ECE/Lib

Roll No. ..... Total Pages : 03

BT-3/D-22 43144

OPTIC AND WAVES

BS-201A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

Unit I

1. (a) Explain the terms phase velocity and group velocity. Derive relation between them. 7

   (b) Derive the expression for energy density and Poynthing vector for propagating waves. 8

2. (a) Explain the boundary conditions for a wave incident normally on boundary. 7

   (b) Explain Maxwell's equation. Derive wave equation for electromagnetic waves in free space. 8

Unit II

3. (a) Explain with theory the construction and formation of Newton's ring by reflected light. 8

(b) What do you understand by division of amplitude and division of wave front ? Give examples. 7

4. (a) What is Fresnel's bi-prism ? Explain the effect of placing a thin film in the path of one of the interfering beams of Fresnel's bi-prism. 7

(b) Explain the construction and working of Michelson's interferometer. 8

Unit III

5. (a) Explain briefly the theory of plane transmission diffraction grating. How do you explain missing order spectra ? 8

(b) Explain the construction and working of Biquartz polarimeter. 7

6. (a) Explain the construction and working of Nicol Prism. What are the limitations of using Nicol Prism as a polariser ? 8

(b) What do you mean by resolving power of a plane diffraction grating ? Derive an expression for it. 7

Unit IV

7. (a) Explain with a neat diagram the working and principle of He-Ne Laser. 8

(b) Describe various applications of Laser. 7

8. (a) What do you mean by pumping in laser ? Why is population inversion necessary for laser action ? 8

(b) Explain the characteristics of laser beam. 7

Roll No. ..... Total Pages : 03

BT-3/D-22 **43145**

ELECTRONIC DEVICES
FC-201A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit.

Unit I

1. (a) Sketch an energy band diagram, and explain conduction band, valence band and forbidden gap in details. **10**

   (b) Draw a diagram to illustrate drift current in a semiconductor material. Briefly explain. **5**

2. (a) Describe the negative and positive shunt clipping circuits and explain the operation of each circuit. **8**

   (b) Explain the current flow in a forward biased PN junction with relevant expression for minority carrier concentration and diagram to illustrate the carrier density close to depletion layer. **7**

Unit II

3. (a) Draw and explain the practical transistor CE amplifier. Also explain the function of each component. **8**

   (b) Explain basic principle of operation of BJT as amplifier. Also explain all the operative modes of BJT. **7**

4. (a) Draw and explain H parameters of CE Transistor. **8**

   (b) Give comparison of CB, CC, CE configurations. **7**

Unit III

5. Explain the following terms in detail : **15**

   (a) Pinch off voltage

   (b) Channel length modulation.

   (c) Velocity saturation

   (d) AC drain resistance

   (e) Amplification factor.

6. What is MOSFET ? Explain the construction and characteristics of N channel MOSFET with a suitable diagram. **15**

Unit IV

7. (a) Outline the construction of Zener voltage regulator with a neat circuit diagram. **5**

(b) With a neat sketch, explain the working of Op-Amp Shunt voltage regulator. **10**

8. Write short notes on any *three* of the following : **5×3=15**

(a) Controlled Transistor shunt voltage regulator

(b) Op Amp Series voltage Regulator

(c) MOS capacitor

(d) DC Regulated power supply.

Roll No. ..... Total Pages : 03

BT-3/D-22 43146

DIGITAL ELECTRONICS

Paper : II

ES-205A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

Unit I

1. (a) Express the following decimal numbers in binary form : **2**

(i) 37

(ii) 255.

(b) Perform the following operations using 2's complement : **4**

(i) 48 – 23

(ii) 23 – (– 67).

(c) Convert into POS term : **4**

$AB + AC' + BC$.

(d) Design a BCD to excess 3 code converter. **5**

2. (a) What are parity check codes ? Explain Hamming codes in detail. **5**

(b) Minimize the expression using Q-M method :

$Y = \Sigma m(0, 3, 6, 7, 10, 12, 15) + d(1, 2, 9, 11)$.

