

Total No. of Questions : 12]

SEAT No. :

P1060

[Total No. of Pages : 3

[4264] - 101

**B.E. (Electronics Engineering)  
COMPUTER NETWORKS  
(2003 Pattern) (Semester - I)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

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

**SECTION - I**

- Q1)** a) Draw and explain the layered architecture of the ISO - OSI model used in computer networking. Also compare it with the TCP/IP Protocol suite. [10]
- b) State and discuss the network design issues. [8]

OR

- Q2)** a) Compare peer to peer and client - server model used in computer networking supported by suitable diagrams, advantages & disadvantages. [10]
- b) What are the service primitives. Explain the connection oriented and connectionless services. [8]

- Q3)** a) What is Shannon channel capacity? Calculate the maximum bit rate for a channel having bandwidth  $3100 \text{ Hz}$  and S/N ratio of 10dB. [8]
- b) Compare circuit switching, message switching and packet switching. Discuss which type of switching preferred in computer networking. [8]

OR

- Q4)** a) What is dial up MODEM? Explain the V.32 & V.90 modem standards. [8]
- b) Explain the guided and unguided transmission media with their types and specifications. [8]

**P.T.O.**

**Q5)** a) What is sliding window protocol? Explain one bit sliding window protocol. [8]

b) Draw and explain the HDLC & PPP frame format. [8]

OR

**Q6)** a) Compare the IEEE 802.3, IEEE 802.4 & IEEE 802.5 standards. [8]

b) What is CSMA/CD? Explain the Binary Count down protocol. [8]

## **SECTION - II**

**Q7)** a) Discuss the connectionless & connection oriented services like UDP and TCP. [8]

b) What is Quality of service? Which are the different parameter which decide the quality of service of wired or wireless computer network. [8]

OR

**Q8)** a) Explain the Token Bucket Algorithm. An ATM network uses a token bucket scheme for traffic shaping. A new token is put into the bucket every 5  $\mu$ sec. What is the maximum sustainable net data rate? (excluding header bits) [10]

b) Explain the Distance vector Routing algorithm. [6]

**Q9)** a) What is cryptography? Explain the difference between secret key and public key algorithm. [8]

b) Explain the concept of Video on Demand. With appropriate diagram. [8]

OR

**Q10)** a) What is HTML? What are common HTML tags? Explain the procedure to write web page in HTML. [8]

b) What is the importance of DNS? Explain the components of the DNS system. [8]

- Q11)** a) Explain the different classes of IP addressing scheme. [6]  
b) Explain the difference between the client server and domain model used in computer networking. [6]  
c) Explain the concept of File Transfer Protocol (FTP). [6]

OR

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

- a) SMTP
- b) Subnet Masking
- c) ICMP
- d) IPv4 V/S IPv6

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Total No. of Questions : 12]

SEAT No. :

P1063

[Total No. of Pages : 2

[4264] - 104

B.E. (Electronics)

VLSI DESIGN

(2003 Pattern) (Theory) (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) Assume suitable data, if necessary.
- 5) Neat diagrams must be drawn wherever necessary.
- 6) Use of non programmable electronic pocket calculators is allowed.

### SECTION - I

- Q1)** a) What is necessity of test benches? State types of test benches and Explain any one with suitable example. [8]
- b) Write structural VHDL descriptions, to describe Universal shift register using D flip flop. [8]

OR

- Q2)** a) Explain the step by step process of synthesis. [8]
- b) Write sequential and concurrent VHDL descriptions, to describe a 8:1 Multiplexer. [8]

- Q3)** a) Draw state machine chart of UART transmitter and write VHDL code for UART Baud rate generator for baud rate of 9600 assuming system clock of 8 MHz. [10]
- b) What is metastability? State the solutions. Explain any one solution in detail. [8]

OR

- Q4)** a) What are the effects of synchronous clock on power dissipation, noise in FSM with examples? [8]
- b) Draw state diagram and write VHDL code for traffic light controller controlling traffic for two lane intersection. [10]

P.T.O.

- Q5)** a) Draw and Explain CPLD architecture. [8]  
b) What are the merits of FPGA/CPLD over other logic implementing devices? [8]

OR

- Q6)** a) What is the difference between ASIC, PLD, CPLD and FPGA? [8]  
b) Draw and Explain FPGA architecture. [8]

## **SECTION - II**

- Q7)** a) Explain different clock distribution strategies in detail. [8]  
b) Draw and Explain floor planning. [8]

OR

- Q8)** a) Explain power distribution and how to achieve power optimization? [8]  
b) Explain the parasitic involved in routing matrix. How to achieve EMI immune design? [8]

- Q9)** a) Explain voltage transfer curve of CMOS Inverter. [10]  
b) Write short note on CMOS layout. [8]

OR

- Q10)** a) Derive the expression for static and dynamic power dissipation. [10]  
b) Derive the relationship between width of n and p channel MOSFET in an inverter. Why sizing is so important? [8]

- Q11)** a) What is BIST? Explain in detail. [8]  
b) Write a short note on JTAG. [8]

OR

- Q12)** a) Explain stuck at fault methods. [8]  
b) Draw and explain boundary scan architecture. [8]



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SEAT No. :

P1066

[Total No. of Pages : 2

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### B.E. (Electronics Engineering)

## ADVANCED DIGITAL SIGNAL PROCESSING

(2003 Pattern) (Elective - I) (Semester - I) (Theory)

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) Draw the block schematic for a decimator and explain the need for a filter. How is Aliasing avoided? [8]

b) Design a suitable interpolator for the following system. [10]

Base band 0–20 kHz

Input Sampling Frequency 44.1 kHz

Output Sampling Frequency 176.4 kHz

Stop band Attenuation 50 dB

Pass band Ripple 0.5 dB

Transition Width 2 kHz

Stop band Edge Frequency 22.05 kHz

OR

**Q2)** a) Write short note on random processes. [8]

b) Explain probability density function and its properties. [10]

**Q3)** a) Explain in detail the LMS algorithm for direct FIR filters. [8]

b) Explain the application of adaptive filter as echo cancellation. [8]

OR

**Q4)** a) Discuss the steps in the RLS algorithm. [8]

b) Explain how noise introduced in the system can be minimized using adaptive filter. [8]

P.T.O.

- Q5)** a) Explain Levinson and Durbin algorithm to determine autoregression parameters of Linear predictive filter. [8]  
b) Explain Lattice Structures. [8]

OR

- Q6)** a) Write short notes on Wiener filter for filtering and prediction. [8]  
b) Explain rational power spectra in detail. [8]

## **SECTION - II**

- Q7)** a) Compute auto correlation & power spectral density for the signal  $X(t) = K \cos (2\pi f_c t + \phi)$  Where  $K$  &  $f_c$  are constants.  $\phi$  is the random variable which is uniformly distributed over interval  $(-\pi, \pi)$ . [8]  
b) Write short note on Welch Method. [10]

OR

- Q8)** a) What is the use of DFT in power spectrum estimation. [8]  
b) Write short note on Barlett Method. [10]

- Q9)** a) Explain in detail Harward Architecture. [8]  
b) What is MAC? How can MAC operate faster using program cache? [8]

OR

- Q10)** a) With the help of block diagram explain architecture of TMS 320C 54XX Processor. [8]  
b) Explain the characteristic of SHARC processor. [8]

- Q11)** a) With the help of block schematic explain the working of speech recognition system. [8]  
b) Write short note on speech analysis. [8]

OR

- Q12)** a) Explain various methods of speech synthesis. [8]  
b) Explain the concept of sub band coding of speech/audio signal. [8]



Total No. of Questions : 12]

SEAT No. :

P1030

[Total No. of Pages : 2

[4264] - 110

**B.E. (Electronics)**

**ELECTRONICS MEASUREMENT SYSTEMS**

**(2003 Pattern) (Semester - 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) Assume suitable data, if necessary.

**SECTION - I**

**Q1)** a) Explain in brief the factors contributing in choosing an Analog Voltmeter. [9]

b) With neat diagram, explain the working of vector Impedance voltmeter. [9]

OR

**Q2)** a) Explain LCR - Q meter with neat diagram. [9]

b) Write a note on Instrument calibration standards. [9]

**Q3)** a) Explain the working of basic frequency counter and draw its waveform. [8]

b) Explain various components in digital systems. [8]

OR

**Q4)** a) Explain different automatic functions incorporated in digital voltmeters. [8]

b) Explain the operation of phase meter with neat diagram. [8]

**Q5)** a) Explain with neat diagram the function of Logic Analyzer. [8]

b) With neat diagram explain in detail the total harmonic distortion Analyzer. [8]

OR

**P.T.O.**

- Q6)** a) Draw a neat block diagram to explain the working of selective wave analyzer. [8]  
b) Explain with neat diagram the operation of spectrum analyzer. [8]

## **SECTION - II**

- Q7)** a) With neat diagram and setup explain SINAD sensitivity test. [8]  
b) Explain SMPTE method of intermodulation distortion measurement. [8]

OR

- Q8)** a) Explain the process for impedance measurement using Network analyzer. [8]  
b) Explain in detail vector Network Analyzer. Mention the applications of Network Analyzer. [8]

- Q9)** a) Write a brief note on sampling technique used in DSO. [9]  
b) What are different types of CRO probes, explain in detail with their applications. [9]

OR

- Q10)** a) Explain with neat diagram digital data acquisition system. [9]  
b) Write in short the concept of ATE. [9]

- Q11)** a) Explain in brief the advantages and disadvantages of virtual instruments. [8]  
b) Explain how to test an audio amplifier using computer controlled measurement system. [8]

OR

- Q12)** a) Comment on PCI express technology. [8]  
b) Give setup for computer controlled testing of radio receiver. [8]

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Total No. of Questions : 12]

SEAT No. :

P1074

[Total No. of Pages : 2

[4264] - 127

B.E. (E & T/C)

## ADVANCED DIGITAL SIGNAL PROCESSING

(2003 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.
- 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)** State and Explain the different configurations of Adaptive filter. [20]

OR

**Q2)** Starting from the Basic wiener filter theory explain the LMS Algorithm. What are its limitations? Write the Pseudo code? [20]

**Q3)** a) Explain the principle of spectrum Estimation. [5]

b) Explain the modern Non parametric methods for power spectrum Estimation. [10]

OR

**Q4)** Explain spectral analysis of EEG using autoregressive modelling. [15]

**Q5)** Explain the Fixed point Digital Signal Processors. [15]

OR

**Q6)** Explain how will you implement FFT using Digital signal processors. Write the Pseudo codes. [15]

**P.T.O.**

## **SECTION - II**

- Q7)** a) Explain sample rate conversion by non integer factors. [8]  
b) Explain multirate approach to sampling rate conversion. [7]

OR

- Q8)** Explain Multirate DSP for efficient Digital Analog Conversion in compact Hi-Fi system. [15]

- Q9)** Explain the Levinson Durbin Algorithm. [20]

OR

- Q10)** a) Explain forward and Backward linear prediction. [10]  
b) Explain AR, MA and ARMA. [10]

- Q11)** Draw the Digital Models for speech signals for : [15]

- a) Vocal Tract                          b) Radiation  
c) Excitation                            d) Complete model

OR

- Q12)** Explain the following w.r.t. speech Processing : [15]

- a) Pitch Detection                      b) Formant Estimation  
c) Cepstrum                             d) Silence Detection

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Total No. of Questions : 12]

SEAT No. :

P972

[Total No. of Pages : 3

[4264] - 132

B.E. (E & TC)

## OPTICAL AND MICROWAVE COMMUNICATIONS (2003 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) Draw and explain the block diagram of optical fiber communication system. [6]
- b) A step index fiber in air has a numerical aperture of 0.16, a core refractive index of 1.45 and a core diameter of 60  $\mu\text{m}$ . Determine the normalized frequency for the fiber when light at a wavelength of 0.9  $\mu\text{m}$  is transmitted. Further, estimate the number of guided modes propagating in the fiber. [6]
- c) An LED emits the light having peak wavelength of 1310 nm, with radiative and non-radiative recombination times 40 ns and 90 ns respectively. If the drive current is 40 mA, find the internal quantum efficiency and optical power generated internally of the LED. [6]

OR

- Q2)** a) Draw the schematic and energy band diagram of double hetero-junction LED and explain the operation? State why it is more efficient in its action than homo-junction? [6]
- b) An InGaAs avalanche photo-detector has a quantum efficiency of 65% at a wavelength of 850 nm. If an incident optical power of 0.5  $\mu\text{W}$  produces a multiplied photocurrent of 10  $\mu\text{A}$ , calculate the responsivity and multiplication factor. [6]
- c) Explain the working of PIN photo-detector with relevant diagrams. [6]

P.T.O.

- Q3)** a) Explain the various degradation mechanisms in optical fibers in detail. [8]  
b) With the help of a neat labelled block diagram, explain the principle of working and the uses of OTDR. [8]

OR

- Q4)** a) A glass fiber exhibits material dispersion given by  $|\lambda^2 \frac{dn}{d\lambda^2}|$  of 0.025. Determine the material dispersion parameter at a wavelength of 0.85  $\mu\text{m}$ . Estimate rms pulse broadening per km for a good LED source with an rms spectral width of 20 nm at this wavelength. [8]  
b) State and explain the requirements of a good optical connector and a fiber splice. [8]

- Q5)** a) Components are chosen for demo-system of digital optical link of overall length of 6 km. The LED chosen is capable of launching 100  $\mu\text{W}$  of optical power into a graded index fiber, which has an attenuation of 3 dB/km. It requires splicing every kilometer with a loss of 0.5 dB per splice. The connector loss at receiver is 1.5 dB. The receiver sensitivity is - 41 dBm. It is also predicted that a safety margin of 6 dB will be required. Write down the optical power budget for the system and hence determine its viability. [8]  
b) Explain the various components and their desirable characteristics in a WDM link. [8]

OR

- Q6)** Write short notes on : [16]  
i) Multi channel Transmission Techniques  
ii) Optical Amplifiers

## SECTION - II

- Q7)** a) Explain the concept of TE and TM modes in rectangular waveguides. [6]  
b) What are scattering parameters? Write S-matrix for Magic Tee. [6]  
c) Explain the power transmission and losses in waveguides. [6]

OR

- Q8)** a) Write a short note on Microwave cavity resonator. [6]  
b) What are matched terminations (MT)? State the major observations when a microwave test bench is properly match terminated. [6]  
c) Explain the use of circulator as isolator. [6]

- Q9)** a) State and explain the major high frequency limitations encountered in conventional vacuum tubes. [8]  
b) With a neat labelled diagram explain the bunching process and velocity modulation in reflex Klystron. [8]

OR

- Q10)** a) Describe the working of a TWT and state its application areas. [8]  
b) Explain the working of Magnetron and state its applications. [8]

- Q11)** a) With the help of neat diagram explain the operation, construction and characteristics of microwave transistor. [8]  
b) Explain the various concepts to be considered during the design of terrestrial microwave link. [8]

OR

- Q12)** Write short notes on : [16]  
a) Gunn Diode  
b) Construction & Applications of Stripline



Total No. of Questions : 12]

SEAT No. :

P1076

[Total No. of Pages : 3

[4264] - 136

B.E. (E & TC)

## AUDIO - VIDEO ENGINEERING

(2003 Pattern) (Elective - II) (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) State CCIR - B standards for Monochrome Television [6]  
b) Distinguish between brightness & contrast. [4]  
c) What do you understand by persistance of vision & flicker. How is flicker removed. [8]

OR

- Q2)** a) Explain the working of Precision - in - line picture tube. Describe the constructional, functional & beam technique employed in the Precision - in - line tube? [8]  
b) Compare different display technologies used for colour TV. [6]  
c) Define the following : [4]  
i) Kell factor.  
ii) Aspect Ratio.  
iii) Hue.  
iv) Saturation.

P.T.O.

**Q3)** a) What do you understand by positive & negative modulation. Justify the choice of negative modulation for TV transmission. Why FM technique is not used for video. [8]

b) Compare PAL, NTSC & SECAM colour TV system. [8]

OR

**Q4)** a) State importance of wobbuloscope in TV receiver alignments. [4]

b) Compare low level & High level modulation for colour TV transmitter. [4]

c) With the help of suitable block diagram, explain working of colour TV receiver. [8]

**Q5)** a) Draw & explain functional block diagram of a digital colour receiver. [8]

b) Compare digital standards for ATSC, DVB & ISDB. [8]

OR

**Q6)** a) Explain MPEG - 2 video compression. Format. [8]

b) With suitable block diagram explain the MAC encoder & its format. [8]

## **SECTION - II**

**Q7)** a) State the HDTV standards. Describe the compatibility problems in HDTV. [8]

b) Explain with neat block diagram direct broadcasting satellite for TV broadcasting. [10]

OR

**Q8)** a) Explain in short : [8]

- i) Video on Demand.
- ii) CATV.

b) Discuss a live TV coverage plan for a cricket match. Show the camera placements at different locations & other equipment set - up for live broadcast. [10]

**Q9)** a) Explain the different DVD formats. [8]

b) Explain the principle of magnetic recording and reproduction with a neat diagram. What is the relationship between gap-width, tape-speed and frequency of audio signal. [8]

OR

- Q10)** a) Explain the MPEG Audio compression formats used today indicating different specifications/ parameters used. [8]  
b) Explain why performance of DVD is superior to other mediums. [8]

- Q11)** a) Explain the need of reverberation. Mention reverberation periods and factors on which reverberation time depends. [8]  
b) Explain the satellite radio receiver with block diagram and state its applications. [8]

OR

- Q12)** a) Explain the working of a typical chordless microphone PA system. State the type of microphone used and its specifications. [8]  
b) What are the requirements of a good auditorium for pleasant listening? Give salient features of accoustical design of an auditorium. [8]



Total No. of Questions : 12]

SEAT No. :

P954

[Total No. of Pages : 3

[4264] - 150

**B.E. (Instrumentation & Control)**  
**COMPUTER TECHNIQUES AND APPLICATIONS**  
**(2003 Pattern)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

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

**SECTION - I**

**Q1)** a) Explain the following with respect to process management : [10]

- i) Job Queue
- ii) Device Queue
- iii) Ready Queue
- iv) Mid term scheduler
- v) Context Switch

b) Explain the different types of Operating systems (any four) [8]

OR

**Q2)** a) What is a deadlock? Explain the four conditions necessary for occurrence of deadlocks. [10]

b) What is Process Control Block? Discuss the information stored in it.[8]

**Q3)** a) What is virtual memory? With the help of neat diagram explain the implementation of virtual memory through demand Paging. [8]

b) What is address binding? [2]

Explain the three stages when address binding of instructions and data to memory addresses can take place. [6]

OR

*P.T.O.*

- Q4)** a) What is external and internal fragmentation? How does paging help in minimizing fragmentation? [8]  
b) With neat diagrams, explain any four types of Directory structures. [8]

- Q5)** a) What are real time systems? Explain the different types of Real Time systems giving examples of each. [8]  
b) What are Array processors? What are its applications? [8]

OR

- Q6)** Write short notes (any two) : [16]  
a) Vector Computers  
b) Intertask dependencies  
c) Lossy and Lossless Compression

## SECTION - II

- Q7)** a) Explain the ISO - OSI seven layer model. [8]  
b) What is the IEEE 802.3 standard? [8]

OR

- Q8)** Write short notes : [16]  
a) LAN and LAN topologies  
b) TCP/IP reference model

- Q9)** a) Write a note on Software Reliability. [8]  
b) Discuss the architectural overview of ARM 922. [8]

OR

- Q10)** a) What are exceptions in processors? List the seven exception types along with their interrupt vector addresses of ARM processors. [8]  
b) What is IEEE 1394? Discuss the technical details of it. [8]

**Q11)** Write short notes : (any three)

**[18]**

- a) CASE tools
- b) Software Development life cycle
- c) Integration testing
- d) White box and black box testing

OR

**Q12)** a) Explain Integration testing and explain the following three integration test approaches : **[10]**

- i) Big-Bang Integration Testing
- ii) Bottom-Up Integration Testing
- iii) Top-Down Integration Testing

b) Explain white box and black box testing. Discuss the advantages and limitations of each. **[8]**



Total No. of Questions : 12]

SEAT No. :

P1384

[Total No. of Pages : 3

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B.E. (Chemical)

**PROCESS EQUIPMENT DESIGN - II**  
**(2003 Pattern) (Sem. - I)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) Answer Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6 from Section - I and Q. 7 or Q. 8, Q. 9 or Q. 10 and Q. 11 or Q. 12 from Section - II.
- 2) Answers to the two sections should be written in separate books.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Figures to the right indicate full marks.
- 5) 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) Calculate the power required for mixing 5000 L with specific gravity 0.8 and viscosity 90 cp in an agitated tank. Pitched blade turbine impeller at 90 rpm is used. Diameter of the tank is 1.0 m and the ratio of tank diam. to agitator diam. is 0.45. The power number and Reynolds number relationship data is : [8]

N <sub>Re</sub>	1,000	2,000	3,000	4,000
N <sub>P</sub>	1.1	1.2	1.3	1.4

- b) Write about different types of agitators. [8]

OR

- Q2)** Design an agitator with the following specifications :

- Agitator type : turbine  
Diameter of vessel : 1500 mm  
Internal pressure : 0.5 N/mm<sup>2</sup>  
Maximum speed : 200 rpm  
Sp. gr. of liquid in tank : 1.2  
Viscosity of liquid in tank : 600 cp

**P.T.O.**

Overhang of agitator shaft	: 1300mm
Flat agitator blades (nos.)	: 6
Width of the blade	: 75 mm
Thickness of the blade	: 8 mm
Baffles at tank walls	: 4 nos.
Shaft material - cold rolled steel	
Permissible shear stress in shaft	: 55 N/mm <sup>2</sup>
Elastic limit in tension	: 246 N/mm <sup>2</sup>
Modulus of elasticity	: $1.95 \times 10^5$ N/mm <sup>2</sup>
Permissible stress for key (CS) Shear	: 65 N/mm <sup>2</sup>
Crushing	: 130 N/mm <sup>2</sup>
Stuffing box (CS) permissible stress	: 95 N/mm <sup>2</sup>
Studs and bolts (hot rolled CS)	: 58.7 N/mm <sup>2</sup>
The vessel has standard geometry and $N_p = 4.5$ .	[16]

- Q3)** a) Explain fluidized bed dryers. [8]  
 b) The moisture content of a solid is to be reduced from 48% to 2% on wet basis, in a continuous counter current dryer which has a wet material handling rate of 2500 kg/h. Critical moisture content is 20% and equilibrium moisture content is 1.5 wt% on wet basis. The initial drying rate is 2.44 kg/hr. m<sup>2</sup>. Air used for drying has inlet moisture content of 0.03 kg/kg dry air and moisture content at saturation at the temperature of material is 0.05 kg/kg dry air. Density of dry material is 640 kg/m<sup>3</sup>, drying surface area per kg material is 0.062m<sup>2</sup>. The final moisture content of air is 0.0294 kg/kg dry air. Find the time required for drying. [8]

OR

- Q4)** a) Describe rotary dryers. [8]  
 b) Give the classification of dryers. [8]
- Q5)** a) Describe any one method for predicting plate efficiency. [8]  
 b) Give formulae for the following - dry plate pressure drop, weir liquid crest and down corner backup. [6]  
 c) Compare the different types of plates. [4]

OR

- Q6)** Design plates for a column separating an aqueous mixture of acetone in a continuous distillation column. [18]

Feed concentration = 10% by wt of acetone.

Distillate concentration = 98% by wt of acetone.

Bottoms concentration = 50 ppm of acetone.

No. of real stages = 25,  $R = 1.35$ .

Slope of the bottom operating line = 5

Slope of the top operating line = 0.57

$\rho_v$ , bottom = 0.72 kg /m<sup>3</sup>,  $\rho_L$  bottom = 954 kg/m<sup>3</sup>

$\sigma_L$  bottom = 0.057 N/m

$\rho_v$ , top = 2.05 kg/m<sup>3</sup>,  $\rho_L$  top = 753 kg/m<sup>3</sup>

$\sigma_2$ , top = 0.023 N/m

$K_1$  bottom = 0.075  $K_1$  top = 0.09

Co = 0.84, Feed rate = 10,000 kg/h

Min. feed rate = 70% of max.

## SECTION - II

- Q7)** a) What are the different types of packings. [8]  
b) Describe how to estimate flow using Cornell's method. [10]

OR

- Q8)** a) List the column internals and give their functions. [8]  
b) Give equations used in Onda's method. [10]

- Q9)** a) Describe cyclone separator. [8]  
b) Make a preliminary design for a steam - water separator with steam flow rate 2000 kg/ h and water flow rate 1000kg /h. Operating pressure 4 bar, liquid density = 927 kg/m<sup>3</sup>. Vapour density = 2.2 kg/m<sup>3</sup>. Design without desmister pad. [8]

OR

- Q10)** a) Explain the functioning and design of knockout drum. [8]  
b) What are plate separators, gravity settlers and impingement separators. [8]

- Q11)** a) Give the design considerations for natural gas pipeline. [8]  
b) Describe any one case with relevant equations for designing pipes based on fluid dynamic parameters. [8]

OR

- Q12)** a) What are considerations for designing an underground pipeline? [8]  
b) Write about pipe supports. [8]



Total No. of Questions : 12]

SEAT No. :

P945

[Total No. of Pages : 2

[4264] - 194

B.E. (Chemical)

## PROCESS MODELING & SIMULATION (2003 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

### SECTION - I

- Q1)** a) Define model.  
b) What is the necessity of model?  
c) Write the different forms of models?  
d) What is difference between lumped and distributed system.

[16]

OR

- Q2)** a) What is simulation?  
b) Give the scope of simulation.  
c) What are different forms of simulation.  
d) Discuss in brief about chemcad.

[16]

- Q3)** a) Write the continuity equation, energy equation and equation of motion.  
b) Discuss about equation of state and chemical equilibrium.

[16]

OR

P.T.O.

- Q4)** a) Discuss how fundamental laws are important in process modeling with suitable example.  
 b) Fit the model  $A = e^{bt}$  to the following data :

t	2	8	14	27	44
A	95	81	68	50	32

where A is the amount of substance remaining in the reacting system after the interval of time 't'.

[16]

- Q5)** Develop modeling for Tripple Effect Evaporator. Draw a neat figure and assume your own notations. [18]

OR

- Q6)** Develop a mode for double pipe heat exchanger. [18]

## SECTION - II

- Q7)** Derive a model for Binery distillation column with tray. [16]

OR

- Q8)** Develop a model for multicomponent separation system. [16]

- Q9)** Derive a model for Trickle Bed Reactor. [18]

OR

- Q10)** Obtain a model for PFR. [18]

- Q11)** A component material balance around a chemical reactor yields the following equation.

$$O = \frac{F}{V} C_{in} - \frac{F}{V} C - KC^3$$

Where  $\frac{F}{V} = 0.1 \text{ min}^{-1}$ ,  $C_{in} = 1 \text{ kg mol/ m}^3$   $K = 0.05 \text{ m}^6/\text{kg mol}^2 \text{ min}$ .

- a) How many steady state solutions are there?  
 b) Perform two iterations of Newton-Raphson method using an initial guess  $C = 1.0$ . [16]

OR

- Q12)** Discuss the simulation of effluent treatment plant. [16]



Total No. of Questions : 8]

SEAT No. :

P1091

[Total No. of Pages : 7

[4264] - 204

B.E. (Petroleum)

NATURAL GAS ENGINEERING

(2003 Pattern) (Sem. - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Answers to the two sections must be written in separate answer books.
- 2) Questions No. 1(one) and 5(five) are compulsory.
- 3) Figures to the right indicate full marks.
- 4) Answer 3 questions from Section - I and 3 questions from Section - II.
- 5) Neat diagrams must be drawn wherever necessary.
- 6) Use of a non-programmable calculator, log-log and semi-log paper is allowed.
- 7) Assume suitable data, if necessary.

### SECTION - I

**Q1) a) Given data :** [13]

- i)  $P_r = 5100 \text{ psi}$
- ii)  $r_e = 2100 \text{ ft}$
- iii)  $h = 30 \text{ ft}$
- iv)  $k = 15 \text{ md}$
- v)  $r_w = 0.45 \text{ ft}$
- vi)  $S_p, \text{Gr} = 0.7$
- vii)  $s = 0$
- viii) Reservoir Temperature = 200 deg F

Calculate the inflow performance relationship curves using the pressure squared method. Take  $p_{wf}$  values from 0 to 5000 psi, with an increment of 1000 psi. Assume that the flow is in pseudo-steady state.

b) Describe, with the help of a diagram, what do you mean by Inflow performance curve and tubing intake curve and its importance. [5]

P.T.O.

**Q2)** a) A wet gas reservoir is producing 30 STB / MMSCF of condensate production at an API gravity of 50. The separator gas has a gravity of 0.7. Calculate the gas gravity of reservoir gas. [10]

b) Define formation volume factor, compressibility, viscosity and gas oil ratio for a gas, and how it varies with pressure, with the help of graphs. [6]

**Q3)** Write short notes on : [16]

- a) Gas Hydrates.
- b) Two phase flow diagram.
- c) Two phase flow regimes.
- d) Pseudo Gas Pressure.

**Q4)** Describe different ways of calculating static and flowing bottom hole pressures. [16]

## SECTION - II

**Q5)** Calculate the flow capacity of the pipeline using the three approximations of single phase gas flow in a horizontal pipeline, if the following data is given : [18]

- a)  $P_1 = 550 \text{ psi}$
- b)  $P_2 = 250 \text{ psi}$
- c)  $T = 95 \text{ deg F}$
- d)  $L = 100 \text{ miles}$
- e)  $D = 10 \text{ inches}$
- f) Specific gravity of gas = 0.65

**Q6)** a) Draw a detailed diagram of centrifugal compressor and label all its parts, along with a brief explanation of its operation. [10]

b) What are the differences between a reciprocating and a centrifugal compressor? [6]

**Q7)** a) Explain all the constants in the gas flow meter equation. [11]

b) Pick the correct answer : [5]

i) In the transient flow regime's equation :

- 1) Time is a parameter.
  - 2) Time is not a parameter.
  - 3) Time is a parameter sometimes, but not always.
  - 4) All of the above.
- ii) At any given time in the producing life of a reservoir, the fluid flow regime may be characterized by :
- 1) Either A) transient, B) natural depletion, C) constant state
  - 2) Either A) transient, B) water influx, C) pseudo-steady state
  - 3) Either A) transient, B) pseudo-steady state, C) steady state
  - 4) Either A) steady state, B) inflow performance, C) transient state.
  - 5) All of the above.
- iii) Darcy's equation corresponds to :
- 1) Laminar flow in porous media.
  - 2) Turbulent flow in porous media.
  - 3) Laminar and turbulent flow in porous media.
  - 4) All of the above.
  - 5) None of the above.
- iv) The non-Darcy flow coefficient accounts for the non-Darcy effects due to turbulence. Where do you think these effects are most dramatic?
- 1) They are never dramatic during the gas flow of a reservoir.
  - 2) They are most dramatic at the outer boundary of the reservoir
  - 3) They are most dramatic at the near-wellbore region.
  - 4) None of the above.

- v) For using a conventional vertical well IPR equation for a vertical fractured well purpose, what would you change.
- 1) Nothing.
  - 2)  $r_w$  and  $r_e$
  - 3)  $r_w$  has to be substituted for equivalent wellbore radius  $r_w$ .
  - 4) bottomhole flowrate is replaced by surface flowrate.
  - 5) None of the above.

- Q8)** a) What is the criteria for choosing a CO<sub>2</sub> removal process.  
 b) Draw a process flow diagram showing the removal of Carbon dioxide.

[16]

**List of formulas :**

1. Function of pressure ratio for gas flow through restrictions

$$F = \left\{ \left[ \left( \frac{p_2}{p_1} \right)^{2/k} - \left( \frac{p_2}{p_1} \right)^{(k+1)/k} \right] \right\}^{1/2}$$

2. Flowrate at which erosion occurs

$$(q_{sc})_e = 1.86 \times 10^5 A \left( \frac{p}{zT\gamma g} \right)^{0.5}$$

3. In field units, the pressure drop for a single phase gas is given by :

$$-\frac{dp}{dL} = 5.057 \times 10^{-17} \cdot \frac{f\gamma_g q_{sc}^2 z T}{d^5} \cdot \frac{1}{p} + 0.01875 \frac{\gamma_g}{z T} \sin \theta \cdot p$$

4. Provide Standing-Katz z-factor chart.

$$5. \quad V_o = 133,316 \gamma_o / M_o$$

$$6. \quad \gamma_o = 141.5 / (131.5 + API)$$

$$7. \quad \text{Charles' Law} = V_1 / V_2 = T_1 / T_2$$

$$8. \quad M_o = 42.43 \gamma_o / (1.008 - \gamma_o)$$

$$9. \quad \gamma_g = R_g \gamma_{sep} + 4603 \gamma_o / (R_g + V_o)$$

$$10. \quad C' = F_b F_{tb} F_{pb} F_g F_{tf} F_r F_{pv} F_m Y$$

$$11. \quad \text{Ideal gas Law} = PV = nRT$$

$$12. \quad q_{sc} = C' (h_w p_f)^{1/2}$$

$$13. \quad \text{Weymouth Equation}$$

$$f = \frac{0.014}{d^{1/3}} \quad q_{sc} = 8.4038 \times 10^8 \sqrt{\frac{(p_1^2 - p_2^2) d^{16/3}}{\gamma_g z TL}}$$

$$14. \quad \text{Panhandle A Equation}$$

$$f = \frac{0.085}{N_{Re}^{0.147}} \quad \text{and} \quad q_{sc} = 1.3919 \times 10^9 \left( \frac{p_1^2 - p_2^2}{z TL} \right)^{0.5394} \left( \frac{1}{\gamma_g} \right)^{0.4604} d^{2.6182}$$

$$N_{Re} = 1667 \frac{q_{sc} \gamma_g}{\mu_g d}$$

15. Panhandle B Equation

$$f = \frac{0.015}{N_{Re}^{0.0392}} q_{SC} = 1.1912 \times 10^9 \left( \frac{p_1^2 - p_2^2}{z T L} \right)^{0.510} \left( \frac{1}{\gamma_g} \right)^{0.49} d^{2.53}$$

16. Pseudo-steady state radial flow of gas in a reservoir

$$q = \frac{k h m [(\bar{p}) - m(p_{wf})]}{1424 T \left[ \ln \left( \frac{0.472 r_e}{r_w} \right) + s + D q \right]} \quad q = \frac{k h (\bar{p}^2 - p_{wf}^2)}{1424 \bar{\mu} \bar{z} T \left[ \ln \left( \frac{0.472 r_e}{r_w} \right) + s + D q \right]}$$

17. Radial flow of compressible gases, in field units

$$Q_g = \frac{k h [m(p_e) - m(p_w)]}{1422 T \left( \ln \frac{r_e}{r_w} \right)} \quad Q_g = \frac{k h [p_r^2 - p_w^2]}{1422 T (\mu_g z)_{avg} \left( \left[ \ln \frac{r_e}{r_w} \right] \right)}$$

18. Pseudo Steady State flow of gas in the reservoir

$$q_{SC} = \frac{k h [m(p_r) - m(p_{wf})]}{1422 T \left[ \ln \frac{r_e}{r_w} - \frac{3}{4} + s + D Q_g \right]} \quad Q_g = \frac{703 \times 10^{-6} k h [p_r^2 - p_w^2]}{T (\mu_g z)_{avg} \left( \left[ \ln \frac{r_e}{r_w} - \frac{3}{4} + S \right] \right)}$$

19. For a separator design, the gas capacity at standard conditions is given by :

$$q = \frac{2.40 (D)^2 (K)(p)}{z(T+460)} \left[ \frac{\rho L - \rho g}{\rho g} \right]^{0.5}$$

20. Nikuradse equation for rough wall pipe calculations

$$\frac{1}{\sqrt{f}} = 1.74 - 2 \log \left( \frac{2e}{D} \right)$$

21. Colebrook and While equation for Reynold's number calculations

$$\frac{1}{\sqrt{f}} = 1.74 - 2 \log \left( \frac{2e}{D} + \frac{18.7}{N_{Re} \sqrt{f}} \right)$$

22. Boyle's Law  $P_1 V_1 = P_2 V_2$ .

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Total No. of Questions : 8]

SEAT No. :

P1092

[Total No. of Pages : 2

[4264] - 205

**B.E. (Petroleum Engineering)**

**REFINING AND PETROCHEMICAL TECHNOLOGY**  
**(2003 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.

**SECTION - I**

- Q1)** a) Describe with flowsheet the absorption method for production of LPG. [12]  
b) Write a note on types, properties and applications of petroleum coke. [6]
- Q2)** a) Describe with diagram the two stage electrostatic desalting of crude oil. [12]  
b) Describe any one method used for dewaxing of tube oil. [4]
- Q3)** a) Describe with flowsheet the process of catalytic hydrodesulphurization. [12]  
b) Write a note on composition of petroleum. [4]
- Q4)** a) Describe with flowsheet the process of delayed coking. [12]  
b) Write a note on bitumen blowing. [4]

**SECTION - II**

- Q5)** a) Describe with flowsheet the oxidation dehydrogenation process for manufacture of formaldehyde from methanol. [12]  
b) Mention end uses of butadiene and ethylene glycol. [6]

**Q6)** a) Describe with flowsheet the process for conversion of ethylene to ethylene oxide. [12]

b) Mention health and handling precautions of acetic acid. [4]

**Q7)** a) Describe with flowsheet any one process for manufacture of isopropanol. [12]

b) Mention applications of methanol and acetone. [4]

**Q8)** a) Describe with flowsheet the process for conversion of acetaldehyde to acetic acid by oxidation. [12]

b) Explain : [4]

i) Aniline point and diesel index.

ii) API gravity of crude oil.

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Total No. of Questions : 8]

SEAT No. :

P980

[Total No. of Pages : 2

[4264] - 210

B.E. (Petroleum Engg.)

**OIL WELL DRILLING ENGINEERING**  
**(2003 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) 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) What is geo technical order? [9]  
b) Discuss drill string design for directional well in detail. [9]
- Q2)** a) What is hydraulics? Discuss various factors to optimize it. [8]  
b) Discuss Mohr's coulomb criteria of rock failure in brief [8]
- Q3)** a) Discuss Type II directional well geometry to find measured depth or length along hole to order casing. [10]  
b) Discuss survey method -Radius of curvature in detail. [6]
- Q4)** Write short note : [16]  
a) LWD  
b) Positive displacement motor  
c) Tool face orientation  
d) Gyroscope

**P.T.O.**

## **SECTION - II**

- Q5)*** a) During pressure test calculate net burst load at casing shoe. Data given as 9–5/8" casing set at 9750 ft, mud weight 11.5 ppg, Top of cement at 3000 ft, previous casing shoe at 1500 ft, pressure Test carried at 3000 psi. [6]
- b) Discuss casing seat / shoe depth selection procedure in detail. [10]
- c) Define casing burst pressure & collapse pressure in brief. [2]
- Q6)*** a) Discuss liner cementation in detail. [8]
- b) Discuss drilling operations on floating rig. [8]
- Q7)*** What are different causes of kick. Discuss indications of well kick and describe driller's method of well control in detail. [16]
- Q8)*** Write short notes on : [16]
- a) Accumulator system of BOP.
  - b) Leak off Test.
  - c) UTM co-ordinate system
  - d) Types of horizontal wells.

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Total No. of Questions : 10]

SEAT No. :

P1095

[Total No. of Pages : 2

[4264] - 225

**B.E. (Petrochemical Engineering)  
ENVIRONMENTAL ENGINEERING  
(2003 Pattern) (Elective - I) (Sem. - 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 electronic pocket calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) What is Ozone Layer depletion? What is effect of ozone layer depletion on global warming? [8]  
b) How is municipal waste treated? Can it be reused? [6]  
c) What do you mean by biodiversity? [2]

OR

- Q2)** a) What is hazardous waste? How it is treated? [6]  
b) How is municipal solid waste collected and treated presently? [6]  
c) How the nature maintains the water cycle? [4]

- Q3)** a) State the effects of Air Pollution on health and vegetation? [8]  
b) What are the air pollution laws for cement factory? [8]

OR

- Q4)** a) For process generating sulphur dioxide emission, what would you suggest in order to follow the present air pollution control laws? [8]  
b) A high efficiency cyclone with diameter one meter handles  $3 \text{ m}^3/\text{s}$  of standard air carrying particles with a density of  $2000 \text{ kg/m}^3$ . For effective number of turns ( $N_e$ ) = 6, determine the cut size. What will be the cut size for a conventional cyclone? The Viscosity of gas ( $\mu_g$ ) =  $1.81 \times 10^{-5} \text{ kg/(m.s)}$  the density of the gas. [8]

**P.T.O.**

- Q5)** a) Write in details about Gaussian plume model. [9]  
 b) Which are the different air pollutants? [5]  
 c) What are the air pollutants generated in thermal power station? [4]

## **SECTION - II**

- Q6)** a) What are the general standards for quality of water for different purposes? [8]  
 b) State water pollution control laws / standards for discharge to sea water. [8]

OR

- Q7)** a) What is COD consist of? What is difference in COD and BOD? [6]  
 b) Determine the 12-day demand of a wastewater at 20°C if its 5-day BOD at the same temperature is 400 mg/L. Also, calculate the 5 - day BOD at 27°C as well as 37°C temperature. [10]

Data

- i)  $\theta = 1.053$
- ii) Reaction Rate constant ( $k$ ) (base e. 20°C) = 0.23 per day.

- Q8)** a) Discuss in detail about how liquid effluent from petrochemical Complex is treated. [8]  
 b) Discuss how waste from fertilizer industry is treated. [8]

OR

- Q9)** a) Write Source, Characteristics and methodology for treatment of Industrial waste from dairy wastewater. [8]  
 b) Elaborate on difference between suspended growth and attached growth process. [8]

- Q10)** Write short note on following (Any Four). [18]
- a) Role of adsorption in advanced waste water treatment.
  - b) Biochemical Oxygen Demand.
  - c) Sludge treatment & disposal.
  - d) Trickling filter.
  - e) Sludge volume index (with formula).



Total No. of Questions : 12]

SEAT No. :

P1320

[Total No. of Pages : 3

[4264] - 231

**B.E. (Polymer)**

**POLYMER STRUCTURE AND PROPERTY RELATIONSHIP**  
**(2003 Pattern) (Semester - I) (Backlog)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) Answers to Section - I and Section - II should be written on separate answer book.
- 2) Solve 3 questions from Sections - I and 3 questions from Section - II.
- 3) Neat diagrams should be drawn wherever necessary.
- 4) Figures to the right indicate full marks.
- 5) Assume suitable data, if necessary.
- 6) Use of electronic pocket calculator is allowed.

**SECTION - I**

- Q1)** a) Explain the principle causing moisture absorption in polymers. Which bonds are responsible for moisture absorption in N 66 and PET? [5]  
b) What are ladder polymers? With suitable example explain why ladder polymers are most stable to heat. [6]  
c) Explain the role of good and bad solvent in paint formulation. [4]  
d) What imparts flexibility in elastomers? [3]

OR

- Q2)** a) How will you differentiate between crystalline and amorphous polymers? Comment on the advantages as well as disadvantages of both the types. [4]  
b) Comment on the effect of aliphatic as well as aromatic C-H bonds present in structure on the polymer properties. [6]  
c) Write a short note on types of bonds formed by carbon atom with other atoms. [8]

- Q3)** a) Although methyl group is present in PMMA as well as Natural rubber, one is rigid while the other is soft. Why? [4]  
b) Why modulus of Nylon is higher than polyolefins? [4]  
c) Briefly explain how brittle nature of polystyrene can be modified. [4]  
d) Comment on role of chemical groups in adhesion. [4]

**P.T.O.**

OR

- Q4)** a) Explain how polarity affects the polymer properties. [5]  
b) Is it possible to have 100% crystalline as well as 100% amorphous polymers? What are the various factors affecting crystallinity in polymers. [6]  
c) Briefly explain the concept of liquid crystalline nature of polymer. [5]

- Q5)** a) What do you understand by dielectric constant, dissipation factor, volume and surface resistivity? Explain their role in understanding electrical properties of polymers. [8]  
b) Write a short note on Conducting Polymers. [5]  
c) Why presence of halogens in structure makes polymer self-extinguishing? [3]

OR

- Q6)** a) What do you understand by the terms MWD, and narrow and broad MWD? Explain in brief the method to obtain these? Comment on their role in polymer processing. [8]  
b) Explain the role of stabilizers and plasticizers in defining polymer properties. Also explain how do they function? [8]

## SECTION - II

- Q7)** a) Between PS and LDPE which one has higher creep? Justify your answer. [4]  
b) What is molecular flexibility? How does it affect polymer properties? [8]  
c) Explain what is potential energy barrier? [6]

OR

- Q8)** a) Write a short note on Freedom of Rotation of bonds. [6]  
b) With suitable examples explain how branching and tacticity affects polymer flexibility. [6]  
c) Explain the effect of quenching on crystallization of polymer. Give suitable examples. [6]

- Q9)** a) Write a short note on “Effect of Thermodynamic Factors on Polymer Crystallinity”. [8]  
b) Explain the difference between crystallinity and orientation. Explain their effects on polymer properties. [8]

OR

- Q10)** a) Write a short note on “Effect of Kinetic Factors on Polymer Crystallinity”. [8]  
b) How symmetry of polymer structure affects crystallinity? Give suitable examples. [4]  
c) Explain the effect of test parameters on the results of tensile testing. [4]

- Q11)** a) Explain in detail WLF equation and various terms and their significances. [8]  
b) What do you understand by intermolecular bonding? With suitable examples explain how does it affect polymer properties. [8]

OR

- Q12)** a) What are intermolecular forces present in Nylons? [4]  
b) Write a short note on “Time-Temperature Superposition” concept in polymers. [6]  
c) What is CED? Explain in role in understanding solubility properties of polymers. [6]

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Total No. of Questions : 12]

SEAT No. :

P1321

[Total No. of Pages : 4

[4264] - 251

**B.E. (Computer Engineering)**

**DESIGN AND ANALYSIS OF ALGORITHMS**

**(2003 Pattern) (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 whenever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) What is worst case, average case and best case time complexity of an algorithm? Write a the selection sort algorithm and Analyze the same to find out its worst case, average case and best case complexity. [10]
- b) Solve the following recurrence using recurrence relation
- $$\begin{aligned} t_n &= n && \text{if } n = 0, 1 \\ &= 2t_{n-1} - 2 t_{n-2} && \text{otherwise} \end{aligned}$$
- [6]

OR

- Q2)** a) What is worst case, average case and best case time complexity of an algorithm? Write a the Binary search and Linear search algorithm and Analyze the same to find out its worst case, average case and best case complexity. [10]
- b) Solve the following recurrence relations :
- i)  $t(n) = 3t(n-1) + n$ ,  $n \geq 1$ , Initial condition  $t(0) = 1$
  - ii)  $t(n) = 4t(n-1) + 5$ ,  $n \geq 1$ , Initial condition  $t(0) = 2$
- [6]

- Q3)** a) Some friends of your work on wireless networks, and they are currently studying the properties of network of  $n$  mobile devices. As the devices move around, they define a graph of any point in time as follows : there is node representing each of the ' $n$ ' devices, and there is an edge between device  $i$  and  $j$  if the physical locations of  $i$  and  $j$  are no more than 500 meters apart.

