed database. **[2]**

Q5) a) Explain : **[9]**

i) XML DTD.
ii) XML Schema.
iii) XQuery.

b) What is Web server, Application server, Mail server. **[3]**

c) What is the difference between Valid XML and well parenthesized XML. **[4]**

OR

Q6) a) Explain : **[9]**

i) Application of XML.
ii) SOAP.
iii) Difference between XML and HTML.

b) What is three tier architecture? Explain its advantages. **[7]**

SECTION - II

Q7) a) Why Data Preprocessing is required? Explain phases of Data Preprocessing. **[10]**

b) Explain : **[8]**

i) OLAP operations.
ii) OLAP server.
iii) OLTP.
iv) Data cube.

OR

Q8) a) Suppose that a data warehouse consists of three dimensions - time doctor and patient and two measures - count and charge. Charge is the fee that doctor charges a patient for a visit. **[6]**

i) Draw a star schema for the data warehouse.

ii) Starting with the base cuboid (day, doctor, patient). What specific OLAP operation should be performed in order to list the total fee collected by each doctor in 2000?

b) Differentiate between OLAP systems and OLTP systems. **[6]**

c) State and explain data transformation and reduction techniques. **[6]**

Q9) a) What is association rule mining? **[8]**

A Database has four transactions. Let min-sup = 60% and min-conf = 80%.

TID	date	items-bought
T100	10/15/99	{K, A, D, B}
T200	10/15/99	{D, A, C, E, B}
T300	10/19/99	{C, A, B, E}
T400	10/12/99	{B, A, D}

i) List all frequent itemset using Apriori.

ii) List all strong association rules (with support s and confidence c) matching the following meta rule, where X is the variable representing customers, and item denotes variable representing items (e.g "A", "B", etc) x ϵ transaction, buys (X, item 1).

buys (X, item 2) => buys (X, item 3) [s, c].

b) What is clustering? Explain k-mean algorithm with example for clustering. **[8]**

OR

Q10) a) Explain : **[9]**

i) Descriptive data mining.

ii) Predictive data mining.

iii) Outlier analysis.

b) Explain decision tree ID3 algorithm by using suitable example. **[7]**

Q11) a) Define information retrieval system. Describe how it is different from database system. **[6]**

b) Explain vector space model. **[6]**

c) What is page ranking and popularity ranking? **[4]**

OR

Q12) a) Write short note on : **[12]**

i) Precision and recall.
ii) Web crawler.
iii) Inverted index.
iv) Directory.

b) What is TF-IDF method of ranking? Explain in brief. **[4]**

Total No. of Questions : 12]

SEAT No. :

P920

[Total No. of Pages : 2

[4264] - 722
B.E. (I.T.)
INFORMATION RETRIEVAL
(2008 Pattern) (Sem. - 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, in necessary.***

SECTION - I

Q1) a) Give difference between data retrieval and information retrieval. **[8]**

b) Enlist the algorithms used for clustering and explain single pass algorithm. **[10]**

OR

Q2) a) Explain Luhn's idea of index term weighting. **[8]**

b) Explain Rochhio's algorithm and what are dendograms? Explain in detail. **[10]**

Q3) a) Explain Boolean model in detail. **[8]**

b) Explain signature file with example. **[8]**

OR

Q4) a) Explain Boolean search in detail. What do you mean by co-ordination level? Explain with example. **[8]**

b) Explain ring structure. Discuss its advantages and disadvantages. **[8]**

Q5) a) Discuss prototypes, projects and interface standards with respect to Digital Libraries. **[8]**

b) Discuss retrieval performance evaluation. **[8]**

OR

Q6) a) What are Digital Libraries? **[6]**

b) Write short notes on : **[10]**

i) Online IR system.

ii) User Oriented Measure.

P.T.O.