Also realize the obtained expression using AOI logic. **10**

Unit II

3. (a) Explain the working of TTL NAND gate. also describe the totem pole output driver circuit. **10**

(b) Explain how CMOS logic families can be interfaces with TTL families. **5**

4. (a) Draw the diagram of 2-Input CMOS NAND and NOR gates. **8**

(b) Design an octal to binary encoder. **7**

Unit III

5. (a) Explain in detail the working of JK flip-flop. Mention the problem associated with it. **8**

(b) Convert SR flip-flop to T flip-flop. **7**

6. (a) Design a synchronous mod 10 up counter. **10**

(b) Draw and explain the working of Johnson counter. Draw the output waveforms for it. **5**

Unit IV

7. (a) Write a short note on ROM. Also draw diagram showing working of ROM array. **7**

(b) With the help of waveforms, explain how read and write operation occur in semiconductor memory. **8**

8. Write a note on PLDs. Mention advantages of PLD. Discuss PLA and PAL. Implement the following function using PAL :

$Y = f_1 + f_2 + f_3$, where $f_1 = \Sigma m(0, 1, 2)$; $f_2 = \Sigma m(1, 2, 4)$ and $f_3 = \Sigma m(0, 3, 5)$. **15**

Roll No. ..... Total Pages : 02

BT-3/D-22 43147

SIGNALS AND SYSTEMS

EC-209A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

Unit I

1. (a) Explain power signals and derive its expression for discrete time signals. 7

   (b) If $x(t) = u(-3t + 2)$, determine $y(t) = x(t - 2) - x(t + 2)$. 8

2. Explain the linearity and stability property of a system. Also check the causality, time invariance, linearity and stability for the system with input $x[n]$ and output $y[n] = n^2 . x[n]$. 15

Unit II

3. Explain correlation functions. Also state and prove its properties. 15

4. Describe LTI systems and impulse response. Also state and prove the unit step response of LTI systems. 15

Unit III

5. (a) Explain the reconstruction process for sigma $x(t)$ and derive the expression for it. **10**

   (b) Determine nyquist rate and nyquist interval of $x(t) = \sin(100\pi t) + \cos(20\pi t)$. **5**

6. Explain and derive the expression for trigonometric and exponential fourier series coefficients. **15**

Unit IV

7. State and prove any *five* properties of DTFT. **3×5=15**

8. Explain the properties of ROC for Laplace transform. Find the Laplace transform for $x(t) = e^{-5t}\, u(t) - e^{-7t}\, u(t)$ and also determine its ROC. **15**

Roll No. ..... Total Pages : 05

BT-3/D-22 43148

NETWORK THEORY

EC-213A (Opt. 1)

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit.

Unit I

1. (a) For the tree shown in Fig. 1, develop the fundamental cut-set matrix. **8**

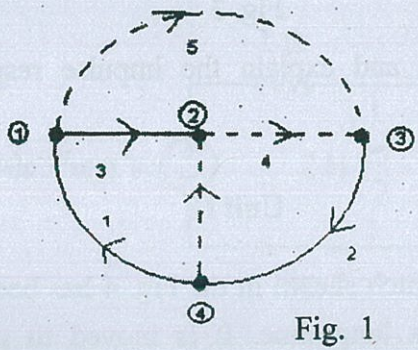

Fig. 1

(b) Find the voltage across the capacitor as a function of time for $t > 0$ for the circuit in Fig. 2. Assume steady-state conditions exists at $t = 0^-$: **7**

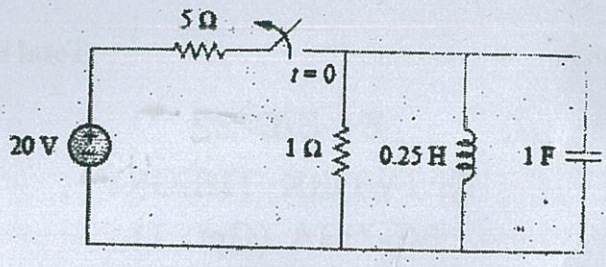

Fig. 2.