**P.T.O.**

They had like it to be the case that the network of devices is connected at all times and so they have constrained the motion of devices to satisfy the property : at all times, each device  $i$  is within 500 meters of at least  $n/2$  of the other devices (assume  $n$  is an even number)

In other word the property is “Let  $G$  be a graph on  $n$  nodes, where  $n$  is an even number. If every node of  $G$  has degree at least  $n/2$ , then  $G$  is connected”

- i) Does this property by itself guarantee that the network will remain connected?
  - ii) Decide whether you think claim is true or false?
  - iii) Give a proof of either claim or its negation. [10]
- b) Determine the running time of quicksort for [8]
- i) Sorted input
  - ii) Random input

When pivot element is chosen as

- i) The first element
- ii) A random element

OR

**Q4)** a) Trace the action of binary search algorithm, including listing the value of Low, High and Mid after each iteration, for the list  $\{2,3,5,7,11,13,17,19,23,29,31,37\}$  for each of the following search elements. [10]

- i)  $X = 3$
- ii)  $X = 24$
- iii)  $X = 108$
- iv)  $X = 13$

b) Design and analyze a divide and conquer algorithm for finding the maximum and minimum number in an array that uses  $[3n/2] - 2$  comparison for any  $n$  - number of elements. [8]

**Q5)** a) Trace the action of Huffman coding algorithms using greedy method for the letters  $\{a,b,c,d,e,f,g,h\}$  occurring with frequencies  $\{10,7,3,5,9,2,3,2\}$ . [8]

b) Explain How Greedy strategy is applied in minimum spanning tree problem? Analyze the Kruskal's algorithm using greedy algorithm. [8]

OR

- Q6)** a) Calculate the average complexity  $A(n)$  of linear search assuming that both of the following two assumptions about the input list  $L[0:n-1]$  and search element  $X$  hold.
- i) The probability that  $X$  occurs in the list is  $2/3$
  - ii) Given that  $X$  occurs in the list,  $X$  is twice as likely to occur in the first half of the list position 0 to  $[n/2] - 1$  as in the second half. Further if  $X$  occurs in the first half of the list it is equally likely to occur in any position in the first half. A similar assumption is made about the second half. [8]
- b) Discuss the randomized quick sort algorithm? And analyze this randomized quick sort algorithm for its complexity. [8]

## SECTION - II

- Q7)** a) Explain the traveling salesman problem as dynamic programming algorithmic strategy? Discuss the time and space complexities. Find out the solution for following example

	City1	City2	City3	City4
Pers1	0	10	15	20
Pers2	5	0	9	10
Pers3	6	13	0	12
Pers4	8	8	9	0

[12]

- b) What is dynamic programming approach to solve the problem? Explain with suitable example. [6]

OR

- Q8)** a) Consider the following instance of Knap sack problem :  $n = 6$ ,  $(p_1, p_2, p_3, p_4, p_5, p_6) = (w_1, w_2, w_3, w_4, w_5, w_6) = (100, 50, 20, 10, 7, 3)$  and  $M = 165$ . Solve the problem using Dynamic programming approach.[12]
- b) What is principle of optimality? Which algorithmic strategy use this principle? Explain with suitable example. [6]

- Q9)** a) Solve the sum of subset problem using backtracking algorithmic strategy for the following data.

$N = 4$  ( $w_1, w_2, w_3, w_4$ ) = (11, 13, 24, 7) and  $M = 31$ . [8]

- b) Consider the following instance for knapsack problem using backtracking  $n = 8$   $P = (11, 21, 31, 33, 43, 53, 55, 65)$   $W = (1, 11, 21, 23, 33, 43, 45, 55)$   $M = 110$  [8]

OR

- Q10)** a) Solve the sum of subset problem using backtracking algorithmic strategy for the following data

$N = 4$  ( $w_1, w_2, w_3, w_4$ ) = (11, 13, 24, 7) and  $M = 31$  [8]

- b) Discuss and analyze the problem of finding Hamiltonian cycle using backtracking. [8]

- Q11)** a) Show that both P and NP are closed under the operation union, intersection, concatenation and kleen closure (\*). [10]

- b) Show that an infinite recursively enumerable set has an infinite recursive subset. [6]

OR

- Q12)** a) Write an algorithm for Depth First Search algorithm in Graph using suitable data structure. What is the complexity of the algorithm? If we have not use this data structure can still we implement the same algorithm, if yes what is its complexity? [8]

- b) Explain the branch and bound algorithmic strategy for solving the problem, take an example of traveling salesman problem using branch and bound. [8]

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Total No. of Questions : 12]

SEAT No. :

P1099

[Total No. of Pages : 2

[4264] - 255

**B.E. (Computer Engg.)**  
**IMAGE PROCESSING**

**(2003 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) *Assume suitable data, if necessary.*

**SECTION - I**

**Q1)** a) Define Digital Image, Digital Image Processing. State Applications of Image Processing. [8]

b) List and explain different Image orthogonal transform. [8]

OR

**Q2)** a) Write a note on Digital Imaging Hardware and Software. [8]

b) Define vector Algebra. Explain the need of Vector algebra in Image Processing. [8]

**Q3)** a) Explain the steps involved in Image Digitization Process. [8]

b) State and explain different types of image and their properties. [8]

OR

**Q4)** a) Explain aliasing in the context of image sampling. How it can be avoided? [8]

b) Explain a simple Image formation model. [8]

**Q5)** a) What is the need for Image compression? Explain redundancy in images. Explain Image-compression scheme. [10]

b) What is meant by image enhancement? What are the different types of image enhancement techniques? [8]

OR

**P.T.O.**

- Q6)** a) What is image restoration? Explain the different ways for estimation of degradation model. [8]  
b) Explain lossy and loss-less image compression. [10]

## **SECTION - II**

- Q7)** a) What is image segmentation? What are the basic approaches for segmenting an image? [8]  
b) Explain identification of isolated points, lines and edges with respect to image segmentation. [8]

OR

- Q8)** a) Explain different approaches for object recognition. [8]  
b) Explain region based segmentation. [8]

- Q9)** a) What is a color space? Mention and explain different color spaces. [10]  
b) What is meant by pseudo coloring? For what purpose is it useful? Explain how a pseudo colored image can be obtained. [8]

OR

- Q10)** a) Explain the effects of the dilation and erosion process. [10]  
b) Give an application of morphological operations in the field of Image Processing. [8]

- Q11)** a) Write a short note on Medical Image processing. [8]  
b) What is the need and application of image processing in multimedia. [8]

OR

- Q12)** a) Explain the role of Image processing in water marking. [8]  
b) Write a note on Satellite Image Processing. [8]



Total No. of Questions : 12]

SEAT No. :

P1100

[Total No. of Pages : 3

[4264] - 256

**B.E. (Computer Engineering)**

**ADVANCED DATABASES**

**(2003 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.*

**SECTION - I**

**Q1)** a) What is skew? What are its type? How it is handled in parallel databases? [9]

b) Explain the following with respect to parallel database systems. [8]  
i) Parallel External Sort-Merge  
ii) Fragment and replicate join

OR

**Q2)** a) Compare the three partitioning techniques of parallel database with respect to [9]

- i) Scanning the entire relation.
- ii) Locating the tuple associatively.
- iii) Locating the tuple for which the value is in specific range.

b) What is meant by cache coherency problem in parallel databases? Explain different approaches to handle cache coherency problem. [8]

**Q3)** a) Define distributed databases. Explain types of distributed database management system architectures. [8]

b) Explain optimistic methods for distributed concurrency control. [5]  
c) Explain lazy propagation. [4]

OR

**P.T.O.**

- Q4)** a) Explain any two locking protocols with respect to distributed databases. [6]  
 b) Define semi-join. Compute semi-join  $r \alpha s$  for the relation  $r$  and  $s$ . [6]

Relation r			Relation s		
A	B	C	C	D	E
1	2	3	3	4	5
4	5	6	3	6	8
1	2	4	2	3	2
5	3	2	1	4	1
8	9	7	1	2	3

- c) Explain Heterogeneous distributed databases? [5]
- Q5)** a) What is three tier architecture? Explain its advantage? [8]  
 b) Explain in detail the XML document. [8]

OR

- Q6)** a) Describe the various issues for efficient evaluation of XML queries. [8]  
 b) Write short notes on : [8]  
     i) SOAP  
     ii) Client-server architecture

## SECTION - II

- Q7)** a) Define data warehouse. Explain data warehouse schemas with example. [8]  
 b) Write short notes on : [8]  
     i) Data mart  
     ii) OLAP implementation

OR

- Q8)** a) Discuss the different ways of handling missing values in data cleaning. [8]  
 b) What is a data cube? Explain any two operations on data cubes. [8]

- Q9)** a) Explain in detail APRIORI algorithm with example. [10]  
 b) Write short note on Text Mining. [6]

OR

- Q10)** a) State and explain K-means algorithm for clustering. [8]  
b) What is a decision tree? How are decision trees used for classification? [8]

- Q11)** a) Define Information Retrieval system. Describe how it is differ from database system. [6]

- b) Write short notes on : [12]
- i) TF-IDF method of ranking
  - ii) Hub/Authority Ranking
  - iii) Web Crawler

OR

- Q12)** a) Explain in detail the measuring of the retrieval effectiveness. [8]  
b) Write short notes on : [10]
- i) Ranking Document Similarity
  - ii) Inverted Index

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Total No. of Questions : 12]

SEAT No. :

P1412

[Total No. of Pages : 2

[4264] - 258

**B.E. (Computer Engineering)**  
**MULTIMEDIA SYSTEMS**

**(2003 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 electronic pocket calculator and is allowed.*
- 6) *Assume suitable data, if necessary.*

**SECTION - I**

**Q1)** a) What are the elements of hypertext? How hypermedia is different from hypertext? [8]

b) What is authoring tool? Describe the basic characteristics of requirements for selecting an authoring tool. [8]

OR

**Q2)** a) Explain Goals & Objectives of Multimedia. [8]

b) What is streaming? How it is useful in multimedia application development? List the protocols used in streaming. [8]

**Q3)** a) Explain how windows supports the multimedia applications in terms of [8]  
i) Resource Reservations ii) Process Management

b) Explain bitmap file format? Explain special features of .bmp files. [8]

OR

**Q4)** a) What is MMDBMS? Explain the characteristics of MMDBMS. [8]

b) Differentiate between Multimedia file system and Conventional file system. [8]

**Q5)** a) What is image enhancement? Explain how it is achieved using the contrast stretching and histogram equalization. [8]

b) Explain in details the JPEG - DCT coder. [10]

OR

**P.T.O.**

- Q6)** a) Explain how image is captured and stored in computers? [8]  
b) Explain Shannon-Fano compression algorithm by taking a suitable example. [10]

## **SECTION - II**

- Q7)** a) Which are the different layers in MPEG? Define and explain I, P and B frames with reference to MPEG. [8]  
b) Discuss the factors that determine size of file and quality of sound for audio capture and playback. What are various chunks present in a sound file stored as WAV format? [8]

OR

- Q8)** a) Generate the Huffman encoding tree and codes for the example- Characters A, B, C, D and E have the following probability of occurrence :  $p(A) = 0.16$ ,  $p(B) = 0.51$ ,  $p(C) = 0.09$ ,  $p(D) = 0.13$ ,  $p(E) = 0.11$ . [8]  
b) Explain AVO and AVI file formats of audio. [8]

- Q9)** a) What is Virtual Reality? Explain any two Virtual Reality devices. [8]  
b) Explain features of VRML 2.0 using examples. Write VRML pseudo code for basic objects like cone and cylinder. [10]

OR

- Q10)** a) Explain any two applications of Virtual reality. [8]  
b) Write a pseudo code for implementing a virtual garden using VRML.[10]

- Q11)** a) Explain different techniques of animation. [8]  
b) Discuss impact and use of -  
i) Interpolation                    ii) Parameter Curve editing  
iii) Inverse Kinematics        iv) Motion Paths  
in the development of animations.

OR

- Q12)** Write short notes on followings (Any 3) [16]
- a) MIDI
  - b) 2D and 3D Animations
  - c) Windows support for Multimedia
  - d) Multimedia over IP



Total No. of Questions : 10]

SEAT No. :

P1103

[Total No. of Pages : 2

[4264] - 277

B.E. (IT)

## ORGANISATIONAL BEHAVIOUR & MANAGEMENT CONCEPTS

(2003 Pattern) (Theory) (Elective - I) (Semester - I)

Time : 3 Hours]

/Max. Marks : 100

Instructions to the candidates:

- 1) *Questions 5 & 10 are compulsory.*
- 2) *Solve any two from remaining each section.*
- 3) *Answers to the two sections should be written in separate books.*
- 4) *Figures to the right indicate full marks.*

### SECTION - I

- Q1)** What is organisational behaviour? What is the importance of study of OB in work situations? [16]
- Q2)** Define motivation. Explain Herzberg's two factor theory of motivation. [16]
- Q3)** What is stress? What are its sources? How to overcome stress? [16]
- Q4)** Describe the process of Human Resource Planning. How do we improve efficiency of employees through HR planning? [16]
- Q5)** Write short notes on any three : [18]  
a) Levels of conflict  
b) Communication competency  
c) Team effectiveness  
d) Conflict management  
e) Measurement of morale.

P.T.O.

## **SECTION - II**

**Q6)** What do you understand by the term organisational culture? What are its characteristics? Give examples. **[16]**

**Q7)** Describe various forces responsible for change. Why do people resist change? **[16]**

**Q8)** “Organisational structure has great effect on human behaviour” Do you agree? Why? **[16]**

**Q9)** What are the various techniques of organisation development? Explain any one giving its advantages and disadvantages. **[16]**

**Q10)** Write short notes on any three : **[18]**

- a) Empowerment
- b) Benchmarking
- c) Conflict resolution
- d) Organisation climate
- e) Learning organisations



Total No. of Questions : 12]

SEAT No. :

P986

[Total No. of Pages : 2

[4264] - 280

B.E. (IT)

## INFORMATION RETRIEVAL (2003 Pattern) (Sem. - 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)** What is Stop word removal and stemming? Explain TF, IDF and TF-IDF. [18]

OR

**Q2)** Explain : Single Link algorithm and probabilistic indexing. [18]

**Q3)** a) Explain suffix trees and suffix arrays. [8]  
b) Explain cluster based retrieval. [8]

OR

**Q4)** a) How is hierachic classification implemented? [8]  
b) Explain different IR Models. [8]

**Q5)** a) What is SQL3? Write formulae for precision and recall. [8]  
b) Discuss Retrieval Performance evaluation. [8]

OR

**Q6)** a) From HCI point of view, what considerations should be given while designing a search engine? [8]  
b) Write short notes on : Dendograms and TREC collections. [8]

**P.T.O.**

## **SECTION - II**

- Q7)** a) Explain : digital libraries prototypes and representations. [8]  
b) Discuss cataloguing using MARC record. [8]

OR

- Q8)** a) Discuss document models in digital libraries. [8]  
b) What is digital library and digital library standards? [8]

- Q9)** a) Explain generic multimedia index approach. [9]  
b) Explain GEMINI algorithm. State its use. [9]

OR

- Q10)** Write short notes on : [18]  
a) Automatic feature extraction.  
b) MULTOS.

- Q11)** a) Compare parallel and distributed IR. [8]  
b) Explain distributed architecture of a search engine. [8]

OR

- Q12)** a) Explain source selection with respect to Distributed IR. [8]  
b) Write notes on : meta searchers and MIMD architecture. [8]

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Total No. of Questions : 12]

SEAT No. :

P1029

[Total No. of Pages : 4

[4264] - 31

**B.E. (Mechanical and Mechanical S/W)  
CAD/CAM AND AUTOMATION  
(2003 Pattern) (Semester - II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) Answer any Three questions from each Section.
- 2) Answers to the two sections should be written in separate books.
- 3) Figures to the right indicate full marks.
- 4) Use of electronic calculator is allowed.
- 5) Assume suitable data, if necessary.

**SECTION - I**

- Q1)** a) A rectangle ABCD has vertices A(2, 2), B(4, 2), C(4, 4) and D(2, 4). It has to be rotated by 90 degree about point P(3, 3). Determine : [8]  
i) The composite transformation matrix.  
ii) The new coordinates of rectangle.  
b) What does mapping mean? What are the various applications for which mapping can be used? [8]

OR

- Q2)** a) A triangle ABC has vertices A(0, 0), B(4, 0) and C(0, 4). It has to be reflected about line BC. Determine : [8]  
i) The composite transformation matrix.  
ii) The new coordinates of rectangle.  
b) Write a short note on transformation matrix for Orthographic and Isometric projections. [8]

- Q3)** a) Explain various methods to control the shape of B-spline Curve. [8]  
b) What are the types of surfaces that CAD/CAM system uses? [4]  
c) Explain parametric representation of a surface. [4]

OR

**P.T.O.**

**Q4)** a) Find the [8]

- Tangent to a given circle and given line with a given radius.
- Tangent two lines passing through a given point.

b) Explain following : [8]

- Bezier Surface
- B-Spline surface

**Q5)** a) Explain, with suitable examples, the plane stress and plane strain condition. [4]

b) What is the transformation matrix? Obtain the transformation matrix for the two dimensional plane truss element. [4]

c) Consider a thin tapered plate with 6 inches width at top and 3 inches width at bottom having a length of 24 inches and uniform thickness of 1 inch. The material of the plate is steel having Young's modulus  $E = 30 \times 10^6$  psi and weight density  $0.28 \text{ lb/in}^3$ . In addition to its self weight, the plate is subjected to point load  $P = 100 \text{ lb}$  at its midpoint. [10]

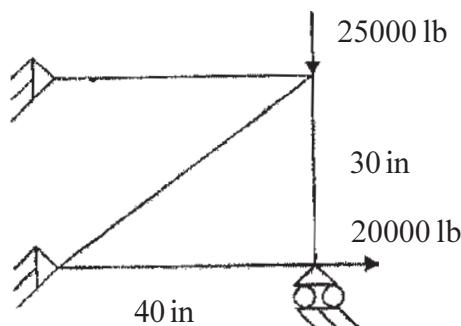
- Model the plate with two finite elements.
- Using elimination approach, solve for the global displacement vector.
- Evaluate stress in each element.

Determine the reaction force at support.

OR

**Q6)** a) Consider the four bar truss shown in the figure. It is given that  $E = 29.5 \times 10^6$  psi and  $A = 1 \text{ in}^2$  for all elements. [10]

- Using elimination approach, solve for the global displacement vector.
- Evaluate stress in each element.
- Determine the reaction force at support.



- b) Using the energy method, derive an expression for the element stiffness matrix of the two noded one-dimensional elements. [4]
- c) Discuss the various steps used in the finite element method. [4]

## **SECTION - II**

**Q7)** a) A constant strain triangle element is defined by three nodes at (1.5, 2), (7, 3.5) and (4, 7). Evaluate the shape functions N1, N2 and N3 at the interior point P (3.85, 4.8). Also determine the Jacobian of the transformation J. [8]

- b) Explain how symmetry is used in FEA with applications. [8]

OR

**Q8)** a) Explain how following problems are modeled and solved. [8]

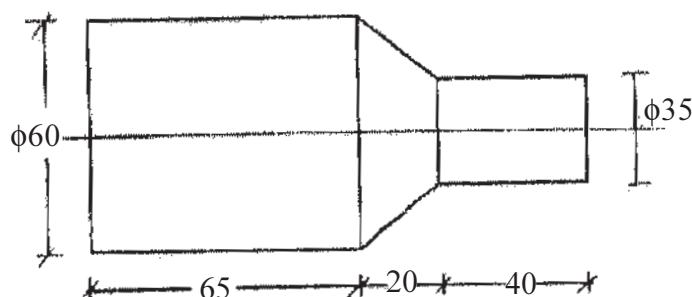
- i) Cylinder subjected to internal pressure.
- ii) Infinite cylinder with external pressure
- iii) Press fit of a ring on a rigid shaft
- iv) Press fit of elastic sleeve on a elastic shaft.

b) Explain shape function and transformation matrix for four noded quadratic elements. [8]

**Q9)** a) Explain the following terms with suitable example for CNC system. [8]

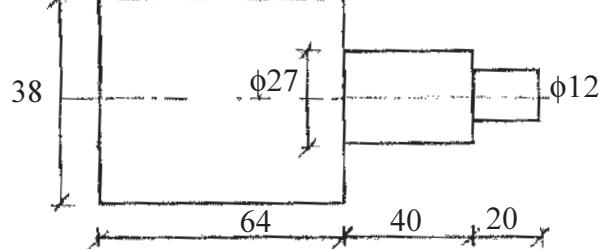
- i) Do loops
- ii) Preparatory functions
- iii) Dwell

b) Write a manual part program for finishing a forged component as shown in the figure. Assume the speed and feed on the turning centre as 300 rpm and 0.5 mm/rev. assume 0.75 mm material is to be removed from external diameter. [8]



OR

- Q10)** a) Write down step by step procedure to machine any job on any CNC system. [6]
- b) Write a manual part program for component as shown in the figure. The size of the raw material is  $\phi 40 \times 125$ . Assume suitable machining data. [10]



- Q11)** a) Write a short note on Robot sensors. [6]
- b) Sketch and explain the work envelope for various configuration of a robot? [6]
- c) What are the different FMS layout configurations? [6]

OR

- Q12)** a) What are different types of joints used in Robot? [6]
- b) What are the Advantages and Limitations of Automation? [6]
- c) Explain the concept of hard and soft automation, with suitable example. [6]

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Total No. of Questions : 12]

SEAT No. :

P962

[Total No. of Pages : 3

[4264] - 61

**B.E. (Production Engineering)  
CAD/CAM/CIM  
(2003 Pattern) (Semester - II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION - I**

**UNIT - I**

- Q1)** a) Consider A SQUARE ABCD having coordinates A (2, 2) B (5, 2), C(5, 5) D(2, 5). Determine the new position of SQUARE by following transformation-rotate by  $30^\circ$  anticlockwise about A, Scaling by 2 units in X and 1.5 in Y direction. [8]
- b) Explain different operators used in modelling by Boundary representation. [7]

OR

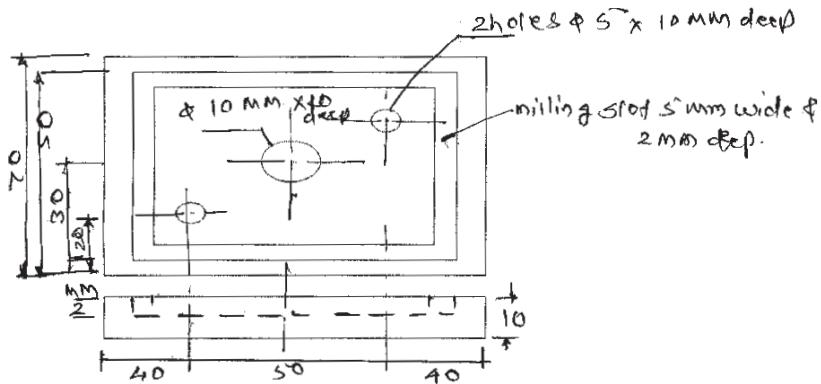
- Q2)** a) Explain the different Network topology in CAD/CAM. [7]
- b) A line XY with end points X(2, 2) and Y(5, 5), find new co-ordinates of line for following transformation- [8]
- i) Translate X 2 unit and Y 4 unit,
  - ii) Scale in x and Y direction by 1.5,
  - iii) Rotate by 50 degree in CCW,
  - iv) reflection about origin.

**UNIT - II**

- Q3)** a) Write a short note on FMS layout. [5]
- b) Explain the positioning of tool in CNC. [5]

**P.T.O.**

- c) Write a CNC program in G and M code for a part as shown in fig No.1. Also write a remark for each block. [10]



OR

- Q4)** a) What is CNC? Compare it with DNC. Write the Classification CNC M/c. [8]
- b) Explain How the Queuing model is used for maximum utilisation of machine tool. [7]
- c) Explain the concept of Petrinets. [5]

### UNIT - III

- Q5)** a) Explain different input and out put reports of MRP-I. [8]
- b) Explain the role of CAD/CAM in CIM. [7]

OR

- Q6)** a) Explain any two module of MRP-II. [8]
- b) Explain concept of CAD/CAM. [7]

### SECTION - II

### UNIT - IV

- Q7)** a) Explain with neat diagram the concept of 3D printing in RP. [8]
- b) Explain With neat sketch steriolithography RP. [7]

OR

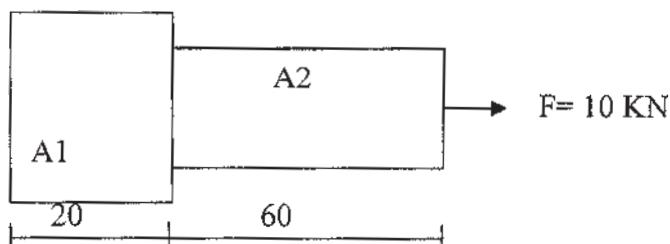
- Q8)** a) Classify RP. Explain with neat diagram the fused deposition method. [8]
- b) Explain staircase effect in RP parts. How it will be minimised. [7]

## UNIT - V

- Q9)** a) Explain the different methods of part classification in GT. [8]  
b) State and Explain the various boundary conditions used in the Engg. Problems. [6]  
c) Explain different methods of coding the parts in GT. [6]

OR

- Q10)** a) A stepped bar is made of two materials joined together as shown in following figure. The bar is subjected to an axial pull of 10kN. Determine the displacement, reaction force at support, stress of each of the section using a 1 D spar element. [14]



$$A_1 = 200 \text{ mm}^2, E_1 = 200 \text{ GPa}, A_2 = 180 \text{ mm}^2, E_2 = 120 \text{ GPa}.$$

- b) Explain the concept of cellular manufacturing. [6]

## UNIT - VI

- Q11)** a) Explain the steps in sequential engineering. [7]  
b) Explain IBM concept of CIM. [8]

OR

- Q12)** a) Explain NIST-AMRF Hierarchical Model. [8]  
b) Explain QFD is used in concurrent Engg. [7]



Total No. of Questions : 10]

SEAT No. :

P1055

[Total No. of Pages : 2

[4264] - 68

**B.E. (Production and Production S/W)**

**ERGONOMICS AND HUMAN FACTORS IN ENGINEERING**

**(2003 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) Assume suitable data, if necessary.
- 4) Figures to the right indicate full marks.

**SECTION - I**

- Q1)** a) Explain the basis for ergonomics problem identification. [9]  
b) What is biomechanics? Explain in brief. [9]

- Q2)** a) Explain in detail Manual Materials Handling Task design. [8]  
b) Explain in detail concept of percentiles used in anthropometric calculations. [8]

OR

- Q3)** a) Explain by how many means the body temperature is controlled in cold working conditions. [8]  
b) Explain any four principles of arranging components in a physical space. [8]

- Q4)** a) What is cumulative trauma disorder? What are the causative factors of CTD? [8]  
b) Write a note on luminance ratio. [4]  
c) Explain vasoconstriction due to cold stress. [4]

OR

- Q5)** a) Write a note on concept of percentile. [8]  
b) Describe the utility of work study in today's situation. [8]

**P.T.O.**

## **SECTION - II**

- Q6)** a) Describe cardiovascular and respiratory response in work physiology. [9]  
b) What are learning curves? Explain their use in HFE. [9]

- Q7)** a) Discuss effects of noise on performance. [6]  
b) Write a note on human factors application in systems design. [10]

OR

- Q8)** a) Explain significance of C/R Ratio in detail. [8]  
b) What is Hand Arm Vibration Syndrome? Explain in brief. [8]

- Q9)** a) What is WFS? What are its types? Explain Detailed WFS in brief. [12]  
b) Explain the Reach element used in MTM - 1? What are its classes? [4]

OR

- Q10)** a) Explain in brief Human Factors Application in system Design. Elaborate any two phases in detail. [12]  
b) Explain the concept of design for shift work. [4]

⌘⌘⌘

Total No. of Questions : 12]

SEAT No. :

P1058

[Total No. of Pages : 2

[4264] - 88

**B.E. (Electrical Engineering)**

**PROJECT MANAGEMENT**

**(2003 Pattern) (Elective - I) (Sem. - I) (Theory)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer of Section - I and Section - II should be written on separate answer sheets.*
- 2) *Figures to the right indicate maximum marks for the respective question.*

**SECTION - I**

**Q1)** Define ‘project’. Explain the need and characteristics of project management. [16]

OR

**Q2)** a) Explain the phases involved in project Life cycle. [8]  
b) Describe various ways of project appraisal. [8]

**Q3)** a) Explain various costs associated with a project. [8]  
b) How will you assess financial viability of a project. [8]

OR

**Q4)** a) How cost of a project is controlled? [8]  
b) Explain the causes of project failures. [8]

**Q5)** Write short notes on :

- a) Gantt chart. [6]
- b) Line of Balancing and crashing the network. [6]
- c) CPM. [6]

OR

**Q6)** Write short notes on :

- a) PERT. [6]
- b) GERT. [6]
- c) AOA and AON. [6]

## **SECTION - II**

**Q7)** Describe the elements of budget. Explain budgetary control. [16]

OR

**Q8)** Explain project cost accounting systems. Point out factors responsible for cost escalation. [16]

**Q9)** Explain the need and processes of project quality management. [16]

OR

**Q10)** Write short notes on :

- a) Quality of procured items. [8]
- b) International project management. [8]

**Q11)** Write short notes on :

- a) Certainty equivalent method. [6]
- b) Computer aided project management. [6]
- c) Adjusted discount rate method. [6]

OR

**Q12)** Write short notes on :

- a) Sources of Risks. [6]
- b) Correlation coefficient. [6]
- c) portfolio risks. [6]



Total No. of Questions : 12]

SEAT No. :

P1064

[Total No. of Pages : 2

**[4264] - 105**

**B.E. (Electronics)**

**EMBEDDED SYSTEM DESIGN**

**(2003 Pattern) (Elective - I) (Sem. - 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) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

**SECTION - I**

**Q1)** a) With the help of design metrics explain the design challenges and optimization of design. [9]

b) Discuss the recent trends in embedded systems. [9]

OR

**Q2)** a) What is an embedded system? Explain with atleast two examples. [9]

b) Explain the CAN bus and it's protocol. [9]

**Q3)** a) With suitable cases discuss the processor selection for embedded systems. [6]

b) Discuss the memory types used for embedded system design. [6]

c) Explain the code optimization. [4]

OR

**Q4)** a) Explain the architecture of DSP processor TMS 320C6173. [6]

b) Discuss with suitable diagram TCP/IP protocol used in embedded systems. [6]

c) Explain the shared data problems. [4]

**Q5)** a) List and explain the software development tools used for embedded system design. [8]

b) With a pseudo code explain the Round-Robin with interrupts scheduling algorithm. [8]

**P.T.O.**

OR

- Q6)** a) Explain the architecture of RTOS. [8]  
b) Explain the function -Que scheduling algorithm. [8]

**SECTION - II**

- Q7)** a) Explain the various states of task. [9]  
b) Discuss the use of following :- [9]  
i) Semaphores                                   ii) Que  
iii) MailBox

OR

- Q8)** a) What is Rate monotonic analysis? Explain with respect to embedded system design. [6]  
b) List and explain the Timer functions of RTOS. [6]  
c) Explain the memory management functions of RTOS. [6]

- Q9)** a) Explain the Time delay functions of μcos. [8]  
b) Explain the Task service functions of μcos. [8]

OR

- Q10)** a) Explain the features of Vx Works RTOS. [6]  
b) Explain following function of Vx works [6]  
i) intLock ()                                   ii) int Vect Set ()  
iii) int Connect ()  
c) Discuss the use of MUTEX. [4]

- Q11)** a) In detail explain the embedded system used for digital camera. [12]  
b) What is an active RFID tag ? [4]

OR

- Q12)** a) Explain the embedded system used for Adaptive cruise control used in car. [12]  
b) What is a smart card. [4]



Total No. of Questions : 10]

SEAT No. :

P1094

[Total No. of Pages : 3

[4264] - 224

B.E. (Petrochemical)

PROCESS DYNAMICS AND CONTROL

(2003 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) 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.

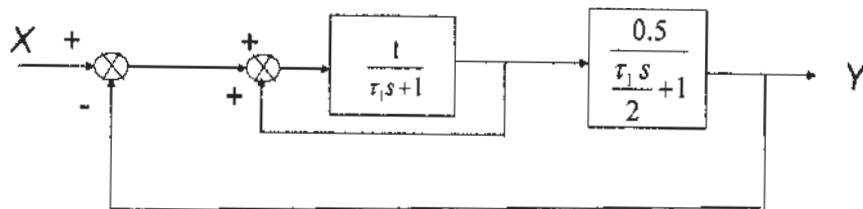
### SECTION - I

- Q1)** a) Develop the mathematical expressions of two non-interacting tanks placed in series. Discuss the dynamics of the system. [8]
- b) What are the benefits of Process Control - Explain with help of suitable examples. [8]

- Q2)** a) Derive the mathematical expression of a simple U-tube manometer. Comment on dynamics of the system. Obtain the transfer function as well. [8]
- b) Obtain the mathematical expression for simple mercury thermometer. What is order of the system. [8]

- Q3)** a) Define following with help of neat diagrams:  
Time Constant, Gain, Damping Factor, Rise Time, Decay Ratio [10]
- b) With help of neat sketch explain the proportional, derivative and integral modes of a PID controller. [8]

- Q4)** a) Discuss Servo and Regulatory control problems with diagrams. [8]  
 b) Find the overall transfer function of the following system: [8]

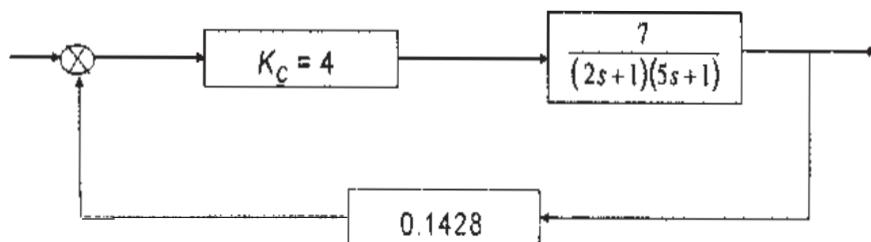


- Q5)** a) With help of neat diagram explain why it is not possible to remove offset completely. [6]  
 b) Density of an ideal gas is function of pressure and temperature and can be represented by:  $\rho = \frac{M p(t)}{RT(t)}$ , where symbols have their usual significances. [10]
  - i) Derive the overall linearized function for density ( $\rho$ ).
  - ii) If  $M=32$ ,  $T=321\text{ K}$ ,  $p=250\text{ kPa}$  and  $R=8.314\text{ (kPa.m}^3\text{)/(kmol.K)}$ , obtain the density.
  - iii) Calculate density of the gas at  $162.6\text{ kPa}$  and  $200.7\text{ }^\circ\text{C}$  temperature with help of derived linearized equation.

## SECTION - II

- Q6)** a) Differentiate between Feedback and Feedforward Control Strategies. [6]  
 b) Explain PLC based control with help of suitable example. [6]  
 c) With help of neat diagram explain Cascade control for Heat Exchanger. [6]

- Q7)** a) Calculate Amplitude Ratio and Phase Angle for overdamped 2<sup>nd</sup> order system with transfer function:  $G(s) = \frac{4}{(0.8s+1)(2s+1)}$  [8]  
 b) Plot the root locus diagram for the following process: [8]



- Q8)** a) What are different time-integral performance criteria generally used for Controller Tuning? - Explain in brief. [8]  
 b) What are the performance criteria to be used for selection and tuning of the controllers? [8]

- Q9)** a) Consider a feedback control system having the characteristic equation

$$s^3 + 2s^2 + (2 + K_c)s + \frac{K_c}{\tau_i} = 0 \quad [8]$$

- i) Derive condition of stability for the system with help of Routh-Hurwitz Criterion.  
 ii) If  $K_c = 10$  and  $\tau_i = 1.6$ , comment on stability.
- b) Draw Bode plots for an open-loop process, whose dynamics can be

represented by:  $G_{OL} = 25K_c \left( \frac{1}{11s+1} \right) \left( \frac{1}{5s+1} \right)$

The value of Gain  $K_c$  can be assumed to be 0.72. [8]

- Q10)** Write short notes on (any four) : [16]

- a) DCS Control System
- b) Digital to Analog Conversion
- c) SCADA operation in Modern Refinery Complex
- d) Z - Transform and its Utility
- e) Split Range Control



Total No. of Questions : 12]

SEAT No. :

P1411

[Total No. of Pages : 2

[4264] - 254

**B.E. (Computer Engineering)**  
**PRINCIPLES OF COMPILER DESIGN**  
**(2003 Pattern) (Semester - I)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate books.*
- 2) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) Explain in detail various compiler construction tools such as LEX and YACC. [8]  
b) Why to write Compiler? Explain role of lexical analysis phase along - with lexical phase errors using suitable example. [8]

OR

- Q2)** a) Explain front-end and back end model of compilation. [12]  
b) Explain byte code compiler along-with example. [4]

- Q3)** a) Explain in detail types of bottom parsing along-with examples. [12]  
b) Explain what do you mean by type checking and type conversion. [4]

OR

- Q4)** a) What is a role of semantic analyser in compilation. [8]  
b) Using suitable example, explain the following : [8]  
i) Recursive Descent Parser  
ii) Predictive Parsing

- Q5)** a) What is syntax directed definition? How bottom up evaluation of S attributed definition takes place. [10]  
b) Explain various intermediate code forms. [8]

OR

*P.T.O.*

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

- Cross Compiler
- Intermediate code generation using YACC.
- Error detection and Recovery during syntax analysis.

## **SECTION - II**

**Q7)** a) What is activation record? Why we need them? Show the activation record for C procedure. [10]

b) Explain the importance of run time storage organization in compiler. [8]

OR

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

- Symbol table organization and management
- Storage allocation strategies for block structured languages
- Incremental Compilers

**Q9)** a) Explain the register allocation strategy for code generation [8]

b) Explain with example peephole optimization. [8]

OR

**Q10)** a) Define the terms with illustration : [8]

- Next use information
- Code generator generator

b) What are the issues in code generation. [8]

**Q11)** a) Explain in detail local optimization and global optimization. [8]

b) Enlist and explain in detail the applications of DAG. [8]

OR

**Q12)** a) Explain various code optimization techniques in detail. [8]

b) Write short note on role of code optimization phase in compiler. [8]



**Total No. of Questions : 11]**

**SEAT No. :**

P1102

[Total No. of Pages : 2]

[4264] - 273

**B.E. (IT)**

# **SOFTWARE TESTING AND QUALITY ASSURANCE**

## **(2003 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.*
  - 2) Answer question number 7 or 8, 9 or 10, 11 from section - II.*
  - 3) Answers to the two sections should be written in separate answer books.*
  - 4) Neat diagrams must be drawn wherever necessary.*
  - 5) Figures to the right indicate full marks.*
  - 6) Assume suitable data, if necessary.*

## **SECTION - I**

- Q1)** a) Is complete testing possible? When to stop testing? Explain the difference between random testing and testing using error guessing. [8]  
b) Explain in short any four methods of System Level Testing. [8]

OR

- Q2)** a) Define any four of the following terms. [8]

i) Failure                              ii) Faults

iii) Test Bed                          iv) Defects

v) Errors                               vi) Software Quality.

b) Differentiate between software verification and software validity. [8]

- Q3)** a) Explain Unit test planning in detail. [8]  
b) Explain in detail different functions (responsibilities) to be handled in a testing life cycle or process. [8]

OR

- Q4)** a) Describe software defect life cycle. [8]  
b) Explain what is test case database, defect repository and configuration management repository in context of test infrastructure management. [8]

P.T.Q.

- Q5)** a) Explain with example the GQM method for identifying software measures. [10]  
b) Write short notes on : [8]  
i) Product quality metrics.      ii) In-Process quality metrics.

OR

- Q6)** a) What is customer problem metric? What are approaches to achieve low PUM? [10]  
b) Explain different types of measurement scales with example. [8]

## **SECTION - II**

- Q7)** a) What are the resources required for Usability testing? Explain some metrics to measure software usability. [8]  
b) Enumerate Ishikawa's seven basic quality tools. Explain any two in detail. [8]

OR

- Q8)** a) What does SQA ensure? What are the goals of SQA activity? [8]  
b) What are the different components of costs for quality software. Explain in detail. [8]

- Q9)** a) Explain with example the six-sigma measure of software quality. [8]  
b) Draw a neatly labeled Cleanroom process. Explain how step wise refinement process helps in improving the quality. [8]

OR

- Q10)** a) How does the ISO 9000:9001 standard ensure in producing a good quality software? [8]  
b) How is defect prevention and process change management brought into practice? [8]

- Q11)** Write short notes on any three: [18]  
a) Class Testing  
b) Functional testing of Web-site.  
c) Client-Server Testing techniques.  
d) Importance of code review in software security testing .  
e) Alpha and Beta Testing.



Total No. of Questions : 11]

SEAT No. :

P1385

[Total No. of Pages : 2

**[4264] - 276**

**B.E. (IT)**

**GIS AND REMOTE SENSING**

**(2003 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.

**SECTION - I**

- Q1)** a) Explain fundamental operations of GIS and theoretical framework of GIS along with suitable diagram. [8]  
b) Explain synthetic Aperture radar with suitable diagram. [8]

OR

- Q2)** a) Explain the geometrical characteristics observed in radar images. [8]  
b) Explain important satellite system parameters which describe functions and operations of remote sensing systems. [8]

- Q3)** How will you transform canonical orthomorphic coordinates to digital imaging coordinates? Explain with suitable example. [16]

OR

- Q4)** a) Explain key elements of visual image interpretation of satellite imagery. [8]  
b) Explain any four basic elements of image interpretation. [8]

- Q5)** a) Define GIS. What are four M's of GIS? Explain the term topology. [8]  
b) Compare and contrast digitizer units for map projections. [8]  
c) What is satellite swath? [2]

OR

**P.T.O.**

- Q6)** a) Explain GIS architecture with suitable diagram. Explain major hardware components of GIS. [8]  
b) List out reasons for using computers in the process of making maps. [5]  
c) Write a note on grid system adopted by India. [5]

## **SECTION - II**

- Q7)** a) Explain vector data representation with suitable example. [8]  
b) Explain how will you manage GIS data files. [8]

OR

- Q8)** a) What is the significance of GIS data modelling. Explain the stages in creating GIS data model with suitable diagram. [8]  
b) What are the functions of DBMS relevant to GIS data management. [8]

- Q9)** a) Explain various kinds of accuracies as applied to quality of remotely sensed data. [10]  
b) How will you capture and digitize the GIS data using GPS systems? [6]

OR

- Q10)** a) What is overlay analysis? Describe the process of digital terrain modelling. [8]  
b) What are the common errors in GIS databases? How can they be prevented or corrected? [8]

- Q11)** Write short notes on (any three) : [18]

- a) Digitization and registration of images in GIS
- b) Importance of GIS in rapid land information system development
- c) Hierarchical raster structures
- d) Mercator systems
- e) Hybrid data models.