SECTION - II

Q7) a) Explain Ontology life cycle with suitable diagram. **[9]**

b) How are queries processed in distributed IR? **[9]**

OR

Q8) a) Compare parallel and distributed IR. **[9]**

b) What is domain specific ontology? How do you create it? **[9]**

Q9) a) Explain generic multimedia index approach. **[8]**

b) Discuss techniques to represent audio and visual documents. **[8]**

OR

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

a) Automatic feature extraction.

b) 2-D color images.

Q11) a) Write a note on web data mining. **[8]**

b) What are Mata searchers? Explain with suitable example. **[8]**

OR

Q12) a) How do you characterize the web? **[8]**

b) What are Meta Crawlers? Explain with suitable example. **[8]**

Total No. of Questions : 12]

SEAT No. :

P921

[Total No. of Pages : 4

[4264] - 731
B.E. (Biotechnology)
BIOSEPARATION - II
(2008 Pattern) (Semester - I)

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

Instructions to the candidates :

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

SECTION - I

Q1) What are process design criteria for low volume high value products. Explain process development of any one product of same category. **[16]**

OR

Q2) a) What are four stages of downstream processing? Elaborate on each stage in detail. **[8]**

b) A process for isolation an antibody against insulin has, as a unit operation, the reaction of the antibody with the antigen in a continuous stirred tank reactor. The reaction product is a precipitate that is continuously removed from the reactor with 10% of the solution, which is mouse serum. Since insulin is an expensive reagent, only stoichiometric amounts can be added to the mouse serum, which contains 8 mg/liter of anti-insulin. If this particular monoclonal antibody precipitates with its antigen in a l : l ratio, how many milligrams of insulin must be added to the reactor per hour to process 100mL of mouse serum per hour? (Assume that equilibrium is achieved in this reactor). Sketch a flowchart of this process. **[8]**

Q3) What is basic principle of spectroscopy? Describe quantitative spectrophotometric analysis with its instrumentation and applications. **[16]**

OR

Q4) Explain Spectroflurometry with the help of following points : **[16]**

a) Fluorescence and Phosphorescence.

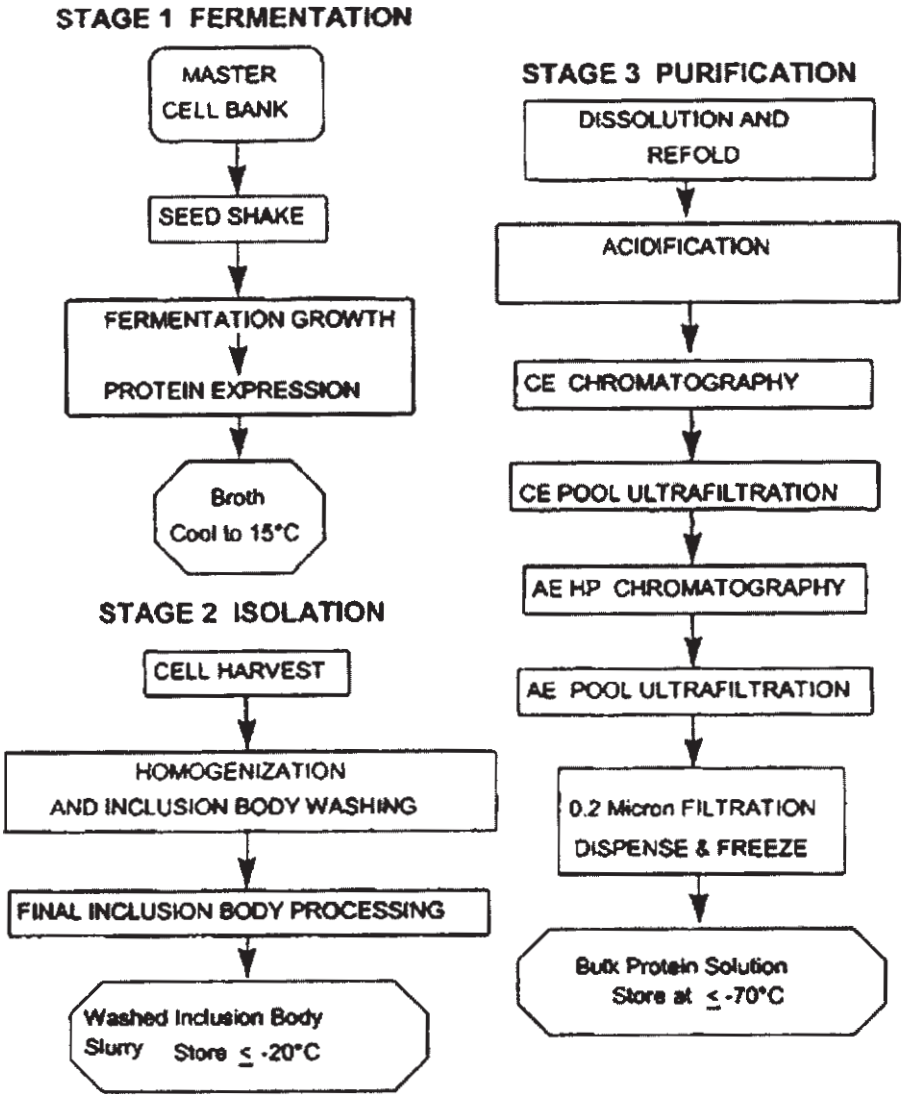
b) Instrumentation.

