(3 Hours) **(Total Marks: 80)**

N.B.: (1) **Question No.1** is **compulsory**.
(2) Answer **any three** out of remaining **five** Questions**.**
(3) **Assumptions** made should be **clearly stated.**
(4) **'Marks'** to the **right** indicate **full marks.**
(5) Illustrate answers with **sketches** whenever **required.**
(6) **Answer to questions should be grouped and written together.**

1. Attempt **any 4** :

a) Explain the "Tunneling Procedure" in IPv6 protocol. **05**

b) Explain the different RTCP messages used for real time communication. **05**

c) Explain the need of audio or video compression in multimedia communication. **05**

d) Differentiate between leaky bucket and token bucket methods of traffic shaping. **05**

e) How is SCTP association different with respect to TCP connection establishment? **05**

2. **a)** An ISP is granted a block of addresses starting with 190.200.0.0/16. **12**
What is the meaning of "/16"?
This ISP needs to distribute these addresses to three groups of customers as follows :
i) First group has 64 customers each needing 256 addresses.
ii) Second group has 128 customers each needing 128 addresses.
iii) Third group has 128 customers each needing 64 addresses.
Allocate the sub-blocks and find out how many addresses are still available after these allocations.

b) With the help of a transition diagram, explain DHCP protocol. Also, calculate the renewal and rebinding time if lease time provided is 8 hours. **08**

3. **a)** Explain the different traffic scheduling techniques used for providing QoS. **10**

b) Explain in brief the characteristics "Jitter", "timestamp", "Mixing" and "Translation" in real time audio and video communication with respect to RTP. **10**

4. **a)** Elaborate on PGP scenarios for Application layer security. **10**

b) Explain how DNS queries are resolved by iterative and recursive methods and also explain why caching is required in DNS? **10**

5. **a)** Compare the procedures : streaming of stored audio/video, streaming live audio/video and interactive audio/video over Internet. **10**

b) Explain MPEG for video compression in detail with reference to JPEG compression. **10**

6. Write a note on (**any four) :** **20**

a) SSL/TSL protocol for transport layer security

b) H.261

c) ICMPv6 messages

d) RSVP : reservation protocol

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(3 Hours) **[Total Marks : 80]**

Please check whether you have got the right question paper.

N.B.: 1) Question No. 1 is compulsory.
2) Attempt any three from remaining questions.

1. a) Define following terms. **(05)**
i) Control channel
ii) Forward channel
iii) Hand-off
iv) Reverse channel
v) Page

b) What is frequency Re-use? Derive the relationship between capacity C and cluster size N. **(05)**

c) List and discuss factors influencing small scale fading. **(05)**

d) Explain soft-hand-off and power control in 3G. **(05)**

2. a) For given path loss exponent (a) n = 4 and (b) n = 3, find the frequency re-use factor and the cluster size that should be used for maximum capacity. The S/I ratio of 15db is minimum required for satisfactory forward channel performance of a cellular system. There are six co-channel cells and all of them at same distance from mobile use suitable approximations. **(10)**

b) Draw the block diagram and explain GSM architecture in detail indicating all the interfaces. **(10)**

3. a) Explain IS-95 forward and reverse channel structure in details. **(10)**

b) Describe GSM frame structure in detail. **(10)**

4. a) Compare IS-95, W-CDMA and CDMA 2000 with respect to channel Bandwidth, chip rate, modulation schemes, data rates and frame size. **(10)**

b) Sketch UMTS Network Architecture and explain it in detail. Give in brief Features and services provided by UMTS. **(10)**

5. a) Draw and explain 3GPP LTE architecture and also discuss frames and slots in LTE. **(10)**

b) Explain the concept of MIMO with respect to 4G technology. **(10)**

6. Write short notes on **Any Two**:- **(20)**
a) Indoor propagation Models
b) Rake Receiver
c) Software defined radio

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[Time: 3 Hours] **[Marks: 80]**

Please check whether you have got the right question paper.

N.B:
1. **Q.1** is **Compulsory**.
2. Solve **any three** questions out of remaining.
3. Draw neat labelled **diagram** whenever **necessary**.
4. Assume suitable data if necessary.