Total No. of Questions : 12]

SEAT No. :

P1039

[Total No. of Pages : 3

[4264] - 5

B.E. (Civil)

## ADVANCED GEOTECHNICAL ENGINEERING

(2003 Pattern) (Elective - I) (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) Your answers will be valued as a whole.
- 5) Use of logarithmic tables, electronic pocket calculator is allowed and IS codes are not allowed.
- 6) Assume suitable data, if necessary.

### SECTION - I

- Q1)** a) Discuss different soil classification systems. [9]  
b) Discuss different ‘Clay Minerals’. [8]

OR

- Q2)** a) Discuss the different ‘Soil structures’. [7]  
b) Explain the role of ‘Montmorillonite’. [5]  
c) Explain ‘diffuse double layer’. [5]

- Q3)** a) Explain ‘Culmann’s Method’ for AEP. [8]  
b) Explain steps for ‘Poncelet’s construction’ for active earth pressure. [8]

OR

*P.T.O.*

- Q4)** a) A vertical excavation was planned in a clay deposit having  $\gamma = 20 \text{ kN/m}^3$ . It caved in after reaching the digging 4 M. Assuming  $\phi = 0$ , calculate,  $C = ?$  If the same clay is to be used as a backfill against a retaining wall, upto a ht. of 8 m. calculate. [8]
- Total AEP
  - Total Passive earth pressure.
- b) Explain the steps for design of anchored sheet pile. [8]

- Q5)** Discuss the following with respect to the geosynthetics.
- Differnt Types. [4]
  - Functions. [4]
  - Properties. [4]
  - Applications in Geoenvironment. [5]

OR

- Q6)** a) Draw a sketch of 'Reinforced Earth Wall' & explain its components. [6]
- b) Explain 'Prinquet & Lee' theory for reinforced soil foundations. [5]
- c) Explain 'Soil Nailing'. [6]

## SECTION - II

- Q7)** Explain the following.
- Free Vibrations. [4]
  - Barken's method. [4]
  - Pauw's Analysis. [4]
  - Elastic half space method. [4]

OR

- Q8)** a) A machine having a total wt. of 20,000 kN has an unbalance such that it's subjected to a force of 5000 kN at a frequency of 600 rpm. What should be spring constant if the max. force transmitted by machine is 500 kN? Neglect Damping. [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) Vibro - flotation. [5]

OR

**Q10)** a) Explain the steps for design of sand drains with soil permeability, [8]

- i) Isotropic case.
- ii) Anisotropic case.

b) Explain the stages of inserting reinforcement in vibro-expanded pile. [9]

**Q11)** Explain the following.

- a) Saint Venant's model. [4]
- b) Reissener's model. [4]
- c) Pring Ram model. [4]
- d) Rheological models & its utility. [5]

OR

**Q12)** a) Discuss the basic & composite Rheological models. [9]

b) Explain 'Secondary Consolidation' & 'Creep', with the help of Rheological models. [8]



Total No. of Questions : 12]

SEAT No. :

P1041

[Total No. of Pages : 3

[4264] - 7

B.E. (Civil)

## FINITE ELEMENT METHOD

(2003 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) Use of non programmable calculator is allowed.
- 6) Assume suitable data, if necessary.

### SECTION - I

- Q1)** a) A beam of length 10m, fixed at one end and supported by roller at the other end carries a 20 kN concentrated load and a clockwise moment of 15kNm at the centre of the span. Take  $E = 200 \text{ GPa}$  and  $I = 20 \times 10^{-6} \text{ m}^4$ , determine deflection, bending moment and shear force at midspan, Also find reactions at supports. [12]  
b) Examine whether the given displacement model satisfies all the convergence criteria for a beam element.  $y = a_0 + a_1x + a_2x^2 + a_3xy$ . [4]

OR

- Q2)** For the plane trusses shown in Fig. 1, determine the horizontal and vertical displacements of node 1 and the stresses in each element. Take  $E = 200 \text{ GPa}$  and  $A = 3.8 \times 10^{-4} \text{ m}^2$ . [16]

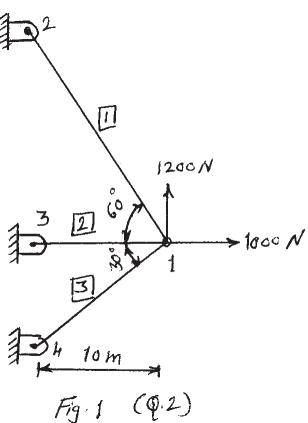


Fig. 1 (Q.2)

P.T.O.

- Q3)** For a rigid frame as shown in Fig.2, determine the nodal displacement components and rotations, the support reactions and forces in each element. Take  $E = 200 \text{ Gpa}$ ,  $I = 2 \times 10^{-4} \text{ m}^4$ ,  $A = 2 \times 10^{-2} \text{ m}^2$  for all elements. [18]

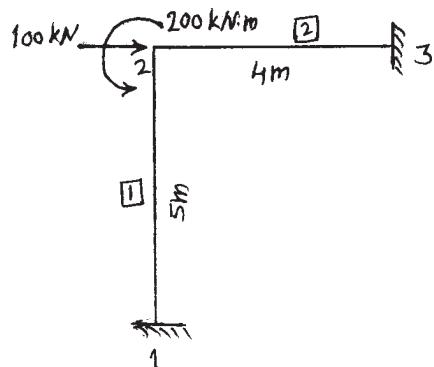


Fig. 2 . (Q.3)

OR

- Q4)** A grid ABC shown in Fig. 3 is in  $xy$  plane. Ends A and C are fixed. Member AB is subjected to concentrated load of 50 kN at midspan and member BC is centrally loaded by 40 kN. Take  $EI = 1600 \text{ kN.m}^2$  and  $GJ = 800 \text{ kN.m}^2$  for both AB and BC, find unknown joint displacements at B. [18]

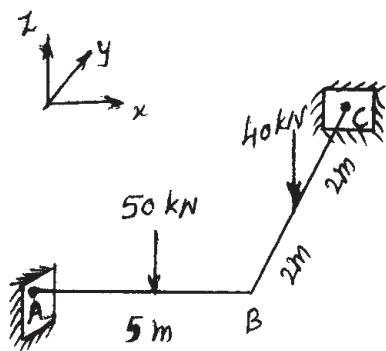


Fig 3. Q.4

- Q5)** a) Explain Pascal's pyramid and its use in selecting terms in displacement function polynomials for 3D tetrahedron element. [10]  
 b) What is discretization? Explain natural and artificial elements. [6]

OR

- Q6)** a) What role does the 'Theory of minimum potential energy' play in generating the stiffness matrix in FEM analysis? [8]  
 b) Explain with example, plane stress and plane strain elasticity problem. [8]

## **SECTION - II**

- Q7)** a) Distinguish between CST and LST elements. [8]  
b) Obtain strain-displacement matrix for a CST elements. [8]

OR

- Q8)** a) Give the meaning of [12]  
i) Cartesian Parameter Matrix  
ii) Displacement Transformation Matrix  
iii) Higher order elements  
b) Define shape function and explain its characteristics. [4]

- Q9)** a) Determine the shape functions for a CST element. Show that they are noting but area coordinates. [10]  
b) Write a short note on ‘ Jacobian matrix’. [6]

OR

- Q10)** a) Derive shape functions for eight noded isoparametric rectangular element with four corner nodes and four mid-side nodes. Use natural coordinate system  $(\xi, \eta)$ . [8]  
b) State and explain three basic laws on which isoparametric concept is developed. [8]

- Q11)** a) What are the stress-strain relations for a thick structure, which is axisymmetric in geometry as well as loading. [8]  
b) Explain the term’ Skyline’ [5]  
c) What do you mean by axisymmetric problem? List practical examples. [5]

OR

- Q12)** An axisymmetric stress analysis problem is to be solved using a 4-noded rectangular element. Write displacement function for this element, and hence write the steps for deriving the element stiffness matrix. [18]



Total No. of Questions : 8]

SEAT No. :

P1042

[Total No. of Pages : 3

[4264] - 8

B.E. (Civil)

**STRUCTURAL DESIGN OF BRIDGES**  
**(2003 Pattern) (Elective - I) (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 and from section II answer Q.5 or Q.6, Q.7 or Q.8,*
- 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 800, IS 1343 and Steel table 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 the IRC class AA and 70R loadings specified for highway bridges. [10]  
b) Explain economic span of a bridge. [10]  
c) What are the functions of bearings? [5]

OR

- Q2)** a) Explain the design procedure for a longitudinal girder of a T- beam deck slab bridge. [15]  
b) Explain the different types of bearing used in highway bridges. [10]

*P.T.O.*

**Q3)** An R.C. T-Beam deck slab bridge has the following details. [25]

- a) Thickness of railings - 80 mm
- b) Thickness of footpath - 150 mm
- c) Thickness of wearing coat - 80 mm
- d) Span of main girder - 24.0 m
- e) No. of main girders - 4
- f) Spacing of cross-beams - 3 m c/c
- g) Live load - IRC Class AA Tracked Vehicle
- h) Materials - M30 grade of concrete and Fe 415 grade of steel

Adopt  $m_1 = 0.07$  and  $m_2 = 0.05$

Design the deck slab and sketch the details of reinforcement.

OR

**Q4)** For the R.C. T-Beam deck slab bridge given in Q.3, design the intermediate post-tensioned girder. Use M45 grade of concrete and high tension strands of 7 ply 15.2 mm diameter having an ultimate tensile strength of 1800 N/mm<sup>2</sup>. Use Fe 415 steel for supplementary reinforcement. Consider loss ratio as 0.80. Sketch the details. [25]

## SECTION II

**Q5)** a) Explain steel bridges based on their load carrying elements. [10]

b) Explain different types of steel bridges with neat sketches. [15]

OR

**Q6)** a) Design a rocker and roller bearing for the given data and also sketch the details. [18]

- i) Reaction from the girder = 2500 kN
- ii) Allowable pressure on bearings = 4 N / mm<sup>2</sup>
- iii) Allowable pressure on bearing plate = 1900 N / mm<sup>2</sup>
- iv) Allowable pressure on concrete bed = 5 N / mm<sup>2</sup>

b) Explain the design procedure for an elastomeric bearing. [7]

**Q7)** Design the members  $U_2 - U_3$ ,  $U_2 - U_1$  and  $U_2 - L_2$  for the railway steel truss bridge shown in Fig. 1 and the connection at joint  $U_2$ . Draw neat sketches of the connections. [25]

- Weight of stock rail - 0.65 kN/m
- Weight of check rail - 0.44 kN/m
- Timber sleepers of size -  $(0.25 \times 0.25 \times 2.5) \text{ m}$  @ 0.45 m c/c
- Unit weight of timber - 7.5 kN/m<sup>3</sup>
- Spacing of truss - 6.2 m c/c
- The bridge supports a eudl of 2280 kN

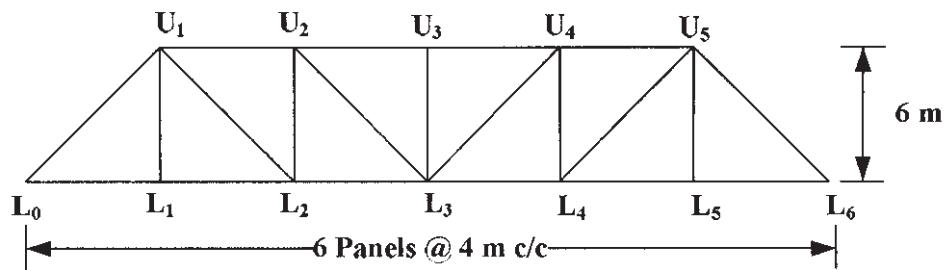


Fig. 1

OR

**Q8)** For the railway bridge shown in Fig.1, design the top and bottom lateral bracing with the given data. The rails are 650 mm above the bottom chord. The chord members are 450 mm deep and 500 mm wide. The end posts are 500 mm deep and 455 mm wide. The web members are 450 mm deep and 250 mm wide. [25]



Total No. of Questions : 12]

SEAT No. :

P1043

[Total No. of Pages : 2

[4264] - 9

B.E. (Civil)

**ARCHITECTURE AND TOWN PLANNING**  
**(2003 Pattern) (Elective - I) (Semester - I)**

*Time :3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Solve Q1 or Q2, Q3 or Q4, Q5 or Q6 from Section I and Q7 or Q8, Q9 or Q10, Q11 or Q12 from Section II.*
- 2) *Figures to the right indicate full marks.*
- 3) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) Explain how Building planning principles are beneficial in designing the structures for the better serviciability. [9]  
b) How factor in architecture influence the design? [8]

OR

- Q2)** a) Compare and contrast gothic & Renaissance architecture. [9]  
b) Write a short note on ‘qualities of architecture’ and elaborate with suitable examples [8]

- Q3)** a) Explain the importance of Garden city concept in today’s context. [9]  
b) Write a short notes on any two: [8]  
i) Work of Ebenezer Howard.,  
ii) Neighbourhood,  
iii) T.P. Schemes.

OR

- Q4)** a) What planning aspect are deal with T.P. S. and Neighbourhood? [9]  
b) Establish the relation within connectivity matrix and planning. [8]

**P.T.O.**

- Q5)** a) How infrastructure is supported through UDPFI ? [8]  
b) Describe the aims, objective and contents of MRTP Act. [8]
- OR
- Q6)** a) Explain in detail ULC Act. [8]  
b) Define D.P. and mention the surveys & aspect of D.P. [8]

## **SECTION - II**

- Q7)** a) Describe in details the different landscaping elements. [9]  
b) Differentiate between soft & hard landscape. [8]
- OR
- Q8)** a) What is landscape design? Explain with sketches the various aspects of landscape planning. [9]  
b) Write short note on :  
i) Soft landscape,  
ii) Elements of landscape [8]
- Q9)** a) Explain in details how will you carry out a traffic & transportation survey for D.P. [8]  
b) Which factors will you consider for the drainage system of a new town? [9]
- OR
- Q10)** a) Write a note on Demographic survey and its importance for DP. [8]  
b) Which factors will you consider for the water supply scheme of a new town? Explain. [9]
- Q11)** a) Describe the role of GIS, GPS & remote sensing in town planning. [8]  
b) Explain the importance of new techniques such as GIS, GPS & remote sensing during disasters. [8]
- OR
- Q12)** Write short note on: [16]  
a) Use of GPS in transportation.,  
b) GPS segments.,  
c) Remote sensing.,  
d) Applications of GIS in town planning



Total No. of Questions : 12]

SEAT No. :

P1044

[Total No. of Pages : 3

**[4264] - 10**

**B.E. (Civil)**

**ADVANCED ENVIRONMENTAL MANAGEMENT**

**(2003 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, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 6) *Assume suitable data, if necessary.*
- 7) *Your answers will be valued as a whole.*

**SECTION - I**

- Q1)** a) Enlist ISO 14000 series. [6]  
b) Explain environmental management system requirements. [6]  
c) What is necessity of ISO-14000 standards? [6]

OR

- Q2)** a) What events lead to development of ISO 14000 series? [6]  
b) Write major requirements for obtaining ISO 14000 certification. [6]  
c) Write importance of environmental policy for smooth working of environmental management system. [6]

**P.T.O.**

- Q3)** a) Briefly discuss the salient features of Environment Protection Act, 1986. [4]  
b) Briefly discuss the salient features of Water (Prevention and control of Pollution) Act, 1974. [6]  
c) Briefly discuss the salient features of Air (Prevention and control of Pollution) Act, 1981. [6]

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) Explain the provision made to regulate collection, segregation, transport and disposal of solid waste in Municipal Solid Waste (Management & Handling) Rules 2000. [8]

- Q5)** a) Write a procedure for controlling the emission of SO<sub>x</sub> by dilution using tall stacks. [8]  
b) Enlist different control measures for NO<sub>x</sub> control and Explain any one in detail. [8]

OR

- Q6)** a) Write National Ambient Air Quality (NAAQ) Standards for SPM, SO<sub>x</sub>, NO<sub>x</sub> & CO. [4]  
b) Explain the limestone injection process used to remove oxides of sulphur from flue gases. [6]  
c) What are the sources of nitrogen oxides? Explain the following techniques to reduce the emission of NO<sub>x</sub> [6]  
i) Low excess air combustion  
ii) Modifications in burner design

## **SECTION - II**

- Q7)** a) What are the classifications of solid waste? Explain. [6]  
b) Explain the various methods of disposal of biomedical waste. [6]  
c) Explain colour coding and type of container for disposal of bio-medical wastes. [6]

OR

- Q8)** a) Discuss the suitable methods of collection & disposal of Municipal solid waste. [8]  
b) Explain treatment methods and disposal of hazardous waste. [6]  
c) Draw symbols for following: [4]  
i) Bio hazard  
ii) Cytotoxic hazard

- Q9)** a) What is advanced waste water treatment? Why it is necessary? [4]  
b) What is adsorption? Explain with a neat sketch granular Activated Carbon (GAC) treatment of effluent and regeneration of carbon. [6]  
c) What are the advantageous of removing nutrients from effluent? [6]

OR

- Q10)** Explain the following land treatment system. [16]  
a) Irrigation  
b) Rapid infiltration  
c) Overland flow system  
d) Wetland flow system

- Q11)** a) Write the time schedule for reporting environmental impact. [6]  
b) Explain the advantages and disadvantages of EIA. [6]  
c) Enlist the projects requiring environmental clearance from the central government. [4]

OR

- Q12)** a) Explain Category - I, Category - II and Category - III projects subject to EIA. [5]  
b) Discuss the role of general public in Environmental Clearance. [5]  
c) Explain the role of regulatory agencies and control board in Environmental Clearance of Project. [6]



Total No. of Questions : 12]

SEAT No. :

P1045

[Total No. of Pages : 3

**[4264] - 11**

**B.E. (Civil)**

**GEOINFORMATICS**

**(2003 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) *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) Explain EMR. State the characteristics of different frequencies. [12]  
b) Define resolution and explain any 2 types. [6]

OR

- Q2)** a) What are the elements of Visual Image Interpretation? Explain their significance and factors influencing them. [12]  
b) Explain interaction of EMR with Earth's Surface. [6]

- Q3)** a) What is image enhancement? Explain its various techniques. [12]  
b) Write a note on: [4]  
i) Image Rectification.  
ii) Geo referencing.

OR

**P.T.O.**

- Q4)** a) Explain the term “Histogram Equalization”. Elaborate the Linear and Non Linear contrast stretch enhancement. [12]  
b) Explain Unsupervised Classification. [4]

- Q5)** a) Explain with neat sketches the working of GPS in association with: [12]  
i) GPS Control Segments.  
ii) GPS Space Segments and  
iii) User Segments.

- b) What are applications of GPS in Civil Engineering? [4]

OR

- Q6)** a) What are the different types of errors in GPS observations and explain how to minimize the errors in field? [12]  
b) Write a note on Codes used in GPS. [4]

## **SECTION - II**

- Q7)** a) What are the different types of Map Projection Systems? Explain the needs of different types of Map Projection. [12]  
b) Explain:  
i) Vector Model.  
ii) Raster Model.

OR

- Q8)** a) Define GIS? Explain in detail its components. [12]  
b) Write a note on:  
i) Data types in DBMS.  
ii) Attributes.

- Q9)** a) Explain any one GIS software's and write a detail account on its Modules. [12]  
b) What are the components of DBMS. [4]

OR

- Q10)** a) What is RDBMS? Explain the Normal form with one example. [12]  
b) Write a note on Soft Keys. [4]

**Q11)** Explain application of Geo Informatics in following areas: [16]

- a) Geotechnical Engineering.
- b) Water Resource Development and Management.

OR

**Q12)** Explain application of Geo Informatics with working flow charts in following areas: [16]

- a) Road Survey and Investigations.
- b) Infrastructure Development.



Total No. of Questions : 12]

SEAT No. :

P1054

[Total No. of Pages : 3

[4264] - 57

**B.E. (Production)**

**PLANT ENGINEERING AND MAINTENANCE**

**(2003 Pattern) (Elective - I) (Sem. - I)**

*Time :3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

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

**SECTION - I**

**UNIT - 1**

- Q1)** a) Discuss various considerations to be made for location of following industries. [8]
- i) Steel Industry
  - ii) Fertilizer Industry
- b) List out various possible errors that can be made while new site selection. [8]

OR

- Q2)** a) Discuss the objectives of good plant location. [8]
- b) Environmental and ecological aspects are assuming growing importance while making decision on plant location. Explain and illustrate with suitable example? [8]

**P.T.O.**

## UNIT - 2

- Q3)** a) Write short notes on: [8]  
          i) CRAFT                           ii) CORELAP  
b) Discuss in brief main steps involved in systematic layout planning. [8]

**OR**

**Q4)** a) Write short notes on: [8]  
          i) Duties of safety officer       ii) Industrial safety act.  
b) What is the use of REL Chart? How is it prepared? [8]

UNIT - 3



## **SECTION - II**

## **UNIT - 4**

- Q7)** a) Discuss centralized Vs. decentralized maintenance. State advantages and disadvantages of both maintenance. [8]  
b) Discuss the relationship between maintenance and efficiency for any organization. What sort of maintenance schedule will you suggest for machine shop? [8]

OR

- Q8)** a) Define condition based maintenance and the advantages derived from a condition monitoring program? [8]  
b) Explain in short how job card system is used in equipment maintenance. [8]

### **UNIT - 5**

- Q9)** a) Describe how store management can help in keeping a better spare parts inventory. [8]  
b) Describe the various types of lubrication system used in practice. [8]

OR

- Q10)** a) How the chemical effects are useful in assessing the condition of equipment? Explain briefly? [8]  
b) Differentiate between the Spectrometric oil analysis procedure and the magnetic plug inspection system. [8]

### **UNIT - 6**

- Q11)** a) Explain the term ‘Failure Mode & Effect Analysis’ in detail? What are the effects of failure? [8]  
b) What is the ‘Total Productive Maintenance’? Explain the various tools and techniques associated with TPM? [10]

OR

- Q12)** a) Explain how computers can be helpful in discharge of maintenance functions. [8]  
b) Discuss the various distribution functions used for the estimation of reliability in performance of the maintenance function. [10]



Total No. of Questions : 12]

SEAT No. :

P1057

[Total No. of Pages : 3

[4264] - 87

B.E. (Electrical)

ILLUMINATION ENGINEERING

(2003 Pattern) (Sem. - I) (Elective - I)

*Time :3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

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

### **SECTION - I**

- Q1)*** a) State and explain laws of Illumination. [6]  
b) What is photometer? Explain its construction and working with a neat diagram. [6]  
c) Discuss the importance of light in human life with respect to various activities. [6]

OR

- Q2)*** a) Explain various methods of controlling natural light. [6]  
b) State and explain properties of light. [6]  
c) What is meant by plane angle, solid angle? Deduce the relation between them. [6]

- Q3)*** a) Explain the construction and working of tungsten halogen lamp with suitable diagram. [8]  
b) With suitable diagram explain construction and working of mercury vapour lamp. State its applications. [8]

***P.T.O.***

OR

- Q4)** a) Describe construction and working of CFL with suitable diagram. Draw respective characteristics. [8]  
b) Write a short note on LASERS. [8]

- Q5)** a) State the different types of ballast. Explain any one in brief with suitable diagram. [8]  
b) Explain following terms with neat sketches- [8]  
i) Specular reflection.  
ii) Difussed reflection.

OR

- Q6)** a) Discuss the various types of light fittings according to the level of illumination. [8]  
b) With a neat sketch explain the starting ballast used for Mercury Vapour lamp. [8]

## **SECTION - II**

- Q7)** a) Elaborate the various factors to be considered while designing indoor illumination scheme. [6]  
b) What is polar curve? Describe any three types of polar curves. [6]  
c) Explain the following terms: [6]  
i) COU.  
ii) Space to height ratio.  
iii) Waste light factor.

OR

- Q8)** a) What is “glare”? Discuss remedies over glares. [6]  
b) Discuss the illumination scheme design for following applications – Educational premises, office. [6]  
c) Explain COU in designing of lighting scheme with suitable example. [6]

- Q9)** a) Compare different sources of light. [8]  
b) Write a short note on design of street lighting scheme. [8]

OR

- Q10)** a) Pay back calculation. [8]  
b) Life cycle costing. [8]

- Q11)** a) Explain photovoltaic lighting system. [8]  
b) What is energy efficient lighting? Discuss its advantages and difficulties. [8]

OR

- Q12)** a) Explain emergency lighting scheme with a neat block diagram. [8]  
b) Write a short note on cold lighting. [8]



Total No. of Questions : 12]

SEAT No. :

P1059

[Total No. of Pages : 3

[4264] - 89

B.E. (Electrical)

**RESTRUCTURING & DEREGULATION  
(2003 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 electronic pocket calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

**SECTION - I**

***Q1)*** Explain duties and role of following institutions of Indian Power Sector. [16]

- a) Central Electricity Authority.
- b) Ministry of Power.
- c) Central and state governments.
- d) Power grid corporation of India Ltd.

OR

***Q2)*** a) Explain salient features and benefits of Electricity Act. 2003. [8]

- b) State and explain critical issues and challenges in case of Indian Power Sector. [8]

***Q3)*** a) Explain the evolution of regulatory commission in India and methods of economic regulation. [8]

- b) Explain long term and short term marginal cost. [8]

OR

***P.T.O.***

**Q4)** Write short note on following: [16]

- a) Concept of life cycle cost
- b) Annual rate of return
- c) Internal rate of return
- d) Net present value of project.

**Q5)** Explain following types of tariff. [18]

- a) Time of day tariff.
- b) Interruptible tariff.
- c) Penalties associated in tariff.
- d) Incentives offered in tariff.

OR

**Q6)** Explain following concepts with reference to economics of power. [18]

- a) Marginal cost
- b) Cost to serve
- c) Average cost
- d) Effect of renewable and captive power generation on tariff

## **SECTION - II**

**Q7)** Explain the working of following entities under restructured power sector scenario. [16]

- a) Independant system operator
- b) Genco (Generation Company)
- c) Transco (Transmission Company)
- d) Disco (Distribution Company)

OR

**Q8)** a) Write short note on ancillary service market and power market. [8]

- b) Give operational differences between forward market and real time market. [8]

**Q9)** a) Explain various non-price issues those are important in power sector restructuring. [8]

- b) Explain the spot price for real and reactive power. [8]

OR

**Q10)** a) Explain Market Clearing Price (MCP) zonal and locational market clearing price. [8]

b) Explain dispatch based pricing and effect of power flows on prices. [8]

**Q11)** a) Explain the issues regarding transmission congestion and management of congestion. [8]

b) Explain price based unit commitment, concept of arbitrage in Electricity market and game theory methods in power systems. [10]

OR

**Q12)** a) Explain three part tariff in detail with reference to Availability Based Tariff (ABT). Also explain the benefits (technical as well as commercial) experienced by Indian Power Sector. [10]

b) Explain the functions of state load dispatch center and regional load dispatch center. [8]



Total No. of Questions : 12]

SEAT No. :

P1065

[Total No. of Pages : 3

[4264] - 106

**B.E. (Electronics Engineering)  
PROCESS INSTRUMENTATION  
(2003 Pattern) (Elective - I) (Sem. - I)**

*Time :3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

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

**SECTION - I**

**Q1)** a) Define the term control system. Draw and explain block diagram of control system with suitable example. [10]

b) Explain different standard test input signals. [8]

OR

**Q2)** a) Define the term transducer with suitable examples explain classification of transducers. [10]

b) Explain two wire transmitter in detail. [8]

**Q3)** a) Explain cavitation and flashing in control valve. [8]

b) Explain different factors for selection of control valve. [8]

OR

**P.T.O.**

**Q4)** a) Define the terms: [8]

- i) Process Lag
- ii) Control Lag
- iii) Process Load
- iv) Manipulated Variable

b) Explain in detail hydraulic PID controller. [8]

**Q5)** a) Compare feedback and feedforward control systems with suitable examples. [8]

b) With P and I diagram explain in detail cascade control for distillation column control. [8]

OR

**Q6)** a) Write a note on self tuning controller. [8]

b) Explain statistical process control with suitable example. [8]

## **SECTION - II**

**Q7)** a) Explain in detail optimization for feedforward control system. [10]

b) Explain ‘Internal Model control’ with suitable example. [8]

OR

**Q8)** a) Explain gradient method for constraint handling. [10]

b) Write a note on Model predictive control. [8]

**Q9)** a) Define the term PLC. Draw and explain architecture of PLC. [8]

b) Draw the block diagram for bottle filling plant construct the ladder diagram for the same. [8]

OR

**Q10)** a) List the different specifications of PLC. Draw the different symbols used to construct ladder diagram for PLC. [8]

b) Draw the diagram with sensors for level control system. The system should pump the water from lower tank  $T_1$  to upper tank  $T_2$ . The required operation is as follows for lifting the water:- [8]

- i) When level in  $T_2$  is low and in  $T_1$  it is above low level.
- ii) When high level in  $T_2$  is reached pumping should stop.
- iii) When  $T_1$  is also full inlet valve should get closed automatically.  
Construct the ladder diagram.

**Q11)** a) Explain SCADA system in detail. [8]

b) Write a short note on DCS. [8]

OR

**Q12)** Write a short note with Industrial application (any two): [16]

- a) Control panel
- b) Alarm Annunciator
- c) Square Root extractor
- d) Recorders



Total No. of Questions : 12]

SEAT No. :

P1067

[Total No. of Pages : 4

[4264] - 109

**B.E. (Electronics Engineering)  
SOFTWARE ENGINEERING  
(2003 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) State the myth that are believed by the developers and explain the reality with respect to each myth. [8]
- b) Explain the phases of unified process and how it supports incremental and iterative development. [8]

OR

- Q2)** a) What do you mean by evolutionary process models? Explain spiral model as an evolutionary process model. [8]
- b) Explain with neat diagram, the waterfall model for software development. What are the advantages and drawback of this model? [8]

- Q3)** a) How use cases can be used to model the requirements? Write an use cases for the ‘Login’ with template and diagram. [8]
- b) What do mean by flow modeling? Explain data flow modeling with an example. [8]

OR

*P.T.O.*

**Q4)** a) Develop the check list for conducting a requirements gathering meeting. Apply this checklist to identify the requirement of the large data processing project. [10]

b) What are requirement engineering tasks? Explain the elicitation process using quality function deployment. [6]

**Q5)** a) Explain the following design concepts. [6]

i) Modularity

ii) Architecture

b) What are the different types of design classes. [6]

c) Explain any two architectural styles with respect to program structure. [6]

OR

**Q6)** a) What is DFD? Explain different types of requirements identified by DFD. Explain with banking application. [10]

b) Explain the concept of DFD? Draw level 0, level 1, and level 2 DFD for any inventory management system. [8]

## **SECTION - II**

**Q7)** a) Explain following design concepts: [6]

i) refinement

ii) abstraction

b) Explain user interface analysis and design process with diagram. [6]

c) Explain the following: [6]

i) Interface design elements

ii) Deployment design elements

OR

**Q8)** a) Explain following design concepts [6]

i) refactoring

ii) design pattern

b) Explain data flow and data centered architecture styles in details. [6]

c) What is design pattern? How patterns can be used in design? How it differs from framework? [6]

**Q9)** a) You have been appointed as a project manager within an information system organization. Your job is to build an application that is quite similar to others your team has built, although this one is larger and more complex. Requirements have been thoroughly documented by the customer. What team structure would you choose and why? What software process model(s) would you choose and why? [10]

b) You have been asked to develop a small application that analyzes each course offered by a university and reports the average grade obtained in the course. Write a statement of scope that bounds this problem. [6]

OR

**Q10)** a) You have been appointed as a project manager within an information system organization. Your job is to build a breakthrough product that combines virtual reality hardware with state of the art software because competition for the home entertainment market is intense. There is significant pressure to get job done. What team structure would you choose and why? What software process model(s) would you choose and why? [10]

b) What guidelines should be applied when we collect software metrics? Describe the difference between process and project metrics in your own words. [6]

**Q11)** a) What are the fundamental sources of change? What are the elements of a configuration management system? What is the importance of baselines? [8]

b) What is the difference between reverse engineering, forward engineering and restructuring. [8]

OR

**Q12)** a) What is software configuration item? What is the role of SCM repository? What is the importance of version control? [8]

b) Explain: [8]

- i) forward engineering for client/server architecture
- ii) forward engineering for object oriented architecture



Total No. of Questions : 12]

SEAT No. :

P1072

[Total No. of Pages : 3

**[4264] - 125**

**B.E. (E & TC)**

**EMBEDDED SYSTEMS DESIGN**

**(2003 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) Assume suitable data, if necessary.

### **SECTION - I**

- Q1)** a) What is Design Metric. Explain the following Design Metric, [6]
- |           |                    |
|-----------|--------------------|
| i) Power  | ii) Time to Market |
| iii) Size | iv) NRE Cost       |
- b) Justify with triangle revenue model, delayed entry in a market subject to revenue loss. [4]
- c) Explain the following communication protocols and compare them, [8]
- |              |          |
|--------------|----------|
| i) Bluetooth | ii) IrDA |
|--------------|----------|

**OR**

- Q2)** a) Explain the Following Terms, [10]
- |        |            |
|--------|------------|
| i) CAN | ii) MODBUS |
|--------|------------|
- b) Compare and contrast processor technologies and also suggest application of each technology. [8]

- Q3)** a) Why RISC is most preferred choice in embedded system? [8]
- b) What are the different criteria used while selecting memory for embedded system? [8]

**P.T.O.**

OR

**Q4)** a) Explain in detail Hardware & Software architecture in embedded system. [8]

b) Explain role of Context switching in interrupt service routine. How interrupt Latency is related to context switching? [8]

**Q5)** a) Explain in detail difference between Task, Process & Thread. [8]

b) Explain in detail the following scheduling algorithm. [8]

- i) First in first out
- ii) Round robin
- iii) Round robin with priority

OR

**Q6)** a) Explain the different tools for the development of embedded system? [8]

b) What is reentrant function? State the rules to decide the function is said to be Reentrant. [8]

## **SECTION - II**

**Q7)** a) Compare Preemptive & Non-preemptive scheduling. Which is better for real time? Why? [6]

b) Compare Hard & Soft Real time operating system with example [4]

c) Explain in detail what is memory management in any RTOS? How MMU is used for memory management in RTOS? [8]

OR

**Q8)** a) Explain in detail what is pipe, event and timer in RTOS and where each of them are used. Give implementation of any of these in embedded C. [10]

b) Justify the usage of RTOS in embedded system. [8]

**Q9)** a) What are Non functional requirement while process of embedded system Development? [8]

b) What is µCOS-II? Explain the features of µCOS-II. [8]

OR

**Q10)** a) Explain the following functions of μCOS-II. [8]

- i) OSENTER\_CRITICAL()
- ii) OS Init()
- iii) OS IntEnter()
- iv) OS MBOX Post()

b) Compare RTOS μCOS-II with RT-Linux. [8]

**Q11)** a) With the help of block diagram explain design of digital camera. [8]

b) Explain the basic feature of the smart card hardware. [8]

OR

**Q12)** a) Explain with neat diagram of an Adaptive Cruise Control system in a car. [10]

b) What is processor and memory requirement of digital camera system? [6]



Total No. of Questions : 12]

SEAT No. :

P1073

[Total No. of Pages : 4

[4264] - 126

B.E. (E & TC)

**ADVANCED POWER ELECTRONICS**

**(2003 Pattern) (Elective - I) (Sem. - I)**

*Time :3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 from Section-I, Q.7 or Q.8, Q.9 or Q.10, Q.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 effect of source inductance on the performance of a single phase full convertor with waveforms. Derive expression for its output voltage in terms of maximum voltage ( $V_m$ ), firing angle  $\alpha$ , overlap angle  $\mu$ . [10]
- b) Draw and explain the necessity of static and dynamic equalising circuit for series connected SCRs. Derive relation used for determining the values of shunt resistor  $R$  and capacitor  $C$  in this circuit. [8]

OR

- Q2)** a) Draw the circuit diagram of 3 -  $\emptyset$  fully controlled convertor operating with highly inductive load and explain operation with following waveforms for  $\alpha = 60^\circ$ . [10]
- i) Load voltage.
  - ii) Current through SCR (any one).
  - iii) Supply current (any one phase).

**P.T.O.**

- b) With the help of a neat circuit diagram and relevant waveforms, explain the operation of a single phase circulating-current type dual converter. [8]

- Q3)** a) With the help of a neat circuit diagram, relevant waveforms, explain the operation of three phase  $180^\circ$  mode voltage source inverter feeding a balanced star connected resistive load. [8]
- b) What are the different output voltage control and harmonics reduction techniques in inverter? [8]

OR

- Q4)** 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. [8]
- b) Compare between VSI and CSI. [4]
- c) Compare between  $120^\circ$  and  $180^\circ$  conduction mode of three phase inverter. [4]

- Q5)** a) With the help of a neat circuit diagram and relevant waveforms, explain the Symmetrical Angle Control (SAC) technique for power factor improvement in AC-DC converters. [8]
- b) With the help of circuit diagram and associated waveforms, explain the operation of class E resonant inverters. [8]

OR

- Q6)** a) Explain operation of ZVS converter with the help of neat circuit diagram and waveforms for inductor current and capacitor voltage. [8]
- b) Explain how the following parameters are sensed in power electronics circuits:  
i) DC current  
ii) AC current. [8]

## **SECTION - II**

- Q7)** a) With the help of a neat circuit diagram and relevant waveforms, explain the operation of a three-phase LCC based separately excited DC drive having a full converter in the armature circuit and a semi converter in the field circuit. Also derive an expression for the motor speed in terms of armature converter firing angle, motor torque and supply voltage. [10]
- b) A 400V, 1500rpm, 10A separately excited DC motor with  $R_a = 0.25\Omega$ ,  $R_f = 200\Omega$ ,  $K_v = 1.2653 \text{ V/A-rad/sec}$  is fed from three-phase full converter operating from the 415V, 50Hz 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  $V_f = 400\text{V}$ , whereas speed variation above base speed is obtained by field voltage control with the armature converter set at  $V_a = 400\text{V}$ . [8]

Calculate:

- 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 5A.

OR

- Q8)** a) What are stepper motors? With the help of a circuit diagram, block diagram and waveforms, explain the operation of a unipolar voltage drive for a variable reluctance stepper motor. [10]
- b) Explain how servomotors are different from DC motors and stepper motors? [8]

- Q9)** a) Explain the induction motor operation with the  $V/f$  ratio is held constant also derive the expression for maximum torque. [8]
- b) Draw the torque speed characteristics of the polyphase induction motor. Also explain the following operating regions. [8]
- i) Motoring region.
  - ii) Generating region.
  - iii) Braking region.

OR

- Q10)** a) Explain with neat diagram the operation of scherbius system. State what for it is used and its advantages. [8]
- b) Enlist various protection circuits required for induction motor. Explain one in detail. [8]

- Q11)** a) What is the need of energy audit? Explain in brief. [8]
- b) What is power quality? Why it is required? Explain different types of power line disturbances. [8]

OR

- Q12)** a) What are the different types of parameters that decide the quality of power? [8]
- b) What are harmonics? Explain different harmonic sources from commercial loads. [8]



Total No. of Questions : 12]

SEAT No. :

P1075

[Total No. of Pages : 3

[4264] - 128

B.E. (E & TC)

**ARTIFICIAL NEURAL NETWORKS  
(2003 Pattern) (Sem. - I) (Elective - 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) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) In what way does ANN resemble the brain? Draw the structure of biological neuron. [8]
- b) What is meant by topology of artificial neural networks? Give a few basic topological structures of artificial neural networks? [8]

OR

- Q2)** a) Differentiate between excitatory and inhibitory connections. What is the noise-saturation dilemma in activation dynamics. [8]
- b) What are the basic learning laws? Explain supervised basic learning law. [8]

- Q3)** a) Explain the algorithm used for training the perceptron net. Why a single layer of perceptron cannot be used to solve linearly inseparable problems. [8]
- b) Draw the architecture of madaline net. How is madaline net formed from Adaline net. [8]

**P.T.O.**

OR

**Q4)** a) State the delta learning rule. Why is it called as Least mean squares rule, explain. [8]

b) Giving the architecture explain the training algorithm of an RBF network. [8]

**Q5)** a) What is discrete Hopfield net. Discuss in detail the energy function used in the discrete Hopfield net. [8]

b) What are hard problems in pattern storage task. [4]

c) What is meant by simulated annealing? What is annealing schedule. [6]

OR

**Q6)** Write short notes on (Any three). [18]

a) Boltzman machine.

b) Modular neural networks.

c) Stability & Convergence.

d) Models of neuron.

## SECTION - II

**Q7)** a) With architecture, explain the training algorithm used in Kohonen self organizing feature map. [8]

b) Compare Kohonen self organizing map and LVQ. [6]

c) How is competition performed using neural net. [4]

OR

**Q8)** a) What is the basic concept behind Adaptive Resonance Theory (ART). How is ART network designed for both stability and plasticity. [8]

b) What is principal component analysis. [4]

c) Explain the architecture of Maxnet with the help of neat diagram and explain how it can be used as a subnet. [6]

**Q9)** a) Explain BAM architecture and explain the difference between BAM and other neural network architectures. [8]

b) Explain the architecture and application of Neocognitron. [8]

OR

**Q10)** a) What is an associative memory. What are the requirements of an associative memory. [8]

b) What is stability plasticity dilemma. [4]

c) What is TAM (Temporal Associative Memory). Explain. [4]

**Q11)** a) Explain how neural network principles are useful for texture classification problem. [8]

b) What is convolutional network architecture and how it is useful for the problem of hand written digit recognition. [8]

OR

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

- a) Traveling salesman problem.
- b) Local minima problem in optimization.
- c) Neural networks application in speech.



Total No. of Questions : 12]

SEAT No. :

P1078

[Total No. of Pages : 2

[4264] - 144

**B.E. (Instrumentation and Control)**

**BIOMEDICAL INSTRUMENTATION**

**(2003 Pattern) (Elective - I) (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 books.
- 3) Neat diagrams must be drawn wherever necessary.