2. (a) Express the current pulse as shown in Fig. 3 in terms of the unit step function : 8

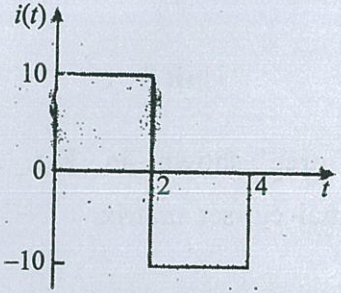

Fig. 3

(b) Derive and explain the impulse response of RL circuit. 7

Unit II

3. (a) The switch shown in the Fig. 4 has been in position *b* for a long time. It is moved to position *a* at $t = 0$. Calculate $v(t)$ for $t > 0$ using Laplace Transform. 8

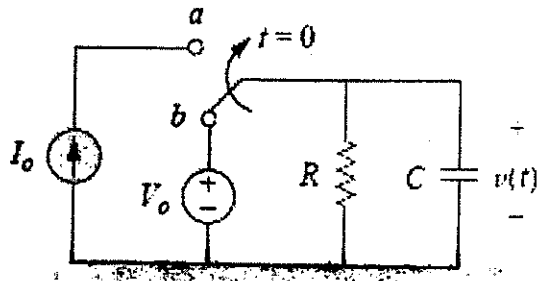

Fig. 4

(b) List and explain various restrictions on pole and zero locations for driving-point functions. 7

4. (a) As shown in Fig. 5, calculate $v_0(t)$ assuming that $i_L(0) = 0A$ using Laplace Transform. 8

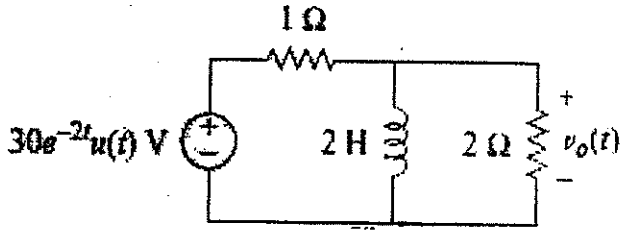

Fig. 5

(b) List and explain various restrictions on pole and zero locations for transfer functions. 7

Unit III

5. (a) Determine the transmission parameters of a two-port networks whose Z-parameters are : **8**

$$[Z] = \begin{bmatrix} 6 & 4 \\ 4 & 6 \end{bmatrix} \Omega$$

(b) Determine the Y parameters for the two-port shown in Fig. 6 : **7**

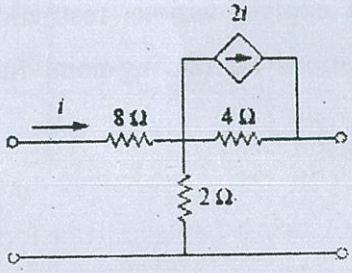

Fig. 6

6. Find the Z parameters of the circuit shown in Fig. 7 : **15**

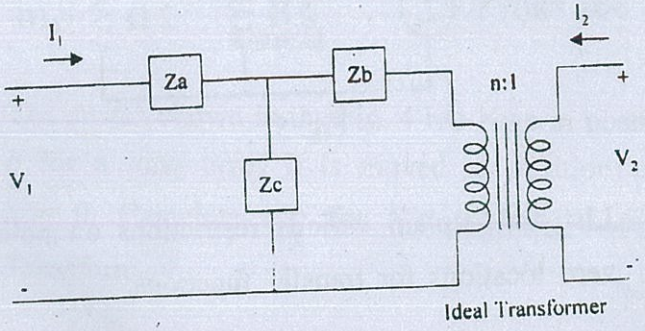

Fig. 7

Unit IV

7. (a) Desing m-derived π-sections LPFs for $R_0 = 600$ ohms, $f_c = 1800$ H_z and $f_\infty = 2000$ Hz. 8

(b) Define and discuss positive real functions and its properties. 7

8. (a) An impedance is given by $Z(s) = \frac{3s^2 + 18s + 24}{s^2 + 3s}$.

Realize the network in Foster-II form. 8

(b) List and explain the synthesis properties of L-C impedance or admittance functions. 7

Roll No. ..... Total Pages : 03

BT-3/D-22 43149

ESSENTIALS OF INFORMATION TECHNOLOGY

Electronics and Communication Engineering

ES-219A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *Five* questions in all selecting at least *one* question from each Unit I to Unit IV. All questions carry equal marks.

Unit I

1. (a) Discuss the int(), float(), str(), chr() and complex() type conversion functions with examples.

(b) Explain the different string formats available in Python with examples. **7+8=15**

2. (a) Illustrate the different types of control flow statements available in Python with flowcharts. Also discuss the rules for writing pseudo code.

(b) What operators does python support ? Write the precedence of operators. Discuss the features/ characteristics of identity operator and membership operator. **7+8=15**

Unit II

3. (a) List some few common exception types and explain when they occur.