1. Answer **any four** questions from the given questions.

a) Describe advantages of Fuzzy logic over crisp logic. **04**

b) Compare RBFNN with FFNN **04**

c) What is role of function in NN. State the types of activation functions **04**

d) Find (i) $A \cap B$ (ii) $\bar{A} \cup B$ (iii) $A \cap \bar{B}$ (iv) $A \cup B$ for the given fuzzy sets. **04**

$\underset{\sim}{A} = \left\{\frac{0.4}{a} + \frac{0.2}{b} + \frac{0.9}{c}\right\}$ and $\underset{\sim}{B} = \left\{\frac{0.1}{a} + \frac{0.5}{b} + \frac{0.8}{c}\right\}$

e) Explain LMS algorithm. **04**

2. a) What is a use of membership function? Explain the different methods by which it is designed. Describe any two fuzzy membership functions with diagram and mathematical equations. **10**

b) Explain perception learning algorithm and developed perception network to implement two inputs AND gate to function. Consider inputs and outputs as Unipolar. Assume initial weight and bias value equal to zero. Consider learning rate equal to one. **10**

3. a) Explain any Five methods of defuzzification in details. **10**

b) Describe Delta Learning rule with diagram and equations. **10**

4. a) Explain Supervised Learning in detail with diagram and its applications. Compare Supervised and Unsupervised Learning. **10**

b) Explain Fuzzy image contrast enhancement using INT operator with the help of 4×4 pixel array. **10**

5. a) A Hopfield network has to store the following pattern **10**
$P1 = [1\ \ 1\ \ 1\ \ 1\ \ 1]^T$, $P2\ [-1\ \ -1\ \ -1\ \ -1\ \ -1]^T$ and $P3 = [1\ \ -1\ \ -1\ \ 1\ \ 1\ ]^T$
Evaluate the weight matrix for it.

b) Describe the application of Neural Network for handwritten character recognition. **10**

6. a) Design a fuzzy control system for washing machine by using triangular membership, five rules, mamdani inference and centroid as defuzzification method to obtain the output. **10**

b) Explain in detail Error back propagation algorithm with block diagram and equations. **10**

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Time : 3 Hours **Marks: 80**

N.B. : (1) Question No. 1 is compulsory
(2) Attempt any three questions out of the remaining five questions.
(3) Figures to the right indicate full marks.
(4) Assume suitable data wherever necessary and justify the same.

1. Solve **any four**
   (a) Differentiate LED and LASER. 5
   (b) Explain different types of fibers with their refractive index profile and-mention its dimensions. 5
   (c) Draw and explain fusion splicing. 5
   (d) Explain the concept of Fiber Bragg Grating. Give its applications. 5
   (e) Derive expression for cut off wavelength for single mode step index fiber 5

2. (a) Explain in brief VAD and MCVD fiber fabrication techniques. 10

   (b) Explain linear and non-linear scattering losses in optical fiber. 10

3. (a) What are the different factors responsible for attenuation and dispersion in optical fiber. 10

   (b) Explain in detail working, principle of RAPD. Why it is called reach through APD and compare its working with PIN diode? 10

4. (a) Explain working principle of EDFA with diagram . 10

   (b) An analog optical fiber system using LASER with 3 dBm optical power into air. A coupling loss of 17.5 dB is present while launching power into fiber. Length of fiber is 6 km with a loss of 5dB/km. It is spliced at every 1.5 km with 1.1dB loss per splice. Connector loss at receiver is 0.8dB. The PIN receiver has sensitivity of -54 dBm. Estimated safety margin is 4 dB. Design the link power budget. 10

5. (a) If a multimode step index fiber having the core refractive index of 1.5, cladding refractive index of 1.38, core radius of 25 µm operates at a wavelength of 1300 nm. Calculate - 10
      (i) Numerical Aperture.
      (ii) Normalized frequency
      (iii) Solid acceptance angle.
      (iv) Total no. of modes entering the fiber.

   (b) Draw and explain block diagram of cutback method of attenuation measurement. 10

6. Write short note on: - 20
      (i) RF over Fiber
      (ii) Quantum Well Laser
      (iii) Solitons
      (iv) Optical Switches

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(3 Hours) **[Total Marks :80]**

Notes:

1. **Question No 1** is **compulsory.**
2. Answer **any 4** from remaining questions.
3. **Illustrate** you answers with **neat sketches** wherever necessary.
4. Write proper **Question** and **sub question numbers** as assigned in this question paper.
5. **Assume** suitable data wherever necessary if not given. However, **justify** the same.
6. Wherever necessary support your answers with relevant **disaster case studies** (if required).

1. **Answer the following (any 4)** **20**

a) Define what do you mean by Disaster, hazard and vulnerability.
b) Write a brief note on Natural Disaster and Man-Made Disaster
c) State the various ways fire accidents occur and explain the ways to avoid it.
d) Write a short note on: Importance of public awareness of Disasters.
e) Explain the ways to raise finance for relief expenditure for disaster.
f) Write a short Note on: International relief aid agencies and their role in extreme events.
g) Explain the importance and principles of disaster management policies.