**SECTION - I**

- Q1)** a) Explain cardiovascular system. [8]  
b) Explain Half Cell potential? [8]

OR

- Q2)** a) Draw the equivalent circuit for two electrodes connected to skin for biopotential measurement. [8]  
b) State the specifications of ECG recorder. [8]

- Q3)** a) Explain different chambers of heart. Explain an electrical conduction system of heart. [8]  
b) Explain the standard amplitude and duration of ECG waveform. [8]

OR

- Q4)** a) Explain the Einthoven triangle. [8]  
b) With a neat block diagram, explain the working of an ECG machine. List the specification of ECG recorder. [8]

**P.T.O.**

- Q5)** a) Explain Photoplethysmography. [10]  
b) Explain various heart sounds and their characteristics. [8]

OR

- Q6)** a) Explain auscultatory method of BP measurement. Its advantages and disadvantages. [10]  
b) Discuss Magnetic blood flow measurement along with neat diagram. [8]

## **SECTION - II**

- Q7)** a) Explain EEG amplitude and frequency bands. [8]  
b) Explain and draw 10-20 EEG electrode placement system. [8]

OR

- Q8)** a) Explain neuron membrane potential. [8]  
b) Explain block diagram of eight channel EEG system. [8]

- Q9)** a) Explain direct and indirect ophthalmoscope. [8]  
b) Explain various types of tonometer. [8]

OR

- Q10)** a) Draw and Explain anatomy of Ear and its working. [8]  
b) Explain pure tone audiometer? [8]

- Q11)** a) Draw and explain Thermal conductivity analyzer. [10]  
b) Draw and explain pneumotachometer. [8]

OR

- Q12)** a) Explain power line isolation transformer? [8]  
b) Explain physiological effects of electricity on humans? [10]



Total No. of Questions : 12]

SEAT No. :

P1079

[Total No. of Pages : 3

[4264] - 146

**B.E. (Instrumentation and Control)**

**LASER APPLICATIONS IN INSTRUMENTATION**

**(2003 Pattern) (Elective - I) (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) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*
- 6) *Use of electronic pocket calculator is allowed.*

**SECTION - I**

- Q1)** a) Explain in detail the process of emission and absorption of radiation. [8]  
b) Explain the importance of Einstein's equations in emissions of radiation. [8]

OR

- Q2)** a) State the different processes due to which the small gain coefficients of laser get affected. [8]  
b) Write short notes on:  
i) Laser modes                                  ii) Q switching [8]

- Q3)** a) What are different laser system features which are applicable to most commercial and industrial lasers? Explain each in short. [9]  
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 0.3 mm. The loss coefficient is 800 per metre length and the internal quantum efficiency is 0.7. [4]  
c) What are the steps that should be followed in a safe laser laboratory operation? [5]

**P.T.O.**

OR

- Q4)** a) Explain the construction and working of GaAs homojunction semiconductor diode laser. [8]  
b) How the laser products are classified for safety standards? [4]  
c) Calculate the threshold pumping power of a Nd: Glass laser for critical population inversion of  $9 \times 10^{21}/m^3$  and spontaneous life time of 250  $\mu s$ . The upper level is at an energy of 1.3eV. [6]

- Q5)** a) Describe how Fabry-Perot interferometer is used with small coherent length source for displacement measurements. [8]  
b) What is Speckle Pattern? Describe subjective and objective speckles. [8]

OR

- Q6)** a) Describe the dynamic tracking of speckle pattern for displacement measurements. [8]  
b) What are the properties of speckle pattern? Describe each in short. [8]

## SECTION - II

- Q7)** a) Explain the principle of operation of Laser velocimeter. [8]  
b) What are the two options for the electronic processing of the Doppler signal? Compare it. [8]

OR

- Q8)** a) Explain the frequency domain processing of Doppler signal in detail. [8]  
b) What are the performance parameters of operation of laser velocimeter? Discuss. [8]

- Q9)** a) What is Sagnac effect? Show how is the phase shift proportional to the angular velocity. [8]  
b) What are the components required for all fiber FOG configuration? Explain each in short. [8]

OR

- Q10)** a) Show that the frequency of the sagnac signal in RLG is proportional to the angular velocity of rotation. [8]
- b) Explain in detail the closed loop configuration of Fiber Optic Gyroscope. [8]

- Q11)** a) Write a short note on Holographic Interferometer. [9]
- b) What are different emulsions used to record the holograms? Mention the characteristics of it. [9]

OR

- Q12)** 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 1.4 per unit length in x-direction and the fringe spacing is found to be 1 mm. Hence find the strain. [8]
- b) List out the applications of holographic interferometer that you know. Explain any one in detail. [10]



Total No. of Questions : 12]

SEAT No. :

P1080

[Total No. of Pages : 4

[4264] - 147

**B.E. (Instrumentation & Control)**

**ADVANCED CONTROL SYSTEMS**

**(2003 Pattern) (Elective - I)(Semester - I)**

*Time :3 Hours]*

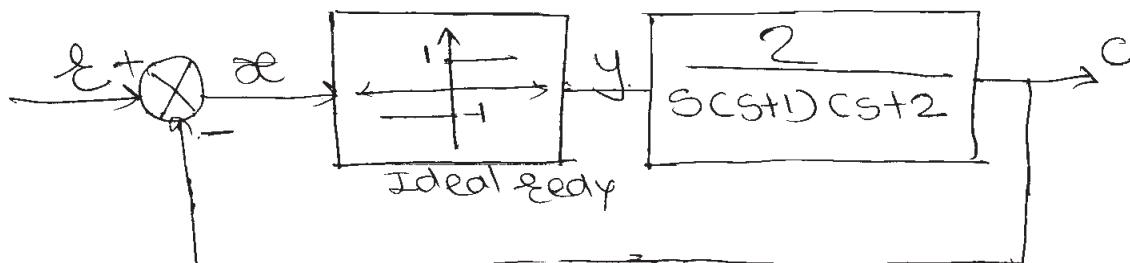
*[Max. Marks :100*

*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) Assume suitable data, if necessary.
- 6) Your answers will be valued as a whole.
- 7) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

**SECTION - I**

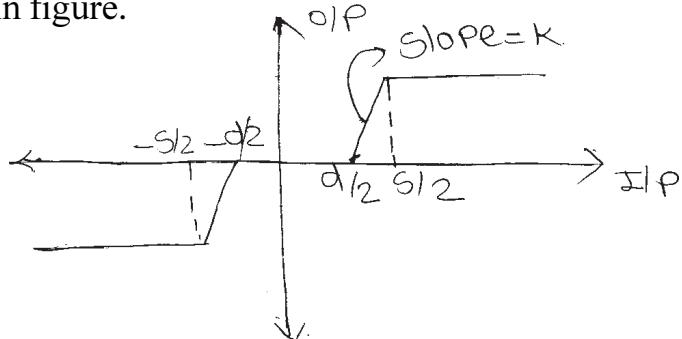
- Q1)** a) Compare the characteristics of linear and nonlinear systems. [6]  
b) Find frequency and Amplitude of limit cycle(s) for the system as shown in figure. [12]



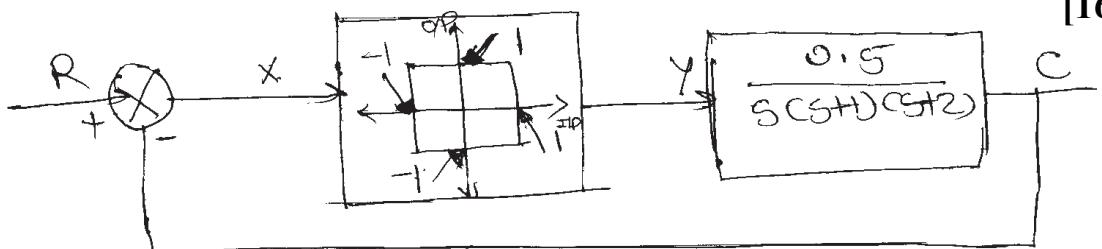
OR

**P.T.O.**

- Q2)** a) Explain the concept of Jump resonance with the help of soft and hard spring. [6]
- b) Find the Describing function for the non-linear system having characteristic as shown in figure. [12]



- Q3)** Consider a system as shown in figure. Find the amplitude and frequency of limit cycles. Also comment on nature of limit cycles and stability of system. [16]

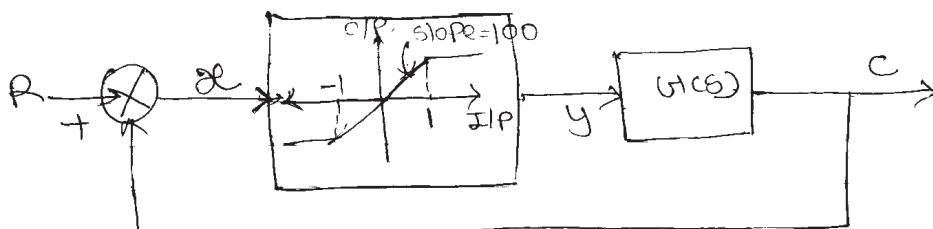


OR

- Q4)** A two phase servomotor is driven by an amplifier as shown in figure the Transfer function of motor is [16]

$$G(s) = \frac{K e^{-0.1s}}{s(0.1s + 1)}$$

Investigate the stability of the system for  $K = 0.1$ . What is the largest value of  $K$  for no limit cycle to exist.



- Q5)** a) Explain MIT rule for adaptive systems. [8]
- b) What are the different components of model reference adaptive systems? Explain each in short? [8]

OR

- Q6)** a) Explain Lyapunov approach for stability analysis of continuous non linear time system. [8]  
b) Design model reference adaptive control (MRAC) system to follow the response of reference model given by [8]

$$\frac{d^2ym}{dt^2} + 15.14 \frac{dym}{dt} + ym = r$$

Select  $r = 1$

## SECTION - II

- Q7)** Write short note on: [18]  
a) Indirect self tuning regulator.  
b) Continuous time self tuners  
c) Linear quadratic self tuning regulator.

OR

- Q8)** a) In Self Tuning Regulator (STR) following input output data has been obtained from real plant. Use any regression method to fit a model with the structure. [10]

Time (t)	Input data u(t)	O/P data y(t)
1	1.0	0.0
2	0.5	0.5
3	1.0	- 0.5
4	1.0	1.25
5	0.0	0.35

$$y(t) + ay(t-1) = bu(t-1) + e(t) \text{ where } e(t) \text{ is error signal}$$

- b) Derive least squares (LS) as a real time parameter estimator. [8]

- Q9)** a) Explain feed control of a distillation column using adaptive control technique. [8]  
b) Explain firstloop adaptive controller with reference to parameter estimation, control design, prior information and industrial experiences. [8]

OR

**Q10)** Explain any three Industrial products, which incorporate adaptive control techniques. [16]

**Q11)** Consider the plant. [16]

$$\begin{bmatrix} dx_1/dt \\ dx_2/dt \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ -1 & 2 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 1 \\ 0 \end{bmatrix} u$$

- a) Prove that the system is controllable.
- b) Prove that the system is unstable.
- c) Select the values of matrices Q and R with the constraint that they are positive definite and design a controller for the plant so as to minimize

$$J = \frac{1}{2} \int_0^{\infty} (x^T Q x + u^T R u) dt$$

Check that the resulting overall system is stable.

OR

**Q12)** a) Obtain the control law that minimizes the performance Index. [8]

$$J = \int_0^{\infty} (x_1^2 + u^2) dt \text{ for the system}$$

$$\begin{bmatrix} x_1' \\ x_2' \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u$$

- b) State equations are [8]

$$\begin{bmatrix} x_1' \\ x_2' \end{bmatrix} = \begin{bmatrix} -2 & -4 \\ 1 & -4 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 2 \end{bmatrix} u$$

$$y = [1 \ 0] \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$$

determined feedback gain matrix for a system & desired pole locations at  $-50, -50$ .



Total No. of Questions : 12]

SEAT No. :

P1081

[Total No. of Pages : 2

[4264] - 148

**B.E. (Instrumentation and Control)**

**BUILDING AUTOMATION - I**

**(2003 Pattern) (Semester - I) (Elective - 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) Discuss the necessity of Building Automation for Industrial Buildings. [8]  
b) Describe advanced building automation system. [10]

OR

- Q2)** a) Explain Fire Triangle. [8]  
b) Describe advanced building automation system. [10]

- Q3)** a) Discuss ADA standard for NAC. [8]  
b) Discuss smoke detectors with suitable applications. [8]

OR

- Q4)** a) Explain dry air fire suppression system. [8]  
b) Discuss cause effect matrix for FAS. [8]

- Q5)** a) Explain class-A loop wiring for FAS. [8]  
b) Compare IDC and NAC. [8]

**P.T.O.**

OR

- Q6)** a) Explain SLC communicating protocols. [8]  
b) Discuss installation of fire detectors. [8]

**SECTION - II**

- Q7)** a) Explain various credential in ACS. [8]  
b) Discuss access control system. [10]

OR

- Q8)** a) Discuss biometrics in ACS. [10]  
b) Explain working of TEMA key with suitable diagram. [8]

- Q9)** a) List types of cameras. List specifications of camera. [8]  
b) Describe image capture, store and transmission phenomenon in camera. [8]

OR

- Q10)** a) Discuss need of VDO switches. [8]  
b) Explain CCTV system with suitable block diagram. [8]

- Q11)** a) Explain perimeter intrusion? State and Explain importance of PIDS. [8]  
b) Explain architecture of PIDS. [8]

OR

- Q12)** a) Explain PIDS for airport. [8]  
b) Explain technologies used for perimeter intrusion system. [8]



Total No. of Questions : 12]

SEAT No. :

P1086

[Total No. of Pages : 3

[4264] - 185

B.E. (Chemical)

ENVIRONMENTAL ENGINEERING

(2003 Pattern) (Sem. - I) (Elective - 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) Give the classification of air pollutants according to source type. [4]
- b) Describe the sources and harmful effects of lead & nickel on human health. [4]
- c) State the adverse effects of population growth on the environment. [4]
- d) Write the relationship for: [4]
- i) Mass - Vol. Concentration.
  - ii) PPm - Vol. Concentration.

OR

- Q2)** Discuss the environmental impact of thermal, hydro and nuclear energy in detail with suitable example. [16]

*P.T.O.*

- Q3)** a) Discuss the economic effects of air pollution.  
b) How to sample the air and give the measurement of air. Draw a neat figure.

[16]

OR

- Q4)** a) The maximum 1 hr. Co level in Calcutta reach 35 PPm. Calculate the equivalent concentration in terms of mass fraction ( $w_p$ ) and in miligrams per cubic meter at  $25^\circ\text{C}$  & 1 atm.  
b) The exhaust gas from a motor vehicle shows a Co concentration of 2% by vol. What is the concentration of Co mg/m<sup>3</sup> at  $0^\circ\text{C}$  and 1 atm.

[16]

- Q5)** a) Draw a neat sketch of fabric filter and explain the mechanism.  
b) Explain the venturi scrubber with neat figure.

[18]

OR

- Q6)** a) Discuss ISO-kinetic sampling in detail with neat figure.  
b) Explain Kyoto protocol.  
c) Draw a neat sketch of settling chambe and explain.

[18]

## SECTION - II

- Q7)** What is oxygen sag curve? Derive the expression for critical oxygen deficit ( $D_c$ ), critical time ( $t_c$ ) and critical distance ( $X_c$ ). What is the significance of DC.

[16]

OR

- Q8)** a) Describe the procedure to determine BOD in a laboratory.  
b) Discuss the least square method to calculate BOD constants.

[16]

- Q9)** a) Differentiate between primary and secondary methods of wastewater treatment.
- b) Draw neat figures, discuss principle, working and give advantages, limitations of the following.
- Reverse osmosis.
  - Adsorption.

[18]

OR

- Q10)** Write notes on: [18]
- Wet air oxidation.
  - Biosorption.

- Q11)** a) Give the sources & classification of solid waste.
- b) Discuss composting in detail.

[16]

OR

- Q12)** Write notes on: [16]
- Nitrification & Denitrification.
  - Disinfection by chlorine.



Total No. of Questions : 12]

SEAT No. :

P1087

[Total No. of Pages : 2

[4264] - 190

B.E. (Chemical)

ADVANCED SEPARATION PROCESSES

(2003 Pattern) (Semester - I) (Elective - 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.*

### **SECTION - I**

- Q1)** a) Explain characterization of chromatography process with application. [9]  
b) Explain adsorption process in detail. [9]

OR

- Q2)** a) Explain in detail ‘Liquid chromatography process’. [9]  
b) Give the difference between ‘Temperature swing adsorption’ and ‘Pressure swing adsorption process’. [9]

- Q3)** a) Give the types of membranes. [8]  
b) Give the industrial application of membrane technology. [8]

OR

- Q4)** Explain the mechanism of separation in microfiltration and Reverse osmosis process. [16]

- Q5)** Explain in detail separation based on reversible chemical complexation. [16]

OR

- Q6)** Explain the mechanism of reactive distillation process. [16]

*P.T.O.*

## **SECTION - II**

***Q7)*** Explain the following in detail [18]

- a) Foam formation.
- b) Adsorption properties of foam.
- c) Collapse and drainage phenomena.

OR

***Q8)*** Explain the bubble and foam separation applications to protein and enzyme separation and waste water treatment. [18]

***Q9)*** Write short notes on the following: [16]

- a) Molecular sieves.
- b) Adductive crystallization.

OR

***Q10)*** Explain zone electrophoresis and refining in detail. [16]

***Q11)*** Explain the ring oven technology with application. [16]

OR

***Q12)*** Write short notes on the following: [16]

- a) Recoil method.
- b) Ultra centrifugation.



Total No. of Questions : 12]

SEAT No. :

P1088

[Total No. of Pages : 3

[4264] - 191

B.E. (Chemical)

PETROLEUM REFINING

(2003 Pattern) (Elective - I) (Sem. - I)

*Time :3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answers 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) Describe in details about introduction to petroleum industries in India as well as world and its scenario. [8]  
b) Describe the tests and properties of Gasoline. [8]

OR

- Q2)** a) What is the need of refining the crude oil? Describe with suitable examples? [6]  
b) Why Pre-refining operation is necessary in the petroleum Industry? Enlists various key issues and challenges for refineries in India. [10]

- Q3)** What are different types of pipe still heaters? Describe Heating through Exchangers and pipe still heaters with schematic diagram? [16]

OR

*P.T.O.*

**Q4)** Describe Atmospheric distillation Unit with suitable Diagram and Distinguish between ADU and VDU with respect to various processing parameters? [16]

**Q5)** a) What is refining operation? Describe acid refining techniques with schematic diagram? [2 + 10 = 12]

b) Give the comments on the statement "*Each fraction of crude contains a mixture of compounds with similar boiling points*"? [6]

OR

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

- a) Hydro cracking operation
- b) Fluid Catalytic Cracking units
- c) Thermal cracking.

## **SECTION - II**

**Q7)** Why desulphurization is necessary? Describe hydrodesulphurization process with schematic diagram. [16]

OR

**Q8)** With neat schematic diagram describe HDM process. [16]

**Q9)** a) Why additives are added in the petroleum products? Discuss in brief about the additives for gasoline and diesel. [10]  
b) Explain the storage method used for petroleum product? [6]

OR

**Q10)** a) What is the blending operation and explain the line blending operation? [8]

b) Discuss various safety aspects in the refinery. [8]

**Q11)** Enlist various public and private sector refineries in India? And briefly discuss on “Indian Scenario of processing of petroleum fractions”. **[18]**

OR

**Q12)** Write short notes on: **[3 × 6 = 18]**

- a) Recent trends in petroleum with respect to distillation.
- b) Recent advances in packing material used for petroleum products.
- c) Integration of refinery and petrochemical plants for power generation.



Total No. of Questions : 10]

SEAT No. :

P1093

[Total No. of Pages : 3

[4264] - 207

**B.E. (Petroleum)**

**ENVIRONMENTAL TECHNOLOGY IN PETROLEUM INDUSTRY**

**(2003 Pattern) (Elective - I) (Sem. - I)**

*Time :3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answers three questions from each section.*
- 2) *Question no. 5 and 10 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) *Use of non programmable electronic pocket calculator is allowed.*
- 7) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) Give detailed classification of solids in waste water. [4]  
b) List different hazardous material produced in Petroleum industry with their impacts on to environment. [6]  
c) What are the different Green House gases produced from petroleum operations and what are the impact of these gases on to environment? [6]

OR

- Q2)** a) What are the characteristic of wastewater produced in petroleum industry? [8]  
b) Carry out HAZOP analysis for any process with its merits and demerits. [8]

**P.T.O.**

- Q3)** a) Discuss the nature of common discharges from offshore and onshore petroleum rigs. Discuss the difference in both of these discharges. [8]

b) What are physical principles used in following equipment Plate condensers, Gas / Air filtration units, hydro cyclones, skim pipes. [8]

OR

- Q4)** a) Discuss the impact of hazardous materials used in petroleum industry in various operations. How it can creates impacts in to environment? [8]

b) What are Indian and international produced water discharge standard with reference to petroleum industry. [8]

- Q5)** a) What are equipment used for treatment of produced water. What are deme of DGF equipment? [10]  
b) Draw & explain working of up flow / down flow CPI [8]

## **SECTION - II**

- Q6)** a) Write short notes on: [8]

  - i) OHSAS 18001
  - ii) Root cause analysis
  - iii) Job safety analysis
  - iv) Work Permit system

b) Why onshore / offshore well abandonment are done? What is its general procedure? [8]

OR

- Q7)** a) Discuss the advantages of Hydro cyclones over conventional methods. [8]  
b) Write merits and demerits of FMEA, JSA, what- if analysis. [8]

- Q8)** a) What is domino theory? How it applies to accident preventions? [10]  
b) What are effects of emulsification on the oil spills? [6]

OR

**Q9)** a) Discuss the environmental aspects of oil field operations with Respect to [10]



**Q10)** Write note on: [18]

- a) BOD & COD
  - b) SVI and Quality of sludge produced.
  - c) Classification of Total solids in wastewater.
  - d) Factors affecting oil spill movements.



Total No. of Questions : 12]

SEAT No. :

P1097

[Total No. of Pages : 3

[4264] - 235

**B.E. (Polymer Engineering)**

**POLYMER REACTION ENGINEERING**

**(2003 Pattern) (Elective - I) (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 books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of logarithmic table, electronic pocket calculators is allowed.*
- 6) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) Explain the role of residence time distribution and the concentration history in Polymerization reaction. [8]  
b) Discuss the importance of molecular weight and molecular weight distribution of polymer. [8]

OR

- Q2)** a) Explain the importance of Polymerization reaction engineering. [8]  
b) Discuss the distinction between Chain Polymerization Vs Step Polymerization based on kinetics. [8]

- Q3)** a) Discuss in detail Molecular weight distribution obtained via step growth polymerization. [8]  
b) Derive the necessary relationship obtained in giving Molecular weight distribution in CSTR for free radical type polymerization. [8]

OR

**P.T.O.**

- Q4)** a) Discuss the effect of initiator concentration on average molecular weight of polymer. [8]  
b) Derive the relationship giving average molecular weight of polymer obtained via chain polymerization. [8]

- Q5)** Discuss the model to find the rate of polymerization in case of emulsion polymerization. [18]

OR

- Q6)** Estimate a model for predicting rate of propagation in irreversible step growth polymerization at high conversion level where diffusion effect is predominates. [18]

## **SECTION - II**

- Q7)** Write a short note on reactor systems used for PET, PVC, PS polymers. [18]

OR

- Q8)** Give technology overview for the following polymer. [18]  
a) SBR rubber.  
b) Nylon 6.  
c) Polystyrene.

- Q9)** a) Discuss the MWD and reactor choice in polymerization process. [8]  
b) Write a note on gel effect in step growth polymerization. [8]

OR

- Q10)** a) Discuss the conclusion from kinetics studies in free radical polymerization. [8]  
b) Write a note on gel effect in chain growth polymerization. [8]

**Q11)** a) Explain in detail design of polymerization reactor as different as that of monomer producing reactor in respect of process control of different parameters. [8]

b) Discuss the choice between batch and continuous reactor for polymerization process. [8]

OR

**Q12)** a) Discuss typical reactor used for finishing stage in step growth polymerization. [8]

b) Discuss in detail the control problem in polymer reactor. [8]



Total No. of Questions : 12]

SEAT No. :

P1101

[Total No. of Pages : 3

[4264] - 257

B.E. (Computer Engg.)

ARTIFICIAL INTELLIGENCE

(2003 Pattern) (Semester - I) (Elective - 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) Assume suitable data, if necessary.

### **SECTION - I**

**Q1)** a) What is Logic programming? Explain backward and forward reasoning with an example. [8]

b) Explain the various applications of AI. [8]

OR

**Q2)** a) Explain the architecture of a typical agent. List the applications of intelligent agents. [8]

b) Explain the seven characteristics of problems in AI with an example. [8]

**Q3)** a) Explain the A\* algorithm. [10]

b) Explain Means End Analysis with an example. [8]

OR

*P.T.O.*

**Q4)** a) Explain Hill Climbing algorithm. Explain plateau, ridge, local maxima and global maxima. [8]

b) Explain alpha beta cut off for an example. [10]

**Q5)** a) Explain the Unification Algorithm. [8]

b) Write a script of going to a Movie. [8]

OR

**Q6)** a) State the rules for converting a given well formed formula to clause form. [8]

b) Represent the following sentences in conceptual dependency: [8]

i) John's Dog.

ii) John is a teacher.

## **SECTION - II**

**Q7)** a) Explain any two learning methods. [8]

b) What is Non-Linear Planning? Explain the steps in Non-Linear Planning. [10]

OR

**Q8)** a) Explain Waltz's algorithm. [8]

b) Explain Goal Stack Planning with a suitable example. [10]

**Q9)** a) Explain NLP and in brief the various steps in natural language processing. [8]

b) Explain RTN with an example. [8]

OR

**Q10)** a) Explain the Robot architecture. [8]

b) Explain A TN with an example. [8]

**Q11)** a) Give detailed architecture of Expert System and explain its components.

[8]

b) Explain in detail artificial neural network architecture. [8]

OR

**Q12)** a) List applications of neural network. [8]

b) Give the grammar and show the parse tree for: [8]

i) John wanted to go to the movie with Sally.

ii) The file was printed by Susan.



Total No. of Questions : 12]

SEAT No. :

P1217

[Total No. of Pages : 3

**[4264] - 86**

**B.E. (Electrical)**

**POWER QUALITY**

**(2003 Pattern) (Elective - I) (Semester - I)**

*Time :3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *In section I, attempt Q1 or Q2, Q3 or Q4, Q5 or Q6. In section II, attempt Q7 or Q8, Q9 or Q10, Q11 or Q12.*
- 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 why power quality problems are becoming very important in today's context. [10]  
b) Define and explain various power quality terms as per IEEE Standard 1159. [8]

OR

- Q2)** a) Explain in detail EMC, immunity and emission. [8]  
b) Explain objectives of grounding and the problems due to poor grounding. [10]

- Q3)** a) What is voltage regulation? Explain various devices used for maintaining voltage regulation. [8]  
b) What are the various causes and effects of voltage flicker on power system operation? Explain. [8]

OR

**P.T.O.**

**Q4)** a) Define voltage flicker and explain various voltage flicker mitigation methods. [8]

b) Explain various factors responsible for RMS voltage variation. What is complex power? [8]

**Q5)** a) Explain voltage sag characteristics such as magnitude, duration, phase angle jump and missing voltage. [8]

b) Explain CBIMA and ITIC voltage tolerance curves. [8]

OR

**Q6)** a) Differentiate between voltage sags and voltage interruptions. What are the causes of voltage sags? [8]

b) Explain the concepts such as area of vulnerability and critical distance. [8]

## **SECTION - II**

**Q7)** a) What are the various sources of harmonics and their effects on the operation of various equipments? [10]

b) Explain step by step procedure for harmonics analysis. [8]

OR

**Q8)** a) What are the various harmonics indices used? Explain various harmonic mitigation measures. [8]

b) Explain harmonics series and parallel resonances. What are its consequences? [10]

**Q9)** a) Define and explain impulsive as well as oscillatory transients with their sources. [8]

b) Explain how voltage magnification takes place due to capacitor switching. [8]

OR

**Q10)** a) Explain various mitigation measures used for overvoltage protection. [10]

b) Explain various computer tools for transient's analysis. [6]

- Q11)** a) Explain procedure for selection of monitoring equipments and use of various equipments required for power quality monitoring. [8]  
b) Explain selection procedure of transducers for power quality monitoring. [8]

OR

- Q12)** a) Explain reactive and proactive approaches in power quality monitoring. [8]  
b) Explain the procedure of connection of power quality monitor, monitoring locations and its period. [8]



Total No. of Questions : 12]

SEAT No. :

P1309

[Total No. of Pages : 3

[4264] - 28

**B.E. (Mechanical)**

**KINEMATIC ANALYSIS AND SYNTHESIS**

**(2003 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 answer books.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data, if necessary.
- 5) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

**SECTION - I**

- Q1)** a) Explain transmission angle in the mechanism with example. [8]  
b) Derive formulas for the degree of freedom of planar and spatial mechanisms. State the limitations of these formulas. Give one example of an exception to the above formula. [8]

OR

- Q2)** a) Explain various types of linkages and mechanism for different practical applications. [8]  
b) Explain the following concepts with examples : [8]  
i) Equivalent linkage.  
ii) Kinematic Inversions in Planer Mechanisms.

- Q3)** a) Explain rotational and translation displacement. [8]  
b) In a four link mechanism, the dimensions of the link are as under. AB = 50 mm, BC = 66 mm, CD = 56 mm and AD = 100 mm. AD is a fixed link. At an instant when angle DAB is  $60^\circ$ , the angular velocity of the input link AB is 11 rsd/s in the counterclockwise direction with an angular retardation of  $30 \text{ rad/s}^2$ . Determine analytically the angular displacement, angular velocities and angular acceleration of the coupler link BC and output link DC. [8]

OR

*P.T.O*

- Q4)** a) State and explain Freudensteins's theorem. [6]  
 b) Explain the complex algebra method for displacement, velocity and acceleration analysis of four bar mechanism. Explain how the resulting equations are solved. [10]

- Q5)** a) Explain the Hurtmann construction with a neat sketch and show that it satisfies the Euler - Savary equation. [8]  
 b) A slider crank mechanism with zero offset has crank length 20 mm, connecting rod length 60 mm. Crank makes  $35^\circ$  with IDC. Use Bobillier construction to draw the inflection circle. Then find the radius of curvature of the midpoint of the connecting rod. [10]

OR

- Q6)** a) A four bar mechanism  $A_0ABB_0$  has following dimensions :  $A_0B_0 = 60$  mm,  $AA_0 = BB_0 = 40$  mm. Draw the inflection circle for the configuration in which the input  $A_0A$  is in-line with the frame  $A_0B_0$ , A being in between  $A_0$  &  $B_0$ . [10]  
 b) Write short notes on any two : [8]  
 i) Ball's point and its use.  
 ii) Fixed and moving Centrede.  
 iii) Hartmann construction.

$\Phi_p = 20^\circ$   
**SECTION - II**

- Q7)** a) Write short notes on (Any two) [8]  
 i) Type, number and dimensional synthesis.  
 ii) Branch and Order defect.  
 iii) Types of error in kinematic synthesis.  
 b) Describe a graphical method to synthesize a Slider crank mechanism when two successive rotations  $\theta_{12}$  and  $\theta_{23}$  of the crank are to be coordinated with two successive linear displacements  $S_{12}$  and  $S_{23}$  of the slider. [8]

OR

- Q8)** Using Freudensteins's equation, design a four bar mechanism with input link 'a' and output link 'c', angle  $\theta$  and  $\phi$  for three successive positions are as follows;

$$\text{and } \Phi_1 = 35^\circ, \theta_1 = 35^\circ \text{ and } \Phi_1 = 45^\circ, \theta_1 = 50^\circ \text{ and } \Phi_1 = 65^\circ.$$

Assume a = 1 unit. [16]

- Q9)** a) State and prove Robert - Chebychev theorem. [6]  
 b) Using complex number method, synthesis a four bar linkages that satisfies following specifications in one of its position.  
 $\omega_1 = 8 \text{ rad/s}, \quad = 1 \text{ rad/s}, \quad = -3 \text{ rad/s}$  and  
 $\alpha_1 = 0 \text{ rad/s}^2, \quad = 20 \text{ rad/s}^2, \quad = 0 \text{ rad/s}^2.$  [10]

OR

- Q10)** a) Obtain an expression for coupler point curve for a four bar linkage. [6]  
 b) For the four bar linkage, following data are given;

$$\theta_2 = 60^\circ, \quad \omega_2 = 3 \text{ rad/s}, \quad = -1 \text{ rad/s}^2.$$

$$, \quad \omega_4 = 2 \text{ rad/s}, \quad = 0 \text{ rad/s}^2.$$

Determine the link-length ratios. [10]

- Q11)** a) Write short note on Eulerian Angles. [8]  
 b) Discuss the concept of Denavit - Hartenberg parameters and their use in the study of spatial mechanisms. [10]

OR

- Q12)** a) Classify various types of spatial mechanisms and mention their applications. [8]  
 b) Explain transformation matrix method of displacement analysis of spatial mechanisms. Obtain displacement relationship for Hooke's Joint. [10]



Total No. of Questions : 12]

SEAT No. :

P1312

[Total No. of Pages : 2

[4264] - 58

**B.E. (Production)**

**MATERIAL HANDLING TECHNOLOGY AND EQUIPMENT DESIGN**  
**(2003 Pattern) (Elective - I) (Sem. - I)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:-*

- 1) Attempt one question of each unit from Section - I and Section - II.
- 2) Answers to the two sections should be written on separate books.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Assume suitable data if required.

**SECTION - I**  
**UNIT - I**

- Q1)** a) Discuss the factors governing selection of material handling system. [8]  
b) State symptoms of poor material handling. [8]

OR

- Q2)** a) Define material handling. State its significance in industry with suitable example. [8]  
b) Explain with suitable example the data required for development of new handling system. [8]

**UNIT - II**

- Q3)** a) Classify the material handling principles. Discuss the principle related to equipment design. [8]  
b) Write in detail classification of material handling equipment. Draw different sketches of material handling equipment used in modern industries. [8]

OR

- Q4)** a) Discuss the planning operating principle of material handling. [8]  
b) Explain with sketch position restricted material handling devices. [8]

**UNIT - III**

- Q5)** a) State the factors involved in selection of mechanical operated handling equipment. [9]  
b) Compare mechanical handling system with hydraulic and pneumatic handling system. [9]

OR

- Q6)** a) Differentiate conventional and automated material handling. [9]  
b) Discuss design consideration for crane and hoists. [9]

**SECTION - II**

**UNIT - IV**

- Q7)** a) Explain different drive system used in automated material handling. [8]  
b) Write advantages and limitations of automated material handling. [8]

OR

- Q8)** a) Discuss the design consideration in automated material handling system. [8]

- b) State the factors for implementation of automated material handling system. [8]

**UNIT - V**

- Q9)** a) Explain the principles of working of Automated guided vehicles. [9]  
b) List the types of AGVs. Explain how motions are control of AGVs. [9]

OR

- Q10)** a) Explain the concept Automatic storage and Retrieval system. [9]  
b) Explain concept of vision system and adaptive control system used in automated material handling system. [9]

**UNIT - VI**

- Q11)** a) Explain the role of computer in material handling. [8]  
b) Discuss different environmental factors consideration in material handling equipments. [8]

OR

- Q12)** a) Discuss different human factors consideration in material handling equipments. [8]  
b) Discuss safety aspect consideration in design of material handling equipments. [8]



Total No. of Questions : 12]

SEAT No. :

P1313

[Total No. of Pages : 3

[4264] - 129

B.E. (E & TC)

**ROBOTICS & INDUSTRIAL AUTOMATION**  
**(2003 Pattern) (Sem. - I) (Elective - I)**

*Time : 3 Hours]*

*[Max. Marks : 100]*

*Instructions to the candidates:-*

- 1) Attempt Q.No. 1 or Q.No. 2, Q.No. 3 or Q.No. 4, Q.No. 5 or Q.No. 6 in Section - I & Q.No. 7 or Q.No. 8, Q.No. 9 or Q.No. 10 and Q.No. 11 or Q.No. 12 in 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) Draw neat sketch of basic robotic system. Explain the function of each block. [10]  
b) Discuss typical specifications of a pick and place robot. [8]

OR

- Q2)** a) Explain the following terms : [10]  
i) Tip speed.                      ii) Spatial Resolution.  
iii) Degrees of freedom.      iv) Pay load.  
v) Repeatability.  
b) Explain the terms - Pitch, Roll and Yaw with the help of neat sketch. [8]

- Q3)** a) Explain the Graphical approach for obtaining Inverse Solution. [8]  
b) What is the significance of D-H representation? Discuss D-H algorithm. [8]

OR

*P.T.O*

- Q4)** a) Explain the term - Robot arm dynamics. Discuss the E-L formulation used for a robotic manipulator. [8]  
b) What is Articulated robot? Explain the application in which it is most suitable. [8]

- Q5)** a) Explain the Lift & Tray technique for slip detection with the help of neat diagram. [8]  
b) Explain the role of actuator in a robot. Explain any one with neat sketch. [8]

OR

- Q6)** a) What is the function of end effector in a robot? What factors are taken in account in designing of a gripper? [8]  
b) Explain the concept of servocontrolled and non-servo controlled robots. [8]

## **SECTION - II**

- Q7)** a) A joint of 6 axis robot goes from initial angle of  $45^\circ$  to final angle of  $90^\circ$  in 5 seconds. Using a third degree polynomial, calculate the joint angles at intervals of 1 second. Also calculate joint velocities & accelerations. Plot the joint angles, velocities and accelerations from 0 to 6 second. [10]  
b) Derive expression for Jacobian matrix for prismatic and revolute joint. [8]

OR

- Q8)** a) R-R-R manipulator is at initial position  $(30, 60, -30)$  degrees. It is required to move to  $(90, 0, 0)$  degrees. Assume that the joints have maximum absolute acceleration/deceleration of  $(30, 60, 90)$  degrees/sec $^2$  & maximum velocities of  $(30, 60, 90)$  degrees/sec. Calculate the travel time for each joint using slew motion. [10]  
b) Explain the terms Path Planning and Trajectory Planning. [8]

- Q9)** a) How vision sensors can be categorized according to their dimensionality? Discuss any one type with neat diagram. [8]  
b) Discuss the term Perspective Transformation in Robot Vision System. [8]

OR

- Q10)** a) What are different types of vision sensors used in robotics? Explain any one of them with the help of neat sketch. [8]
- b) Name various segmentation techniques used in robot vision system. Explain any one of them. [8]

- Q11)** a) Explain the terms - MEMS and Microsystems. [8]
- b) What do you mean by Nanorobot? Name its various fields of application. Explain any one application, in detail. [8]

OR

- Q12)** Write notes on : [16]
- a) H matrix.
- b) Link and Joint Parameters.
- c) Teach Pendant.
- d) Screw Transformation.



Total No. of Questions : 12]

SEAT No. :

P1315

[Total No. of Pages : 2

[4264] - 145

**B.E. (Instru. & Control)**

**INSTRUMENTATION FOR ENVIRONMENTAL ENGINEERING**  
**(Semester - I) (2003 Pattern) (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 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 different sensors for measurement of pollution. [10]  
b) Explain different environmental cycles. [8]

OR

- Q2)** Explain role of instrumentation Engineer for environmental analysis and control. [18]

- Q3)** a) Explain environmental toxicology and hazards. [8]  
b) Explain different toxic agents and their analysis. [8]

OR

- Q4)** Write short notes on : [16]  
a) Dry heat environmental testing.  
b) Vibration testing.  
c) Free fall testing.  
d) Drop / Topple testing.

- Q5)** a) Explain analysis of aerosols and its monitoring. [8]  
b) Explain HVAC controls. [8]

OR

- Q6)** Explain Instrumentation setups for air pollution analysis and control. [16]

## **SECTION - II**

- Q7)** a) Explain modern methods of water treatment and its analysis. [10]  
b) Explain biological investigations of waste water. [8]

OR

- Q8)** Explain physical characterization of water / effluent [18]  
a) BOD  
b) COD  
c) TOC  
d) Dissolved oxygen.

- Q9)** What is Sonic boom? Explain noise measurement techniques using suitable diagram. [16]

OR

- Q10)** Explain effects of radiation pollution on [16]  
a) Living organisms.  
b) Nonliving things.

- Q11)** a) Explain analysis of micronutrients. [8]  
b) Explain chromatographic characterization of soil pollution. [8]

OR

- Q12)** Write notes on [16]  
a) Pesticide analysis.  
b) Instrumentation setup for soil pollution.



Total No. of Questions : 12]

SEAT No. :

P1405

[Total No. of Pages : 3

[4264] - 41

**B.E. (Mechanical / Mechanical S/W)  
INDUSTRIAL HYDRAULIC AND PNEUMATIC  
(2003 Pattern) (Semester - I)**

*Time : 3 Hours]*

*[Max. Marks : 100*

**Instructions to the candidates:**

- 1) Answer any three questions from each section.
- 2) Answers to the two sections should be written in separate books.
- 3) Figures to the right indicate full marks.
- 4) Use of electronic pocket calculator is allowed.
- 5) Assume suitable data, if necessary.

**SECTION - I**

- Q1)** a) What are the important advantages & applications of fluid power? Explain Material Handling application. [8]
- b) What are Different types of Seals state the criteria for selection of sealing devices and what are the various sealing materials? [8]

OR

- Q2)** a) What are the characteristic of an effective hydraulic fluid, What is meant by Viscosity Index and how is it used? [8]
- b) Differentiate Hydrostatic Transmission and Hydro dynamic Transmission? [8]

- Q3)** a) Give Classifications of Pumps and which parameters are considered for the analysis of pump performance. [8]
- b) Write short notes on:
- i) Internal Gear Pump
  - ii) Lobe Pump

OR

*P.T.O.*

- Q4)** a) What do you mean by characteristic curves of Pump and Draw the curves for positive and non positive displacement pump? [8]  
b) What are various types of Vane Pumps Explain any one type. [8]

- Q5)** a) Explain with the neat Sketch 4/3 closed centre lever operated direction control valve also state its advantages and disadvantages. [10]  
b) Compare the advantages and disadvantages of meter- in and meter-out flow control valve. [8]

OR

- Q6)** Write short notes on any three: [18]  
a) Pressure compensated flow control valve  
b) Pilot operated check valve  
c) Counter balance valve  
d) Pressure Sequence valve

## SECTION - II

- Q7)** Draw and Explain cylinder Synchronizing circuit and Drilling Machine circuit used in industrial applications. [16]

OR

- Q8)** Draw and explain the operation of the speed control of a cylinder by Meter-In, Meter-Out, and Bleed-Off Circuits. [16]

- Q9)** a) Draw a Pneumatic Circuit equivalent to: [10]  
i) And gate  
ii) OR gate  
b) Write short note on advantages of Pneumatic systems and field of applications of Pneumatic Systems. [8]

OR

**Q10)** a) Compare Pneumatic and Hydraulic Systems. [6]

b) Short notes on: [12]

- i) F-R-L Unit
- ii) Pneumatic Direction control Valve

**Q11)** Draw a Regenerative circuit for Hydraulic output using additional 3/2 Pilot operated D.C.V, when the full load acts on the cylinder and when the cylinder is retracting. [16]

OR

**Q12)** Draw the hydraulic circuit for the following operation: [16]

A circuit is required for Press operation, an accumulator will supply the necessary flow once the power is shut off by pressure switch at the end of advance stroke. Locate pressure relief valve, check valve, and other essential components of the circuit. Explain operation of circuit.

Draw symbols of Weighted accumulator, spring loaded accumulator.



Total No. of Questions : 12]

SEAT No. :

P1408

[Total No. of Pages : 3

**[4264] - 45**

**B.E. (Mechanical/Mech.S/W)  
AUTOMOBILE ENGINEERING  
(Sem. - I) (2003 Pattern) (Elective - 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) Describe with neat sketch layout of automobile chassis and explain functions of various components of it. [8]  
b) What is a need of clutch in the transmission system? What are requirements of a good clutch? [8]

OR

- Q2)** a) Explain the history of development of automobiles discuss the present status and future trend of todays automobile. [8]  
b) Describe construction and working of a multiplate clutch with suitable diagram. How do the number of plates affect the working of this clutch? Explain. [8]

- Q3)** a) Some vehicles are not provided with a gear box name them and state as to how do they manage to overcome road gradients and driving needs? Explain. [8]  
b) Sketch and explain the construction of a sliding mesh gear box. Show power flow path in top gear, second gear, and reverse gear. [8]

**P.T.O.**

OR

- Q4)** a) Sketch the layout, explain the construction and working of synchromesh gear box used on any Indian vehicle. [8]  
b) What are advantages of using an overdrive? Explain the principle of its working using a suitable diagram. [8]

- Q5)** a) Name the different components that constitute a differential assembly. What role do each of these play? Explain with suitable sketch. [10]

b) Sketch the constructional details of a heavy duty pneumatic tyre and explain the working of: [8]

i) Breaker	ii) Shoulder
iii) Wire beds	iv) Wear indicators.

OR

- Q6)** Write short note on the following (any three): [18]

  - a) Aspect ratio of a tyre.
  - b) Torque convertor.
  - c) Wheel balancing.
  - d) Construction of propellor shaft.
  - e) Four wheel drive.

## **SECTION - II**

- Q7)** a) Draw a neat sketch of a rigid front axle. How wheels turn on it for steering? Explain. [8]  
b) Explain construction and working of rock and pinion type steering gear. [8]

OR

- Q8)** a) Describe the following: [8]  
i) Over steer and under steer.  
ii) Cornering force.

b) What is the purpose of suspension springs? Classify various types of suspension springs. [8]

- Q9)** a) Describe with neat sketch, a telescopic type hydraulic shock absorber used in suspension system. [8]
- b) What are the functions of a brake? On which principle does the brake system work? What are the essential requirements of a good brake? Explain. [8]

OR

- Q10)** a) Sketch and explain the construction and working of a drum brake. For what purposes are the expander and adjuster used? [8]
- b) Explain the meaning of the following terms. State their salient features. [8]
- i) Servo brakes
  - ii) Booster brakes
  - iii) Anti-lock brakes

- Q11)** a) What are various auto electrical systems, used in todays vehicles? Discuss their functions. Name various instruments, devices, accessories associated with them. [10]
- b) Why is maintenance of automobile is necessary? What are different kinds of maintenance required for cars? Explain. [8]

OR

- Q12)** Write short note on the following (any three): [18]
- a) Yearly maintenance schedule of a car.
  - b) Head lamp.
  - c) Wind shield wiper.
  - d) Automobile battery.
  - e) Master cylinder.



Total No. of Questions : 12]

SEAT No. :

P940

[Total No. of Pages : 3

**[4264] - 19**

**B.E. (Civil)**

**DAMS & HYDRAULIC STRUCTURE**

**(2003 Pattern)**

*Time :3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

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

### **SECTION - I**

- Q1)** a) Discuss briefly various watershed structures. [8]  
b) Explain the aspects to be taken into consideration while deciding the type of dam. [8]

OR

- Q2)** a) Explain in brief ‘Instrumentation in dams’. [8]  
b) Discuss briefly the various applications of remote sensing and GIS to watershed development. [8]

- Q3)** a) Describe as to how you would fix the storage capacity of a reservoir. [8]  
b) Explain earthquake effects in the design of a gravity dam. [6]  
c) Explain necessity and method of strengthening of dams. [4]

OR

**P.T.O.**

- Q4)** A gravity dam 45 m high has upstream face vertical. The top width is 8m and bottom width is 30m. The downstream slope starts 7m from the top. Check the stability of this non-overflow section for the reservoir full condition with water retained upto a depth of 40 m above the base. Assume uplift as triangular with 80% uplift at upstream end. [18]

Horizontal acceleration = 0.19

Maximum permissible compressive stress = 3000 kN/m<sup>2</sup>.

Permissible average shear strength of the joint at the base = 1200 kN/m<sup>2</sup>.

Coefficient of friction = 0.75

Unit weight of material of dam = 24 kN/m<sup>2</sup>.