c) Application.

P.T.O.

Q5) a) Explain different methods of designing affinity media using pre-activated matrices. **[9]**

b) Overall process flow chart of process development of chromatography steps for purification of a recombinant *E. coli* expressed protein is given here. The protein of interest is a dual agonist of both the granulocyte colony stimulating factor (G-CSF) and fetal liver tyrosine kinase 3 (flt-3) receptors. It is under development as a component of cancer vaccine protocols to stimulate dendritic cell proliferation. The objective of this work was to develop a robust and efficient purification process that would generate material of adequate purity and quantity. Try to explain each step of flow sheet with its importance and mechanism. Elaborate the significance of each and every step for the purification of recombinant protein mentioned here. **[9]**



CE - Cation Exchange Column, AE - Anion Exchange Column,

OR

Q6) a) Read the following case example of purification of chitinases and chitosanases and as per your knowledge write a flow sheet of purification techniques (Specifically type of chromatography) used for the isolation of these two enzymes.

"Acidic chitinases (EC 3.2.1.14) were isolated and characterized from 4-week - old nonembryogenic Citrus sinensis L.Osbeck cv 'Valencia' callus tissue. Eleven isoforms were isolated with molecular weights between 26,000 and 37,400. Eight of the isoforms were purified to homogeneity, and all but one cross-reacted with a polyclonal antibody raised against a basic class I potato leaf chitinase. The isoelectric points were from pH 4.5 to 5.4. All hydrolases degraded chitin and four were capable of hydrolyzing solubilized shrimp shell chitosan suggesting they may be chitosanases (EC 3.2.1.99). Apparent chitosanase activity generally decreased with decreasing acetylation of the chitosan (i.e. from 20% To 0% acetylation). The chitinases and chitosanases are predominantly endochitinases. Chitosanase activity was optimal at pH 5 while pH optimum for chitinase activity ranged between pH 3.5 and 5.5. Basic and acidic forms of chitinase and chitosanase were separated from each other". **[6]**

b) Write theory of 'Reversed Phase Chromatography'. Describe RPC with following points. **[12]**

i) Matrix.

ii) Ligand.