2.

a) Short Note on: Direct and indirect effects of disasters. **10**
b) Explain Disaster management Act 2005. **10**

3.

a) Explain in brief: NIDM and NDMA **10**
b) State the Applications of GIS, Remote sensing and GPS in disaster management. **10**

4.

a) State the application of internet and software's for effective disaster management. **10**
b) Explain Pre-disaster, during disaster and post-disaster measures in some events in general. **10**

5.

a) State the role various NGO's and the works they have carried out in the past on the occurrence of various disasters. **10**
b) What do you mean by Structural mapping and early warning and communication in Disaster Management? **10**

6. **a)** State the Do's and Don'ts in case for various disasters. **10**
b) How urbanization and changing lifestyle of human beings causes manmade disasters? **10**

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(3 Hours) **(Total Marks : 80)**

N.B: 1) **Q.1** is **compulsory.**
2) Attempt **any THREE** questions from the remaining questions.
3) Assume suitable **data** if **necessary**.

Q.1 Attempt **any four** :

a) Compare active attacks vs Passive attacks. [5]

b) Explain various types of key-loggers in brief. [5]

c) Classify the cybercrimes and explain any one briefly. [5]

d) Explain how the appeals can be made under The IT ACT 2000. [5]

e) Write brief note on : Cyber-terrorism. [5]

Q.2 a) How criminals plan the attack? Discuss various steps involved [10]

b) Explain how Intellectual property laws protect the rights of the owner of the intellectual Property. [10]

Q.3 a) Compare Vishing, Phishing and Smishing in cyber security. [10]

b) What is E-commerce? Explain different types of e-commerce with suitable examples. [10]

Q.4 a) What is Bluetooth hacking? Explain Bluetooth hacking tools in brief. [10]

b) How the Indian penal code IPC 1860 addresses cybercrime? [10]

Q.5 a) Discuss basic security precautions to be taken to safeguard Laptops and wireless devices. [10]

b) What is E-contract? Discuss E-contract Act 1872. [10]

Q.6 Write short note on **(Any 2)** : [20]

1) Computer Sabotage.
2) Indian Information Technology Act 2000
3) Write key IT requirements for SOX and HIPAA.

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3 Hours **Total: 80 marks**

N.B: (1) Question no 1 is compulsory
(2) Attempt any **three** out of remaining **five** questions
(3) Figures to the right indicate full marks
(4) Assume Suitable data if necessary
(5) Notations carry usual meaning

Q.1 Answer **any four** of the following questions:

a)Write the dual of the following LPP
Maximise Z= $4x_1 + 2x_2$
Subject to ,
$x_1 - 2x_2 \geq 2$
$x_1 + 2x_2 = 8$
$x_1 - x_2 \leq 10$
Where$x_1 \geq 0$,x_2 is unrestricted in sign. **(05)**
b)What are assumptions made in game theory **(05)**
c) Write short note on special cases in Linear Programming Problem. **(05)**
d) Enlist assumptions in sequencing problem. **(05)**
e) Briefly explain Monte Carlo simulation with suitable example. **(05)**

Q.2 a) Solve by Simplex Method:

Maximize Z=$3x_1 + 2x_2$
Subject to
$x_1 + x_2 \leq 4$,
$x_1 - x_2 \leq 2$
Where $x_1, x_2 \geq 0$ **(10)**

b) Workers come to tool store room to receive special tools (required by them) for accomplishing a particular project assigned to them. The average time between two arrivals is 60 seconds and the arrivals are assumed to be in Poisson distribution. The average service time (of tool room attendant) is 40 seconds. Determine

1) Average queue length
2) Average length of non empty queue
3) Average number of workers in system
4) Mean waiting time of an arrival
5) Average waiting time of an arrival (worker) who waits. **(10)**

Q.3 a) Solve the following by Vogel's Approximation Method (VAM) and find optimal transportation plan. **(10)**

	D_1	**D_2**	**D_3**	**D_4**	**Supply**
S_1	19	30	50	10	**7**
S_2	70	30	40	60	**9**
S_3	40	8	70	20	**18**
Demand	**5**	**8**	**7**	**14**	

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b) Iyengar Bakery keeps stock of a popular brand of cake. Previous experience indicates the daily demand as given here: **(10)**

Daily Demand	0	10	20	30	40	50
Probability	0.01	0.20	0.15	0.50	0.12	0.02

Consider the following sequence of random numbers:
48,78,19,51,56,77,15,14,68,09

Using this sequence simulate the demand for the next 10 days. Find out the stock situation if the owner of the bakery decided to make 30 cakes every day. Also estimate the daily average demand for this cake on the basis of simulated data.