- Q5)** a) What are the various causes of failure of earth dam? Explain methods to adopt seepage control through the body of the earth dam. [8]
- b) What are energy dissipators? State the various types and the circumstances under which they can be recommended. [8]

OR

- Q6)** a) Draw a typical cross-section of an earth dam to store water upto a maximum depth of 30m. Impervious foundation is available at a depth of 6m below the ground level. Adequate quantity of clayey non-cohesive soil is available for construction. Show the various components. Give their approximate dimensions and explain the use of any five of them. [8]
- b) Explain various types of spillways and discuss any one type. [8]

## SECTION - II

- Q7)** a) Explain Khosla's theory of design of weirs on permeable foundations and its use. [8]
- b) What is the difference between barrage and weir. [2]
- c) Write short notes on: [6]
- i) Lake tapping and
  - ii) Head regulator

OR

- Q8)** a) Draw a typical layout of a diversion head works showing all the components and explain their purposes. [8]
- b) Describe with neat sketches the discharge measuring devices in a canal and their functions. [6]
- c) Differentiate between initial regime and final regime. [2]

- Q9)** a) Explain different types of cross drainage works provided on a canal alignment. [10]
- b) Design an unlined canal in alluvial soil using Lacey's theory to carry a discharge of  $20 \text{ m}^3/\text{s}$ . Assume silt factor = 1. [8]

OR

- Q10)** a) Explain the importance of canal lining. What are the different types of canal lining? [6]
- b) What is meant by 'Canal Escapes'? How do they help in protecting the adjoining areas against, flooding due to some breach in the canal embankment? [6]
- c) Write briefly on canal operation and automation. [6]

- Q11)** a) Write short notes on the following: [8]
- |                  |                 |
|------------------|-----------------|
| i) Levees        | ii) Guide banks |
| iii) Groynes and | iv) Cut-offs.   |
- b) Draw a typical layout of a high head hydro - electric power development scheme and explain the various components along with their function. [8]

OR

- Q12)** a) What is meant by 'river training' and what are the different objectives served by it? [6]
- b) What are the different types of hydro - electric power plants? Describe any one with a neat sketch. [10]



Total No. of Questions : 6]

SEAT No. :

P946

[Total No. of Pages : 2

[4264] - 168

B.E. (Printing)

**TECHNOLOGY OF GRAVURE AND FLEXO  
(2003 Pattern)**

*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 diagram wherever necessary.

**SECTION - I**

**Q1)** a) Describe in detail sections of a Gravure Press. [10]

b) Mention the features of Gravure Process. [8]

OR

a) Explain in detail CI Flexo Press [10]

b) Mention the benefits of Flexo process. [8]

**Q2)** Explain mechanical and hydraulic impression loading system. [16]

OR

Explain pressurization systems of Doctor Blade. [16]

**Q3)** Explain the importance of web transport rollers on a Gravure press. [16]

OR

State Causes and Remedies of the following: [16]

- |                 |             |
|-----------------|-------------|
| a) Ink Adhesion | b) Doughnut |
| c) Web break    | d) Dot Skip |

**P.T.O.**

## **SECTION - II**

**Q4)** Explain in detail closed and open inking system for flexography. [18]

OR

Explain the making of anilox roller. [18]

**Q5)** a) Explain the factors governing pressure for Gravure printability. [8]

b) Explain Moving Cylinder and Moving Impression System of Gravure Press. [8]

OR

Explain the impact of roller hardness on Gravure print quality. [16]

**Q6)** Explain Gravure press fingerprinting. [16]

OR

Explain the methods of optimizing a flexo press. [16]



Total No. of Questions : 12]

SEAT No. :

P949

[Total No. of Pages : 4

[4264] - 209

**B.E. (Petroleum)**

**PETROLEUM PRODUCTION ENGINEERING - II**  
**(2003 Pattern)**

*Time :3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

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

**SECTION - I**

- Q1)** a) List the different types of artificial lift methods. Write in brief selection criteria for SRP. [10]  
b) Describe in brief subsurface pumping cycle for SRP. [6]

OR

- Q2)** Calculate, effective plunger stroke, tubing and rod stretch, polished rod stroke and over travel if 100 bbls/day are to be produced using sucker rod pump. The proposed pump setting depth is 8289 ft. in  $2\frac{7}{8}$  inch tubing O.D./I.D. is 2.875/2.441 inch. The unit utilizes a rod string consisting of  $\frac{3}{4}$  inch and  $\frac{7}{8}$  inch rods and operates at 18 spm. Assume volumetric efficiency of 0.8. Oil is having a Sp. gravity of 0.93, is at a level of 6900 ft in the casing annulus. The elastic constant for the rod string is  $0.774 \times 10^{-6}$  in lb/ft. Modulus of elasticity for steel,  $30 \times 10^6$  psi. [16]

**P.T.O.**

- Q3)** a) Draw the graph and find the point of gas injection. Also calculate the required gas daily injection rate. Following data is given, [10]  
Perforation depth is 7890 ft.

Formation pressure is 2,670 psi

Well's P.I. is 4.5 bpd/psi.

The well produces daily 800 barrels with a formation GLR of 100 scf/bbl. (gradient 328 psi/1000 ft.) Existing tubing size is  $2\frac{3}{8}$  inch. O.D. and a THP of 250 psi, Lift gas of 0.71 gravity is injected with surface injection pressure of 800 psi and gas gradient 36 psi / 1000 ft. GLR belonging to expected pressure traverse connecting injection point and WHP is 259 scf/bbl.

- b) Write the merits and demerits of PCP method of artificial lift. [8]

OR

- Q4)** a) Write a note on casing pressure operated valve. [6]  
b) Draw the neat schematic sketch and explain various flow regimes for flow through vertical production tubing and horizontal pipe line. [8]  
c) What is productivity index? Explain. [4]

- Q5)** Write short notes on: [16]

- a) Optimum GLR
- b) Gas lift valve testing
- c) Surface set-up of ESP
- d) Counterbalance unit in SRP

OR

- Q6)** a) Calculate total dynamic head, no. of stages required and motor horsepower required for following ESP. [8]

Data:

Desired rate = 9,100 b/d.

P.I. = 8 bbl/d/ft. of drawdown.

Static fluid level 410 ft. from the S/C.

Surface flow line = 2,400 ft. of 4 inch, with elevation rise of 40 ft., for this friction loss is 40 ft./1000ft.

Perforations = 1850 – 2300 ft.

Wellbore depth = 2289 ft.

Tubing friction loss given = 20 ft./1000 ft.

From the performance curve, it is recommended to use the pump which gives 67 ft. of head per stage; while horsepower required is 8 hp per stage.

- b) Draw a neat schematic sketch of sub-surface set-up of ESP and explain working of pump in brief. [8]

## **SECTION - II**

- Q7)** List the various possible mechanical workover problems for a well. Draw necessary sketch and explain any two with remedial solution in detail. [18]

OR

- Q8)** Explain with necessary graphs the steps wise approach in, pressure drop calculation and sizing of perforation, tubing and choke from sandface to wellhead in nodal analysis. [18]

- Q9)** a) Use any standard equation to calculate the pressure drop in a 6 inch diameter liquid pipe line. [4]

Given data:

Oil flow rate = 910 bpd. Water = 220 bpd.

Sp. gravity oil = 0.89 Water = 1.07

Viscosity = 8.2 Cp Length = 8,500 ft.

Inlet pressure = 855 psi. Temp. = 85°F.

- b) Use any two standard equations and calculate pressure drop in 6 inch. gas pipeline. Following date is given. [8]

Gas flow rate = 23 MMscfd.

Viscosity = 4.7 Cp.

Gas gravity = 0.80. Z = 0.69

Pipe line length = 8,500 ft.

Inlet pressure = 851 psi.

Temperature = 85°F.

Assume friction factor = 0.0182 for old steel pipe line.

- c) Explain, 'NPSH' equation in brief. [4]

OR

- Q10)** Describe in detail pipe line design considerations for offshore transportation of gas. [16]

**Q11)** Write short notes on :

**[16]**

- a) Skin damage
- b) Necessity of artificial lifting
- c) Gas lift design
- d) Sand problems

OR

**Q12)** a) Write the applications of multilateral well technology in production optimization. **[6]**

b) Write the procedure of Intermittent gas lifting in brief. **[6]**

c) Draw the sketch of plunger lift ALT. **[4]**



Total No. of Questions : 12]

SEAT No. :

P951

[Total No. of Pages : 3

[4264] - 60

**B.E. (Production Engineering)**  
**PROCESS PLANNING AND TOOL SELECTION**  
**(2003 Pattern)**

*Time :3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) Answer three questions from section-I and three questions from section-II.
- 2) 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) “Process Engineering is the hub of the organization”, Discuss with the help of a material flow in an organization. [8]

b) How does a process planner determine the most economical process for the manufacture of a product? [8]

OR

**Q2)** a) Explain the various steps involved in the process planning. Discuss the contents of process plan. [8]

b) Discuss the principles of DFM which are useful for designing a product. [8]

**Q3)** a) What key points to be considered in determining the nature of work to be performed and functional surfaces on the work-piece? [8]

b) What is mean by geometry of form? [8]

Define      i)    Flatness,                  ii)    Cylindricity,  
                       iii)   Roundness,                  iv)   Concentricity.

OR

- Q4)** a) Explain the part print analysis in detail with respect to General characteristics of the work-piece. [8]  
b) Explain the purpose of grouping related surfaces or areas? [8]

- Q5)** a) What is six point location principle? Explain it with the help of suitable sketches. [8]  
b) What are the rules for locating long cylinder and short cylinder? Explain with neat diagrams. [10]

OR

- Q6)** a) What is mean by V -location? What error is caused by improper location of a V -locator? [8]  
b) What is meant by “selective assembly”? What is the basic difference between tolerance stack and limit stack, illustrate with suitable example. [10]

## **SECTION - II**

- Q7)** a) Why milling is suited than shaper in mass-production? Which type of milling used the least power, Up or down milling? Explain. [8]  
b) Distinguish between General purpose machine (GPM) and special purpose Machine (SPM). [8]

OR

- Q8)** a) What are the influential factors in terms of machine performance? Discuss. [8]  
b) What are the various sources of information available to the process engineer in making a machine selection? [8]

- Q9)** a) What is the role of expert system in generative computer aided process Planning (CAPP) system? [8]  
b) What is an auxiliary operation? How can supporting operation be distinguished from auxiliary operation? [8]

OR

- Q10)** a) Explain the benefits of CAPP, and discuss an approach of generative CAPP System. [8]  
 b) What are the advantages and disadvantages of combining operations? [8]

**Q11)** Write the process plan that describes the operations necessary to produce the part as shown in fig 1. Write detailed manufacturing plan, operation sequence, proper tooling and equipment selection, process parameters with sample calculations. The quantity required to produce: 1000 pieces/ month.

[18]

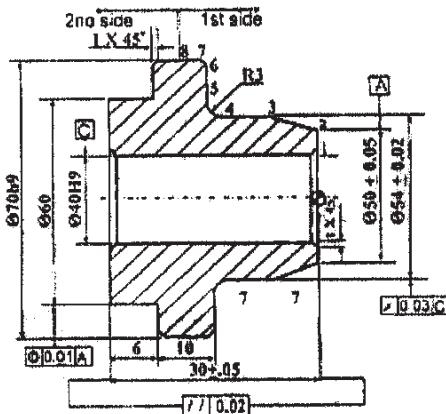


Fig. No. 1

OR

- Q12)** Prepare a process sheet for a component as shown in figure 2. Which is to be manufactured in batches of size 600. Analyse the part print carefully and prepare the process sheet containing manufacturing plan with operation sequence, equipments, tooling, fixtures, process parameters and sample calculation of operation time. [18]

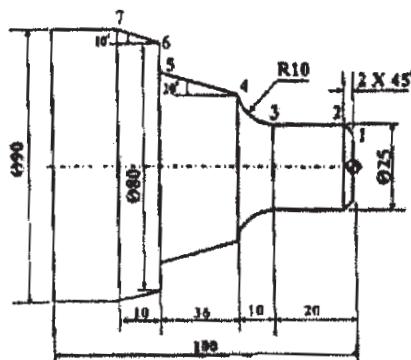


Fig. No. 2



**[4264] - 155**

**B.E. (Instrumentation and Control)**  
**MODELING AND OPTIMIZATION**  
**(2003 & 2008 Pattern)**

*Time : 3 Hours]**[Max. Marks :100***Instructions to the candidates:**

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

**SECTION - I**

- Q1)** a) With suitable electrical circuit, find the model of first and second order Electrical systems. [8]
- b) Obtain the linearized model of gravity flow tank assuming suitable notation. Comment on the step response of gravity flow tank. [8]

OR

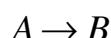
- Q2)** Fit the following data to the model  $y = a_0 + a_1x + a_2x^2$  using least square method [16]

x	10	10	15	20	20	25	25	30	30
y	73	78	85	90	91	87	86	90	65

- Q3)** What are the steps required to develop the model of the ideal distillation column? Develop mathematical model of the ideal distillation column. [16]

OR

- Q4)** What are the steps required to develop the model of non isothermal CSTR? Develop the model of the non isothermal CSTR with first order reaction dynamics for the reaction. [16]



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

- a) Concept of offline and online modeling.
- b) Pulse test for system Identification.
- c) Step testing for system Identification

OR

**Q6)** Explain the advantage pf the ATV identification over pulse test. Explain the ATV identification method with suitable model. [18]

## **SECTION - II**

**Q7)** a) Explain the terms : [8]

- i) Niederlinsky index
- ii) Resiliency
- iii) Interaction and decoupling

b) Define the relative gain array. Obtain the RGA of the system whose transfer function matrix is. [10]

$$G(s) = \begin{bmatrix} \frac{22.89e^{-0.2s}}{4.572s+1} & \frac{-11.64e^{-0.4s}}{1.807s+1} \\ \frac{4.689e^{-0.2s}}{2.174s+1} & \frac{5.8e^{-0.4s}}{1.801s+1} \end{bmatrix}$$

OR

**Q8)** a) Determine the Morari Resiliency index of the systems given in Q7 (b). [10]

b) Explain Skogestad and Morari method. [8]

**Q9)** Explain the following terms : [16]

- a) Convex Region
- b) Convex function
- c) Local minimum and global minimum
- d) Hessian matrix for function  $f(x)$

OR

**Q10)** a) Find the optimum values  $f(x) = 12x^5 - 45x^4 + 40x^3 + 5$  of . [8]

b) Find the minimum value of the 'y' for [8]

$$y = \frac{x_1}{x_2} + \frac{1}{x_1 x_3} + \frac{x_2^2}{2} + \frac{x_3}{16}$$

**Q11)** a) Explain steepest descent method. [8]

b) Explain the Newton's method of function minimization. [8]

OR

**Q12)** a) Explain the secant method with the help of algorithm and flowchart. [8]

b) Maximize  $f(x_1, x_2) = x_1 - x_2 + 2x_1^2 + 2x_1x_2 + 2x_2^2$  using Newton's method.

Assume starting point is  $x = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$ . [8]



Total No. of Questions : 12]

SEAT No. :

P1012

[Total No. of Pages : 2

[4264] - 152

**B.E. (Instrumentation and Control)**

**ADVANCED BIOMEDICAL INSTRUMENTATION**

**(2003 Pattern) (Semester - II) (Elective - 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) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) List the types of fibrillation. [4]  
b) List the types of electrodes used in defibrillation. [4]  
c) What are classification of defibrillator? Explain any one of them? [8]

OR

- Q2)** a) Explain different modes of electrosurgical unit. Also, write down specifications of ESU. [10]  
b) What are different electrode configuration used in cutting and coagulation mode. [6]

- Q3)** a) With the help of graph, explain the basic working principle of a pulse oximeter. [8]  
b) Explain coulter counter used for blood cell counting. [10]

OR

- Q4)** a) Explain the working of an In-Vivo type of oximeter with the help of a suitable diagram. [10]  
b) List and explain various methods for glucose measurement. [8]

- Q5)** a) Discuss X-ray properties and X-ray film used for imaging. [8]  
b) List specifications of X-ray machine and explain their importance. [8]

OR

- Q6)** a) What are the desirable properties of ultrasound. [8]  
b) What is echoencephalograph? [8]

## **SECTION - II**

- Q7)** a) Describe various types of gantries used in CT scanner. [8]  
b) Explain A scan, B scan and M-scan in ultrasound imaging. [8]

OR

- Q8)** a) With the help of a suitable block diagram, explain the working of rectilinear Scanner. [8]  
b) What is Nuclear medicine? Describe various types of detectors that are used to detect  $\beta$  and  $\gamma$  rays. [8]

- Q9)** a) Why to use various method of imaging and list them. [8]  
b) What is an Endoscope? Explain its construction with the help of neat diagram. [8]

OR

- Q10)** a) Write a note on Positron Emission Tomography. [8]  
b) Explain Peritoneal dialysis technique. [8]

- Q11)** a) What is kidney stone? Explain lithotripsy based on acoustic shock wave with plasma explosion. [10]  
b) State any three materials used for wheelchair and specify their properties. [8]

OR

- Q12)** a) Explain Instrumentation and various controls in Hemodialysis. [10]  
b) Explain various types of dialysers their advantages and disadvantages. [8]



Total No. of Questions : 12]

SEAT No. :

P1018

[Total No. of Pages : 3

[4264] - 155

**B.E. (Instrumentation and Control)**

**PROCESS MODELING AND OPTIMIZATION**

**(2003 Pattern) (Semester - II) (Elective - 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 answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 6) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) With suitable electrical circuit, find the model of first and second order Electrical systems. [8]
- b) Obtain the linearized model of gravity flow tank assuming suitable notation. Comment on the step response of gravity flow tank. [8]

OR

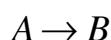
- Q2)** Fit the following data to the model  $y = a_0 + a_1x + a_2x^2$  using least square method [16]

x	10	10	15	20	20	25	25	30	30
y	73	78	85	90	91	87	86	90	65

- Q3)** What are the steps required to develop the model of the ideal distillation column? Develop mathematical model of the ideal distillation column. [16]

OR

- Q4)** What are the steps required to develop the model of non isothermal CSTR? Develop the model of the non isothermal CSTR with first order reaction dynamics for the reaction. [16]



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

- a) Concept of offline and online modeling.
- b) Pulse test for system Identification.
- c) Step testing for system Identification

OR

**Q6)** Explain the advantage pf the ATV identification over pulse test. Explain the ATV identification method with suitable model. [18]

## **SECTION - II**

**Q7)** a) Explain the terms : [8]

- i) Niederlinsky index
- ii) Resiliency
- iii) Interaction and decoupling

b) Define the relative gain array. Obtain the RGA of the system whose transfer function matrix is [10]

$$G(s) = \begin{bmatrix} \frac{22.89e^{-0.2s}}{4.572s+1} & \frac{-11.64e^{-0.4s}}{1.807s+1} \\ \frac{4.689e^{-0.2s}}{2.174s+1} & \frac{5.8e^{-0.4s}}{1.801s+1} \end{bmatrix}$$

OR

**Q8)** a) Determine the Morari Resiliency index of the systems given in Q7 (b). [10]

b) Explain Skogestad and Morari method. [8]

**Q9)** Explain the following terms : [16]

- a) Convex Region
- b) Convex function
- c) Local minimum and global minimum
- d) Hessian matrix for function  $f(x)$

OR

**Q10)** a) Find the optimum values  $f(x) = 12x^5 - 45x^4 + 40x^3 + 5$  of [8]

b) Find the minimum value of the 'y' for [8]

$$y = \frac{x_1}{x_2} + \frac{1}{x_1 x_3} + \frac{x_2^2}{2} + \frac{x_3}{16}$$

**Q11)** a) Explain steepest descent method. [8]

b) Explain the Newton's method of function minimization. [8]

OR

**Q12)** a) Explain the secant method with the help of algorithm and flowchart. [8]

b) Maximize  $f(x_1, x_2) = x_1 - x_2 + 2x_1^2 + 2x_1x_2 + 2x_2^2$  using Newton's method.

Assume starting point is  $x = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$ . [8]



Total No. of Questions : 12]

SEAT No. :

**P1028**

[4264]-20

[Total No. of Pages : 3

**B.E. (Civil)**

**TRANSPORTATION ENGINEERING - II**  
**(2003 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 answer books.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Figures to the right indicate full marks.
- 5) Your answers will be valued as a whole.
- 6) Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

**SECTION - I**

- Q1)** a) With the help of a neat sketch, describe the concept of Star and Grid pattern. [4]  
b) Write a detail note on Traffic Volume Study. [6]  
c) Describe the method of preparation of master plan and based on saturation system. [7]

OR

- Q2)** a) Explain in brief classification of roads based on location & function. [7]  
b) Write a detail note on parking studies. [4]  
c) Discuss the salient features of first road development plan. [6]

- Q3)** a) Explain in brief various engineering surveys carried out to finalise road alignment. [7]  
b) Calculate the values of [6]  
i) Head light sight distance and  
ii) Intermediate sight distance for a highway with design speed of 65 kmph. Assume  $f = 0.36$  and  $t = 2.5$  sec.  
c) Write a short note on PIEV Theory. [4]

OR

- Q4)** a) Derive an expression for finding the Stopping Sight Distance (SSD) at level and at grade. [7]  
b) Enumerate the steps for practical design of superelevation. [6]  
c) Explain curve resistance and compensation of gradient on horizontal curve. [4]

**P.T.O.**

- Q5)** a) Explain the desirable properties of aggregates to be used in different types of road construction. [6]
- b) The CBR value of subgrade soil is 5.0%, Calculate total thickness of a pavement using design formula developed by the U.S. corps of engineers. Assume wheel load = 4100 kg and Tyre pressure = 6 kg/cm<sup>2</sup> [6]
- c) State comparison between Rigid Pavement and Flexible Pavement. [4]

OR

- Q6)** a) Write a note on Equivalent Single Wheel Load [4]
- b) The width of expansion joint gap is 2.5 cm in a cement concrete pavement. If the laying temperature is 10°C, calculate the spacing between expansion joints. Assume coefficient of thermal expansion of concrete as  $10 \times 10^{-6}$  per degree celcius. Maximum slab temperature in summer is 54° C. [6]
- c) What are the various tests carried out on bitumen? Also mention the significance of each test. [6]

### **SECTION - II**

- Q7)** a) Write an explanatory note on the following : [8]
- i) Three controls of an airplane.
  - ii) Wind Rose type II for orientation of runway.
- b) Explain the term Minimum Turning Radius with the help of suitable sketch. [3]
- c) Differentiate between : [6]
- i) Runway and Taxiway.
  - ii) Airport and Aerodrome.
  - iii) Apron and Hangars.

OR

- Q8)** a) Discuss the various factors affecting Airport Capacity. [5]
- b) Explain in brief basic runway length. [4]
- c) What are the points to be considered during the site selection of a Heliport. [4]
- d) How Runway orientation should be done? Discuss. [4]

- Q9)** a) Give detail classification of bridges. [5]
- b) Derive the equation you use to determine the Economic span. State the assumptions also. [6]

c) Write a note on : [6]

- i) Scour Depth and its effect.
- ii) Importance of Free board and clearances.

OR

**Q10)** a) Sketch any 2 types of pliers that are commonly used. Also label the parts. [6]

- b) Explain in brief the Rational Formula to calculate the design discharge. [6]
- c) Define Afflux. State and explain various formula to calculate Afflux. [5]

**Q11)** a) Enlist various types of Loads coming on a major bridge structure and briefly discuss IRC Class AA loading. [6]

- b) What is Culvert? State their types with their suitability. [6]
- c) Write a note on Maintenance of bridges. [4]

OR

**Q12)** a) Differentiate between [6]

- i) Cantilever bridges and Bascule bridges.
- ii) Movable span and Fixed span bridges.
- iii) Fixed bearing and Free bearing.

b) Write a detail note on the different erection methods employed during construction of bridges. [6]

c) What is Cut water and Ease water? Sketch any two shapes of Cut water and Ease water. [4]



Total No. of Questions : 12]

SEAT No. :

**P1032**

[4264]-131

[Total No. of Pages : 2

**B.E. (Electronics & Telecommunication)**  
**TELECOMM NETWORKS AND MANAGEMENT**  
**(2003 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) 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) Explain in brief various aspects of network design issues. [8]  
b) Explain the difference between LAN, WAN & MAN. [8]

OR

- Q2)** a) Explain Distance Vector Routing in detail. Differentiate between Distance Vector and Link - State Routing. [12]  
b) Distinguish between Cable Modem & DSL. [4]

- Q3)** a) Explain the ISDN Protocol Architecture. [8]  
b) Explain the circuit switching, packet switching & virtual switching. [8]

OR

- Q4)** a) Explain the SS7 Protocol Architecture. [8]  
b) Draw & explain STS - 1 frame format. [8]

- Q5)** a) Write notes on : [9]  
i) Broadband Cable Modem.  
ii) Leased Line.  
iii) Local Multipoint Distribution system [LMDS].  
b) i) Draw & explain ATM cell header format. [5]  
ii) Compare frame relay over X.25 services. [4]

OR

**P.T.O.**

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

- a) WLL
- b) SONET Network Elements.
- c) Comparison of SDSL & ADSL.
- d) Multichannel Multipoint Distribution System (MMDS).

### **SECTION - II**

**Q7)** a) Explain OWDM Architecture model. [8]

- b) Explain Dijkstra's Algorithm for finding the shortest path. [8]

OR

**Q8)** a) Explain TMN Building Blocks & TMN Cube. [8]

- b) Explain in brief the various network attacks & protection mechanisms in detail. [8]

**Q9)** a) Explain QOS model & discuss priority levels. [8]

- b) Explain following terms in telecomm. network. [8]

- i) Through put.
- ii) Good put.
- iii) Overheads.
- iv) Latency.

OR

**Q10)** a) What is cross Talk & Jitter? How jitter & cross talk affects the quality of service in the networks? [8]

- b) Describe the features of configuration management systems. [8]

**Q11)** a) Explain SNMP protocol in detail. [9]

- b) Explain the functional architecture of TNM in details. [9]

OR

**Q12)** a) Classify various types of Routing protocols. Describe them briefly & give one example of each type of routing. [9]

- b) Discuss security aspects of networks & how security is ensured? [9]



Total No. of Questions : 12]

SEAT No. :

**P1034**

[4264]-91

[Total No. of Pages : 2

**B.E. (Electrical)**

**SWITCHGEAR & PROTECTION  
(2003 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) What is a fault? What are the causes of fault? List the various types of faults. [8]  
b) With neat sketch, explain the directional overcurrent relay. [8]

OR

- Q2)** a) Obtain the torque equation of induction type relay. [8]  
b) Explain the following terms [8]  
i) Plug setting multiplier.  
ii) Time setting multiplier.

- Q3)** a) Explain the theories related to arc interruption. [8]  
b) Derive the expression of restriking voltage and hence, condition for maximum restriking voltage. [8]

OR

- Q4)** a) What do you mean by resistance switching. State its advantages. [8]  
b) With neat curves, explain the capacitor switching. [8]

- Q5)** a) Explain the following terms related to circuit breaker [10]  
i) Symmetrical and unsymmetrical breaking.  
ii) Rated short circuit making current  
iii) Rated duration of short circuit.  
b) With neat sketch, explain the principle of working of  $Sf_6$  circuit breaker. [8]

OR

**P.T.O.**

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

- a) Air break circuit breaker.
- b) Gas insulation substation [GIS]
- c) Autoreclosure.

### **SECTION - II**

**Q7)** a) List the various types of faults in the transformer and explain Buchholz relay. [8]

- b) Explain the restricted earth fault protection of stator winding by differential system. [8]

OR

**Q8)** a) What is overfluxing in the transformer? Explain the protection against overfluxing. [8]

- b) Explain the various schemes of rotor faults protection of the alternator. [8]

**Q9)** a) Explain the time graded and current graded system protection of 3 - ph feeder using over current relays. [8]

- b) Explain the PLCC scheme for protection of transmission line. [8]

OR

**Q10)** a) Compare impedance, reactance and admittance relays. [8]

- b) What is the effect of power swings and arc resistance on distance relay. [8]

**Q11)** a) Explain the static relays related to : [10]

- i) Reliability and security.
- ii) Limitations.

- b) Explain, microprocessor based over current relay. [8]

OR

**Q12)** Write short notes on : [18]

- a) Numerical relays.
- b) Amplitude and phase comparator.
- c) Time - delay circuits used in static relays.



Total No. of Questions : 8]

SEAT No. :

**P1038**

[4264]-4

[Total No. of Pages : 4

B.E. (Civil)

**STRUCTURAL DESIGN III  
(Semester - I) (2003 Pattern)**

*Time : 4 Hours*

*/Max. Marks : 100*

**Instructions to the candidates:**

- 1) Answer Q. 1 or Q. 2, Q. 3 or Q. 4 in section - I.
- 2) Answer Q. 5 or Q. 6, Q. 7 or Q. 8 section - II.
- 3) Answers to two sections should be written in separate books.
- 4) Figures to the right indicate full marks.
- 5) Use of IS 1343, IS 456, IS 3370 & non programmable calculator is allowed.
- 6) Neat diagrams must be drawn wherever necessary.
- 7) Assume any other data if necessary & mention it at the starting of the answer.
- 8) Mere reproduction from IS code as answer, will not be given full credit.
- 9) Assume any other data, if required.

**SECTION - I**

**Q1)** a) Explain in brief [8]

- i) Damping
- ii) Multi degree freedom

b) A post tensioned prestressed concrete beam section has top flange  $750 \times 150$ , web  $150 \times 800$  and bottom flange  $350 \times 240$  mm, is simply supported over a effective span of 18 m and carries a super imposed load of 13 kN/m over entire span. Calculate extreme fiber stresses in concrete at midspan at initial and final stage. The 8 No. of 12/7 Freyssinet cables having zero eccentricity at supports and c.g. area of steel at 100 mm from soffit of the section and are stressed to initial prestress of 1100 Mpa. Take loss ratio as 0.85 and unit weight concrete as  $25 \text{ kN/m}^3$ . [17]

OR

**Q2)** a) A mild steel plate of cross section  $12 \text{ mm} \times 48 \text{ mm}$ , of length 0.8 m is supporting a load of 150 N through a spring having stiffness  $K = 100 \text{ N/mm}$  as shown in fig (1). Calculate the natural frequency of the system if modulus of elasticity of mild steel is 200 Gpa. [8]

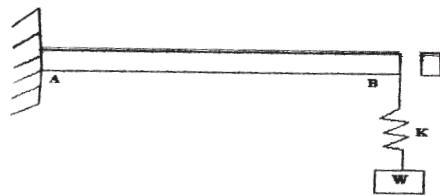


Fig. (1)

**P.T.O.**

- b) A post tensioned prestressed concrete beam section has top flange  $450 \times 150$ , web  $120 \times 600$  and bottom flange  $300 \times 200$  mm, is simply supported over a effective span of 16 m. The beam is prestressed with 5 No. of 12/5 Freyssinet parabolic cables with their c.g. at 120 mm from extreme bottom fiber, stressed one at a time from only one end. Calculate total loss of prestress at the age of 150 days, if  $k = 0.0026 /m$  length of cable, slip of anchorage = 2mm,  $C_c = 2.0$ ,  $E_s = 2 \times 10^5$  MPa, concrete grade = M40, Creep and relaxation of steel = 2% of initial prestress. [17]

- Q3)** Design a post tensioned prestressed concrete rectangular or 'I' section beam for flexure to carry a live load of 10 kN/m over entire simply supported span of 12 m with M40 grade of concrete and Freyssinet cables of 12/5 ( $f_y = 1750$  MPa) or 12/7( $f_y = 1500$  MPa), including the design of end block. Draw sketches showing cable profiles and end block reinforcement details Check fiber stresses in concrete and deflection. [25]

OR

- Q4)** a) State remedial measures to be taken to reduce the friction loss in continuous PSC beams. [10]
- b) A post tensioned prestressed concrete continuous beam ABC as shown in fig (1) is prestressed with initial prestressing force of 1500 kN. The loads shown are exclusive of dead load. Locate centerline of thrust under prestress plus dead load also & make it concordant stating the shift of cable at salient points find the stresses in concrete at extreme fibers at intermediate support take loss ratio of 0.85,  $AD = DB = BE = EC = 8$ m. The eccentricities at A & C = 0, at D & E = 240 mm (down wards), at B = 150 mm (upwards). Size of beam is  $200 \times 700$  mm. [15]

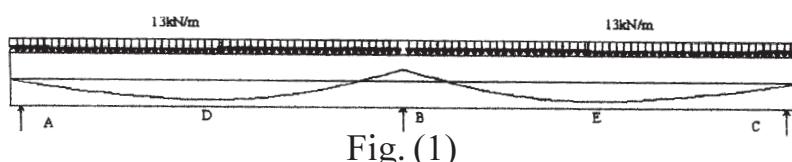
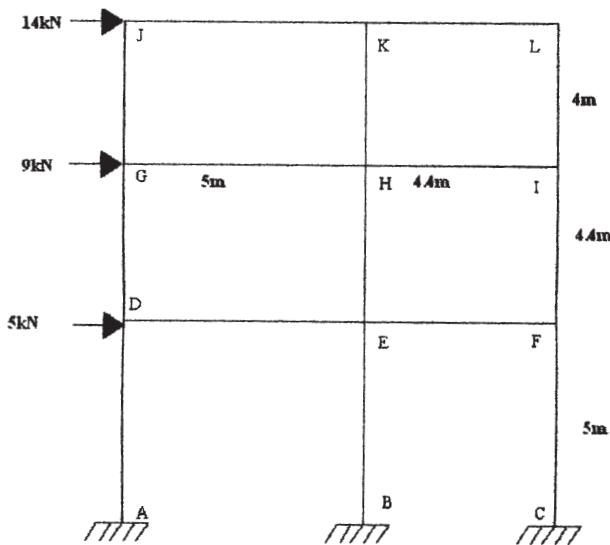


Fig. (1)

## SECTION - II

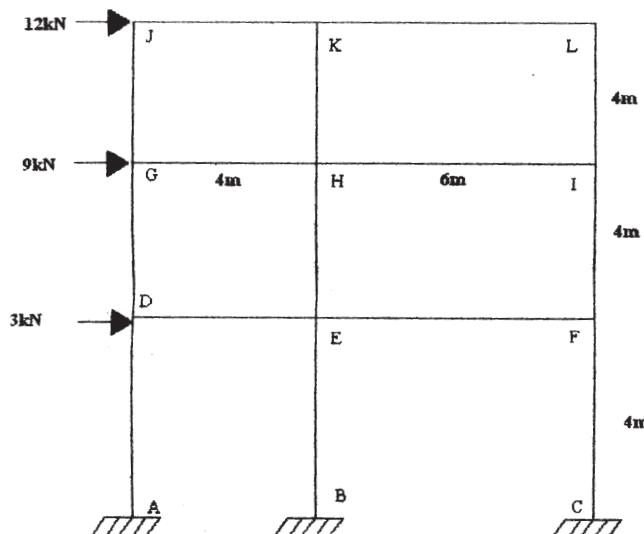
- Q5)** a) Write detailed note on portal method. [8]
- b) Analyze a rigid jointed frame shown in fig (2) by cantilever method for lateral loads. Flexural rigidity for all members is same. Analyze beam GHI using proper substitute frame, if it is subjected to vertical ultimate live & dead load incl. of its self wt. intensities of 12 kN/m & 15 kN/m on GH and 18 kN/m & 20 kN/m on HI respectively. Calculate Max. span moment for span HI and support moment at H. Design section for combined effect of vertical and horizontal Loads. Adopt 15% redistribution of moments for vertical load moments Use M20, Fe415.[17]



Fig(2)

OR

- Q6)** a) Write detailed note on substitute frame method. [8]
- b) Analyze a rigid jointed frame shown in fig (3) by portal method for lateral loads. Flexural rigidity for all members is same. Analyze beam GHI using proper substitute frame, if it is subjected to vertical ultimate live & dead load incl. of its self wt. intensities of 22 kN/m & 20 kN/m on GH and 16 kN/m & 15 kN/m on HI respectively. Calculate max. span moment for span HI and support moment at H. Design section for combined effect of vertical and horizontal Loads. Adopt 10% redistribution of moments for vertical load moments Use M20, Fe500. [17]



Fig(3)

- Q7)** a) Compare rectangular combined footings with strap beam to that without it. [5]
- b) Design circular reinforced concrete tank resting on ground to store 3.5 lakh liters of water the top of tank is open take the safe bearing capacity of the supporting strata as  $200 \text{ kN/m}^2$  Design the wall and bottom slab of the tank using IS code. Draw all details of reinforcements. [20]

OR

- Q8)** Design a 'L' shaped retaining wall for two layered leveled backfill for the following data

Upper layer, height = 4 m,  $\phi = 30^\circ$ ,  $\gamma = 18 \text{ kN/m}^3$

Lower layer, height = 3 m,  $\phi = 32^\circ$ ,  $\gamma = 20 \text{ kN/m}^3$

Safe bearing capacity of the underlying strata =  $150 \text{ kN/m}^2$ , the coefficient friction between the base slab and the underlying strata = 0.52. Draw lateral pressure diagram and details of reinforcement of stem and base showing curtailment if any. [25]



Total No. of Questions : 12]

SEAT No. :

P1040

[Total No. of Pages : 4

[4264] - 6

B.E. (Civil)

## SYSTEM APPROACH IN CIVIL ENGG.

(1997 & 2003 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) Assume suitable data, if necessary.
- 5) Figures to the right indicate full marks.

### SECTION - I

**Q1)** a) Maximize  $Z = 2x_1 + 3x_2 + 4x_3$  [12]

$$\text{S.t. } 3x_1 + x_2 + 4x_3 \leq 600$$

$$2x_1 + 4x_2 + 2x_3 \geq 480$$

$$2x_1 + 3x_2 + 3x_3 = 540$$

$$x_1, x_2, x_3 \geq 0$$

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
<b>Demand</b>	180	320	100	500	

P.T.O.

- i) Find initial feasible solution by VAM
- ii) Find the optimal solution which will minimize the distribution policy.

OR

- 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)** 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) Explain the algorithm of Newton's method. What are its advantages over steepest gradient technique? [8]

OR

- Q6)** 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]

## SECTION - II

- Q7)** a) Use Lagrange Multiplier Technique to Minimize  $Z=5X_1 + X_2 - (X_1 - X_2)^2$   
Subject to  $X_1 + X_2 = 4$ , &  $X_1, X_2 \geq 0$  [10]
- b) Distinguish between interior and exterior penalty function methods. [6]

OR

- Q8)** In an irrigation project, 6 million m<sup>3</sup> 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 m<sup>3</sup>, then suggest the distribution policy.

Quantity of water in million m <sup>3</sup>	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

- 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 → C → D → B → E → F

Job 2 : A → C → B → D → F → 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) 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						
		I	II	III	IV	V	VI	
Player A		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

OR

- Q12)** a) What are the factors affecting the choice of a project from amongst various alternatives. [6]  
 b) Following data pertains to two projects.

Particulars	Project A	Project B
Investment in Rs.1akh.	50	58
Useful life in years	15	12
Annual Benefits in Rs.1akh	10	12
Discount Rate	10%	10%

Discuss the choice of the projects based on NPV and B/C ratio. Ranks the projects. [12]



Total No. of Questions : 12]

SEAT No. :

**P1048**

[4264]-24

[Total No. of Pages : 3

B.E. (Mech.)

**GAS TURBINES & JET PROPULSION**

**(Sem. - I) (2003 Pattern)**

*Time : 3 Hours*

*/Max. Marks : 100*

**Instructions to the candidates:**

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

**SECTION - I**  
**Unit - I**

- Q1)** a) Dry saturated steam is expanded in a nozzle from 10 bar to a pressure of 5 bar. If the expansion is supersaturated, find the degree of undercooling and supersaturation. [8]
- b) Explain the following : [8]
- i) Stagnation temperature
  - ii) Nozzle efficiency
  - iii) Choking of nozzle

OR

- Q2)** a) Steam nozzle supplied steam with pressure of 7 bar and  $275^{\circ}\text{C}$  discharges steam at 1 bar. If the diverging portion of the nozzle is 60 mm long and the throat diameter is 5 mm, determine the cone angle of the divergent portion. Assume 10% of the total available enthalpy drop to be lost in friction in the divergent portion. [8]
- b) Explain the following : [8]
- i) Supersaturated flow in the nozzle.
  - ii) Effect of variation in back pressure on flow characteristics.

**Unit - II**

- Q3)** a) A SLX stage axial flow compressor takes air at a temperature of  $25^{\circ}\text{C}$  at a rate of 5 kg/s. The pressure ratio is 5 and isentropic efficiency 0.85. The compressor stages are similar and has 50% degree of reaction. In each stage the mean blade speed is 190 m/s and axial velocity of flow is 100 m/s. Calculate the power required and blade angles. [10]

**P.T.O.**

- b) Write short note on choking of rotary air compressors. [8]

OR

- Q4)** Write short notes on the following for rotary air compressors. [18]

- a) Surging
- b) Stalling
- c) Slip factor
- d) Work done factor

### Unit - III

- Q5)** a) A gas turbine operates between  $5^{\circ}\text{C}$  and  $839^{\circ}\text{C}$ . Find [10]

- i) Pressure ratio at which cycle efficiency equals Carnot cycle efficiency.
- ii) Pressure ratio at which maximum work is obtained.
- iii) Efficiency under conditions giving maximum work.

- b) State the assumptions made in an ideal cycle analysis of gas turbines. [6]

OR

- Q6)** a) Derive the expressions for specific work output and the efficiency of a simple gas turbine cycle. Draw their trends as a function of pressure ratio. [10]

- b) Explain with the help of diagrams the reheat and heat exchange gas turbine cycle. [6]

## SECTION - II

### Unit - IV

- Q7)** a) Derive an expression for maximum diagram efficiency of a 50% reaction turbine. [8]

- b) In a fifty percent reaction turbine, the outlet and inlet blade angles are  $70^{\circ}$  and  $55^{\circ}$  respectively with respect to axial direction. The mean diameter of the blade stage is 1 m and speed is 5000 rpm. The gas flow is 80 kg/s. Calculate the power developed by the stage. [8]

OR

- Q8)** a) With a neat sketch, explain pressure compounding of a multistage impulse turbine. [6]

- b) A single stage impulse turbine has a mean blade speed of 215 m/s. Nozzle angle is  $60^{\circ}$  to the axial direction. The gas velocity from the nozzle is 550 m/s. There is 15% loss of relative velocity due to friction across blades. The discharge of gas from the turbine is axial. The gas flow through the turbine is 700 kg/hr. Determine [10]

- i) inlet and exit angles of the blades.
- ii) the absolute velocity of gas at exit .
- iii) power output.

**Unit - V**

- Q9)** a) Discuss the factors affecting combustion chamber design and performance. [8]
- b) With a neat sketch, explain the combustion chamber geometry bringing out the various zones that play a part in the process of combustion. [8]

OR

- Q10)** Write short notes on : [16]
- a) Flame tube cooling.
  - b) Fuel injection and ignition.
  - c) Fuels for gas turbines and pollution problems.

**Unit - VI**

- Q11)** a) With a neat sketch and T - S diagram, explain the working of turbo jet engines and also derive the expressions for the thrust and propulsive efficiency. [10]
- b) A turbojet engines consumes air at the rate of 60 kg/s when flying at a speed of 950 km/h. Calculate [8]
- i) Exit velocity of jet when the enthalpy change for the nozzle is 210 kJ/kg.
  - ii) Fuel flow rate in kg/s if A/F = 65
  - iii) TSFC
  - iv) Thermal efficiency of the plant when combustion efficiency is 93% and C.V. of fuel is 42500 kJ/kg.

OR

- Q12)** a) With neat sketches, discuss liquid propellant rockets. [6]
- b) Write a short note on rocket propellants. [6]
- c) Discuss thrust augmentation with respect to turbo jet engine. [6]



Total No. of Questions : 6]

SEAT No. :

P1049

[Total No. of Pages : 4

[4264] - 29

B.E. (Mechanical)

OPERATIONS RESEARCH

(2003 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.
- 4) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.
- 5) Assume suitable data, if necessary.
- 6) All questions are compulsory.

### SECTION - I

- Q1)** a) 'OR is an art of giving bad answers to the problems which will otherwise has worse answers' - Explain. [3]  
b) The Poona Decorators Company is planning to make up floral arrangements for the forth coming X-mas festival. The company has available the following supply of flowers at the costs shown -

Types	Number available	cost/flower (Rs.)
Red roses	800	0.20
Gardenias	456	0.25
Carnations	4,000	0.15
White roses	920	0.20
Yellow roses	422	0.22

These flowers can be used in any of the four popular arrangements whose make up and selling prices are as follows.