   (b) Explain the following list methods with an example :

   (i) append()

   (ii) extend()

   (iii) insert()

   (iv) index()

   (v) sort(). **7+8=15**

4. (a) Write Python program to sort words in a sentence in decreasing order of their length. Display the sorted words along with their length.

   (b) What is Pyplot module ? Discuss the uses of Pyplot in Python. How can it be used for data visualization ? **7+8=15**

Unit III

5. (a) Draw distinction between computer system and mobile system in terms of CPU, memory, hard disk, battery and power.

   (b) Distinguish between application software and system software with suitable examples. **7+8=15**

6. (a) Define operating system. What are the functions of an operating system ? How operating system act as a resource manager ?

(b) What does cloud storage mean ? Which is the best cloud storage ? Discuss four types of cloud storage.

7+8=15

Unit IV

7. Discuss different types of keys in relational databases. Write the syntax to establish primary key and foreign key relationship among two tables using create statement at table level and column level. **15**

8. (a) Differentiate between alter and update SQL statement.

(b) How are indexes created and dropped in SQL ?

(c) Write a short note on MongoDB. **5+5+5=15**

Roll No. ..... Total Pages : 2

BT-5/D-22 **45244**

COMPUTER ORGANIZATION AND ARCHITECTURE

Paper–EC-305A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt any *five* questions.

1. (a) Differentiate between computer organization and computer architecture. Draw a table showing in two columns these differences. (8)

(b) Describe the meaning of the term micro operation. Briefly discuss the working of arithmetic, logical and shift micro operations. (7)

2. (a) What is a register? What is its role inside a processor? Explain various registers and general register organization. (8)

(b) Draw the architecture of a central processing unit. Label each unit and briefly explain the working of each part. (7)

3. (a) What are different types of CPU instructions? Give differences between Zero-address and 1-address instructions. (9)

(b) How does data transfer take place in a computer unit? Discuss various modes. (6)

4. (a) Explain how BCD subtraction takes place. (7)

(b) Describe the functioning of multiplier control unit. (8)

5. (a) How do you compare various memories in memory hierarchy design? (7)

(b) Differentiate between cache memory and virtual memory. Describe functions of the two. (8)

6. (a) What is cache memory? What are the issues in its performance? What is the problem of locality of reference and cache coherence? (9)

(b) What is associative memory? What advantages does it provide? (6)

7. (a) What is pipelining? What advantages does it provide? Differentiate between arithmetic and instruction pipeline. (9)

(b) What is priority encoder? Draw the truth table of priority encoder. (6)

8. (a) What are the differences between synchronous and asynchronous data transfer? (8)

(b) Explain in detail programmed I/O and memory-mapped I/O. (7)

ECE (12)

Roll No. ..... Total Pages : 2

BT-5/D-22 **45245**

INFORMATION THEORY AND CODING

Paper-EC-307-A

Time : Three Hours] [Maximum Marks : 75

Note : The students are required to attempt *five* questions in all, selecting at least *one* question from each unit.

UNIT-I

1. Discuss probability distribution and density functions of a random variable. Describe the various moments of a random process. (15)

2. Define entropy. Compute entropy of discrete binary source with probability p for 0 and 1 – p for 1. Draw graph between Entropy and p. (15)

UNIT-II

3. Discuss various types of codes. Compare variable length codes with fixed length codes with the help of suitable example. (15)

4. Define Channel Capacity. Define and prove Shannon's noise coding theorem. (15)

UNIT-III

5. Consider a DMS with seven symbols with probabilities {0.35, 0.33, 0.13, 0.07, 0.03, 0.04, 0.03}. Determine the Huffman Code for this source. Compute the efficiency of the code. (15)

6. Define Mutual Information. Compute its expression and discuss its properties. (15)

UNIT-IV

7. Consider the following generator Matrix :
   G = [10100 ; 10011; 01010].
   (a) Generate all possible code words. (5)
   (b) Find the parity check matrix H. (5)
   (c) What is minimum distance of this code? (5)

8. Discuss Trellis Diagram of Convolution Codes and Viterbi Decoding. (15)

Roll No. ..... Total Pages : 2

BT-5/D-22 **45246**

DIGITAL SIGNAL PROCESSING

Paper–EC-309A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *five* questions selecting at least *one* question from each unit.