SECTION - II

Q7) a) Explain quantitative Gas chromatographic analysis methods in detail.**[6]**

b) Describe chromatographic process along with five factors contributing to molecular spreading in liquid chromatography. **[10]**

OR

Q8) a) Elaborate on "Liquid versus Gas chromatography". **[4]**

b) Draw standard chromatogram and explain all terminologies of chromatogram. **[12]**

Q9) a) Based on the Kirkwood theory of the interactions between ions and dipoles, answer the following : **[6]**

i) When comparing the solubilities of proteins at the same ionic strength, would you expect solubility of a protein with a high dipole moment to be high or low?

ii) In highly polar solvents, what balance would you expect between salting in and salting out of a protein? Use appropriate equations to justify your answers.

b) Justify the statement "Supercritical Fluid extraction is upcoming green Technology". **[4]**

c) Write the principle of following separation Techniques : **[6]**

i) Aqueous two phase separation.

ii) Molecular Sieves.

OR

Q10) What are 'Hyphenated Techniques', explain it with one example? **[16]**

Q11) Write and explain flowsheet of separation of following bioproducts (09M, each). **[18]**

a) Peptide Antibiotics.

b) Butanol.

OR

Q12) Select one commodity organic acid and describe its production process with the help of following points : **[18]**

a) Upstream Process.

b) Downstream Process.

Also elaborate on economic evaluation of each process.

Total No. of Questions : 12]

SEAT No. :

P950

[Total No. of Pages : 4

[4264] - 442
B.E. (Mechanical)
MECHANICAL SYSTEM DESIGN
(2008 Pattern) (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 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 are allowed.***
6) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) A compound cylinder consists of an inner steel tube with inner and outer diameters of 40mm and 60mm respectively. It is reinforced by shrinking a steel jacket of outer diameter 80mm. The compound cylinder is subjected to an internal pressure of 60 MPa. The shrinkage allowance is such that the maximum circumferential stresses in inner tube and jacket are same. Calculate :

i) The interference pressure; and

ii) The original dimensions of inner tube and jacket.

Assume : $E = 207 kN/mm^2$. **[12]**

b) Derive Birnie's equation. Also explain under what conditions it is used. **[4]**

OR

Q2) a) What are the factors to be considered for design of vertical cylindrical pressure vessel. **[4]**

b) A pressure vessel, subjected to a design pressure of 0.75 MPa, consists of a cylindrical shell with 2 m inside diameter and 10 mm thickness. An opening of inner diameter 300 mm and wall thickness of 10 mm is provided in the shell. The corrosion allowance is 2 mm and the weld efficiency is 0.85. The extension of the opening inside and outside the shell is 15mm. The yield strength of the material used for the shell and the opening is 210 MPa. A reinforcing pad of a 10 mm thick plate is provided for the opening. Determine the dimensions of reinforcing pad. Assume factor of safety as 1.5. **[12]**

P.T.O.

Q3) a) A two stroke engine is to be designed for a brake power of 7 kW at a speed of 800 rpm. The indicated mean effective pressure may be assumed as 0.5 MPa. Design :

i) The bore and length of the cylinder liner.
ii) The thickness of the liner.
iii) The cylinder head thickness.
iv) The size, number and pitch of the studs.

Also calculate the apparent and net stresses in the liner, if the Poisson's ratio is 0.25. **[12]**

b) Draw a neat sketch of the connecting rod and explain its constructional details. **[4]**

OR

Q4) Design a cast iron piston for a single acting four stroke diesel engine with the following data : **[16]**

Cylinder bore = 200 mm

Length of the stroke = 250 mm

Speed = 600 rpm

Brake mean effective pressure = 0.60 MPa

Maximum gas pressure = 4 MPa

Fuel consumption = 0.25 kg per BP per hr

I/d ratio for bush in small end of connecting rod = 1.5

Assume suitable data if required and state the assumptions you make.