Arrangement	Make up Requirement	Selling price
Economy	4 red roses, 2 gardenias, 8 carnations	Rs. 6
May time	8 white roses, 5 gardenias, 10 carnations, 4 yellow roses	Rs. 8
Spring colour	9 red roses, 10 carnations, 9 white roses, 6 yellow roses	Rs. 10
Deluxe rose	12 red roses, 12 white roses, 12 yellow roses	Rs.12

Write a LPP which allows the company to determine how many units of each arrangement should be made up in order to Maxi-Mix profits assuming all arrangement can be sold. [7]

- c) Sketch special cases in graphical solution of LPP. [4]  
d) Define following terms in L.P.P. [4]
- |                      |                          |
|----------------------|--------------------------|
| i) Active constraint | ii) Feasible region      |
| iii) Basic solution  | iv) Degenerate solution. |

OR

- a) Solve by Simplex method - [10]

$$\begin{aligned} \text{Max } Z &= 4x_1 + 3x_2 + 6x_3 \\ \text{St. } &2x_1 + 3x_2 + 2x_3 \leq 440 \\ &4x_1 + 3x_3 \leq 470 \\ &2x_1 + 5x_2 \leq 430 \text{ & } x_1, x_2, x_3 \geq 0 \end{aligned}$$

- b) Write the dual of the above problem & values of dual decision variables from primal simplex table. [3]  
c) Discuss the concept of sensitivity analysis in LPP. [5]

- Q2)** a) Write LP form for an assignment problem. [3]  
b) For n size square assignment problem  
How many constraints are involved in it's LP form & what type? [2]  
c) Solve the following transportation problem - [11]

To	→	W <sub>1</sub>	W <sub>2</sub>	W <sub>3</sub>	ai
From	F <sub>1</sub>	2	7	4	5
↓	F <sub>2</sub>	3	3	1	8
	F <sub>3</sub>	5	4	7	7
	F <sub>4</sub>	1	6	2	14
	bj	7	9	18	

OR

- a) 'Assignment problem is inherent degenerate Transportation problem, which inturn inherent degenerate LP problem'-Discuss. [6]  
b) Solve 5 workers - 4 machine assignment problem for minimisation. Assume any cost for worker-machine pairs. Comment on the performance of a particular worker not included in the solution. If the same problem is to be solve as 'Maximisation'. What change you have to carry out to initiate the procedure. [10]

- Q3)** a) Define the terms with respect to NLP  
i) Local optima ii) Global optima iii) Point of inflexion [3]  
b) Derive basic EOQ formula. [6]  
c) Mention any seven characteristics of DPP. [7]

OR

- a) A company has a demand of 12,000 units / year for an item & it can produce 2,000 such items permonth. The cost of one set up is Rs. 400

and the holding cost/unit/month is Rs. 0.15. Find the optimum lot size and the total cost per year, assuming the cost of one unit as Rs. 4. Also find the maximum inventory, manufacturing time & total time. Sketch the inventory cycle you used. [10]

- b) Discuss the cutting plane algorithm in IPP. [6]

## SECTION - II

- Q4)** a) Discuss the replacement policy for the items that fail suddenly. [5]  
 b) Solve the following game by dominance & check the answer by Maximin & Minimax principle. [11]

1	3	2	7	4
3	4	1	5	6
6	5	7	6	5
2	0	6	3	1

OR

- a) Explain - i) Two person zero sum game ii) Pure and mix strategy.  
 iii) Value of Game. [6]  
 b) The cost of a new machine is Rs. 5000/- . The maintenance cost during the  $n^{\text{th}}$  year is given by  $M_n = \text{Rs. } 500(n - 1)$  where  $n = 1, 2, 3, \dots$ . If the discount rate per year is 0.05, after how many years will it be economical to replace the machine by a new one? [8]  
 c) What is a sub-game method in theory of Games. [2]
- Q5)** Tools in an engineering company are issued at tool crib window. Workers who want tools or wish to return tools approach this window where the crib clerk uses & accept tools on the basic of FCFS. The workers arrive at the tool crib at random intervals of time and they are served by clerk with random servicing time.

A study of 100 arrivals gave the following inter arrival time distribution

Inter arrival time (min.)	1	2	3	4	5	6	7	8	9	10
Frequency	3	5	12	15	25	20	10	6	3	1

The stop watch study of servicing time for above 100 arrivals has the following distribution.

Service time (min)	1	2	3	4	5
Frequency	10	25	30	25	10

Simulate a sample of 10 workers & calculate average % worker waiting time & average % clerk's idle time.

Use Randoms nos. as - 16, 22, 77, 94, 39, 49, 54, 43, 54, 82 for both. [16]

OR

- a) A repairman is to be hired to repair machines which break down at an average rate of 3 per hour. The breakdown follows poisson distribution. Non-productive time of machine is considered to cost Rs. 16 per hour. Two repairmen have been interviewed : one is slow but cheap, while the other is fast but expensive. The slow repairman changes Rs. 8 per hour & he services breakdown machines at a rate of 4 per hours. The fast repairman demands Rs. 10/hr. & he services at an average rate of 6 per hour. Which repairman should be hired? Assume an 8 hour day. [8]
- b) Five jobs P, Q, R, S, T are to be made on three groups of machines  $F_1$ ,  $F_2$  &  $F_3$  in that order. The time required for each job is given below.

Jobs	$\rightarrow$	P	Q	R	S	T
Time required	$F_1$	20	27	31	15	19
in min. on	$F_2$	7	9	6	12	14
	$F_3$	27	31	16	11	12

Sequence the jobs on machines for minimum elapsed time from starting 1<sup>st</sup> job on  $F_1$  to finish last job on  $F_3$ . Also determine idle time of machines during elapsed time. [8]

- Q6)** a) The following table gives the activities in a construction project.
- | Activity        | - | A  | B  | C  | D  | E   | F    |
|-----------------|---|----|----|----|----|-----|------|
| Preceded by     | - | -  | -  | A  | A  | B,C | E, D |
| Duration (days) | - | 20 | 25 | 10 | 12 | 6   | 10   |
- i) Draw the network of the project [6]
  - ii) Find critical path & duration of project. [3]
  - iii) If duration is average calculated from 3 time estimates, what is probability of completion of project in calculated duration? [1]
- b) Explain in brief related to project management. [8]
- i) Bar chart
  - ii) Activity & event
  - iii) Slack for event
  - iv) Float for activity.

OR

- a) Differentiate between CPM & PERT. [6]
- b) Discuss in detail probabilistic considerations in PERT. [8]
- c) Explain in brief i) Dummy activity ii) Earliest start & latest start for an activity. [4]



Total No. of Questions : 12]

SEAT No. :

**P1053**

**[4264]-54**

[Total No. of Pages : 7

**B.E. (Production)**  
**OPERATION RESEARCH**  
**(Semester - I) (2003 Pattern)**

*Time : 3 Hours*

*/Max. Marks : 100*

*Instructions to the candidates:*

- 1) Select Q.1 or Q.2, Q.3, or Q.4, Q.5 or Q.6 from section - I & Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12 from section - II.
- 2) Answers to the two sections should be written in separate answer books.
- 3) Use of calculator is allowed.
- 4) Assume suitable data if necessary.

**SECTION - I**

**Unit - I**

**Q1)** a) What are the various phases in solving O.R. problem. [6]

b) A firm manufactures headache pills in two sizes, A & B. size A contains 2 grains of aspiriane, 5 grains of Biocarbonate and 1 grain of codeine, size B contains 1 grain of aspiriane, 8 grains of biocarbonate & 6 grains of codeine. It has been found by uses that it requires at least 12 grains of aspiriane, 74 Biocarbonate & 24 grains of codeine for providing immediate effect. Determine the least number of pins a patient should take to get immediate relief. Determine also quantity of codeine consumed by the patient. [12]

OR

**Q2)** a) Using the Big- M method for solve the following LPP. [6]

$$\text{Max } Z = 2x_1 + x_2 + 3x_3$$

$$\text{Subjected to } x_1 + x_2 + 2x_3 \leq 5$$

$$2x_1 + 3x_2 + 4x_3 = 12$$

$$x_1, x_2, x_3 \geq 0$$

**P.T.O.**

- b) ABC manufacturing company makes three products  $x_1$ ,  $x_2$  &  $x_3$  with contribution per unit to profit Rs. 2, Rs. 4, & Rs. 3 respectively. Each of these products passes through three centres as part of production process. Time required in each centre to produce one unit of each product is as given below : [12]

Product	Hours per unit		
	Centre 1	Centre 2	Centre 3
$X_1$	3	2	1
$X_2$	4	1	3
$X_3$	2	2	2
Time available (Hrs)	60	40	80

Determine the optimal product mix for nextweek production.

### Unit - II

- Q3)** a) Solve the assignment problem of maximization [8]

5	10	7	11	9
4	9	8	5	7
12	6	8	3	12
6	4	8	3	12
10	12	7	8	7

- b) A company has three plants locations A, B, C which supplies to warehouses located at DEFG & H monthly plant capacities are 800, 500, 900 units respectively. Monthly ware houses requirements are 400, 400, 500, 400, 800 units respectively. Determine an optimal distribution for the company inorder to minimise the total transportation costs. [8]

To From	D	E	F	G	H	capacity
A	5	8	6	6	3	800
	5	7	7	6	5	500
C	8	4	6	6	4	900
	400	400	500	400	800	
requirement						

OR

- Q4)** a) Find the assignment of men to jobs that will minimise total time. [8]

		Jobs			
		J <sub>1</sub>	J <sub>2</sub>	J <sub>3</sub>	J <sub>4</sub>
Men	M <sub>1</sub>	8	26	17	11
	M <sub>2</sub>	13	28	4	26
	M <sub>3</sub>	38	19	18	15
	M <sub>4</sub>	19	26	24	10

- b) Find the basic feasible solution of the following transportation problem by VAM method and find optimal solution. [8]

	1	2	3	4	5	Available
A	4	3	1	2	6	80
B	5	2	3	4	5	60
C	3	5	6	3	2	40
D	2	4	4	5	3	20
Required	60	60	30	40	10	

### Unit - III

- Q5)** a) Solve the following LPP by branch & bound method. [8]

$$\text{Max } Z = 6x_1 + 8x_2$$

$$\text{St. } 4x_1 + 5x_2 \leq 22$$

$$5x_1 + 8x_2 \leq 30$$

$$x_1, x_2 \geq 0$$

- b) Write the dual of the following LPP. [8]

$$\text{i) Min } Z = x_1 + x_2 + x_3$$

$$\text{St. } x_1 + 2x_2 \leq 3$$

$$x_1 - 3x_2 + 4x_3 = 5$$

$$2x_2 - x_3 \geq 4$$

$$x_1, x_2, x_3 \geq 0$$

ii)  $\text{Max } Z = 20x_1 + 30x_2 + 10x_3$

St.  $x_1 - x_3 \leq 4$

$$12x_1 + 18x_2 \leq 15$$

$$x_1 + x_2 + x_3 \geq 8$$

$$4x_1 + x_2 - x_3 = 0$$

$$x_1, x_2, x_3 \geq 0$$

OR

**Q6)** a) Use duality to solve

[8]

$$\text{Min } Z = 3x_1 + x_2$$

St.  $x_1 + x_3 \geq 1$

$$2x_1 + 3x_2 \geq 2$$

$$x_1, x_2 \geq 0$$

b) Write short note on

[8]

i) Cutting plane method in Integer programming

ii) Non linear programming.

## SECTION - II

### Unit - IV

**Q7)** a) A fleet owner finds from his past records that the cost per year of running a vehicles whose purchase cost is Rs. 50,000/- are as under.

Year	1	2	3	4	5	6	7
running cost Rs.	5000	6000	7000	9000	15000	16000	18000
resale value Rs.	30,000	15,000	7500	3750	2000	2000	2000

There after running cost increases by Rs. 2000, but resale value remains constant Rs. 2000. At what age is a replacement due. [10]

b) Explain briefly goal programming.

[6]

OR

**Q8)** a) Find the cost / period of individual replacement policy of an installation of 300 bulbs. Given that

- i) Cost of replacing an individual bulb is Rs. 2
- ii) Conditional probability of failure are given below

Week number	0	1	2	3	4
Conditional cumulative probability of failure	0	0.10	0.30	0.70	1.00

Calculate cost and the number of bulb that would fail during each week. [10]

b) Explain briefly Geometric programming. [6]

### Unit - V

**Q9)** a) Find best strategy for player A & B and value of game. [8]

		Player B			
		B <sub>1</sub>	B <sub>2</sub>	B <sub>3</sub>	B <sub>4</sub>
Player A	A <sub>1</sub>	3	2	4	0
	A <sub>2</sub>	3	4	2	4
	A <sub>3</sub>	4	2	4	1
	A <sub>4</sub>	3	4	3	4

b) The inter arrival time at tool criebe are exponential with an average time of 10 minutes. The length of service time is assumed to be exponentially distributed with mean 6 minutes. Find. [8]

- i) The probability that a person arriving at booth will have to wait.
- ii) Average length of the queue that forms and the average time that an operate sends in the queue system.
- iii) The manager of the shop will install a second booth when an arrival would have to wait 10 minutes or more for the service. By how much rate of arrival be increased in order to justify a second booth.
- iv) The probability that an arrival will have to wait for more than 12 minutes for service and to obtain his tools.
- v) Estimate the fraction of the day that tool criebe operator will be ideal.

OR

**Q10)** a) Explain the following terms in games theory [6]

- i) Saddle point.
- ii) Maximin and minimax principle
- iii) Value of the game.

b) Write information for following related to queuing system. [10]

- i) characteristics of queuing system
- ii) queue length
- iii) traffic intensity
- iv) steady & transient state.

### Unit - VI

**Q11)** a) What is the significance of three time estimates used in PERT? How are these estimates derived from these estimates. [6]

b) The relevant data for a project are given below. [12]

Activity	preceding activity	Time in weeks		cost in Rs	
		Normal	Crash	Normal	Crash
A	None	12	10	5000	7400
B	A	9	8	4300	5900
C	A	6	4	3700	4400
D	C	3	3	2500	2500
E	B	7	6	3400	4800
F	D	8	5	4600	6100
G	DE	4	4	2800	2800
H	F	6	3	4100	6200
I	G	7	5	4800	7800

Crash the activity & find minimum cost for completion of a project.

OR

- Q12)** a) Find the critical path & probability of completion of project that finish one day before the expected time. [12]

Activity	12	23	24	34	35	45	56
Optimistic	0.7	0.7	2	2.2	5.2	3.8	0.7
Most likely	1	3.4	6.8	2.7	7.6	5.6	1
Pessimistic	1.3	3.7	12.8	5.1	12.4	9.8	1.3

Standard deviation	0.1	0.2	0.3	0.4	0.5	0.6
% probability	46	42.1	38.2	34.5	30.8	27.4

- b) Explain in brief [6]

- i) Crashing slope.
- ii) Project updation
- iii) Resource levelling.



Total No. of Questions : 12]

SEAT No. :

**P1071**

[4264]-124

[Total No. of Pages : 3

B.E. (E & TC)  
VLSI DESIGN

(2003 Pattern) (Semester - I)

*Time : 3 Hours]*

*/Max. Marks : 100*

*Instructions to the candidates:*

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

### **SECTION - I**

**Q1)** a) Write code in VHDL for 4 : 1 multiplexer in three different modeling types. [8]  
b) What are the object types involved in VHDL? Explain with example. [10]

OR

**Q2)** a) Write VHDL code for 4 bit comparator. Also write test bench for it. Focus on test bench concept. [10]  
b) Differentiate between function and procedure with respect to following points :  
i) Return values  
ii) Preferred application  
iii) Calling methods  
iv) Simulation time

**Q3)** a) Design Voting machine for elections using FSM. [8]  
b) What do you mean by Metastability? What are the solutions? [8]

OR

**Q4)** a) Compare Moore and Mealy machines with respect to speed, hardware, glitch, number of states. [8]  
b) Design sequence detector 1-0-0-1-0 using FSM representation. Write VHDL code for it. [8]

**P.T.O.**

- Q5)** a) Compare EPROM, PLA, PAL, CPLD, and FPGA. [8]  
b) Explain with block schematic, the architecture of FPGA. [8]

OR

- Q6)** a) Explain architecture of PLD w.r.t. : [8]  
i) Microcell  
ii) CLB  
iii) I/O bank  
iv) Memory banks  
b) Discuss various criteria for selection of programmable device for any application. [8]

## **SECTION - II**

- Q7)** a) Explain the on-chip I/O architecture in detail. [8]  
b) What is wire parasitic? How do parasitics affect the performance of chip. [8]

OR

- Q8)** a) With the help of suitable schematic, explain the architecture of DRAM cell. [8]  
b) What is Clock Distribution? Explain H tree and Balanced tree for Clock Distribution. [8]

- Q9)** a) Design CMOS logic for  $Y = \overline{AB} + C(D + E)$ . Calculate total area in terms of width required for MOSFETs on chip. [8]  
b) Explain n-well process for CMOS fabrication. [8]

OR

- Q10)** a) Explain with neat diagrams, CMOS layout design rules with respect to maximum and minimum size spacing for [8]  
i) n - well  
ii) poly  
iii) metal  
iv) active area  
b) Explain noise margin  $NM_L$  and  $NM_H$  with respect to CMOS. [8]

**Q11)** a) Explain controllability and observability and fault coverage. [10]

b) What is full and partial scan? Explain in detail. [8]

OR

**Q12)** a) Define and explain Design for Testability (DFT) and fault coverage. [8]

b) What is JTAG? Explain the functions of TDI, TCK, TMS, TDO and TRST. [10]



Total No. of Questions : 12]

SEAT No. :

**P1298**

[4264]-278

[Total No. of Pages : 2

B.E. (I.T.)

**SYSTEM OPERATIONS AND MAINTENANCE  
(2003 Pattern) (Sem. - II)**

*Time : 3 Hours]*

*/Max. Marks : 100*

**Instructions to the candidates:**

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

**SECTION - I**

- Q1)** a) Classify telecommunications service providers. With a neat diagram explain the organizational structure of an average telecommunications provider. [10]  
b) Explain the industry issues of support system. [8]

OR

- Q2)** a) Explain with neat diagram the signaling system 7. [10]  
b) State and explain different types of virtual circuits. [8]

- Q3)** a) Discuss the typical services, applications and benefits of voice over IP. [8]  
b) Explain the structure of SNMP based management services. [8]

OR

- Q4)** a) What is LDAP? Explain the typical features of LDAP. State the limitations of LDAP. [8]  
b) Explain telecommunication management network. [8]

- Q5)** a) Explain the different functions of sales process with suitable block diagram. [8]  
b) What are the different problems and solutions in Internet billing. [8]

OR

- Q6)** a) Explain the role of CRM in telecom. [8]  
b) What is micropayment? Explain with generic architecture. [8]

**P.T.O.**

## **SECTION - II**

- Q7)*** a) Discuss the issues involved with network traffic management. [10]  
b) What are the different security management issues in telecom. [8]

OR

- Q8)*** a) Define service provisioning process. Explain the different types of implementing the same. [10]  
b) What is the significance of periodic security audit for telecommunication service provider. [8]

- Q9)*** a) Explain complete framework for support system. [8]  
b) What are different trends of support system. [8]

OR

- Q10)*** a) Explain the profile of call center operator. [8]  
b) Write note on “customer service order processing” in telecom. [8]

- Q11)*** a) Compare and contrast between building teams and keeping teams. [8]  
b) What is the job profile of network operations manager? [8]

OR

- Q12)*** a) Compare reverse engineering and reengineering. [8]  
b) Explain benchmarking and role of HR in building the teams. [8]



Total No. of Questions : 12]

SEAT No. :

**P1382**

[Total No. of Pages : 3

**[4264]-253**

**B.E. (Computer Engg.)  
(Common to I.T.)**

**OBJECT ORIENTED MODELING & DESIGN  
(2003 Pattern) (Semester - I)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION - I**

**Q1)** a) Explain in brief [9]

- i) RUP
- ii) CORBA
- iii) XMI

b) Explain new diagrams in UML2.0. [8]

OR

**Q2)** a) Explain in brief [9]

- i) 4 + 1 View Architecture.
- ii) Object oriented features.
- iii) OMG

b) Explain the building blocks of UML. [8]

**Q3)** a) What are functional requirements & how are they depicted in use case diagram? Elaborate with example for Library management system. [9]

b) Explain the OCL syntax for constraints on classifiers. [8]

OR

**Q4)** a) What are profiles and tagged values in UML, Explain with example. [8]

b) Which stereotypes are used in Use case diagram. Explain with example for the system : Online shopping. [9]

**P.T.O.**

- Q5)** a) Draw CRC card for ATM system. [5]  
 b) Explain Aggregation and composition with example. [5]  
 c) What are different adornments used in association relationship. [6]

OR

- Q6)** a) What are ports and pins. [5]  
 b) Explain different types of interfaces used in composite structure diagrams. [5]  
 c) Draw a class diagram for inventory control system. Assume suitable scope. [6]

### **SECTION - II**

- Q7)** a) Consider the scenario : Facebook (FB) user could be authenticated in a web application to allow access to his/her FB resources. Assume suitable scope and draw a sequence diagram with full notations. [9]  
 b) Explain the Timing diagram with suitable example. [4]  
 c) With your own suitable example, explain object node and activity node. [4]

OR

- Q8)** a) What are different types of messages in sequence diagram? [8]  
 b) What are interaction operators? Explain with example loop, opt and parallel operator. [9]

- Q9)** a) Consider the system : writing a text document : [9]  
 Suppose that you're writing a document in some of famous text processing tools, like Microsoft Word for example. You can start typing a new document, or open an existing one, You type a text by using your keyboard. Every document consists of several pages, and every page consists of header, document's body or/and footer. In header and footer you may add date, time, page number, file location e.t.c. Document's body has sentences. Sentences are made up of words and punctual signs. Words consists of letters, numbers and/or special characters. Also in the text you may insert pictures and tables. Table consists of rows and columns. Every cell from table may hold up text or pictures.

After finishing the document, user can choose to save or to print the document. Draw a detailed activity diagram for the given system.

- b) What are fork and joins. Elaborate with example. [4]  
 c) Explain Submachine states and composite states with suitable example. [4]

OR

- Q10)** a) What are the history states? Considering the above example 9(a) and explain history states. [8]  
b) Describe Pseudo states. Explain signals deferred events in state chart diagrams. [9]

- Q11)** a) Draw a deployment diagram for Admission procedure system. It's a centralized system which deals with a central server at university and clients at different colleges. System also contains database server. [8]  
b) Compare Access and import stereotypes in package diagram. Explain with suitable examples. [8]

OR

- Q12)** a) Define component. Explain the significance of component diagram in modeling a system with appropriate example. [8]  
b) What is reverse engineering. Write a piece of code in c ++ which depicts inheritance and also draw its UML representation. [8]



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

**SEAT No. :**

P960

[Total No. of Pages : 3]

[4264] - 1

B.E. (Civil)

# **HYDROLOGY AND IRRIGATION ENGINEERING**

## **(2003 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 to be written in separate answer books.*
  - 3) Figures to the right indicate full marks.*
  - 4) Draw neat diagrams wherever necessary.*
  - 5) Use of calculators is allowed.*
  - 6) Assume suitable data, if necessary.*

## **SECTION - I**

- Q1)** a) State conditions for Raining. Explain cyclonic & Orographic precipitation. [10]  
b) Describe the Tipping bucket type rainfall measurement. Explain telemetry. [8]

OR

- Q2)** a) Explain how will you calculate missing rainfall data at station. State raingauge density as per WMO standards [10]  
b) The hourly precipitation data during a storm is as follows : [8]

<b>Time (Hrs)</b>	0	1	2	3	4	5	6	7	8	9	10
<b>Precipitation( mm)</b>	0	10	30	28	50	5	12	10	25	22	0

Plot i) hyetograph. ii) Mass curve

for the above data.

- Q3)** a) Explain extreme value (Gumbel's) distribution. [8]  
b) State various formulae to estimate flood and explain rational method in detail. [8]

OR

PTO

**Q4)** a) What do you understand by return period? Give few formulae to determine return period. [8]

b) The ordinates of a 4 h UH of a basin of area  $300 \text{ Km}^2$  measured at 1 hour intervals are 6, 36, 66, 91, 108, 93, 79, 68, 58, 49, 42, 34, 27, 23, 17, 15, 9.6, 3 and  $1.5 \text{ m}^3/\text{s}$  respectively. Obtain the ordinates of a 3 h UH for the basin using the S-Curve technique. [8]

**Q5)** a) Explain the points considered for selecting the site for a reservoir and state the investigation required for construction of a reservoir. [8]

b) Explain the design life period of storage reservoir? [8]

OR

**Q6)** a) Define trap efficiency of reservoir. Describe how the time required to for the reservoir to fill up with the sediments is calculated. [8]

b) Write a note on Benefit-Cost studies for reservoir. Explain any two methods. [8]

## **SECTION - II**

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

b) Explain Sprinkler irrigation with a neat layout sketch and state the advantages of Sprinkler irrigation over other methods of irrigation. [8]

OR

**Q8)** a) Explain the relation between duty, delta and base period. Derive the relation between them and states the methods to improve duty of water. [8]

b) Define i) kor watering, ii) kor depth, iii) Paleo irrigation, iv) crop period, v) base period, vi) intensity of irrigation, vii) gross command area, viii) culturable command area. [8]

**Q9)** a) Explain Dupits and Thiems theory and state the assumptions made. [8]

b) Enlist different types of tube wells and dug wells and explain strainer type with a neat sketch. [8]

OR

**Q10)** a) Explain pumping and recuperation test. What should be the diameter of an open well to give safe yield of 4.8 lit/sec? Assume the working head at 3.75 m and the subsoil consists of fine sand. (For fine sand specific yield = 0.5/hour). [8]

- b) In an artesian aquifer of 8 m thick, a 10 cm diameter well is pumped at a constant rate of 100 lit/minute. The steady state drawdown observed in two wells located at 10 m and 50 m distances from the centre of the well are 3 m and 0.05 m respectively, compute the transmissivity and the hydraulic conductivity of the aquifer. [8]

**Q11)** Write notes on : [18]

- a) Application of Remote sensing in reservoir sedimentation
- b) Use of GIS in crop assessment
- c) Warabandi

OR

**Q12)** a) What are co-operative water distribution society's. State the rules and regulation laid down by these societies for equitable distribution of water to farmers. [8]

b) What is water logging? What are the ill effects of water logging? State the methods to improve the sub-surface drainage. [10]



Total No. of Questions : 12]

SEAT No. :

**P961**

**[4264]-18**

[Total No. of Pages : 2

**B.E. (Civil)**

**ADVANCED ENGINEERING GEOLOGY WITH ROCK MECHANICS  
(2003 Pattern) (Semester - II) (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) Neat diagrams should be drawn wherever necessary.

**SECTION - I**

- Q1)** a) Only mention three case histories each of dams and tunnels in which economy has been achieved by interpreting correctly the local geological conditions in Deccan Trap area. [6]  
b) Explain field characters of Fractures in Deccan trap area. [6]  
c) Engineering significance of Archaean rocks in Maharashtra state. [4]

OR

- Q2)** a) Engineering significance of Precambrian secondary rocks in Maharashtra state. [8]  
b) What are the varieties of Volcanic Breccias? [4]  
c) Region 2 [4]

- Q3)** a) Geological conditions resulting to tail channel erosion in Deccan trap area. Only mention case histories. [8]  
b) Discuss with suitable examples, suitability of Compact Basalts and Amygdaloidal Basalts from dam foundation point of view. [8]

OR

- Q4)** a) Discuss in detail the origin of Tachytic basalts and their civil engineering significance. [8]  
b) Treatment to be given to a dyke crossing dam alignment. Give case histories. [8]

- Q5)** Write notes on the following  
a) Permeability of rock mass. [4]  
b) Compressive strengths of rock mass. [8]  
c) Elasticity of rock mass. [3]  
d) Stand up time of a rock mass during tunneling. [3]

**P.T.O.**

OR

- Q6)** a) Only mention various rock mass classification systems. Discuss in detail Rock Mass Rating (RMR) classification. [13]  
b) Explain in brief Electrical Resistivity method. [5]

**SECTION - II**

- Q7)** a) How location and depth of drill holes to be taken for bridge pier foundation is located? [6]  
b) Tunneling through Amygdaloidal basalt with examples. [6]  
c) Stand up time of a rock mass during tunneling. [4]

OR

- Q8)** a) What are fractures? Discuss their engineering significance from tunneling point of view. [10]  
b) Explain Importance of subsurface investigations for bridge foundation. [6]
- Q9)** Give detailed account water bearing characters of Compact and Amygdaloidal basalt with examples. [16]

OR

- Q10)** a) Availability of natural sand in Deccan trap area. [4]  
b) Excavation Cut Off Trench through river alluvium in Deccan trap area. Give case histories. [8]  
c) Water bearing characters of dykes in deccan trap area. [4]
- Q11)** a) Compact basalt as a construction material. [4]  
b) R.I.S. in Deccan Trap area. [10]  
c) Fault zone treatment. [4]

OR

- Q12)** a) Occurrence of zeolites in natural sands. [4]  
b) Use of dyke rock as construction material. [5]  
c) Active Faults. [5]  
d) Problems with made grounds in cities. [4]



Total No. of Questions : 12]

SEAT No. :

P963

[4264]-65

[Total No. of Pages : 2

### B.E. (Production Engineering)

### ADVANCED PRODUCTION TECHNOLOGY (2003 Pattern) (Elective - II) (Semester - II)

Time : 3 Hours]

[Max. Marks : 100

#### Instructions to the candidates:

- 1) Attempt One question of each unit from Section - I and Section - II.
- 2) Answers to the two sections should be written in separate books.
- 3) Draw neat diagrams wherever necessary.
- 4) Assume suitable data, if required.

#### SECTION - I

##### Unit - I

- Q1)** a) Describe the benefits of JIT system? [8]  
b) Explain in detail KANBAN system. [8]

OR

- Q2)** a) Differentiate Toyota production system and other production system. [8]  
b) How production planning and production smoothening is carried out in TPS. [8]

##### Unit - II

- Q3)** a) What is benchmarking? Explain its process. [8]  
b) Explain performance rating for conventional and world class manufacturing. [8]

OR

- Q4)** a) Explain with neat sketch various activities involved in SMED. [8]  
b) What is value stream mapping? Explain the importance of it in todays Manufacturing system. [8]

##### Unit - III

- Q5)** a) Describe the various hard and soft factors of the organisation for productivity improvement. [9]  
b) Explain with suitable example how you will improve the productivity in small scale industry. [9]

OR

- Q6)** a) What are the objectives of productivity measurement. [9]  
b) Explain the role of MBO in productivity measurement. [9]

**P.T.O.**

## **SECTION - II**

### **Unit - IV**

- Q7)** a) Explain the concept of simulation in manufacturing industry. [8]  
b) Explain the various ways of Representing knowledge. [8]

OR

- Q8)** a) Explain how data collection will be done in expert system. [8]  
b) Explain how Artificial Intelligence is used in manufacturing. [8]

### **Unit - V**

- Q9)** a) What is System? Explain the basic concepts of system design. [9]  
b) Explain with suitable example the design synthesis and functional analysis in design. [9]

OR

- Q10)** a) Explain the concept of product design based on design attributes. [9]  
b) Explain in brief the characteristics matrix with suitable example. [9]

### **Unit - VI**

- Q11)** a) Define the technology? Explain its characteristics. [8]  
b) Explain the phases of transfer of technology process. [8]

OR

- Q12)** a) Explain the role of technology management in today's manufacturing era. [8]  
b) Explain which factors to be considered for the change of technology. [8]



Total No. of Questions : 12]

SEAT No. :

P964

[Total No. of Pages : 3

**[4264] - 67**

**B.E. (Production) (Production Sandwich)  
MECHATRONICS & ROBOTICS  
(2003 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) *Answer three questions from each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) State the various elements of Control System. Explain with a help of example. [8]  
b) Explain the following with an example: [10]  
i) Amplitude Linearity  
ii) Signal Distortion

OR

- Q2)** a) Explain : [6]  
i) Digital Multiplexer  
ii) Time division Multiplexing  
b) Discuss the following with neat sketches : [12]  
i) Data Acquisition System  
ii) DAC Converter  
iii) ADC Converter

- Q3)** Explain the following for a Microprocessor : [16]  
a) Flag Register  
b) Instruction Pointer  
c) Assembler  
d) Memory address

OR

P.T.O.

- Q4)** a) Explain what Logic gates might be used to compare two digital words to determine if they are exactly equal. [10]  
b) Explain the functions of : [6]  
i) Program Counter  
ii) Stack Pointer  
iii) General Registers

- Q5)** a) Explain the following instructions : [8]  
i) MOV  
ii) ADC  
iii) RAL  
iv) LHLD  
b) What do you understand by ‘Assembly Language’? Define mnemonics with examples. [8]

OR

- Q6)** a) Explain the functions of the Pins : [8]  
i) Hold  
ii) Trap  
iii) Ready  
iv)  $X_1$  and  $X_2$   
b) Explain the following with neat figures : [8]  
i) Bidirectional Buffer  
ii) Handshaking

## SECTION - II

- Q7)** a) Explain the following with respect to PLC : [8]  
i) Latching  
ii) Timers  
iii) Internal relays  
iv) Shift registers  
b) State and explain a sensor to measure the following : [8]  
i) Fluid Pressure  
ii) Temperature

OR

- Q8)** a) Explain the following with respect to PLC : [8]  
i) Latching  
ii) Timer Stacking  
b) Explain the following terms w.r.t. Fluid Pressure Sensors : [8]  
i) Rotary Encoder  
ii) Proximity Sensor

- Q9)** a) State the various Mechanical and Electrical drives for robotic applications.  
State the particular applications of each in Robots. [8]  
b) State the specifications of Stepper Motor. Compare advantages of stepper  
motors with the AC motors? [8]

OR

- Q10)** State and explain various types of : [16]  
a) Valve bodies and Plugs  
b) Ball and roller bearings  
c) Solid state devices  
d) Vane motor

- Q11)** a) Explain the work envelope of Robots. [6]  
b) Discuss the role of Robot in following applications: [12]  
i) Assembly  
ii) Automobile Industry

OR

- Q12)** a) What are the types of actuators used for Robot End-Effectors? State the  
advantages and typical applications of each. [6]  
b) Discuss the role of Robot in following applications: [12]  
i) Welding  
ii) Assembly



Total No. of Questions : 12]

SEAT No. :

**P965**

[Total No. of Pages : 3

**[4264]-73**

**B.E. (Production) (Prod S/W)  
SUPPLY CHAIN MANAGEMENT  
(2003 Pattern) (Elective - II) (Sem. - II)**

*Time : 3 Hours*

*/Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION - I**

**Unit - I**

- Q1)** a) Consider the supply chain involved when a customer purchases a ‘Tata salt’ pack from a retail store. Identify the cycles in this supply chain and the location of the push pull boundary. [8]
- b) Discuss the role of sourcing in supply chain and list the sourcing related matrices (Performance measures). [8]

OR

- Q2)** a) What are competitive and supply chain strategies of an organization? What is strategic fit? [8]
- b) Discuss in brief the drivers affecting supply chain performance and mention the obstacles in it. [8]

**Unit - II**

- Q3)** a) By managing the capacity and the inventory, how the firm can control the supply? [8]
- b) What is aggregate planning problem? Which type of information is needed for this planning? Which decisions are taken based on this information? [10]

OR

- Q4)** a) Write short notes on : [10]
- i) Role of IT in aggregate planning.
  - ii) Different methods of forecasting.
- b) What is adaptive forecasting? Discuss in brief steps involved in it. [8]

**P.T.O.**

### **Unit - III**

- Q5)** a) When the quantity discounts are justified in a supply chain? Differentiate between lot size based and volume based quantity discounts? [8]  
b) Describe two types of ordering policies and impact that each of them has on safety inventory. [8]

OR

- Q6)** a) Discuss the meaning of 'Product Availability'. How it is measured? Describe two types of replenishment policies. [8]  
b) Explain the 'Managerial Levers' to improve the supply chain profitability. [8]

### **SECTION - II**

#### **Unit - IV**

- Q7)** a) Discuss the importance of information and information technology in supply chain. [8]  
b) What modes of transportation are best suited for large, low volume shipment? Justify? [8]

OR

- Q8)** a) Discuss the role of transportation in supply chain network. Mention the various modes of transportation with their strength and weaknesses. [8]  
b) Mention the various factors affecting the design of supply chain network. Discuss any two factors affecting the location decision in supply chain. [8]

#### **Unit - V**

- Q9)** a) What issues must be considered when designing a supply chain relationship to improve the chances of developing cooperation and trust? [8]  
b) List out major obstacles for co-ordination in supply chain. Discuss in brief. [8]

OR

- Q10)** a) What is bull whip effect? How the lack of coordination in supply chain affects the performance of a firm? [8]  
b) How the design of distribution network in various types of industries has been affected due to evolution of E-business? [8]

#### **Unit - VI**

- Q11)** a) Write short notes on : [10]  
i) Role & importance of revenue Management in SC.  
ii) Decision Tree.  
b) Discuss 'Changing the distribution network affects the supply chain cost'. [8]

OR

- Q12)** a) Mention the ideas considered by managers to make better Network design decision under uncertainty. [8]
- b) What is ‘Discounted Cash Flow Analysis’? Why it is used in supply chain management? How the flexibility is evaluated in supply chain.[10]



Total No. of Questions : 12]

SEAT No. :

**P966**

[Total No. of Pages : 3

**[4264]-113**

**B.E. (Electronics)**

**REAL TIME OPERATING SYSTEMS**

**(2003 Pattern) (Elective - II) (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) In Section - I attempt Q.1 or 2, Q.3 or 4 and Q.5 or 6 in Section - II attempt Q.7 or 8, Q.9 or 10 and Q.11 or 12.
- 3) Neat diagrams, flow charts must be drawn and well commented pseudo code written wherever necessary.
- 4) Figures to the right indicate full marks.
- 5) Assume suitable data, if necessary.

### **SECTION - I**

- Q1)** a) What is RMS theorem? How it is useful in assigning tasks priorities?  
Check whether the following set of periodic real - time tasks is schedulable under RMS on a uniprocessor system : T1 = (e1 = 20, p1 = 100), T2 = (e2=30, p2 = 150), T3 = (e3 = 60, p3 = 200). [8]
- b) Discuss interrupt and interrupt timings for foreground/back ground, non - preemptive and preemptive kernel. [8]

OR

- Q2)** a) Discuss the memory requirements in foreground/background and multi tasking system. [8]
- b) Explain clock tick in multitasking system. What are the constraints in selection of the clock tick in multitasking system? How accurate time this can give? [8]

- Q3)** a) Explain, what is ready list in uCOSII? How uCOSII add the task in the ready list? How uCOSII remove a task from ready list? [8]
- b) What are different events handled using ECB in uCOSII. Explain data structure OS-EVENT. [8]

OR

- Q4)** a) Explain, Locking and unlocking of scheduler in uCOSII, Nesting of scheduler lock, Possible situation and precautions while using scheduler lock/unlock. [8]

**P.T.O.**

- b) What is the use of following members of OS\_TCB? And how they are manipulated? [8]

INT8U	OSTCBX;
INT8U	OSTCBY;
INT8U	OSTCBitX;
INT8U	OSTCBitY;

- Q5)** a) Explain Event Flag Group data structure OS\_FLAG\_GRP and OS\_FLAG\_NODE. [6]  
b) Write short note on [6]  
    i) Semaphore management in uCOSII.  
    ii) Mutual exclusion semaphore in uCOSII.  
c) What is relationship between Task, ISR and Semaphore in uCOSII? [6]  
OR

- Q6)** a) Write short note on any two : [6]  
    i) Semaphore management in uCOSII.  
    ii) Mutual exclusion semaphore in uCOSII.  
    iii) Event flag management in uCOSII.  
b) Explain in detail OSMutex Create (). [6]  
c) Enlist different MUTEX services. What configuration constants provided to configure MUTEX? [6]

## SECTION - II

- Q7)** a) How to use Mail Box as binary semaphore. Explain by using pseudo code. [6]  
b) What is relationship between Task, ISR and MailBox in uCOSII. [6]  
c) What are message queue services in uCOSII? How message Queue services enabled/disabled in uCOSII. [6]

OR

- Q8)** a) Explain the relationship between tasks, ISR and Message Queue. [6]  
b) What are the features of Message Queue in uCOSII. [6]  
c) Explain Mailbox services and configuration in uCOSII. [6]

- Q9)** a) Explain Memory Control Block data structure OS\_MEM. [4]  
b) Explain memory partition and multiple memory partition in uCOSII. [4]  
c) Define porting of uCOSII. What requirements the processor should satisfy to run uCOSII? [4]  
d) What is testing of port? What are the steps to follow for testing of port? [4]

OR

- Q10)** a) Explain the need of memory management services by OS as compare to compiler functions. [4]  
b) What are memory management services in uCOSII? Explain any one of them. [4]  
c) How OS\_CPU.H makes uCOSII processor and implementation specific? [4]  
d) Explain uCOSII hardware/software architecture. [4]

**Q11)** Answer the following by considering the implementation of Chocolate Vending Machine.

- a) Define the hardware architecture for the system. [4]  
b) Define the tasks for the system and assign the tasks priority and explain. [4]  
c) Enlist the services of uCOSII required in the system. [4]  
d) Write the application software for the system. [4]

OR

**Q12)** Answer the following by considering the implementation of Temperature Controller.

- a) Define the hardware architecture for the system. [4]  
b) Define the tasks for the system and assign the tasks priority and explain. [4]  
c) Enlist the services of uCOSII required in the system. [4]  
d) Write the application software for the system. [4]



Total No. of Questions : 11]

SEAT No. :

**P967**

**[4264]-16**

[Total No. of Pages : 3

**B.E. (Civil)**

**CONSTRUCTION MANAGEMENT**  
**(2003 Pattern) (Elective - II) (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) *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) Construction of infrastructure has changed the face of India. Discuss the role of infrastructure development in Economic Development of India. [10]  
b) Discuss following principles of management in brief. [8]  
i) Planning  
ii) Organizing  
iii) Controlling  
iv) Staffing

OR

- Q2)** a) How ‘ethics’ are followed on construction site? Discuss by gining suitable example. [8]  
b) ‘Project Management Consultancy’ is a new dimension added to construction. Discuss its role and importance on a construction project with reference to Government Projects. [10]

- Q3)** a) Define ‘Inventory’ and ‘Inventory Control’. List different methods of inventory control and explain any one of it. [8]  
b) What is Economic Order Quantity (EOQ)? Also state Bulk Order Quantity (BOQ) and Arbitrary Order Quantity (AOQ). Explain with suitable example, the factors on which BOQ & AOQ depend. [8]

OR

**P.T.O.**

- Q4)** a) Draw the saw toothed diagram for material procurement and explain w.r.t. following. [8]
- i) safety stock
  - ii) stockout
  - iii) lead time
  - iv) average inventory
  - v) minimum inventory
  - vi) maximum inventory
  - vii) reorder point
  - viii) order Cycle time.
- b) Following is the list of materials that are required on a site. Fit the materials in MUSIC 2D table by giving reasons. Assume suitable data Steel, cement, fly ash, Dholpur stone, aggregates, sand, reinforcement, imported geotextiles, windows (as per sizes given by you). [8]

- Q5)** a) What are the criteria involved in Environmental Assessment of a construction site? [8]
- b) What do you mean by Environmental feasibility? List any 4 methods to carry out economical feasibility by giving suitable examples. [8]

OR

- Q6)** What are the effects of FDI on construction & infrastructure development? [16]
- a) Employment
  - b) National Development and GDP of India.
  - c) Effects on other sectors.

### **SECTION - II**

- Q7)** a) Discuss arbitration act in detail. [8]
- b) What are different types of training? Explain advantages and disadvantages of training? [10]

OR

- Q8)** a) What are the important clauses of Child Labour Act? [8]
- b) Design a training programme for executive engineers having average experience of 20 years on field and working for Maharashtra State Electricity Distribution Co. Ltd. (Hint : The programme should comprise of technical as well as nontechnical skills. [10]

- Q9)** a) Write the majors of mitigation applied in case of following disasters. [8]  
i) Tsunami  
ii) Flood  
b) Define 'Disaster'. Explain the steps in rehabilitation after a terrorist attack. [8]

OR

- Q10)** Explain the steps in mitigation of disasters as

- a) famine  
b) earthquake

Also explain the majors of rehabilitation taken for the same.