UNIT–I

1. (a) Obtain z-transform for (i) $x1\ (n) = (1/2)n\ u(n) + (2)\ n\ u(n)$ (ii) $x2(n) = -an\ u(-n\ -1)$. Plot pole - zero diagram and state ROC for both. 7

(b) Determine the inverse z-transform of the function $z\ x(z) = z/(z - 0.5)$, $|\ z\ | > 0.5$ using long division method. 8

2. (a) Explain the following : (i) Goertzel Algorithm and (ii) Chirp Z Transform. Derive the expression for both. 8

(b) An LT1 system has impulse response $h(n) = 5\ (-1/2)\ n\ u(n)$. Check whether the system is causal and stable. 7

UNIT–II

3. (a) Find the DFT of the following sequence $x(n)$ using DFT FFT 7

$x(n) = (1, -1, -1, -1, 1, 1, 1, -1)$.

(b) Determine the response of LT1 system when the input sequence $x(n) = \{-1, 1, 2, 1, -1\}$ by radix 2 DIT FFT. The impulse response of the system is $h(n) = \{-1, 1, -1, 1\}$. 8

4. Determine the cascade and parallel realizations for the system described by the system function 15

$$H(z) = \frac{10\left(1-\frac{1}{2}z^{-1}\right)\left(1-\frac{2}{3}z^{-1}\right)(1+2z^{-1})}{\left(1-\frac{3}{4}z^{-1}\right)\left(1-\frac{1}{8}z^{-1}\right)\left[1-\left(\frac{1}{2}+j\frac{1}{2}\right)z^{-1}\right]\left[1-\left(\frac{1}{2}-j\frac{1}{2}\right)z^{-1}\right]}$$

UNIT–III

5. Draw three different FIR structures for the $H(z)$ given below :

H(Z) = (1 + 5Z – 1 + 6Z – 2)(1 + Z – 1). 15

6. Using a rectangular window technique, design a low pass FIR filter with passband gain unity, cutoff wavelength 1000 Hz working at sampling frequency of 5 KHZ. Length of impulse response should be 7. 15

UNIT–IV

7. Design an IIR filter using bilinear transformation method. 15

8. Design a digital second order low pass Butterworth IIR filter with cut off frequency 2200 Hz using bilinear transformation. The sampling rate is 8000 Hz. 15

Roll No. ..... Total Pages : 2

BT-5/D-22 **45247**

COMPUTER NETWORKS

Paper – ECO-1-A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt any *five* questions selecting at least *one* question from each unit.

UNIT–I

1. What is difference between OSI and TCP/IP model of computer networks? What is addressing scheme and also write the types of addressing scheme with the help of example? (15)

2. What is guided and unguided media? And also explain circuit switching and packet switching with the help of example. (15)

UNIT–II

3. What is framing in data link layer and also explain the issue in data link layer? What are the applications and structure of HDLC protocol? (15)

4. What are different wired LAN protocol and wireless LAN protocol? Explain ALOHA protocol in detail. (15)

UNIT–III

5. What is use of Network Layer also explain SNMP and ARP protocol in detail with the help of example. (15)

6. What do you mean by flow control and congestion control at transport layer in detail with the help of example? (15)

UNIT–IV

7. What are the design issues in application Layer and explain FTP protocol designing and its working in detail? (15)

8. Explain the following term with the help of example :
   (a) Email–SMPTP, POP protocol.
   (b) HTTP and HTTPs Protocol. (15)

Roll No. ..... Total Pages : 2

BT-5/D-22 **45255**

VLSI TECHNOLOGY

Paper : ECP-5-A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *five* questions in all, selecting at least *one* question from each unit. All questions carry equal marks.

UNIT–I

1. What do you mean by crystal growth? Explain Czochralski technique of crystal growth.

2. What is plasma oxidation? Describe its properties and defects due to oxidation.

UNIT–II

3. What is Epitaxy? Explain MBE system in detail for growth of epitaxial layer.

4. Explain Fick's theory of diffusion along with solution of Fick's law.

UNIT–III

5. Differentiate between optical and non-optical lithography and give detailed description of ion beam lithography.

6. What do you mean by etching in VLSI technology. Explain dry and wet etching along with sputter etching.

UNIT–IV

7. Describe theory and working of PVD technique for metallization.

8. Give detailed description of CMOS fabrication steps.

Roll No. ..... Total Pages : 2

BT-5/D-22 **45258**

UNIVERSAL HUMAN VALUES–II : UNDERSTANDING HARMONY

Paper–HTM-901A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *five* questions in all, by selecting at least one question from each unit.