Q.4 a) Solve the following Assignment Problem. **(10)**

Contractors	**Cost of Repairs (Rs.in Lakhs) of Roads**			
	R_1	**R_2**	**R_3**	**R_4**
C_1	9	14	19	15
C_2	9	17	20	19
C_3	9	18	21	18
C_4	10	12	18	19
C_5	10	15	21	16

Rs.50 Lakhs is total cost of repair.

1) Find the best way of assigning the repair work to the contractors and cost.
2) If it is necessary to seek supplementary grants, then what should be the amount?
3) Which of the 5 contractors will be unsuccessful in his bid?

b) A distance network consists of eleven nodes which are distributed as shown in following table. Find the shortest path from node 1 to node 11 using dynamic programming. The corresponding distance are: **(10)**

Arc	**Distance**	**Arc**	**Distance**
1-2	8	5-8	12
1-3	7	5-9	7
1-4	1	6-9	9
2-5	5	7-9	6
3-5	9	7-10	13
3-6	2	8-11	4
3-7	8	9-11	2
4-7	10	10-11	15

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Q.5 a) A and B play a game in which each has three coins a 5p,a 10p and 20p.Each player selects a coin without the knowledge of the others choice. If the sum of the coin is an odd amount, A wins B's coin; if the sum is even, B wins A's coin. Find the best strategy for each player and the value of the game. **(10)**

b)Solve by **Big-M or Charne's Penalty Method** **(10)**

Maximize $\mathbf{Z=4x_1 + x_2}$

Subject to $3x_1 + x_2 = 3$

$4x_1 + 3x_2 \geq 6$

$x_1 + 2x_2 \leq 4$

Where $x_1, x_2 \geq 0$

Q.6 a) A book binder has one printing press, one binding machine and the manuscript of number of different books. The time required to perform the printing and binding operation for each book are given below. Determine the order in which book should be processed, in order to minimise the total time required to turn out all the books. Also find the idle time of binding machine. **(10)**

Books	**1**	**2**	**3**	**4**	**5**	**6**
Printing time (hr)	30	120	50	20	90	110
Binding time (hr)	80	100	90	60	30	10

b) Mini Computer Company purchases a component of which it has a steady usage of 1000 units per year. The ordering cost is Rs.50 per order. The estimated cost of money invested is 25% per year. The unit cost of the component is Rs.40.Calculate the optimal ordering policy and total cost of inventory system, including purchase cost of the components. If the component supplier agrees to offer price discounts of minimum lot supplies as per schedule given below, reassess the decision on optimal ordering policy and total cost. **(10)**

Lot size	**Price**
Upto 149	Rs.40
150-499	Rs.39
500 or More	Rs.38

----------The End----------

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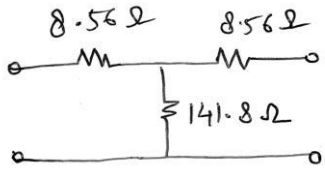
Time : 3 Hrs **Marks : 80**

Note:

1. Question **No.1** is **compulsory.**
2. Attempt **any three** from the remaining questions.
3. Assume suitable data if required.
4. Figures on the right hand side indicate full marks.

1. a) Design Circulator using Magic Tee. **(05)**
   b) Explain Amplification Process in TWT. **(05)**
   c) Compare Isolator and Gyrator. **(05)**
   d) Calculate S parameters for 3dB Attenuator. Assume Zo = 50 Ω **(05)**



2. a) Explain the significance of RWH theory and explain two valley models in GUNN diode. **(10)**
   b) What is the importance of beam coupling coefficient? Derive the expression for velocity modulation in two cavity klystron. **(10)**

3. a) Derive the expression for various parameters that describe the wave propagation in TE/TM mode in Rectangular Waveguide **(10)**
   b) Explain Impedance measurement Technique in microwave. **(10)**

4. a) Design a two lumped element matching network at frequency 500 MHz frequency to match Z_L =200-j100 ohms with a transmission line of Zo=100 ohms using Smith Chart. **(10)**
   b) Draw and explain two-hole directional coupler and derive the S-parameter for the same. **(10)**

5. a) Design two single stub matching network (shunt- short) for a given load of 60-j80 ohms to match with a 50 ohms transmission line using Smith Chart. **(10)**
   b) Compare HMICs and MMICs with suitable diagram. **(10)**

6. Write short note on ***any two*** **(20)**
   a) Magnetron
   b) Transit time diodes
   c) HEMT

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