[16]

- Q11)** Write detailed note on any two [16]

- a) RAMP handbook  
b) Role of Risk Manager  
c) CIDC  
d) Application of MIS for quality control



Total No. of Questions : 12]

SEAT No. :

**P968**

[4264]-17

[Total No. of Pages : 2

B.E. (Civil)

**INTEGRATED WATER RESOURCES PLANNING & MANAGEMENT  
(2003 Pattern) (Elective - II) (Sem. - 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**

- Q1)** a) What are the steps followed in planning of any water resources project? Explain each of them in brief. [8]  
b) What are different laws in water resources engineering? State the names. [4]  
c) Explain scope of privatization in water resources sector in India. [4]

OR

- Q2)** a) Discuss the National Water Policy. [8]  
b) Discuss how project evaluation is done in water resources management. [8]

- Q3)** a) The annual peak flood discharge recorded at a stream gauging site for 19 years during the period, 1961 to 1979 in  $\text{m}^3/\text{s}$  are given below :  
3950, 6190, 7660, 4220, 2820, 5600, 7050, 5280, 5200, 4360, 6970, 6240, 4960, 5890, 5980, 3590, 6860, 7210, 5270. Construct the frequency curve and hence find the flood peak with a return period of 50 years and 100 years. [10]  
b) What is the difference between the correlation coefficient and regression coefficient? How are they related? [8]

OR

- Q4)** a) The annual peak discharge of a river follows the Gumbel's extreme value distribution with a mean of  $10000 \text{ m}^3/\text{s}$  and a standard deviation of  $3000 \text{ m}^3/\text{s}$ . What is the probability that the annual peak discharge is more than  $15000 \text{ m}^3/\text{s}$ ? What is the magnitude of the peak discharge with an exceedence probability of 0.1? [10]  
b) Define the mean, mode, median, standard deviation and skewness coefficient. Sketch the probability density function of a random variable with positive, negative and zero skewness coefficients. [8]

**P.T.O.**

- Q5)** a) What is geo - informatics? What are its applications in flood management? [8]  
b) Explain salient features of draught mitigation plan. [8]

OR

- Q6)** a) Explain criteria for flood damage assessment. [8]  
b) What is severity index? How drought forecasting is done? [8]

## **SECTION - II**

- Q7)** a) What is irrigation efficiency? Define efficiency of water conveyance, efficiency of water application, efficiency of water storage and efficiency of water use. [10]  
b) How the runoff of a storm is measured? Describe various methods used for it. [8]

OR

- Q8)** a) What is artificial recharge of ground water? Discuss methods of artificial recharge. [8]  
b) Write a short note on demand estimation in hydro electric power plant. [6]  
c) Write short note on inter-basin water transfer. [4]

- Q9)** a) Explain management of rehabilitation and resettlement. [8]  
b) Explain steps to be taken for protection of environment while allowing the water resource development of an area. [8]

OR

- Q10)** a) Discuss the social impact of water resource development like construction of KT weir. [8]  
b) Explain water logging, causes, effects and controlling measures. [8]

- Q11)** a) What are strengths and limitations of artificial neural networks? [6]  
b) What is a decision support system in water resources management? What are its components? Discuss a decision support system for continuous water supply for your city/town throughout the year. [10]

OR

- Q12)** a) Discuss components of a decision support system for flood protection. [6]  
b) Discuss applications of artificial neural networks in water resources management giving details about problem definition, objective, data, inputs, outputs, algorithm used and results. [10]



Total No. of Questions : 12]

SEAT No. :

P969

[Total No. of Pages : 4

[4264] - 21

B.E. (Mechanical)

MECHANICAL SYSTEM DESIGN

(2003 Pattern) (Sem. - I)

Time : 4 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

### SECTION - I

- Q1)** a) Derive Lame's equation for thick cylinders. Highlight the assumptions made. [8]
- b) A closed vessel having internal diameter of 430 mm is to be designed to withstand an internal pressure of 45 MPa. Material to be used is ductile with  $Syt = 300$  MPa;  $Sut = 500$  MPa and poisson's ratio 0.3. Estimate the wall thickness by using factor of safety 1.5. If designed cylinder is overloaded above the designed pressure what will be the magnitude of pressure at which the cylinder will actually fail? [10]

OR

- Q2)** a) What is autofrettage? Where do you use it? [6]
- b) A pressure vessel consists of a cylinder shell with an inner diameter of 1500 mm and a thickness of 20 mm. It is provided with a nozzle of inner diameter 250 mm and a thickness of 15 mm. The yield strength of material for the shell and nozzle is  $200$  N/mm $^2$  and the design pressure is 2.5 MPa. The extension of nozzle inside the vessel is 15 mm. The corrosion allowance is 2 mm, while the weld joint efficiency is 85%. Neglecting the area of welds, determine whether or not a reinforcing pad is required for the opening. If so, determine the dimensions of pad made from a plate of 15 mm thickness. [12]

- Q3)** a) Differentiate between optimum design problems with normal specifications and redundant specifications. [4]
- b) A tensile bar of length 400 mm is subjected to constant tensile force of 4000 N. If the factor of safety is 2; design the bar with objective of minimizing material cost using optimum material from the list. What will be the cost of designed shaft? [12]

Material	Density ( $\rho$ )	Cost (C)	Syt	G
	kg/m <sup>3</sup>	Rs/kg	N/mm <sup>2</sup>	N/mm <sup>2</sup>
Steel	7800	14	400	82000
Aluminum alloy	2800	70	150	27000
Titanium alloy	4500	1100	800	41000

OR

- Q4)** a) Define 'optimum design'. How it is different from adequate design? [4]
- b) A helical compression spring is to be designed for a specified maximum force 'f'. The spring should have stiffness 'k' and factor of safety based on yield strength in shear is 4. Design the spring for minimum weight. Neglecting effect of inactive coils. Assume Wahl's factor as kw. [12]

- Q5)** a) What are the principal stresses in solid disc flywheel? [4]
- b) The torque developed by an engine is given by following equation. [12]

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

Where, T is the torque in N-m and  $\theta$  is the crank angle from inner dead centre position. The resisting torque of the machine is constant throughout the work cycle. The coefficient of speed fluctuations is 0.01. The engine speed is 150 rpm. A solid circular steel disk 50 mm thick, is used as a flywheel. The mass density of steel is 7800 kg/m<sup>3</sup>, calculate the diameter of the flywheel disc.

OR

- Q6)** a) What types of stress are induced in the rim of a rimmed flywheel? [4]
- b) The load torque on a machine varies linearly from zero to 300 N-m, during 90° rotation of the crank. The torque is constant for further 180° crank rotation and then drops linearly to zero in next 90° rotation. Machine is driven by a 720 rpm constant torque electric motor. Mean linear velocity of the rim is not to exceed 15 m/sec and density of flywheel material is 7400 kg/m<sup>3</sup>.
- i) Estimate necessary power for electric motor.
  - ii) Find the flywheel rim dimensions if width to thickness ratio is 2 and speed fluctuations are to be limited between 702 to 738 rpm. [12]

## SECTION - II

- Q7)** a) Two populations X and Y are added together. Derive the expressions to find mean & standard deviations of the resultant population. [6]  
b) Three cylindrical components each with a length of 30 mm 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]

OR

- Q8)** a) Explain the basic principles of DFMA. [6]  
b) A mechanical component is subjected to a mean stress of 207 N/mm<sup>2</sup> with a standard deviation of 55.2 N/mm<sup>2</sup>. The material has mean strength of 276 N/mm<sup>2</sup> with a standard deviation of 41.4 N/mm<sup>2</sup>. Determine -  
i) Probability of failure  
ii) Minimum factor of safety available  
iii) Average factor of safety available  
The area under the standard normal distribution curve from zero to Z are as follows. [10]

Z	1.0	1.4	1.8	2.2	2.6	3.0
Area	0.3413	0.4192	0.4641	0.4861	0.4953	0.4987

- 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.  
 $N_{\min} = 100 \text{ rpm}$ ;  $N_{\max} = 1800 \text{ rpm}$ ; Number of speed steps  $Z = 8$   
Also draw the best possible structure diagram for the same. [12]

OR

- Q10)** a) The geometric progression ratio ( $\phi$ ) in a multi speed gear box is selected in the range of 1 to 2. Explain its significance. [5]  
b) Draw a structure diagram for following structural formulae [5]  
i) 3(1) 2(3) 2(6)  
ii) 2(1) 3(2)  
c) 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]

**Q11)** a) Describe with neat sketch of any two types of tension takeup systems used for belt conveyors. [8]

b) A belt conveyor is to be designed to carry bulk material at the rate  $300 \times 10^3$  kg/hour with following details.

- Bulk density of the material :  $800 \text{ kg/m}^3$
- Angle of repose of bulk material :  $15^\circ$
- Belt speed is 10 km/hour.
- Material factor for plies  $K_1 = 2$
- Belt tension and arc of contact factor  $K_2 = 63$
- No. of plies for the belt = 4

Suggest

- i) Suitable width for the belt.
- ii) Diameter of the drive pulley.

[10]

OR

**Q12)** a) Explain in brief the system concept for material handling. [6]

b) Following data refers to a flat belt conveyor for transporting crushed rock.

- Mass density  $\rho = 2 \text{ Ton/m}^3$
- Belt speed  $v = 1.75 \text{ m/s}$
- Belt width  $B = 0.8 \text{ m}$
- Surcharge angle  $\alpha = 25^\circ$ ;  $K = 2.35 \times 10^{-4}$
- Effective width of the material carried by the belt safety  $b = (0.9B - 0.05)$ .

Determine the capacity of conveyor in Ton/hr. [8]

c) Explain concept of containerization in material handling system. [4]



Total No. of Questions : 10]

SEAT No. :

P970

[4264]-38

[Total No. of Pages : 4

B.E. (Mechanical)

RELIABILITY ENGINEERING

(Elective - II) (2003 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) Assume suitable data, if necessary.
- 5) Figures to the right indicate full marks.
- 6) Use non-programmable electronic calculators is allowed.

**SECTION - I**

**Q1)** a) Calculate the reliability of the system shown in Fig. 1. [10]

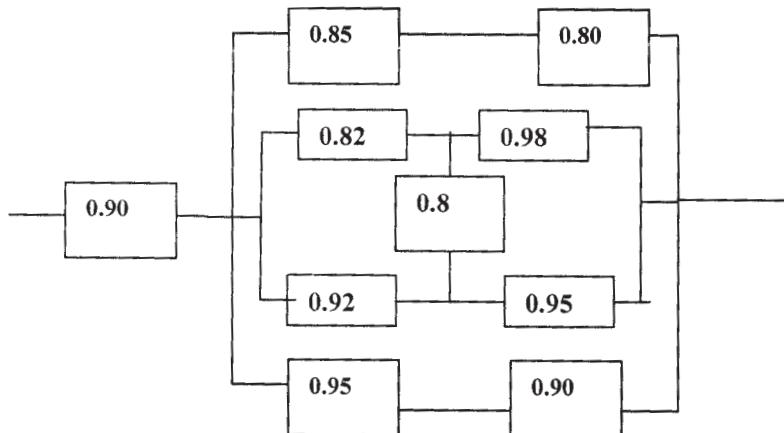


Fig. 1

b) Explain Maintainability. How it correlates with availability. [8]

**Q2)** a) Derive the expression for reliability  $R(t)=e^{-\lambda t}$ . [8]

b) Explain series and parallel configuration of reliability evaluation. [8]

**Q3)** a) Explain the process of FMECA analysis. [8]

- b) The reliability of each element is 0.90. Find the reliability of system shown in Fig. 2. [8]

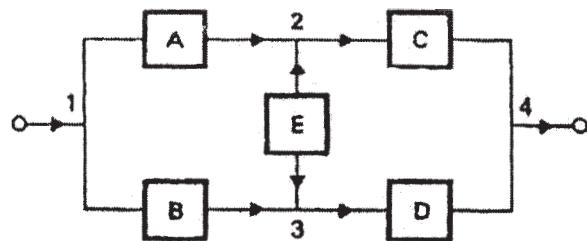


Fig.2

- Q4)** a) Write all the possible tie sets and cut sets of system shown in Fig. 3. Use minimal tie sets and Calculate the reliability of the system if all the components are identical with a reliability of 0.95 [8]

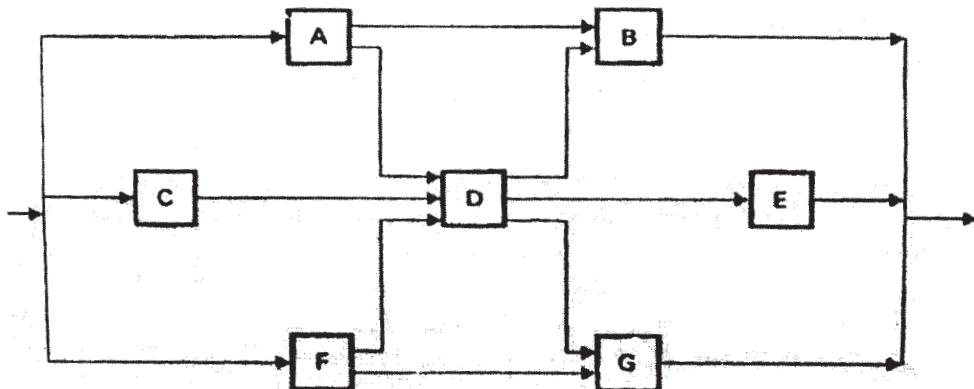


Fig. 3

- b) The three identical items are connected in series having same reliability. Derive an expression for Reliability and MTBF of system. [8]

- Q5)** Write short note on following (Any three) [18]
- Markov chain Analysis
  - Total Probability Theorem
  - Risk Priority Number
  - Baye's theorem and its applications
  - AGREE method for Reliability allocation

## SECTION - II

- Q6)** a) What is mean by safety margin and loading roughness explain in brief. [8]  
 b) Explain the weibull distribution used in reliability analysis. [8]

- Q7)** a) Explain the sudden death testing method in accelerated life testing. [6]  
 b) In a short sample life testing of a system the following data is recorded as follows

Failure No.	1	2	3	4	5	6	7	8	9	10
MTTF (Hrs)	28	23	19	20	35	38	30	19	25	20

Plot the variation of reliability against time using [10]  
 i) Mean ranking and  
 ii) Median Ranking Method

- Q8)** a) Allocate failure rates and find mean lives for the following data if the reliability goal is 0.90. [8]

i	No. of modules	Importance factor	Operating time
1	20	1	12
2	80	0.95	12
3	60	0.9	12
4	80	1	12

- b) The following data refer to predicted reliability of eight components in series. In case the desired reliability of the system is not to fall below 0.80 find the reliability goal for individual components. [8]

Components	1	2	3	4	5	6	7	8
Predicted reliability	0.97	0.90	0.99	0.996	0.95	0.98	0.96	0.94

- Q9)** a) Explain reliability evaluation using K - statistics method. [8]  
 b) The mean strength and the standard deviation of a bolted joint are 3100 kg/cm<sup>2</sup> and 260 kg/cm<sup>2</sup> respectively. The joint is loaded such that stress induced has a mean value of 2400 kg/cm<sup>2</sup> with a standard deviation of 60 Kg/cm<sup>2</sup>. Assuming that shear strength and the induced stresses are independent and normally distributed, find out the probability of survival of the bolted joint. Extract of data from statistical table is given below : [10]

Z	1.2	1.3	1.4	1.5	1.6	1.7	1.8
$\phi(Z)$	0.8849	0.9032	0.9192	0.9331	0.9452	0.9550	0.9640

**Q10)** Write short notes on (Any three)

**[18]**

- a) Fault Tree Analysis
- b) Magnified Loading test
- c) Vibration signature analysis
- d) Geometric considerations in reliability based design.



Total No. of Questions : 12]

SEAT No. :

**P971**

[4264]-117

[Total No. of Pages : 3

**B.E. (Electronics)**

**DIGITAL IMAGE PROCESSING**

**(2003 Pattern) (Elective - II) (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) 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) With the help of illustration explain Mach band effect and simultaneous contrast. [8]
- b) What are the steps in image digitization? Explain image quantization in detail. [8]

OR

- Q2)** a) With the help of block diagram explain the fundamental steps in Digital Image Processing. [8]
- b) Give pictorial representation of pixel relationships. [6]
- c) Define [2]
- i) MTF
  - ii) Profile of Image

- Q3)** a) Give the equation of 2D FFT. What are the properties of 2D DFT? Explain in detail. [10]
- b) For the given  $2 \times 2$  image K find DCT and show that DCT preserves signal energy. [8]

K = 22

12

OR

- Q4)** a) With reference to HSI color model explain how RGB can be converted to HSI and viceversa. [8]
- b) Explain Walsh Transform in detail. [10]

**P.T.O.**

**Q5)** a) Explain image histogram Equalization with the help of an example. What is its application. [8]

b) Explain [8]

i) Image subtraction.

ii) Averaging filter in spatial domain.

OR

**Q6)** a) Define High Pass filter in frequency domain. Differentiate between Butterworth High pass and Gaussian High Pass filter. [8]

b) Compute the median value of the four marked pixels (marked by a\*) shown in figure using  $3 \times 3$  mask. [8]

$$F(m, n) = \begin{vmatrix} 18 & 22 & 33 & 25 & 32 & 24 \\ 34 & 128* & 24* & 172* & 26* & 23 \\ 22 & 19 & 32 & 31 & 28 & 26 \end{vmatrix}$$

## SECTION - II

**Q7)** a) With the help of neat block diagrams explain the difference between Lossy and lossless Predictive Coding. [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
Probability	0.1	0.1	0.2	0.1	0.2	0.3

OR

**Q8)** a) Explain JPEG standard. [10]

b) Enlist the different methods of error free compression. Explain any one in detail. [8]

**Q9)** a) Given  $10 \times 10$  image I, perform dilation using structuring element J given as follows. [8]

$$I = \begin{vmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 1 & 1 & 1 & 1 & 1 & 0 & 0 \\ 0 & 0 & 1 & 1 & 1 & 1 & 1 & 1 & 0 & 0 \\ 0 & 0 & 1 & 1 & 0 & 0 & 1 & 1 & 0 & 0 \\ 0 & 0 & 1 & 1 & 0 & 0 & 1 & 1 & 0 & 0 \\ 0 & 0 & 1 & 1 & 1 & 1 & 1 & 1 & 0 & 0 \\ 0 & 0 & 1 & 1 & 1 & 1 & 1 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{vmatrix}$$

$$J = \begin{matrix} 1 & 1 \\ 1 & 1 \end{matrix}$$

- b) With the help of appropriate masks explain the following. [8]
- i) Point detection.
  - ii) Line detection.
  - iii) Edge Detection.

OR

- Q10)** a) Explain edge detection using Sobel mask. Discuss the problems in presence of noise. [8]
- b) What is boundary representation? Explain how chain codes are used for boundary representations. [8]

- Q11)** a) Enlist different noise models. Explain any one in detail. [8]
- b) Discuss in brief Character Recognition. [8]

OR

- Q12)** a) With the help of neat diagram explain image observation model to represent degraded images in presence of blurring and signal dependent noise degradations. [8]
- b) Explain remote sensing using Satellite images. [8]



Total No. of Questions : 12]

SEAT No. :

**P974**

[4264]-154

[Total No. of Pages : 3

**B.E. (Instrumentation & Control)**  
**FIBER OPTIC INSTRUMENTATION**  
**(2003 Pattern) (Elective - II) (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) With a suitable ray diagram, explain ‘Total Internal Reflection’. How ‘Total Internal Reflection’ is achieved in an optical fiber? [8]
- b) Explain with suitable diagrams (any three) [8]
- i) Acceptance angle.
  - ii) Numerical Aperture.
  - iii) Skew rays.
  - iv) Evanescent field.

OR

- Q2)** a) An optical fiber has a numerical aperture of 0.22 and cladding refractive index of 1.553. Determine [8]
- i) The acceptance angle for the fiber in water of refractive index of 1.333
  - ii) The critical angle at the core-cladding interface.
- b) Differentiate between Step Index Fiber and Graded Index Fiber on the basis of structure, refractive index profile and applications. [8]

- Q3)** a) What do you mean by signal degradation in an optical fiber? Discuss various signal degradation mechanisms in an optical fiber. [8]
- b) Write a note on ‘Optical Time Domain Reflectometer’ (OTDR). [8]

OR

- Q4)** a) Explain the reasons for pulse broadening in optical fiber. [8]
- b) Explain the principle and working of OTDR. [8]

**P.T.O.**

- Q5)** a) What are the requirements for a source in an optical fiber? Enlist some sources, which are used in optical fiber. [9]  
b) Compare LED with Laser as optical fiber sources. [9]

OR

- Q6)** a) What is difference between splices and connectors? Describe any two types of splices in optical fibers with suitable diagrams. [9]  
b) Describe three types of mechanical fiber misalignments, which may contribute to insertion loss at an optical fiber joint. [9]

### **SECTION - II**

- Q7)** a) What are the attractive features of Optical Fiber Sensors? Also enlist some of the limitations of optical fiber. [8]  
b) Write a note on ‘Intensity Modulation based Optical Fiber Sensors’ based on following points. [8]  
i) Principle of operation with diagram.  
ii) Advantages and disadvantages.  
iii) The parameters, measured by this type of sensors.

OR

- Q8)** a) What are the characteristics of light, which may be monitored in sensing applications? Describe one technique of sensing which is based on phase modulation. [8]  
b) Write a note on ‘Encoding based position sensors’. [8]

- Q9)** a) What is ‘Optical Fiber Brag Grating’? Explain with suitable diagram working of ‘Optical Fiber Brag Grating’. [8]  
b) Explain a fabrication technique of ‘Optical Fiber Brag Grating’. [8]

OR

- Q10)** a) What do you understand by ‘Distributed Optical Fiber Sensing’? Enlist the advantages of Distributed Optical Fiber Sensing. [8]  
b) Explain Distributed Optical Fiber Sensing for the dam structure monitoring. What are limitations of this type of sensing? [8]

- Q11)** a) What do you understand by ‘Integrated Optics Device’? What are advantages of Integrated Optical Devices over conventional optical devices? [9]

- b) Explain with the aid of suitable diagrams. [9]
- Optical amplifier.
  - Silicon laser amplifier

OR

- Q12)** a) Sketch the major elements of a fiber amplifier and describe the operation of the device. Indicate the benefits of fiber amplifier technology in comparison with that associated with silicon laser amplifiers (SLAs). [9]
- b) What are the advantages of Optical Amplifiers over conventional electric amplifiers used in optical applications? [9]



Total No. of Questions : 12]

SEAT No. :

**P975**

[4264]-156

[Total No. of Pages : 2

**B.E. (Instrumentation and Control)**  
**BUILDING AUTOMATION - II**  
**(2003 Pattern) (Semester - II) (Elective - II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION - I**

- Q1)** a) Describe various air properties in relation to HVAC. [8]  
b) Describe different ways of heat transfer with suitable examples. [10]

OR

- Q2)** a) Discuss Human Comfort and Zones. [10]  
b) Explain use of Psychometric chart. [8]

- Q3)** a) Discuss direct heating and indirect heating. [6]  
b) Describe cooling system of HVAC. [10]

OR

- Q4)** a) Explain difference between boiler and Furnace. [6]  
b) Describe Ventilation system of HVAC. [10]

- Q5)** a) Explain multiloop controller DDC. [8]  
b) Discuss various parameter measurement sensors and final control element with respect to Evaporator. [8]

OR

- Q6)** a) Describe P, PI and PID control actions with HVAC. [8]  
b) Explain :
  - i) Optimum start.
  - ii) Night cycle.
  - iii) Night purge.
  - iv) Enthalpy.

**P.T.O.**

## **SECTION - II**

**Q7)** a) What is MCC. Explain basic component of MCC with suitable diagrams. [10]

b) Explain Daisy Chain or Bus Topology LON Bus protocol. [8]

OR

**Q8)** a) Explain BACnet Protocol. [10]

b) Explain Communication basic for HVAC. [8]

**Q9)** a) Draw ASHARE symbol for sensors and transmitters. [10]

b) Explain Green Building. [6]

OR

**Q10)** a) What are the functions of Integrated Building management systems. [10]

b) What do you mean energy management? Explain types of Energy Measurement Devices. [6]

**Q11)** a) Explain different features of IBMS & List benefits of IBMS. [6]

b) Explain BMS Verticals. [10]

OR

**Q12)** a) Explain the verticals of BMS for [10]

i) Healthcare

ii) Industrial

b) Explain the role of Energy management in security & HVAC Systems. [6]



Total No. of Questions : 12]

SEAT No. :

P1011

[Total No. of Pages : 3

[4264] - 50

**B.E. (Mechanical/Mechanical Sandwich)  
MACHINE TOOL DESIGN  
(2003 Pattern) (Semester - II) (Elective - III)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) Answer three questions from Section - I and three questions from Section - II.
- 2) Answers to the two sections should be written in separate books.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Figures to the right indicate full marks.
- 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) Discuss the recent trends in Machine Tool Design with respect to [10]  
i) Operating speed range.  
ii) Accuracy.  
iii) Control systems.  
b) Explain PIV drive with block diagram. [8]

OR

- Q2)** a) Explain construction and working of Norton gear box. [10]  
b) Discuss design considerations of speed regulation in cone variator. [8]

**Unit - II**

- Q3)** Design a three stage 12 speed gear box transmitting 7.5 kW power with Speeds from 80 rpm to 1000 rpm. The minimum number of teeth on gear 17. Electric motor speed is 1440 rpm. Draw structural diagram and also Calculate number of teeth on gears. [16]

OR

*P.T.O.*

- Q4)** a) Discuss design of Feed gear box in detail. Also state its features. [8]  
b) State different progressions used in designing gear box with applications. [8]

### Unit - III

- Q5)** a) What is static and dynamic stiffness? What is their effect on selection of Material for slideways? [8]  
b) Discuss various types of lubrication systems for beds & slideways. [8]

OR

- Q6)** a) Describe various methods used for compensation of wear of guides. [8]  
b) Describe stick-slip sliding. Explain its remedies. [8]

### SECTION - II Unit - IV

- Q7)** a) What is the importance of power screws in machine tools? [10]  
Discuss design factors to be considered while designing  
i) Sliding friction power screws.  
ii) Rolling friction power screws.  
b) Explain how the optimum spacing between spindle supports is determined while designing the machine tool spindles. [8]

OR

- Q8)** a) Describe working of a ball recirculating power screws. [10]  
Explain how preloading is carried out in ball screws.  
b) Discuss design considerations for spindle unit of machine tool. [8]

### Unit - V

- Q9)** a) What is adaptive control system? [8]  
How it is used in recent machine tools?  
b) Explain principle and working of Electric braking system in machine tools. [8]

OR

- Q10)** a) Explain hydraulic system used in shaper. [8]  
b) Explain hydraulic system used for chuck clamping in machine tools. [8]

**Unit - VI**

- Q11)** a) Discuss types of ATC (Automatic Tool Changer). [8]  
b) Explain closed loop system of CNC machine in details. [8]

OR

- Q12)** a) State and discuss design features of NC and CNC machines. [8]  
b) Explain part programming of CNC machines. [8]



Total No. of Questions : 6]

P1013

SEAT No. :

[Total No. of Pages : 2

**[4264] - 170**

**B.E. (Printing)**

**SUBSTRATES AND INK TECHNOLOGY**  
**(2003 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) State the importance of Fourdrinier machine in the production of printing paper and discuss the qualities required in printing paper.
- b) Mention the types of polypropylene and state one use of each type of PP.
- c) Comment on any two :
  - i) Conical Refiner.
  - ii) Hydropulper.
  - iii) Breaker Beater.

**Q2) Answer any two [16]**

- a) Explain the qualities of the following substrate (any two) :
  - i) Newsprint.
  - ii) Kraft Paper.
  - iii) Tag Paper.
  - iv) Cover Paper.
- b) Comment on any Two :
  - i) Stiffness.
  - ii) Acidity.
  - iii) Brightness.
- c) Mention the importance of the following points in the selection of paper :
  - i) Grammage
  - ii) Paper Grains
  - iii) Opacity
  - iv) Gloss

**P.T.O.**

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

- a) Discuss the points to be considered under the direct cost of the printing job.
- b) Find the total quantity of paper required in the size  $65 \times 90\text{mm}$  for Printing 10,000 booklets in size  $210 \times 297\text{mm}$ , assume booklet contains 12 pages.
- c) Find the length of paper of 80GSM in the reel of 62cms. The reel weight is 120kgs.

## **SECTION - II**

**Q4) Answer Any Two :** [18]

- a) What are the different pigments used for manufacturing printing inks.
- b) What are the different Resins used in printing inks, explain with their purpose and properties.
- c) Explain UV curing.

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

- a) Explain Importance of Rheology of ink for printing process.
- b) Explain various Testing Devices used for printing Ink Testing.
- c) Explain different ink testing methods used in laboratory.

**Q6) Answer any two :** [16]

- a) Explain the environmental laws affecting the printing industry.
- b) Explain the formulation of waterbased inks with their essential properties.
- c) Explain any two :
  - i) Security printing inks.
  - ii) BIS & ISO standards.
  - iii) Green printing.



Total No. of Questions : 12]

SEAT No. :

P1014

[Total No. of Pages : 2

**[4264] - 271**

**B.E. (IT)**

**INFORMATION SYSTEMS SECURITY  
(2003 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.*

**SECTION - I**

- Q1)** a) Draw and explain different architectures to secure peer to peer chat. [9]  
b) State the six security tool used for network security. [9]  
OR
- Q2)** a) State the physical controls for end to end security solutions. [9]  
b) How encryption does not solve the integrity problem. Explain any one Integrity model. [9]
- Q3)** a) Write the security policy for bank customers for online transactions. [8]  
b) Describe in detail any one security model with hybrid policies, meaning a model which refers equally to confidentiality and integrity. [8]  
OR
- Q4)** a) List the different types of access control used in a security policy. [8]  
b) Why digest is important in Digital Signatures. [8]
- Q5)** a) Illustrate the need of Centralized Authentication System. [8]  
b) “More the networking protocols, More the security risks!!”. Justify. [8]  
OR
- Q6)** a) Compare Methods of Symmetric and Asymmetric Key Distribution. [8]  
b) Draw transport and tunnel modes in IPSEC. [8]

**P.T.O.**

## **SECTION - II**

- Q7)** a) How wireless security is different than wired security? [9]  
b) Explain any security mechanism or algorithm with reference to wireless security. [9]

OR

- Q8)** a) Explain how Unix file system implicity plays the role of information security. [9]  
b) Explain access control mechanisms using examples. [9]

- Q9)** a) Draw and Explain Intrusion detection mechanisms. [8]  
b) Explain any four fields in Digital Certificate X509. [8]

OR

- Q10)** a) List disadvantages of Symmetric Key systems. [8]  
b) Explain types of Intrusion Detection Systems. [8]

- Q11)** a) Explain Security design principles. [8]  
b) Describe Identity Management Techniques. [8]

OR

- Q12)** a) Write short note on Vulnerability Assessment and tools. [8]  
b) Write short note on Penetration Techniques and tools. [8]



Total No. of Questions : 12]

SEAT No. :

P1031

[Total No. of Pages : 2

[4264] - 130

B.E. (E & TC)

**ELECTRONIC MEASUREMENT SYSTEMS  
(2003 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) Explain any four static characteristics of measuring instrument. [8]  
b) What are the various automatic functions available in voltmeters? Explain any one in detail. [8]

OR

- Q2)** a) With neat block diagram explain working of digital LCR-Q meter. [8]  
b) Explain vector impedance meter with the help of block diagram. [8]

- Q3)** a) What do you mean by calibration? Explain calibration process in detail with the help of block diagram. What do you mean by traceability in calibration? [8]  
b) Set of measurements : 10.2, 10.1, 9.8, 9.95, 10, 10.5, 10.8, 9.9, 9.8, 10.2 Amperes. Calculate arithmetic mean, standard deviation, probable error and variance. [8]

OR

- Q4)** a) Describe period measurement technique. How this technique improves accuracy over frequency measurement. [8]  
b) Explain various plug in units used with frequency counter. [8]

- Q5)** a) Rise time of CRO is 10 nsec. Rise time observed on CRO of the signal is 13 nsec. Calculate actual rise time of signal. [6]  
b) Explain the concept of delay line in CRO. Explain types of delay line used in CRO. [12]

**P.T.O.**

OR

- Q6)** a) Explain the working of DSO with suitable block diagram. [6]  
b) Describe different sampling methods used in DSO. [12]

**SECTION - II**

- Q7)** a) Explain working of Fundamental Suppression Harmonic Distortion Analyzer. [8]  
b) Explain the terms w.r.t. Spectrum analyser : [10]  
i) Frequency resolution and bandwidth.  
ii) Sweep desensitization.  
iii) Sensitivity.  
iv) Dynamic range.

OR

- Q8)** a) Explain Logic analyzer with the help of block diagram. [8]  
b) Explain digital FFT analyzer with block diagram. [8]  
c) Compare logic and spectrum analyzer. [2]

- Q9)** a) With respect to communication, explain how to carry SINAD sensitivity measurement. [8]  
b) Explain the set up to measure the sensitivity and selectivity of a receiver. [8]

OR

- Q10)** a) Explain the block diagram of Network analyzer measurement system. [8]  
b) Explain s-parameter measurement using network analyser. [8]

- Q11)** a) Explain typical automatic test system. [8]  
b) Explain Virtual Instrumentation with suitable example. [8]

OR

- Q12)** Write short note on : [16]  
a) IEEE 488 bus.  
b) Labview.



Total No. of Questions : 12]

SEAT No. :

P1033

[Total No. of Pages : 2

**[4264] - 259**

**B.E. (Computer Engg.)**

**NETWORKS AND INFORMATION SECURITY  
(2003 Pattern)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates :*

- 1) *Answer any 3 questions from each section.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *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 various attributes of network and information security? Explain in detail. [8]

b) Differentiate between the terms threats and attacks related to information security. What are the various types of attacks? Explain with examples. [8]

OR

**Q2)** a) Explain and differentiate between worms, viruses and trojans. Give suitable examples for each. [8]

b) What is the need of information security? Explain the information security lifecycle. [8]

**Q3)** a) Explain Diffie-Hellman algorithm for key exchange. How is it vulnerable to man-in-the-middle attack? How to eliminate this vulnerability? [10]

b) What is the need for digital signature? Explain DSA algorithm for digital signature. [8]

OR

**Q4)** a) Explain Kerberos authentication server's working in detail. How does version 5 Kerberos differ from version 4? [10]

b) Explain RSA algorithm. Discuss its strengths against various attacks. [8]

**Q5)** a) Explain the round structure in IDEA, algorithm for encryption and decryption. [8]

b) Explain in detail the symmetric key cryptography principal. What are the issues in key distribution in symmetric cryptosystems. [8]

**P.T.O.**

OR

- Q6)** a) What is triple DES? Why it is more secure than DES? Explain 3DES with 2 keys. [8]  
b) Explain the round structure of AES algorithm for encryption and decryption. [8]

**SECTION - II**

- Q7)** a) Explain following protocols in brief : [8]  
i) PPTP.  
ii) L2TP.  
b) What is the need for VPN? Explain VPN with suitable diagram. How to set up VPN? Discuss the disadvantages of VPN. [8]

OR

- Q8)** a) Explain the ESP header format used in IPSec. [8]  
b) Explain and differentiate transport and tunnel mode of operation with respect to IPSec protocol suite. [8]
- Q9)** a) What is packet filter router? Explain in detail. What are the limitations of a simple packet filter router? [8]  
b) What is DMZ? Explain with diagram, the working of Honey pots. [8]

OR

- Q10)** a) What is application level gateway? Explain in detail. What is a Bastion host? [8]  
b) What is an intrusion prevention system? How does an intrusion detection system (IDS) work? [8]
- Q11)** a) Explain Secure Electronic Transaction (SET) in detail. What is dual signature? Why is it required in SET? [10]  
b) Explain the operations performed in PGP. What is the general format of PGP message? [8]

OR

- Q12)** Write short notes on any three of the following : [18]  
a) SSL and TLS.  
b) E-Cache.  
c) S/MIME.  
d) Micro Payments.



Total No. of Questions : 12]

SEAT No. :

P1036

[Total No. of Pages : 3

[4264] - 2

B.E. (Civil)

ENVIRONMENTAL ENGINEERING - II

(2003 Pattern) (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 giving reasons, when to adopt separate and combined systems. [6]  
b) Explain procedure of B.O.D. test. [6]  
c) Write a short note on testing of sewers. [4]

OR

- Q2)** a) What is a treatability index? Explain the significance of treatability index. [6]  
b) The  $BOD_5$  of waste has been measured as 500 mg/l. If rate constant is 0.12, find out ultimate BOD and 3 day BOD at 27°C. [6]  
c) Differentiate between sanitary sewage and storm water runoff. [4]

- Q3)** a) What are the physical changes observed at zone of degradation, zone of decomposition and zone of recovery in a polluted stream? [6]  
b) Give a list of methods available for treatment of sewage both for rural and urban conditions. [6]  
c) What are the natural forces acts for the purification for streams? [4]

*P.T.O.*

OR

- Q4)** a) A screen consisting of 10mm diameter bars, at a clear spacing of 40 mm, treats a maximum hourly flow of  $1200 \text{ m}^3$ , velocity of flow through screen chamber = 75 cm/sec. Work out: [6]
- i) Length and number of bars.
  - ii) Head loss in the chamber.
- b) Draw a neat sketch of skimming tank and explain its working. [6]
- c) What is the difference between preliminary and primary treatment of wastewater? [4]

- Q5)** a) What is meant by activated sludge? Describe with sketch the treatment of the sewage by activated sludge process (ASP). [6]
- b) Design an activated sludge process for the following data: [12]
- i) Municipal wastewater flow rate =  $12,000 \text{ m}^3/\text{day}$ .
  - ii) BOD of settled effluent =  $150 \text{ mg/lit}$ .
  - iii) BOD of treated effluent =  $5 \text{ mg/lit}$ .
  - iv) Yield coefficient,  $Y = 0.5 \text{ kg/kg}$ .
  - v) Endogenous decay coefficient,  $k_d = 0.05\text{d}^{-1}$ .
  - vi) MLSS,  $X = 3000 \text{ mg/lit}$ .
  - vii) Return sludge solids concentration,  $X_r = 15,000 \text{ mg/lit}$ .
  - viii) Mean cell residence time,  $\theta_c = 10 \text{ days}$ .

Determine:

- 1) Volume of reactor.
- 2) F/M ratio.
- 3) Volumetric loading rate.
- 4) Oxygen requirement.
- 5) Recycle ratio.
- 6) BOD removal efficiency.

OR

- Q6)** a) What do you understand by secondary treatment of waste water? Enumerate the various treatment techniques used for biological treatment. [6]
- b) What are the advantages and disadvantages of trickling filter? [6]
- c) What is the difference between high rate and low rate trickling filters? [6]

## **SECTION - II**

- Q7)** a) Draw a neat sketch of typical oxidation pond with inlet/outlet arrangements. [8]  
b) Distinguish clearly between the working of an oxidation ditch and oxidation pond. [8]

OR

- Q8)** a) Explain the mechanism of purification in facultative oxidation pond. [8]  
b) What are the different methods of aerations in the treatment of aerated lagoons? [8]

- Q9)** a) Discuss the criteria for design of a septic tank. [6]  
b) Draw a neat sketch of septic tank (Plan & Elevation) and explain its working. [6]  
c) Write a short note on septic tank. [4]

OR

- Q10)** a) Write the various design parameters of anaerobic digesters. [6]  
b) What are the various gases generated in anaerobic digesters and their percentage? [6]  
c) Explain the process of UASB. [4]

- Q11)** a) Draw a flowchart for treating paper mill waste water. [6]  
b) Discuss in brief various treatment processes adopted for treating industrial waste water. [6]  
c) Explain equilization and proportioning. [6]

OR

- Q12)** a) Explain in detail reactivity and toxicity in hazardous waste. [6]  
b) Explain the benefits of waste minimization. [6]  
c) What is the difference between grab and composite sample? Explain. [6]



Total No. of Questions : 12]

SEAT No. :

P1050

[Total No. of Pages : 3

[4264] - 51

**B.E. (Production)**

**PRODUCTION MANAGEMENT**

**(2003 Pattern) (Semester - I)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION - I**  
**Unit - I**

- Q1)** a) What are the duties of Production manager in modern manufacturing industry. What is the need of new product design? [8]  
b) Explain Product Life Cycle with its characteristics of phases. [8]

OR

- Q2)** a) Explain Standardization, Simplification and Specialization in relation to product design and development. [6]  
b) Explain the relationship of product design and product cost. [6]  
c) Draw an organization structure for a single product line business. [4]

**Unit - II**

- Q3)** a) Compare the urban and suburban locations with their advantages and disadvantages. [9]  
b) Enumerate different types of layout and compare process layout with product layout. [9]

OR

**P.T.O.**

- Q4)** a) Explain principles of plant layout. [6]  
 b) What are the symptoms of bad material handling. [6]  
 c) There are 6 existing plants, which have a material movement relationship with a new plant. The existing plants have locations of (200,300), (400,700), (900,600), (800,100), (200,650) and (1100,400). The numbers of tons of materials transported per year from the new plant to various existing plants are 400, 800, 300, 800, 700 and 1500 respectively. Determine the optimum location for the new plant such that the distance moved (Cost) in transporting the material to the existing facilities is minimized. Use centre of gravity method for calculation. [6]

### Unit - III

- Q5)** a) What are the different manpower forecasting techniques? Explain any two in brief. [8]  
 b) Explain the long term and short term capacity strategies. [8]
- OR
- Q6)** a) Explain partial productivity measures and total productivity measures with their advantages and disadvantages. [8]  
 b) What are the main elements of Productivity Improvement Programme (PIP)? And explain in brief when to use PIP? [8]

### SECTION - II

### Unit - IV

- Q7)** a) Compare emerging business trends in information age with industrial age business through following points: [9]  
 i) Economic  
 ii) Organizational  
 iii) Competition  
 iv) Socio-cultural  
 v) Technical.  
 b) Write in brief “World Class Manufacturing (WCM) - The Indian Scenario”. [9]
- OR

- Q8)** a) Explain the concept of World Class Manufacturing (WCM) in information age. [9]  
 b) Explain in brief Maskal’s model of WCM. [9]

## Unit - V

**Q9)** a) What are the factors considered while preparing maintenance schedule. [8]

b) What are the different maintenance techniques used in Total Productive Maintenance (**TPM**)? Explain objectives of TPM. [8]

OR

**Q10)** a) What are the 8 pillars of **TPM**? Explain 5S and **Jishu Hozan** (Autonomous maintenance). [8]

b) What are the factors considered while estimating maintenance costs. [8]

## Unit - VI

**Q11)** a) Explain agile manufacturing in brief. [8]

b) What is ISO 14000? Explain in brief. [8]

OR

**Q12)** a) How environmental pollution is classified? Explain. [8]

b) Explain “Computerized Management System” in brief. [8]



Total No. of Questions : 12]

SEAT No. :

P1056

[Total No. of Pages : 2

[4264] - 82

B.E. (Electrical)

UTILIZATION OF ELECTRICAL ENERGY

(2003 Pattern) (Semester - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Answer any three questions from each section.
- 2) Answers to the two sections should be written in separate answer books.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Figures to the right 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 advantages of electric heating. [6]  
b) With a suitable diagram explain induction heating. [6]  
c) Explain different methods of controlling temperature of resistance oven with suitable circuit diagrams. [6]

OR

- Q2)** a) State desired properties of heating element used for resistance heating.  
State any two materials used for making heating element. [6]  
b) With a suitable diagram explain dielectric heating. State applications of dielectric heating. [6]  
c) Explain projection welding and butt welding process with suitable diagrams. [6]

- Q3)** a) With a suitable diagram explain - electroplating. [8]  
b) Draw electric circuit of refrigerator and explain its working. [8]

OR

- Q4)** a) Explain the process of electro extraction of aluminium using electrolysis. [8]  
b) Explain the working of central air conditioning system with suitable diagram. [8]

*P.T.O.*

- Q5)** a) Explain construction and working of sodium vapour lamp. [8]  
b) State and elaborate the steps involved in design of illumination scheme. [8]

OR

- Q6)** a) State and explain laws of illumination. [8]  
b) Explain construction and working of mercury vapour lamp. [8]

## **SECTION - II**

- Q7)** a) State advantages of electric traction. [10]  
b) State different systems of track electrification Explain any one in brief. [8]

OR

- Q8)** a) Draw a block diagram of electric locomotive. Explain it in detail. [10]  
b) Draw a neat sketch of pantograph current collector & explain its working. [8]

- Q9)** a) Draw trapezoidal speed-time curve. State and explain different terms involved in it. [8]  
b) What is meant by coefficient of adhesion? State and explain the factors affecting coefficient of adhesion. [8]

OR

- Q10)** a) What is meant by tractive effort? What are different parts of tractive effort? [8]  
b) Draw quadrilateral speed-time curve. State and explain different terms involved in it. [8]

- Q11)** a) State desired properties of traction motor. [8]  
b) With suitable diagrams explain series - parallel transition method of speed control of traction motors. [8]

OR

- Q12)** a) What is meant by regenerative braking? How it is achieved in case of DC series motor? [8]  
b) Discuss the suitability of following motors for traction work-DC series motor, AC series motor. [8]



Total No. of Questions : 12]

SEAT No. :

P1068

[Total No. of Pages : 2

[4264] - 121

**B.E. (Electronics & Telecommunication)  
COMPUTER NETWORKS  
(2003 Pattern) (Theory) (Semester - I)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION - I**

- Q1)** a) Explain the terms interfaces, services and protocols. [6]  
b) Compare TCP/IP and OSI model. [8]  
c) Compare Computer Network and Distributed Computer Network. [4]  
OR
- Q2)** a) Explain the Categories/Types of Network. [6]  
b) Explain TCP/IP Protocol Suite. [6]  
c) Explain the different Network Topologies. [6]
- Q3)** a) Compare circuit switching and packet switching techniques. [8]  
b) Write a short note on DSL modem. [8]  
OR
- Q4)** a) Compare LEO, GEO and MEO communication satellites. [8]  
b) Compare characteristics of Coaxial cable, Twisted Pair cable and Fiber Optic Cables. [8]
- Q5)** a) Explain PPP protocol. [10]  
b) Explain CSMA/CD. [6]  
OR

*P.T.O.*

- Q6)** a) Explain HDLC protocol. [10]  
 b) Explain functions of data link layer. [6]

## **SECTION - II**

- Q7)** a) What is distance vector routing with suitable example? [8]  
 b) What is congestion control? State and explain techniques for congestion control. [8]

OR

- Q8)** a) Explain QoS (quality of service) w.r.t. delay, bandwidth, jitter and throughput. [8]  
 b) Compare TCP and UDP. [8]

- Q9)** a) Explain WWW and HTTP. [9]  
 b) What is cryptography? Explain symmetric and asymmetric cryptography. [9]

OR

- Q10)** a) Explain FTP and DNS. [9]  
 b) Write a note on video demand. [9]

- Q11)** a) What is DHCP? How does it work? [8]  
 b) Compare IPv4 and IPv6. [8]

OR

- Q12)** a) Write a note on ICMP. [8]  
 b) Write short notes on:  
 i) ARP. [4]  
 ii) RARP. [4]



Total No. of Questions : 12]

SEAT No. :

P1083

[Total No. of Pages : 3

[4264] - 181

B.E. (Chemical)

PROCESS DYNAMICS AND CONTROL

(2003 Pattern) (Semester - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

### SECTION - I

- Q1)** a) Discuss the history and importance of Chemical process control. [8]  
b) Define modeling and derive the Input-output model for stirred tank heater. [8]

OR

- Q2)** a) Draw a suitable sketch and derive the transfer function of pure capacitive process. [8]  
b) A thermometer showing steady state temperature of 25°C had been subjected to step input of surrounding temperature from 25° to 125°C. If the time constant of thermometer is 5 sec, determine the following; [8]  
i) Thermometer reading after 5 sec.  
ii) Time required to read 70°C on Thermometer.  
iii) Time required for 70% response.