Q5) a) Explain the Johnson's method of optimum design. **[4]**

b) A thin spherical vessel is to be designed with the objective of maximum gas storage capacity given by $(1/6)\ \pi\ D^3$, where D is the diameter of the vessel. Mass of the empty vessel should not exceed 150 kg. The vessel is subjected to internal pressure of 5 N/mm^2 and the required factor of safety based on yield strength is 2.0. Design the vessel using the following materials. Also find the storage capacity. **[14]**

Material	Mass Density (kg/m^3)	Yield Strength (N/m^2)
Steel alloy	7800	450×10^6
Aluminium alloy	2800	150×10^6
Titanium alloy	4500	800×10^6
Magnesium alloy	1800	100×10^6

OR

Q6) A cantilever beam of length 200mm and rectangular cross - section is to function in a device as a spring member. The width of the beam is five times its depth. It is subjected to vertical force which varies from + 500 N to –500 N at its free end. The maximum deflection at the free end is limited to 1mm. The factor of safety is 2. Design the beam for minimum material cost, out of the following materials. **[18]**

Material	Mass Density (kg/m^3)	Material cost (Rs/kg Weight)	Endurance Limit (N/mm^2)	Modulus of Elasticity (N/mm^2)
M1	7800	20	130	207×10^3
M2	2800	70	50	72×10^3
M3	4500	800	260	114×10^3

SECTION - II

Q7) a) Explain the basic principles of DFMA. **[6]**

b) A straight tensile bars of diameter $10^{\pm 0.1}$mm are made of plain carbon steel 40C8 having tensile yield strength of $300 \pm 30 N/mm^2$. The load on the bars is 23.5 ± 5kN. If the diameters, strength and loads are normally distributed, estimate the reliability of with standing the load by the bars. The areas under the standard normal distribution curve from zero to Z are as follows : **[10]**

Z	1.0	1.2	1.4	1.6	1.8	2.0	2.2	2.4
Area	0.3413	0.3849	0.4192	0.4452	0.4641	0.4772	0.4861	0.4918

OR

Q8) a) Two populations X and Y are added together. Derive the expressions to find mean and standard deviations of the resultant population. **[6]**

b) Three cylindrical components each with a length of 30mm are to be assembled to give a total length of $90^{\pm 0.6}$mm. All individual cylindrical components have same standard deviation and their natural and design tolerances are equal. Specify the tolerances for individual components. **[10]**

Q9) a) Explain the term maximum loss of economic cutting speed. **[4]**

b) Find the speed steps arranged in geometric progression for the following conditions.

Nmin = 100 rpm; Nmax = 1800 rpm.

Number of speed steps z = 8

Also draw the best possible structure diagram for the same. **[12]**

OR

Q10) a) The geometric progression ratio (ϕ) in a multispeed gear box is selected in the range of 1 to 2. Explain its significance. **[5]**

b) Draw a layout of a machine tool gear box having following structural formula 3 (1) 3 (3). Assume that the input speed to the gear box is through a belt drive. **[6]**

c) Draw a structure diagram for the following structural formulae. **[5]**

i) 3 (1) 2 (3) 2 (6) ii) $\Leftrightarrow$ 2 (1) 3 (2)

Q11) a) Following data refers to a horizontal belt conveyor used for conveying a coal in a thermal power plant. **[12]**

- Capacity of conveyor M = 300×10^3kg/hr
- Belt speed v = 2m/s
- Density of coal ρ = 800kg/m^3
- Surcharge factor for belt c = 0.0725
- Number of plies for belt $z_p = 3$
- Material factor for plies $K_1 = 2$
- Belt tension and arc of contact factor for belt $K_2 = 80$
- Electric motor speed 1440 rpm
- Centre distance between snub pulleys L_1 = 255m
- Centre distance between drive and tail pulley L_2 = 260m
- Pitch of carrying run idlers tc = 1m
- Pitch of return run idlers tr = 2.5m

Determine :

i) Standard belt width.

ii) Reduction ratio of gear reducer.

iii) Number of carrying and return run idlers.
standard belt width (mm) - 500, 600, 750, 800, 900, 1000, 1200, 1400, 1600

b) What are the design considerations in selecting the belt speed of a conveyor. **[6]**

OR

Q12) a) Following data refers to a flat belt conveyor for transporting crushed rock.