1. (a) 'The prime need of value education is to understand human aspirations, to discover what is truly valuable (human value) in life'. Explain and illustrate. (7.5)
   (b) Explain the role of Education-Sanskar in holistic development. (7.5)

2. What do you mean by Natural acceptance? Explain the process of Self Exploration with the help of diagram. (15)

UNIT-II

3. 'The needs of the Self and the Body are of two different types, so they have to be filled separately. A gross misunderstanding is to assume the two to be the same, and this leads to the feeling of deprivation and exploitation'. Explain. (15)

4. 'Human being is co-existence of the Self and the Body'– elaborate on this statement. (15)

UNIT-III

5. What do you understand by Respect? How do we disrespect others due to lack of right understanding of this feeling? Explain the problems faced due to differentiation in relationship. (15)

6. "When we are assured of the intention of the other and find that the competence is lacking, we become a help to the other. When we doubt the intention of the other, we get into opposition." Explain. (15)

UNIT-IV

7. There is interconnectedness and mutual fulfillment among the four orders in nature. With right understanding only, human being will be self organized, in harmony within and participate in the harmony in the large order. Explain. (15)

8. (a) How does 'Justice' leads to mutual happiness. Explain the natural process of a child in an environment of relationship and in an environment of domination. (7.5)

   (b) Write a short note on 'nature (units) submerged in space'. (7.5)

Roll No. ..... Total Pages : 2

BT-7/D-22 **47297**

INTELLECTUAL PROPERTY RIGHTS FOR TECHNOLOGY DEVELOPMENT & MANAGEMENT

Paper–HM-904 A

Time allowed : 3 Hours] [Maximum Marks : 75

Note : Attempt **five** questions in all, selecting at least **one** question from each unit. All questions carry equal marks.

UNIT-I

1. What is included in the term Intellectual Property Rights? Why IPRs are so important?
2. Which steps are taken in the process of patenting and development? Why patents are important for business?

UNIT-II

3. 'Licensing and transfer of technology play pivotal role in business.' Comment on the statement considering its legal aspect.
4. What is the scope patent rights and geographical indications? How database of patents is maintained?

UNIT-III

5. Which laws regulate Intellectual Property Rights in India? What are recent amendments in those laws?

6. (a) What are laws and policy considerations regarding duration of patents?

   (b) What are the laws related to copyrights in India?

UNIT-IV

7. (a) Which developments are recently noted regarding IPR in India?

   (b) What are recent development on IPR of Biological Systems?

8. (a) How IPRs are administered in India?

   (b) Which recent development do you observe in IPRs for computer software?

Roll No. ..... Total Pages : 2

BT–7/D-22 **47298**

FIBER OPTIC COMMUNICATIONS

Paper–ECP–10A

Time Allowed : 3 Hours] [Maximum Marks : 75

Note : Attempt **five** questions in all, selecting at least **one** question from each Unit. All questions carry equal marks.

Unit–I

1. What is the principle behind Fiber-Optic technology for communication? Describe the structure and working of optical fiber communication. Also describe the functional and physical advantages and disadvantages of optical fibers.

2. Distinguish between the following :

   (a) Step index and graded index fiber.

   (b) Single mode and multimode fiber.

   (c) Splices and Connectors.

Unit–II

3. Describe the following types of losses in Optical Fibers:

   (a) Attenuation

   (b) Scattering losses

   (c) Bending losses.

4. What do you mean by optical fiber dispersion? What is the difference between modal dispersion, polarization mode dispersion and Material dispersion? How can we make fiber dispersion compensation?

Unit–III

5. Describe how LED and Lasers are used in optical fibers and compare their characteristics. How are semiconductor lasers different from normal lasers?

6. What is Avalanche photodiode? Describe its working, characteristics and applications. What is the difference between P-I-N diode and Avalanche diode?

Unit–IV

7. What factors and design considerations are involved in the design of fiber optic systems? What is the significance of multiplexing in the design of optical fiber systems?

8. What elements contribute in the composition of fiber-optic networks? Categorize optical networks on the basis of topologies and scale.