- Q3)** a) Define second order system and derive the transfer function for U tube manometer system. Comment on type of dynamic response of the system. [10]

P.T.O.

- b) A second order process with following transfer function is subjected to unit step change in input. Determine the damping factor  $\xi$  and the ultimate value of response. [6]

$$G_p = \frac{1}{s^2 + s + 1}.$$

OR

- Q4)** a) Define P,I & D controller and derive their transfer functions. Discuss their effect on closed loop response. [8]
- b) A first order process with following transfer function is controlled by PI controller. Assuming servo problem and neglecting the dynamics of final control element and measuring instrument i.e.  $G_f(s) = G_m(s) = 1$ ; [8]

The open loop process is  $G_p(s) = \frac{1}{s-1}$

Determine the following;

- i) Closed loop transfer function.
- ii) Order of response.
- iii) Closed loop gain and time constant.
- iv) Offset.

- Q5)** a) Define stability of the process and discuss the characteristic equation criteria. [6]
- b) Draw the root locus diagram for the system with following transfer function; [12]

$$G_p(s) = \frac{1}{(s+5)^2}$$

OR

- Q6)** Define controller tuning and discuss the Time integral performance criteria and process reaction curve method for tuning of controller. [18]

## SECTION - II

- Q7)** Define the Bode stability criteria and Sketch the Bode diagram for PI and PD controller. [18]

OR

**Q8)** Define the Nyquist stability criteria and Sketch the Nyquist plot for PI and PD controller. [18]

**Q9)** Draw a neat sketch and write short notes on: [16]

- a) Cascade control.
- b) Split range control.

OR

**Q10)** Draw a neat sketch and discuss in detail about; [16]

- a) Adaptive control.
- b) Feed forward control & ratio control.

**Q11)** Draw the instrumentation diagram for CSTR control and discuss in detail about its functioning. [16]

OR

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

- a) Role of digital computers in control.
- b) Supervisory control.
- c) DCS.
- d) Model Predictive control.



Total No. of Questions : 12]

SEAT No. :

P1310

[Total No. of Pages : 3

**[4264] - 46**

**B.E. (Mechanical & Mech. Sandwich)  
COMPUTATIONAL FLUID DYNAMICS  
(2003 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 answer books.*
- 2) *Figures to the right indicate full marks.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Assume suitable data, if necessary and mention it clearly.*

**SECTION - I**

- Q1)** a) Derive the equation for conservation of mass in differential form for infinitesimally small fluid element fixed in space. [10]  
b) What is divergence of velocity? Explain its physical meaning. [6]

OR

- Q2)** a) For a moving fluid element, develop an expression for the substantial derivative. Explain its physical meaning. [8]  
b) Discuss the various types of boundary conditions with one example of each. [8]

- Q3)** a) Solve the system using Runge-Kutta method  $\frac{dy}{dx} = x + y, \frac{dz}{dx} = x^2 - y^2$  subject to  $x_0 = 0, y_0 = 1$  and  $z_0 = 0.5$  to find  $y$  and  $z$  at 0.25 taking  $h = 0.25$ . [8]  
b) Explain the merits and demerits of [8]  
i) explicit method  
ii) implicit method  
iii) semi-implicit method

OR

**P.T.O.**

- Q4)** a) List the full procedure for the solution of Blasius equation using shooting method. [12]  
 b) Explain initial value problem and boundary value problem. [4]

**Q5)** Consider the first order wave equation  $\frac{\partial u}{\partial t} + C \frac{\partial u}{\partial x} = 0$  [18]

- a) Discretise the above equation using finite difference scheme.  
 b) Obtain condition for stability of its numerical solution.

OR

- Q6)** a) Derive  $\left( \frac{\partial^2 u}{\partial x^2} \right)_{i,j} = \frac{-u_{i+3,j} + 4u_{i+2,j} - 5u_{i+1,j} + 2u_{i,j}}{(\Delta x)^2} + o(\Delta x)^2$  [10]  
 b) Explain [8]  
 i) convergence  
 ii) stability and  
 iii) consistency of the numerical solution

## SECTION - II

- Q7)** Develop the solution algorithm for one dimensional transient heat conduction problem using [16]  
 a) Implicit scheme and  
 b) Explicit scheme.

OR

- Q8)** Consider thermally developing flow and hydrodynamically fully developed flow inside a 2D channel. [16]  
 a) Write governing equation with boundary conditions.  
 b) Write equation in discretised form.  
 c) Present the solution method.

- Q9)** Outline the MAC algorithm for fluid flow solution and show how the incompressible flow field is obtained. [16]

OR

**Q10)** For quasi-one dimensional compressible flow in converging diverging nozzle, [16]

- a) Derive the continuity equations.
- b) Write momentum and energy equation for this nozzle.
- c) Show how the density is updated using MacCormack method.

**Q11)** a) Write down the step by step procedure for SIMPLE algorithm. [12]  
b) Explain : stability of solution and its criteria. [6]

OR

**Q12)** Write short notes on : [18]

- a) Navier-Stokes equations.
- b) Finite volume method.
- c) CFD simulation technique.



Total No. of Questions : 11]

P1311

SEAT No. :

[Total No. of Pages : 7

[4264] - 55

**B.E. (Production) (Common to Prod. S/W)**

**RELIABILITY ENGG.**

**(2003 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) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam table is allowed.
- 5) Assume suitable data, if necessary.
- 6) You are advised to attempt not more than 3 questions.

**SECTION - I**

**Q1)** a) Derive an expression  $MTTF = \frac{1}{N} \sum n_k k \Delta t$ . [6]

- b) In a survival test conducted on 160 cardboard boxes for their strength under impact loading, the following results were obtained:

Number of impacts	20	30	34	36	39	42	45	47	50
Number of boxes failed	17	20	25	24	25	23	13	8	5

For this case, how will you define failure density, failure rate? [6]

- c) Explain with neat sketch early failure, random failure & wear out failure of 'Bath tub' curve. [4]

OR

**P.T.O.**

- Q2) a)** The results of tests conducted under severe adverse conditions on 250 safety valves are tabulated as given below. Calculate failure density ( $f_d$ ) and hazard rate  $Z(t)$  when the time interval is four hours instead of one hour. Also calculate number of survivors. [8]

Time interval	00	0-4	4-8	8-12	12-16	16-20	20-24
No. of failures	00	135	35	32	22	15	11

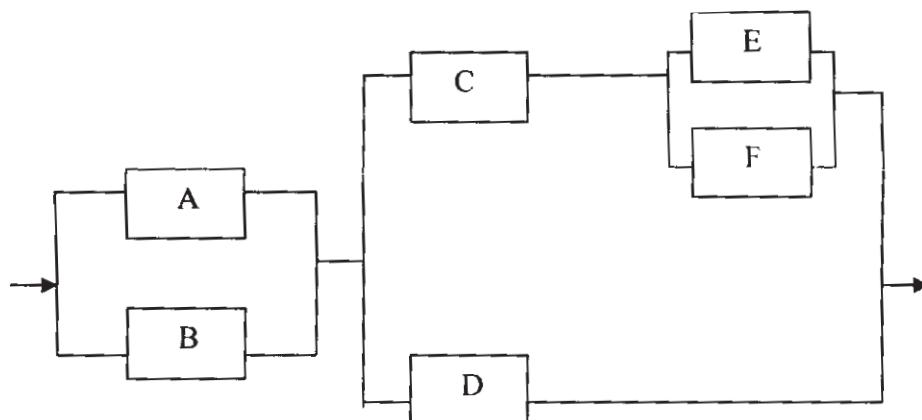
- b) In the life testing of 200 specimens of a particular device, the number of failures during each time interval of 20 hrs. is shown in table. Estimate MTTF for these specimens. [4]

Time Interval (Hours)	Number of failures during the interval
$T \leq 1000$	00
$1000 <= T <= 1020$	30
$1020 <= T <= 1040$	40
$1040 <= T <= 1060$	35
$1060 <= T <= 1080$	40
$1080 <= T <= 1100$	20
$1100 <= T <= 1120$	25
$1120 <= T <= 1140$	05
$1140 <= T <= 1160$	05

- c) Explain with neat sketch meaning of different types of Gates used in the fault tree analysis. [4]

**Q3) a)** Explain the concept of “Techno-Physico Constraints” with a conceptual system. [6]

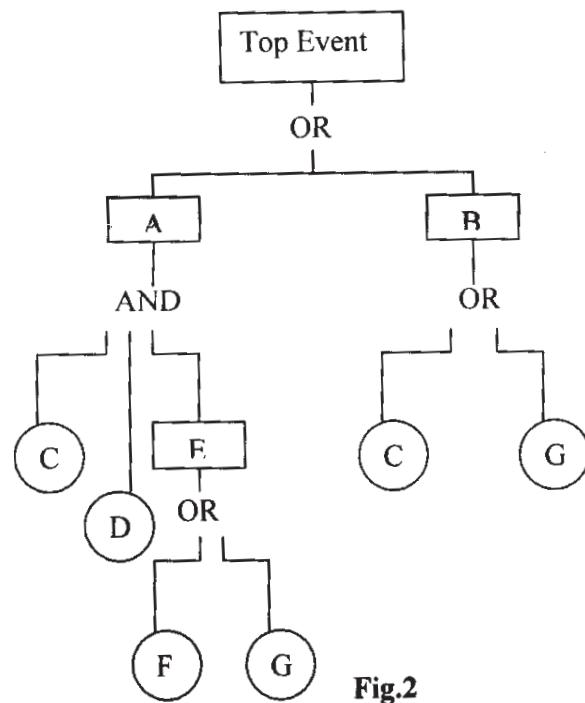
**b)** Construct a fault tree from Fig. 1 such that the top event is a system failure and component failures are basic events. If  $\Pr\{A\} = \Pr\{B\} = 0.9$ ,  $\Pr\{C\} = \Pr\{D\} = 0.8$  and  $\Pr\{E\} = \Pr\{F\} = 0.75$ , compute the probability of the top event. [10]



**Fig.1**

OR

**Q4) a)** Construct a reliability block diagram for given fault tree Fig. 2 [8]



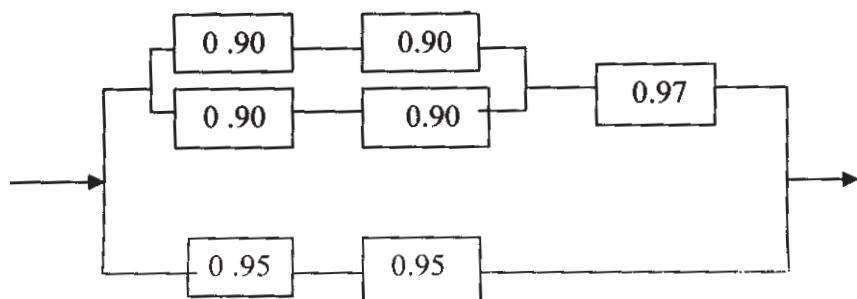
**Fig.2**

- b) Differentiate between : Design FMEA and Process FMEA. Explain methodology of system analysis. [8]

**Q5)** a) Explain with neat sketch [10]

- i) Series Configuration
- ii) General Series-Parallel configuration.

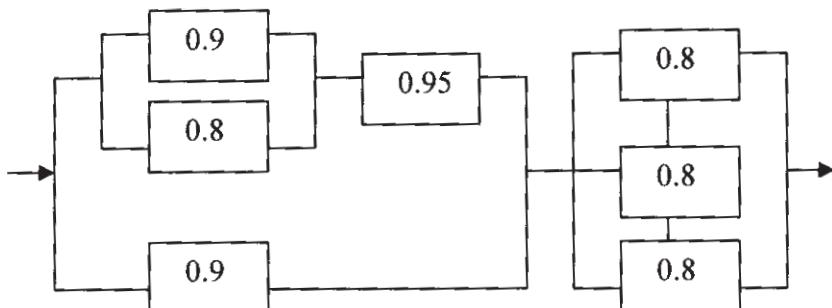
b) Find the system reliability of the configuration in Fig. 3, [8]



**Fig.3**

OR

**Q6)** a) Find the reliability of the configurations shown below in Fig. 4, [8]



**Fig.4**

- b) Explain with neat sketch [10]
- i) Parallel Configuration
  - ii) General Parallel-Series configuration.

## SECTION - II

- Q7) a) Define Terotechnology and explain various elements of LCC. [8]**
- b) A company is planning to acquire a truck. Two makes of trucks are available in the market. The cost of garaging and the driver's wages are same for both. The other data on cost are provided in the table.

Parameters	Truck A	Truck B
Capital cost	Rs. 5 Lakhs	Rs. 3 Lakhs
Annual Road Tax & Insurance	Rs. 8,000	Rs. 7,000
Operating Cost		
a) fuel consumption	20km/Lit.	20km/Lit.
b) oil consumption	2 lit/1000km	2 lit/1000km
c) fuel cost	Rs. 3/lit.	Rs. 3/lit.
d) oil cost	25/lit	21/lit
Maintenance Cost		
a) service interval	Every 7,000km	Every 4,000 km
b) cost of service	Rs. 3,000	Rs. 5,000
c) random breakdown	Every 30,000 km.	Every 10,000 km.
d) cost of breakdown	Rs. 9,000.	Rs.6,000.
Expected life	10 yrs.	10 yrs.

Calculate annual maintenance cost for a period of 30,000 km & find out which truck is advantageous [8]

OR

**Q8) a) Explain mean and median ranking method. [8]**

b) The following data refer to ‘Mean time to failure’ of a equipment used in electric power house installation :

No. of failure	1	2	3	4	5	6	7	8	9
MTTF/MTBF (Hrs)	31.3	45.9	78.3	22.1	2.3	4.8	8.1	11.3	17.3

Plot the reliability against time using the method median statistics.  
How will values changes with mean statistics? [8]

**Q9) a) Explain i) Inherent availability ii) Achieved availability iii) Operational availability. [6]**

b) If two components having failure rates  $\lambda_1, \lambda_2$  respectively are connected in parallel show that the Reliability of this parallel configuration at time t is given as.  $R_p(t) = e^{-\lambda_1 t} + e^{-\lambda_2 t} - e^{-(\lambda_1+\lambda_2)t}$ . [10]

OR

**Q10)a) Derive an expression for techno-economic life of equipment given maintenance function ( $at^n$ ), operating cost per year (v) and first cost (C). [6]**

b) The following data have been collected at the plant : [6]

Mean time before failure = 30 hrs.

Mean time to repair = 15hrs.

Administrative logistic time is 30% of Mean Down Time(MDT).

Calculate the operational availability and inherent availability of the plant.

c) Explain the term availability and maintainability of system. [4]

**Q11)** Write short note on (Any 3) :

**[18]**

- a) k out of m systems.
- b) Types of maintenance system.
- c) Risk priority number in FMEA.
- d) “Tie-set” & “cut set”.
- e) Redundancy.



Total No. of Questions : 8]

SEAT No. :

P1317

[Total No. of Pages : 1

**[4264] - 201**

**B.E. (Petroleum Engineering)  
RESERVOIR ENGINEERING - I  
(2003 Pattern) (Sem. - I)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates :*

- 1) *Answers to the two sections must be written in separate answer books.*
- 2) *Questions No. 2 (two) and 8 (eight) are compulsory.*
- 3) *Figures to the right indicate full marks.*
- 4) *Neat diagrams should 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)** a) What is reservoir engineering? [8]  
b) Explain in detail classification of reserves and how are they calculated? [8]
- Q2)** Derive the generalized material balance equation. [18]
- Q3)** Derive the material balance equation for an oil reservoir operating rock and fluid expansion. [16]
- Q4)** State and explain decline curve analysis. [16]

**SECTION - II**

- Q5)** Derive the diffusivity equation in cylindrical coordinate system. [16]
- Q6)** For a pressure drawdown test explain the terms ETR, MTR and LTR on a semi log, log plot and on the derivative plot. [16]
- Q7)** Explain isochronal and modified isochronal test. [16]
- Q8)** Write short notes on : [18]  
a) Type curves.  
b) Interference test analysis.



Total No. of Questions : 8]

SEAT No. :

P1318

[Total No. of Pages : 2

**[4264] - 221**  
**B.E. (Petrochemical)**  
**REFINING OPERATIONS**  
**(2003 Pattern) (Semester - I)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates :*

- 1) *Attempt any three questions from each section.*
- 2) *Answers to the two sections should be written in two separate answer books.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of steam tables and electronic calculator is allowed.*
- 5) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) Draw and discuss process flow of crude desalting operation. [8]  
b) Explain in brief the necessity of crude desalting. Comment on waste stream generated in desalting operation and its treatment. [8]
- Q2)** Explain in detail the operation of atmospheric distillation unit with reference to  
a) The products  
b) Feed preheating,  
c) Overflash provision  
d) Reflux arrangement [16]
- Q3)** Discuss emerging trends in fuel specifications of any four fuel products and their fall out on refinery operation and its economy. [18]
- Q4)** Write notes :  
a) Vacuum Distillation Products. [5]  
b) Hardware of Vacuum distillation. [5]  
c) Energy conservation in refinery. [6]

**SECTION - II**

- Q5)** Explain important carbon rejection options in detail. [16]  
**Q6)** Describe FCCU and Hydrocracking Unit in brief. [18]

*P.T.O.*

**Q7)** Explain in detail how elemental sulphur is produced from waste streams in modern refineries. **[16]**

**Q8)** Write Notes (Any Two) :

a) Lube Additives. **[8]**

b) Hydrogen Production. **[8]**

c) Lube specifications. **[8]**



Total No. of Questions : 12]

SEAT No. :

P1322

[Total No. of Pages : 2

**[4264] - 275**

**B.E. (IT)**

## **MOBILE COMPUTING**

**(2003 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) *Assume suitable data, if necessary.*

### **SECTION - I**

- Q1)** a) Explain various types of mobilities you know. [8]  
b) What are the advantages and disadvantages of standards? Explain at least 6 standard bodies in brief. [8]

OR

- Q2)** a) Explain various generation of mobile communication system. [8]  
b) Explain in detail the concept of frequency reuse. [8]

- Q3)** a) Explain A3, A5 and A8 algorithms used in GSM system. [9]  
b) Explain the strengths and features of SMS. [9]

OR

- Q4)** Write short notes on : [18]  
a) Bluetooth protocol stack.  
b) Java card.  
c) IPv6.

- Q5)** a) Explain various services, applications and limitations of GPRS. [8]  
b) Explain the architecture of GPRS. [8]

OR

- Q6)** a) Explain IS-95 architectural model. [8]  
b) Explain two spread spectrum technologies. [8]

**P.T.O.**

## **SECTION - II**

- Q7)*** a) Explain the internal components of PDA. [8]  
b) Explain SS#7 architecture. [8]

OR

- Q8)*** a) Explain various entities used in WLAN architecture. [8]  
b) Where WLAN is desirable over wired LAN? Explain advantages and disadvantages of WLAN. [8]

- Q9)*** a) Explain the various layers in Symbian OS. [8]  
b) Explain the various layers in Palm OS. [8]

OR

- Q10)***a) Compare J2ME with J2SE and J2EE. [8]  
b) Explain the security issues used in Symbian OS. [8]

- Q11)***a) Explain various flavors of Windows-CE. [9]  
b) Explain any three real time protocols. [9]

OR

- Q12)***Write short notes on : [18]

- a) Asymmetric key algorithm.
- b) Attacks of static assets.
- c) Attacks on dynamic assets.



Total No. of Questions : 12]

SEAT No. :

P1375

[Total No. of Pages : 4

**[4264]-226**

**B.E. (Petrochemical)**

**NOVEL SEPARATION PROCESSES**

**(2003 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) Discuss the process principles involved in Ultrafiltration and Nanofiltration. [6]  
b) Write a note on : Macroemulsions and Microemulsions with suitable examples. [6]  
c) Discuss in brief Adsorptive bubble separation techniques. [6]

OR

- Q2)** Discuss in detail on : [18]  
a) Energy requirements for separation processes by giving suitable examples.  
b) Selection criteria for separation Processes.

- Q3)** Derive the model equation for Complete mixing model for gas separation by membranes. Discuss the solution strategy for model equations. [16]

OR

- Q4)** An 8 micron tubular membrane is used to recover salt A from a dilute solution. The solutions to either side are at 0.02 and 0.0045 kmol/m<sup>3</sup>, with mass transfer coefficients of  $3.5 \times 10^{-5}$  and  $2.2 \times 10^{-5}$  m/s respectively. The distribution coefficient is 0.79 and the diffusivity of A in the membrane is  $2.9 \times 10^{-11}$  m<sup>2</sup>/s.

**P.T.O.**

- 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 & Linton correlation. If the velocities of both solutions are doubled, what will the membrane resistance now be?

[16]

**Q5)** Write short notes on : [16]

- a) Classification of membrane separation processes.
- b) Ultrafiltration and Nanofiltration-Principles and applications.
- c) Diffusion type model for Reverse osmosis.

OR

**Q6)** Discuss with sketches different types of membrane modules, mentioning applications, material of construction. [16]

## **SECTION - II**

**Q7)** Discuss in detail the process principles involved in Pressure Swing Adsorption (PSA) and Temperature Swing Adsorption (TSA) with industrial applications.

[18]

OR

**Q8)** a) Nitrogen gas contaminated with water at 926 mg per kg of  $N_2$  is continuously Copper ions are removed from aqueous solution by an ion exchange resin. Pilot-scale tests where 94.6 ml/min of solution was passed through a cylindrical bed of resin 0.0254 m in diameter and 0.365 m high gave a breakthrough time of 7.0 minutes, by which time 60% of the bed height had been fully spent. The plant-scale tower is to be 0.91 meters high, with a flow rate of 283.90 ml/min.

Determine :

- i) New breakthrough time;
- ii) Diameter required;

Assume that “zone” of resin in transition is to be the same in both towers.

[10]

b) Discuss various adsorption models for design of fixed bed adsorber.[8]

- Q9)** From Darcy's Law, the velocity through a packed bed for a given pressure drop (P) is given by :

$$u = \frac{\varphi P d^2 p}{l \eta}$$

Where,

$\varphi$  = Darcy's constant

P = Pressure drop

$d_p$  = Particle diameter

l = Length of column

$\eta$  = Viscosity of the mobile phase

Also, from the analysis of the Van Deemter equation, for a well packed column and for a highly retained solute, it is found that :

$$H_{\min} = 2.48d_p$$

and the velocity at  $H_{\min}$  is equal to

$$1.62D_m/d_p$$

Where  $D_m$  is the diffusivity of the solute in the mobile phase.

From the above informations, derive an analytical expression for the maximum efficiency obtainable for a column in terms of these parameters, if the maximum allowable pressure drop is P. [16]

OR

- Q10) a)** In gas chromatography, a plot of HETP as a function of the mobile phase velocity is described by the Van Deemter equation :

$$HETP = A + B/u + Cu$$

Physically, what do the terms A, B and C represent? Calculate the optimum value of the mobile phase velocity and the plate height in terms of these parameters. [8]

- b) A solution of 1500 kg of  $NaSO_4$  in 6500 kg water is cooled from 333 K to 283 K in an agitated mild steel vessel weighing 750 kg. At 283 K, the stable crystalline phase is  $NaSO_4 \cdot 10H_2O$  and at 290 K, the heat of solution is -78.5 MJ/kmol and the heat capacities of the solution and mild steel are 3.6 and 0.5 Kj/kg.K respectively. If, during cooling, 2% of the water is lost by evaporation, estimate the heat to be removed. [8]

- Q11) a)** Discuss in brief the process principles and operational fundamentals involved Supercritical fluid extraction. [10]

b) Define the following terms in connection with chromatographic separations and give appropriate equations : [6]

- i) Partition coefficient (K)
- ii) Retention Volume ( $V_R$ )
- iii) Retention Ratio (R)
- iv) Capacity factor (k)
- v) Separation factor ( $\alpha$ )
- vi) Resolution ( $R_s$ )

OR

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

- a) Reactive Separations.
- b) Isoelectric Focusing.
- c) Reverse Micelle Extraction.



Total No. of Questions : 12]

SEAT No. :

P1407

[Total No. of Pages : 3

[4264] - 27

B.E. (Mechanical)

ALTERNATIVE ENERGY SOURCES

(2003 Pattern) (Elective - I) (Sem. - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

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

### SECTION - I

- Q1)** a) Explain how solar radiations on horizontal surface are measured? [8]  
b) Calculate the angle made by beam radiation with the normal to a flat plate collector on December 1 at 0900 h (local apparent time). The collector is located in New Delhi ( $28^{\circ} 35' N$ ,  $77^{\circ} 12' E$ ), and is titled at an angle of  $36^{\circ}$  with the horizontal and is pointing due south.

For this case,  $\gamma = 0^{\circ}$ , on December 1,  $n = 335$ . [8]

OR

- Q2)** a) Write a note on solar energy option - an overview of thermal applications. [8]  
b) Estimate the monthly average daily global radiation horizontal surface at Baroda ( $22^{\circ} 00' N$ ,  $73^{\circ} 10' E$ ) during the month of March if the average sunshine hours per day is 9.5.  
 $\alpha = 0.28$ ,  $b = 0.48$  [8]

- Q3)** a) Write short note on how performance analysis of liquid flat plate collector is done? [8]  
b) Explain in brief different parameters affecting the performance of the liquid flat plate collector. [8]

OR

P.T.O.

**Q4)** a) Explain in brief different coefficients used in the analysis of the liquid flat plate collector. [8]

b) Write a note on selection criteria of liquid flat plate collector. [8]

**Q5)** a) Explain in brief testing procedure of liquid flat plate collector. [10]

b) Write short note on evacuated tube collectors. [8]

OR

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

a) Solar ponds

b) Air Heaters

c) Pyranometer

d) Solar Stills

### **SECTION - II**

**Q7)** a) Discuss the industrial and consumer applications of photovoltaic system with materials used for it. [8]

b) Explain the mechanism of solar energy into power conversion using photovoltaic. And state advantages, limitations and applications associated with it. [10]

OR

**Q8)** a) Describe the important factors for site selection of wind mill power generation. What is cut in speed and furling speed considered while operating wind. [10]

b) Discuss the prospects of Tidal energy in India. Suggest the suitable locations for same. [8]

**Q9)** a) With neat sketch explain the functioning of OTEC closed cycle system. [8]

b) Explain vapour dominating geothermal system. [8]

OR

**Q10)** a) What is fuel cell? Explain working of any one type of it with its demerits. [8]

b) How passive space cooling in summer is done using solar energy. [8]

**Q11)** a) Draw a schematic diagram of down draft gasifire. Discuss the various zones in it along with chemical reactions involved in it. [8]

b) Discuss the significance of Bio-gas plants in India's energy strategy. [8]

OR

- Q12)** a) Which are the different methods for obtaining energy from biomass?  
What is an anaerobic digestion? [8]
- b) Write a short note on : [8]
- i) Use of biogas as diesel fuel.
  - ii) Environmental protection norms.

Total No. of Questions : 12]

P938

SEAT No. :

[Total No. of Pages : 3

**[4264] - 192**

**B.E. (Chemical)**

**PROJECT COSTING AND APPRAISAL  
(2003 Pattern)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

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

**SECTION - I**

- Q1)** a) Explain the concept of market survey. [8]  
b) What is meant by project evaluation? [8]

OR

- Q2)** Explain the terms in detail. [16]

- |                       |                     |
|-----------------------|---------------------|
| a) Supply and demand. | b) Concept of cost. |
| c) Margin.            | d) Profit.          |

- Q3)** a) Discuss the statement of income and expenditure in detail. [8]  
b) The annual direct production costs for a plant operating at 80 percent capacity are Rs. 2,80,000 while the sum of the annual fixed charges, overhead costs, and general expenses is Rs. 2,00,000. What is the break-even point in units of production per year if total annual sales are Rs. 5,60,000 and the product sells at Rs. 40 per unit? What were the annual gross earnings and net profit for this plant at 100 percent capacity when corporate income taxes required a 15 percent tax on the first Rs. 50,000 of annual gross earnings, 25 percent on annual gross earnings of Rs. 50,000 to Rs. 75,000, 34 percent on annual gross earnings above Rs. 75,000, and 5 percent on gross earnings from Rs. 1,00,000 to Rs. 3,35,000. [8]

**P.T.O.**

OR

- Q4)** a) Discuss with example the concept of journal and ledger entries. [8]  
b) Explain the balance sheet with detailed analysis. [8]

- Q5)** a) What are the basic factors involved in equipment costing? [8]  
b) Explain the terms : [10]  
i) Basic concept of cost.  
ii) Prime Cost.

OR

- Q6)** a) Calculate in detail the cost of any heat exchanger of your choice giving details about technical specifications and costing of the equipment. [8]  
b) Explain how the allocation of over heads of various cost elements is worked out. [10]

## **SECTION - II**

- Q7)** a) Write in detail about various methods for raising the finance. [8]  
b) Explain the terms : [8]  
i) Fixed Capital.  
ii) Working Capital.

OR

- Q8)** It is desired to borrow Rs. 10,000 to meet a financial obligation. [16]  
This money can be borrowed from a loan agency at a monthly interest rate of 2 percent. Determine the following :  
a) The total amount of principal plus simple interest due after 2 years if no intermediate payments are made.  
b) The total amount of principal plus compounded interest due after 2 years if no intermediate payments are made.  
c) The nominal interest rate when the interest is compounded monthly.  
d) The effective interest rate when the interest is compounded monthly.

- Q9)** a) Explain in detail cash flow diagram. [8]  
b) Explain the concept of taxes and their types. [8]

OR

**Q10)** Explain the terms : [16]

- a) Cash flow statement.
- b) Discount cash flow.
- c) Need for expansion & diversification.
- d) Capitalized cost.

**Q11)a)** Define depreciation and discuss its need and significance with limitations. [8]

b) Discuss various methods of determining depreciation charge. [10]

OR

**Q12)** The original value of a piece of equipment is Rs. 22,000 completely installed and ready for use. [18]

Its salvage value is estimated to be Rs. 2,000 at the end of a service life estimated to be 15 years.

Determine the asset (or book) value of the equipment at the end of each year using :

- a) Straight-line method.
- b) Textbook declining-balance method.



Total No. of Questions : 12]

P939

SEAT No. :

[Total No. of Pages : 2

**[4264] - 240**

**B.E. (Polymer Engineering)**

**POLYMER PROCESSING OPERATIONS - II  
(2003 Pattern)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) Answer three questions from Section I and three questions from Section II.
- 2) Answers to the two sections should be written in separate books.
- 3) Draw neat diagrams wherever necessary.
- 4) Numbers to the right indicate full marks.
- 5) Assume suitable data, if necessary.
- 6) Use of logarithmic table, electronic pocket calculators is allowed.

**SECTION - I**

- Q1)** a) Explain Superimposed, Offset and Z-type Calender arrangement with neat diagram. [9]  
b) Explain Calendering plant layout for making PVC Sheet. [9]

OR

- Q2)** a) Explain various methodologies used for ensuring uniform thickness including roll shapes modifications. [4]  
b) Explain the significance of Friction ratio in Calendering. [6]  
c) Discuss different heating systems and different materials used in Calendering. [8]

- Q3)** a) Derive necessary equation to find time taken to heat rotational mould. [8]  
b) Explain any two types of rotational molding machines. [8]

OR

- Q4)** a) Explain Rotational Molding of Nylon. [8]  
b) Explain the advantages of Liquid polymer rotational molding and discuss flow behavior of polymer during rotational molding. [8]

**P.T.O.**

**Q5)** Write a note on the followings : [16]

- a) Flexography Printing.
- b) Electroplating.

OR

**Q6)** a) Explain in detail Vacuum metalizing Process. [8]

- b) Discuss different techniques of surface treatment and explain any one. [8]

## **SECTION - II**

**Q7)** a) Explain in detail effects of different process parameters on the quality of Nylon Fibers. [9]

- b) Explain in detail Melt Spinning Process with one example. [9]

OR

**Q8)** a) Differentiate between Wet and Dry spinning and explain both in detail with examples. [14]

- b) What is texturising and how it is carried out. [4]

**Q9)** a) Explain the process of PET Recycling with examples. [8]

- b) Discuss in brief standards used for recycling of plastics. [8]

OR

**Q10)**a) List different methods of separation of plastic waste and explain any one in detail. [8]

- b) Write a note on Incineration Process of Plastic Waste. [8]

**Q11)**a) Write a note on Ultrasonic welding, Hot Gas welding. [8]

- b) Explain Laser Machining of Plastics. [8]

OR

**Q12)**a) Discuss Theory and Mechanism of Adhesion Bonding. [8]

- b) Discuss Mechanical Fastening, Press Fit Assembly. [8]



**[4264] - 90**  
**B.E. (Electrical)**  
**ENERGY MANAGEMENT**  
**(2003 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)** a) Explain in detail the Electricity Act. 2003. [8]  
b) Explain in detail the energy saving and energy conservation concept. [8]

OR

- Q2)** a) Explain the policies frameol by Govt. of India for short term and long term for energy sector of India. [8]  
b) Explain how the economic growth of nation is linked with energy consumption. [8]

- Q3)** a) Write comprehensive definition of energy management. What are objectives of energy management. [6]  
b) Explain the need of energy audit for any industry. Also explain methodology for detail energy audit. [6]  
c) Explain the role of training and awareness programme for staff of industry in energy management. [6]

OR

- Q4)** a) Explain the concept of supply side management and demand side management with advantages and disadvantages. [6]  
b) What is the significance of knowing the energy costs. Why it is very much important in energy management. [6]  
c) Write the various duties and responsibilities assigned to energy manager by EC Act.2001. [6]

*P.T.O.*

- Q5)** a) Write format for writing energy audit report for any industry. [4]  
b) What is the role of top management in energy management. [6]  
c) Explain the Sankey diagram and its importance in energy management. [6]

OR

- Q6)** a) Explain CUSUM technique. What is use of CUSUM technique in energy management. [8]  
b) Explain the importance of instrumentation in energy audit and various equipments required to conduct energy audit with function. [8]

## **SECTION - II**

- Q7)** a) Explain the following terms used in financial analysis. [8]  
i) ROI.  
ii) IRR.  
b) Calculate the SPP and percentage return on investment of a energy conservation project costing Rs.33,00,000/- to purchase and Rs.1.5 Lakhs per year for operation and maintenance the expected saving per year is Rs.17 Lakhs. [8]

OR

- Q8)** a) With an example, explain the role of electricity tariff in energy management. [4]  
b) Explain briefly the various financial analysis techniques for investments in energy efficiency projects and their suitability of application. [6]  
c) Explain the options of investment in the project of energy management in detail. [6]

- Q9)** a) Explain the energy conservation opportunities in HVAC systems. [8]  
b) Explain the advantages of heat recovery systems used in thermal power plants. [8]

OR

- Q10)** a) List down the various energy conservation opportunities in water pumping systems. [8]  
b) What are the various energy conservation measures as applied to lighting systems. [8]

- Q11)** Explain in detail energy audit case study for [18]  
a) T. and D sector, and  
b) Agricultural sector.

OR

- Q12)** a) Explain the various options for the reduction of commercial loss in Indian power distribution systems. [9]  
b) Explain the energy audit case study for a steel industry. [9]

☒☒☒☒

Total No. of Questions : 12]

P952

SEAT No. :

[Total No. of Pages : 2

**[4264] - 279**

**B.E. (Information Technology)  
DISTRIBUTED SYSTEMS  
(2003 Pattern)**

*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) What are the various challenges for designing distributed systems? [8]  
b) List and explain advantages and disadvantages of distributed systems over centralized system and personal computers. [8]

OR

- Q2)** a) Explain with neat diagram architectural Models of distributed systems. [8]  
b) What are the services offered by middleware in a distributed system? [8]

- Q3)** a) What is RPC? Explain role client and server stub procedures in RPC in the context of a procedural language. [8]  
b) Explain how quality of service can be achieved in stream oriented communication. [8]

OR

- Q4)** a) What is RMI? Explain types of RMI invocation semantics. [8]  
b) Explain general architecture of message queuing system for persistent communication. [8]

**P.T.O.**

- Q5)** a) List and explain distributed file system requirements. [10]  
b) Explain different types of file sharing semantics. [8]

OR

- Q6)** a) Draw and explain NFS architecture and give detail functions of layers. [10]  
b) Compare NFS and CODA file system. [8]

## **SECTION - II**

- Q7)** a) What is Physical clock and how physical clock is synchronized? [8]  
b) What is a distributed Deadlock? Explain phantom deadlock in distributed system. [8]

OR

- Q8)** a) What is Network Time Protocol? Discuss design aims and features of NTP? [8]  
b) List and explain uses of election algorithm? What is Bully algorithm? [8]

- Q9)** a) Define : [8]  
i) Reliable Multicast. ii) Ordered Multicast.  
iii) Distributed Mutual Exclusion. iv) Logical Clock.  
b) Describe mutual exclusion algorithm. [8]

OR

- Q10)**a) What is recovery? What is backward and forward recovery? [8]  
b) What is check pointing? Explain independent check pointing and coordinated check pointing. [8]

- Q11)**a) Explain in brief the steps to build CORBA application. [10]  
b) Draw and explain CORBA architecture. [8]

OR

- Q12)**a) What is Cluster? What are different types of clusters? [10]  
b) Explain : OBV, CCM, GIOP, DDS. [8]



Total No. of Questions : 12]

SEAT No. :

P955

[Total No. of Pages : 3

**[4264] - 32**  
**B.E. (Mechanical)**  
**POWER PLANT ENGINEERING**  
**(2003 Pattern) (Semester - II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates :*

- 1) Answer three questions from Section-I and three questions from section-II.
- 2) Answers to the two sections should be written in separate answer books.
- 3) Neat diagrams must be drawn, wherever necessary.
- 4) 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) With the help of neat sketch explain working of a diesel engine power plant. [10]  
b) Write a short note on present status of power generation in India. [6]

OR

- Q2)** a) Write a short note on “Types of Nuclear Reactors”. [8]  
b) What are the points considered for selection of site of a Nuclear Power Plant. [4]  
c) Write a note on “Nuclear Waste Disposal”. [4]

**Unit - II**

- Q3)** a) Explain with neat sketch the following : [8]  
i) Bowl mill.  
ii) Cyclone Burner.  
b) State the characteristics of a good ash handling system. How dust collectors are classified? [8]

OR

- Q4)** a) What are the different types of coal conveyors? Indicate the use of each and justify. [8]  
b) Explain with a neat sketch working of an electrostatic precipitator. Enlist its outstanding features over other collectors. [8]

*P.T.O.*

### Unit - III

- Q5)** a) Explain with neat sketch working of Benson boiler. What are its advantages? [9]  
b) What are the basic requirements of steam piping used in power plants? What are the steps involved in designing of steam piping? [9]

OR

- Q6)** a) Explain the “Ideal regenerative feed heating cycle. “Why it is not used in practice? Explain. [6]  
b) A steam power plant operating on Rankine cycle receives steam from a boiler at 3.5 MPa and 350°C. It is exhausted to condenser at 10 kpa. Calculate :  
i) Energy supplied per kg of steam generated in a boiler.  
ii) Quality of steam entering the condenser.  
iii) Rankine cycle efficiency considering the feed pump work.  
iv) Specific steam consumption. [12]

### SECTION - II

### Unit - IV

- Q7)** a) Show by analytical method that for isentropic flow of steam through a convergent-divergent nozzle the velocity at throat is local acoustic velocity. [8]  
b) Derive the expressions relating area, velocity and mach number for a varying cross section. Show the sections for supersonic, subsonic nozzles. [8]

OR

- Q8)** a) Define the terms : [8]  
i) Condenser efficiency.  
ii) Vacuum efficiency.  
iii) Degree of super saturation.  
iv) Degree of undercooling.  
b) Explain with the help of T-S diagram the necessity of condenser in a steam power plant. [8]

### Unit - V

- Q9)** a) Derive an expression for optimum value of the ratio of blade speed to steam speed for maximum efficiency for a single stage impulse turbine. [8]  
b) Write short notes on : [8]  
i) Methods of fixing turbine blades to discs and drum  
ii) Labyrynth packings.

OR

- Q10)** a) What is the necessity of compounding of steam turbines? Explain different methods of compounding of steam turbines. [8]
- b) Write short notes on : [8]
- Throttle governing of steam Turbines.
  - Losses in steam Turbines.

**Unit - VI**

- Q11)** a) Discuss in details how unit energy cost is determined? [9]
- b) Explain with neat sketch load curve & Load Duration Curve. How average load is calculated? [9]

OR

- Q12)** a) Explain the economic scheduling principle for load distribution and prove that combined input is minimum, if the incremental heat rate of each unit is same. [8]
- b) The daily load for a power plant is given by the equation  $L = 290 + 12t - t^2$ . Where  $t$  is time in hours from 0 to 24 hrs and 'L' is load in MW. Calculate :  
i) Magnitude of maximum load and when it occurs and  
ii) Plant Load Factor. [10]



Total No. of Questions : 12]

SEAT No. :

P973

[Total No. of Pages : 3

[4264] - 141

**B.E. (Instrumentation & Control)  
PROCESS INSTRUMENTATION - I  
(2003 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) 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) Elaborate control valve selection criteria. [8]  
b) A control valve is used for flow control. The line size is 10 inches and the liquid is water. Maximum flow rate is 3,000 gpm and minimum is 250 gpm. The line pressure varies between 40 to 50 psi. The downstream pipe loss is 2 psi at 3,000 gpm and the downstream pressure is 25 psi. Select a valve size and type that will satisfy the process. [8]

OR

- Q2)** Explain the sources of noise in a control valve. Draw the setup to measure the noise in a control valve. Differentiate between the source treatment and path treatment for reducing the control valve noise. [16]

- Q3)** a) Compare self regulating and non self regulating Processes. [9]  
b) Explain why single capacity processes are simple to control. [9]

OR

- Q4)** a) Explain:
  - Dead time.
  - Time constant.
  - Dead band.b) With the help of necessary equations explain the various gains considered in process control. [9]

*P.T.O.*

- Q5)** a) Compare Feedback + Feedforward Control and Cascade Control. [8]  
 b) What is Dual mode Control? Explain with a suitable example. [8]

OR

- Q6)** a) Explain “Auctioneering Control”. [8]  
 b) With the help of suitable application explain the working of Ratio Control. Why Ratio calculations are done outside the work station. [8]

## **SECTION - II**

- Q7)** a) Enumerate detailed features of MLPC. [9]  
 b) With the help of necessary equations explain the analysis of a typical Pressure Loop? [9]

OR

- Q8)** a) List various non-linear elements. Explain any two in detail. [9]  
 b) Apply scaling and develop Instrument Scheme for distillation column for following data. [9]

- Internal Reflux Rate : 0 – 15000 GPM (Li).
- External Reflux Rate : 0 – 10000 GPM (L).
- Temperature of overhead vapors : 150-250° F.
- External Reflux Temperature : 125-225° F.
- $\Delta T_{max}$  : 50° F
- $C_p$  : 0.65 BTU/lb °F.
- $\Delta H$  : 250 BTU/hr.

Consider the Equation:

$$\frac{Li}{L} = \left[ 1 + \frac{C_p}{\Delta H} (T_0 - T_r) \right]$$

- Q9)** a) Differentiate clearly between Adaptive Control and Self tuning Control method. [8]  
 b) Explain the use of predictive control in improving the performance of a process. What are its disadvantages? [8]

OR

- Q10)** a) Compare Conventional Controllers and Intelligent Controller. [8]  
b) Explain the advantages, disadvantages and applications of a Self Tuning Controller. [8]

- Q11)** a) With the help of block schematic, explain the working of Fuzzy Logic based controller. [8]  
b) Explain the techniques for analysis of process control performance using statistical process control. [8]

OR

- Q12)** Write short notes on: [16]
- Model predictive control.
  - ANN based control.