- Mass density ρ = 2 Ton/m^3
- Belt speed v = 1.75 m/s
- Belt width B = 0.8 m
- Surcharge angle $\alpha = 25°$ for $k = 2.35 \times 10^{-4}$
- Effective width of the material carried by the belt safety b = (0.9B – 0.05)

Determine the capacity of conveyor in Ton/hr. **[8]**

b) Explain concept of containerization and considerations in the design of the same. **[4]**

c) Explain on the basis of applications selection between : **[6]**

i) Chain conveyor. ii) Screw conveyor. iii) Belt conveyor.

Total No. of Questions : 6]

SEAT No. :

P953

[Total No. of Pages : 2

[4264] - 591
B.E. (Printing)
PRINT PRODUCTION PLANNING AND CONTROL
(2008 Pattern) (Sem. - II)

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

Instructions to the candidates :

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

SECTION - I

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

OR

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

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

OR

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

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, LCM and VAM 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. :

P994

[Total No. of Pages : 3

[4264] - 540
B.E. (Electronics)
ARTIFICIAL INTELLIGENCE
(2008 Pattern) (Elective - IV) (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) What are various definitions of artificial Intelligence (AI)? List the applications of artificial Intelligence. **[8]**

b) Explain the significance of PEAs in AI? **[5]**

c) Compare Depth first and Best first search methods. **[5]**

OR

Q2) a) Explain the following terms: **[4]**

i) State.

ii) Search tree.

iii) Successor function.

iv) Branching factor.

b) What is turing test and explain with example. **[6]**

c) What are intelligent agents? Explain architecture of any one typical agent with example. **[8]**

P.T.O.

Q3) a) Explain waiting for Quiescence and Secondary search with proper example. **[8]**

b) Apply constraint satisfaction to solve following cryptarithmetic problem. **[8]**

SEND
+MORE
MONEY

OR

Q4) a) Explain Hill climbing algorithm in detail. **[8]**

b) Explain Mini - Max algorithm with example. **[8]**

Q5) a) Explain the forward chaining & backward chaining in knowledge representation. **[8]**

b) Explain the first order logic symbols with suitable example. **[8]**

OR

Q6) a) Explain knowledge engineering in first order logic. **[8]**

b) What is Ontological Engineering? **[8]**

SECTION - II

Q7) a) Explain the reinforcement learning with its types. **[8]**

b) Explain the different learning methods with advantages and disadvantages. **[8]**

OR

Q8) a) Explain architecture of artificial Neural Network and explain its applications. **[8]**

b) Explain decision tree algorithm with suitable example. **[8]**

Q9) a) Explain Waltz's algorithm in detail. **[8]**

b) Explain architecture of expert system and its components. **[10]**

OR

Q10) a) What is perception? Give typical structure of it? **[8]**

b) Explain forward and backward reasoning with examples. **[10]**

Q11) a) What is natural language processing? Explain the steps in natural language processing. **[8]**

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

i) Syntacting processing.

ii) Semantic analysis.

OR

Q12) a) What is probabilistic language processing and explain probabilistic language models. **[8]**

b) Explain the Grammer induction in detail. **[8]**

Total No. of Questions : 12]

SEAT No. :

P996

[Total No. of Pages : 3

[4264] - 560A

B.E. (Electronics & Telecommunication)

PLC AND INDUSTRIAL PROCESS AUTOMATION

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

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) What is P & I diagrams? Explain what information it contains & its use for system engineer? **[8]**

b) Draw and explain the block diagram of process control & following terms with example. **[8]**

i) Process.
ii) Error Detector.
iii) Set point.
iv) Control Element.