Roll No. ..... Total Pages : 2

BT–7/D-22 **47305**

DIGITAL IMAGE PROCESSING

Paper–ECP 17A

Time Allowed : 3 Hours] [Maximum Marks : 75

Note : Attempt **five** questions in all, selecting at least **one** question from each Unit. All questions carry equal marks.

Unit–I

1. (a) Briefly Explain Image Processing applications.

   (b) Write short note on fundamental steps in Digital Image Processing. 15

2. Write short notes on the following : 15

   (a) Image sampling and Quantization.

   (b) Relationship between pixels.

   (c) Color fundamentals.

Unit–II

3. Write short notes on the following : 15

   (a) Intensity transformation in image processing.

   (b) Histogram Processing.

   (c) Spatial domain filtering.

4. Explain smoothing and sharpening frequency domain filters used in image processing. 15

Unit–III

5. What do you understand by Image compression. Explain any two-error free image compression coding techniques. 15

6. Write short notes on the following : 15

   (a) Erosion and Dilation.

   (b) Image Segmentation.

Unit–IV

7. Write short note on Video Frame Classifications. 15

8. Write short note on Patterns and Pattern Classes. 15

Roll No. .....

Total Pages : 2

BT-7/D-22

47308

OPERATING SYSTEM

Paper–ECO–11 A

Time allowed : 3 Hours]

[Maximum Marks : 75

Note : Attempt **five** questions in all, selecting at least **one** question from each unit. All questions carry equal marks.

UNIT-I

1. (a) What are the resources of a computer system? 8

   (b) Is it necessary to have an operating system in a computer system ? 7

2. Explain the following :

   (a) CUI and GUI Interfaces. 8

   (b) User friendliness of an operating system. 7

UNIT-II

3. (a) What is concurrency and why it is important ? How it is different parallelism ? 8

   (b) Explain the goals of concurrent processing. 7

4. Write notes on the following :

   (a) External Interrupts. 5

   (b) Internal Interrupts. 5

   (c) Software Interrupts. 5

UNIT-III

5. (a) What is a Process Control Block (PCB) ? Explain the structure of a PCB. 7

   (b) Draw a process life cycle. 8

6. (a) Explain how process thrashing is handled ? How does it effect system performance? 7

   (b) What is the working of Process Status Word (PSW)? 8

UNIT-IV

7. Explain following CPU scheduling algorithms :

   (a) Shortest Job First. 7

   (b) First Come First Serve (FCFS). 8

8. (a) Devise any two method of breaking a deadlock. 7

   (b) Write a note on deadlock avoidance and deadlock recovery. 8

Roll No. ..... Total Pages : 2

BT-8/D-22 **48312**

SATELLITE COMMUNICATION

Paper–ECP-24A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt any *five* questions, selecting atleast *one* question from each unit.

UNIT-I

1. Discuss in detail the Kepler's 2nd and 3rd laws of Orbital Mechanics. Use diagrams to support your answer. (15)

2. (a) Discuss the effect of longitudinal and inclination changes on earth's orbit.

(b) Discuss the terms :

(i) Apogee.

(ii) Perigee.

(iii) Semi major axis.

(iv) Inclination angle.

(v) Solar eclipse. (15)

UNIT-II

3. Draw and explain the block diagram of a TTC & M system in detail. (15)

4. (a) Discuss the attitude system in orbit control system.
   (b) Discuss some of the basic antennas used in satellite communication. (15)

UNIT-III

5. (a) Derive and explain the basic transmission theory using the link equation.
   (b) Write down the steps for communication link design procedure. (15)

6. Derive the relation between system noise temperature and G/T ratio. Also, discuss the types of RF to IF conversion systems used in this using suitable diagrams. (15)

UNIT-IV

7. Write short notes on :
   (a) VSAT systems.
   (b) DBS TV. (15)

8. What are multiple access techniques? Compare FDMA, TDMA and CDMA with necessary diagrams. (15)

Roll No. ..... Total Pages : 3

BT-8/D-22 **48316**

SOFT COMPUTING

Paper-ECO-13A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *five* questions in all, selecting at least *one* question from each Section.

SECTION-I

1. (a) Classify the various types of soft computing techniques. Define Intelligent System. (5)

(b) Explain Swarm Intelligent System and its Properties. (5)

(c) Define Intelligent System. (5)

2. (a) Write the training algorithm and testing algorithm of Adaline Network and with a neat architecture. (7)

(b) Write short notes on the following :

(i) Artificial Intelligence.