OR

Q2) a) Explain the followings with examples. **[8]**

i) Regulatory control.
ii) Human Aided control.
iii) Discrete state control.

b) Explain with neat diagram. **[8]**

i) DDC.
ii) DCS.

P.T.O.

Q3) a) What are intelligent transmitter and their features? **[8]**

b) Explain the Differential Pressure Transmitter with block diagram? Explain various sensing Elements for differential pressure measurement? **[8]**

OR

Q4) a) What is process transmitter explain with block diagrams? Explain 2 wire transmitter in detail. **[8]**

b) Explain how DPT can be used for process tank level and Flow measurement? **[8]**

Q5) a) Explain the need of field busses, Write short note on: **[10]**

i) Foundation Field Bus.

ii) Profibus.

b) Why linearization of the sensor is necessary? **[8]**
Discuss various techniques used for linearization?

OR

Q6) a) What are the types of temperature sensors used in process industries? **[10]**

Explain temperature measurement using

i) RTD.

ii) Thermocouple

with neat circuit diagrams.

b) The sensor output range of 2 mV to 20mV as the variable varies over the range. Develop the signal conditioning so that this becomes 0-5V. The circuit must have very high input impedance? **[8]**

SECTION - II

Q7) a) What are the various types of converters used in process control loop? **[8]**

Explain Following converters

i) I to P Converter.

ii) I to V Converter.

b) Pressure from 30 to 300 psi is converted to voltage by relation. **[8]**

$V = 0.38[p]^{1/2} - 2.72$

It is converted by 8 bit ADC to digital value *DV* with 5V reference to (0-255 range), Develop the linearization equation to give quantity in terms of *DV*.

OR

Q8) a) Explain how to find CV to Flow control Value and Find **[8]**

i) The CV for a valve that must allow 150 gal of ethyl alcohol per min. with a specific gravity of 0.8 at maximum pressure of 50 psi, and

ii) The required valve size.

b) Explain various principles of flow measurement? Explain various flow control characteristics of flow control valves and explain working of flow control valve with forward and reverse action of pneumatic actuator? **[8]**

Q9) a) Explain what is PLCs in following regards **[8]**

i) Elements of PLCs.

ii) Operation of PLC.

iii) Scan Cycle and Scan Time.

iv) PLC programming languages.

b) Explain various parts of PLC. Draw the block diagram of I/O Cards of PLC? Explain various network topologies used for networking of PLCs. **[8]**

OR

Q10) a) A temperature sensor has a span of 20º-250ºC. A measurement results in a value of 55ºC for the temperature. Specify the error if the accuracy is

i) ± 0.5% full scale.

ii) ± 0.75% of span.

iii) ± 0.8% of reading.

What is possible temperature in each case? **[8]**

b) Develop the automation algorithm for water pumping system from underground tank to overhead tank automatically? Select appropriate sensing & control devices & PLC I/Os? Show the wiring connections with PLC? Implement the ladder logic? **[8]**

Q11) a) Discuss PID algorithm for Digital implementation. **[8]**

b) State various implementation of PI controller? Explain any in detail. **[10]** Explain effect of integral action on loop response.

OR

Q12) a) What is integral windup? Explain various method of controller tuning. **[10]**

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

i) Fuzzy logic systems and controllers.

ii) ANN based controllers.

Total No. of Questions : 12]

SEAT No. :

P998

[Total No. of Pages : 2

[4264] - 579

B.E. (Instrumentation & Control)

MICRO ELECTRO MECHANICAL SYSTEMS

(Elective - IV) (2008 Pattern) (Sem. - II)

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

Instructions to the candidates:

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

SECTION - I

Q1) a) What are different benefits of Miniaturization? **[8]**

b) Explain working of ADXL50 accelerometer with neat diagram. **[8]**

OR

Q2) a) What are the different applications of smart system in various areas? **[8]**

b) What is the purpose of various Components of smart system? **[8]**

Q3) a) Explain working principle of Electrostatic Comb drive with neat diagram. **[8]**

b) Explain working principle of Silicon Capacitive Accelerometer with neat diagram. **[8]**

OR

Q4) a) What are the applications of portable blood analyzer? Give its advantages. **[8]**

b) Explain working principle of Micromirror with neat diagram. **[8]**

Q5) Explain following micromachining techniques with neat diagram. **[18]**

a) Thin film Deposition.

b) Evaporation.