(ii) Artificial Neural Network. (8)

SECTION-II

3. (a) Explain the training algorithm of Kohonen self-organizing feature maps and with a neat diagram. (10)

(b) With a neat Architecture, Explain the training algorithm of Back Propagation Network. (5)

4. (a) Construct and test the Hamming network to cluster four vectors. Given the exemplar vectors :

$e(1) = [\ 1\ -1\ -1\ -1\ ]$;

$e(2) = [\ -1\ -1\ -1\ 1]$

The bipolar input vectors are

$x1 = [-1\ -1\ 1\ -1]$

$x2 = [-1\ -1\ 1\ 1]$

$x2 = [-1\ -1\ -1\ 1]$

$x2 = [1\ 1\ -1\ -1]$. (10)

(b) Draw the structure of Hamming network and Explain. (5)

SECTION-III

5. (a) Discuss the methods of aggregation of fuzzy rules.

(b) With suitable block diagram, explain the working principle of fuzzy inference system.

(c) Explain the different types of membership function used in fuzzification process. (5)

6. (a) The discretized membership functions for a transistor and a resistor are given below :

$\mu T = \{0/0 + 0.2/1 + 0.7/2 + 0.8/3 + 0.9/4 + 1/5\}$

$\mu R = \{0/0 + 0.1/1 + 0.3/2 + 0.2/3 + 0.4/4 + 0.5/5\}$

Find the following :

(i) Algebraic sum.

(ii) Algebraic product.

(iii) Bounded sum.

(iv) Bounded difference. (8)

(b) Discuss about the four modes of fuzzy reasoning. (7)

SECTION-IV

7. (a) What do you understand by Fitness function? Mention the importance of Fitness function in genetic algorithm. How can Fitness functions be found for any optimization problem? (7)

(b) Define Mutation and explain various types of Mutation in Genetic algorithm. Describe the Encoding operators in Genetic algorithm. (8)

8. (a) Implement Optimization of Travelling Salesman Problem using Genetic algorithm approach. (8)

(b) Design a fuzzy logic controller to simulate a temperature control system for a room. (7)

Roll No. ..... Total Pages : 2

BT-8/D-22 **48319**

MIXED SIGNAL DESIGN

Paper–ECO-16A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *five* questions in all, selecting *one* question from each Unit. All questions carry equal marks.

UNIT–I

1. What is Sampling Switches? Explain MOSFET as switches and describe charge injection cancellation.

2. What are switched capacitor amplifiers explain unity gain sampler/buffer?

UNIT–II

3. Explain basic CMOS comparator design along with its working and design issues.

4. What is the operating principle of PLL explain its working and applications.

UNIT–III

5. Explain specifications and architectures of DAC.

6. Discuss design and operation of charge-scaling DACs.

UNIT–IV

7. What do you mean by flash ADC? Explain two-step flash ADC.

8. Discuss ADC specifications and architectures.

Roll No. ..... Total Pages : 2

MT/D-22 **49371**

SECURITY, NETWORKS AND CRYPTOGRAPHY

Paper–MTEC–ELI–313N

Time Allowed : 3 Hours] [Maximum Marks : 60

Note : Attempt **five** questions in all, selecting at least **one** question from each Unit. All questions carry equal marks.

Unit–I

1. Differentiate between Symmetric and Asymmetric Key Cryptography? Give examples to justify your answer. 12

2. Discuss the mode of Operation of a block cipher. What are Contemporary Symmetric Ciphers? Discuss the working in detail. 12

Unit–II

3. Write short notes on the following : 12

   (a) Kerberos X.509

   (b) Electronic mail security.

4. Discuss in detail the IP security architecture with its authentication header. What is Key management? Discuss in detail. 12

Unit–III

5. (a) Differentiate between signature based and anomaly based intrusion detection systems with suitable diagrams and examples.

   (b) Distinguish between Packet filters, Stateful inspection and Proxy server firewalls. 12

6. (a) What are the main aspects of Password management?

   (b) What are the three main types of Malware? Discuss. 12

Unit–IV

7. How will you distinguish between three Wireless LAN encryption techniques, viz. WEP, WPA and WPA2 ? Discuss in detail. 12

8. Discuss the Security factors of Wireless LAN in detail. What are the issues related to Wireless LAN. Specify some of them. 12