OR

Q6) Explain following micromachining techniques with neat diagram. **[18]**

a) Sputtering.

b) Chemical Vapor Deposition.

P.T.O.

SECTION - II

Q7) a) Define Hooks Law. Derive the Equation to calculate strain using hooks law in case of Bar. **[8]**

b) List the assumption in the theory of torsion. **[8]**

OR

Q8) a) Explain in detail Bimorph Effect. **[8]**

b) Derive the equation for strain energy of the bar. **[8]**

Q9) a) Draw flow chart of finite element procedure and describe it. **[8]**

b) What are the different applications of finite Element Method. **[8]**

OR

Q10) a) What is finite element method? **[8]**

b) What are different steps involved in solving structural problem using Finite Element Method. **[8]**

Q11) a) Explain working of Successive Approximation ADC with neat diagram. **[9]**

b) What are different types of micro system Packages? Explain any two in detail. **[9]**

OR

Q12) a) Draw and explain n-channel enhancement MOSFET. **[9]**

b) Explain with neat diagram flip-chip assembly of packaging technology. **[9]**

Total No. of Questions : 12]

SEAT No. :

P999

[Total No. of Pages : 2

[4264] - 580

B.E. (Instrumentation & Control)

DIGITAL IMAGE PROCESSING

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

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

Instructions to the candidates:

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

SECTION - I

Q1) a) Write a short note on fundamental steps involved in digital image processing. **[8]**

b) Explain in detail the components that are used in image processing system. **[8]**

OR

Q2) a) Write a short note on image digitizing components. **[8]**

b) List out the different characteristics of image and explain anyone with an example. **[8]**

Q3) a) Write are the different methods of image acquisition? Explain any one in detail with neat diagram. **[8]**

b) Explain the concept of sampling and quantization with regard to digital image acquisition. **[8]**

OR

Q4) a) Write a short note on different image operations on pixel basis. **[8]**

b) Explain the following terms related to image pixels. **[8]**

i) Luminance.
ii) Light.
iii) Intensity.
iv) Contrast.

P.T.O.

Q5) a) What do you mean by basis image and energy compaction with respect to 2-D FT. **[8]**

b) Write a short note on the following: **[10]**

i) Discrete cosine transform (DCT).

ii) Short time Fourier transform (STFT).

OR

Q6) a) Discuss the properties of 2-D discrete cosine transform. Comment on its Computational complexity. **[8]**

b) Write a short note on the following: **[10]**

i) Radon Transform.

ii) Gabor Transform.

SECTION - II

Q7) a) What is the necessity of image enhancement? Explain with one example. **[8]**

b) Write a short note on histogram equalization. **[10]**

OR

Q8) a) Explain how high pass filter can be used for image sharpening. **[8]**

b) What do you mean by image averaging and mean filter. **[6]**

c) Explain how histogram statistics can be used for image enhancement. **[4]**

Q9) a) Explain the concept of image restoration and its necessity. **[8]**

b) Write a short note on least mean square (Wiener) filter used for image restoration. **[8]**

OR

Q10) a) Explain the concept of inverse filtering. **[8]**

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

i) Degradation model.

ii) Linear Degradations.

Q11) a) List out the various operations for edge detection? Explain any one in detail. **[8]**

b) Explain the concept of segmentation? List out are the different methods. **[8]**

OR

Q12) a) Write a short note on edge linking and boundary detection. **[8]**

b) What is region based segmentation? Write a short note on regional descriptions. **[8]**