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

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) Make suitable assumptions wherever necessary and justify them

Q.1.	a)	Write a note on dynamic range compression.	4
	b)	Find DTFT of x(n) = {1,2,3,4}	4
	c)	Explain energy and power signal with examples.	4
	d)	Write a note on distance measures.	4
	e)	Explain Image segmentation.	4
Q.2.	a)	Explain any 5 properties of Discrete Fourier Transform	10
	b)	(i) Find the 4 point DFT of x(n) = {1,-1,2,-2}	10
		(ii) Find the IDFT of X(k) = {1,0,1,0}	
Q.3.	a)	For x(n) = {1,3,-1,2,0,4}, plot the following discrete time signals	10
		(i) x (n+2)	
		(ii) x(-n-1)	
		(iii) 2x(n)	
		(iv) x(n-1). δ (n-3)	
		(v) x(n).u(n-2)	
	b)	(i) Find the cross correlation of the causal sequences	10
		x(n) = {1,4,7,8} and y(n) ={2,0,1,3}	
		(ii) Determine whether the following system is linear or non linear	
		y(n) = 4x(n)+ 2	
Q 4.	a)	Determine radix 2 DIT-FFT Flow graph for	10
		x(n) = {2,2,3,1}	
	b)	Justify or Contradict	10
		(i) Point processing techniques are called as Zero memory operations	
		(ii) To remove salt and pepper noise median filter is better than low pass filter	

Q 5. (a) Apply Horizontal and vertical line detection mask on the following 8 bits per pixel image F. Use appropriate threshold value. Assume virtual rows and Column by repeating border pixel values. 10

F =

10	15	10
200	200	200
5	20	10

b) Explain Contrast stretching. Perform Contrast stretching on the following 4 bpp images 10

r1=4, r2= 9, s1= 2, s2 = 13

4 BPP IMAGE			
7	**8**	**5**	**1**
7	**8**	**8**	**2**
5	**9**	**7**	**7**
8	**7**	**12**	**15**

Q 6. a) Write Short note on edge detection in detail 10

b) What is a Histogram and what is histogram equalization. Perform Histogram Equalization on the following 3 bpp image. Calculate the new histogram. Plot the original and new histogram and show the new image. 10

5	**0**	**7**	**7**	**1**	**4**	**5**	**2**	**0**	**1**
7	**5**	**6**	**2**	**5**	**3**	**4**	**3**	**2**	**5**
4	**3**	**6**	**2**	**7**	**3**	**2**	**4**	**3**	**5**
7	**4**	**4**	**1**	**6**	**4**	**3**	**7**	**7**	**4**
3	**2**	**5**	**1**	**1**	**1**	**1**	**5**	**4**	**0**

[Total Marks 80]

(3 Hours)

N. B:

1. Question **No. 1 is Compulsory**.
2. Solve any **THREE** from Question No. 2 to 6.
3. Draw neat well labeled diagram wherever necessary

Q. 1	**a)**	Explain access control policies in detail.	**(05)**
	b)	Describe the concepts of covert channel in detail.	**(05)**
	c)	What is the concept of cross site scripting? Describe with example.	**(05)**
	d)	Explain the cybercrimes in detail.	**(05)**
Q. 2	**a)**	Describe session hijacking in detail.	**(10)**
	b)	Explain salami attack and linearization attack.	**(10)**
Q. 3	**a)**	What is phishing and pharming? Explain it with example.	**(10)**
	b)	Explain bell-La Padula model with neat diagram.	**(10)**
Q. 4	**a)**	Explain possible attacks on wireless LAN in detail.	**(10)**
	b)	Describe copyrights and intellectual property in details.	**(10)**
Q. 5	**a)**	Explain in details wireless security offered by 802.11 with neat diagram.	**(10)**
	b)	Describe incident response methodology with diagram.	**(10)**

Q. 6 Write short note on: **(20)**

1. Windows vulnerabilities
2. Operating system security
3. Federated Identity Management
4. Forensic duplication

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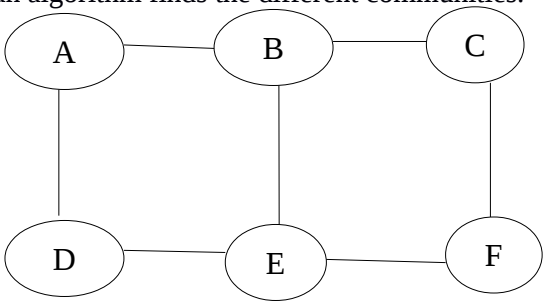
(3 Hours)

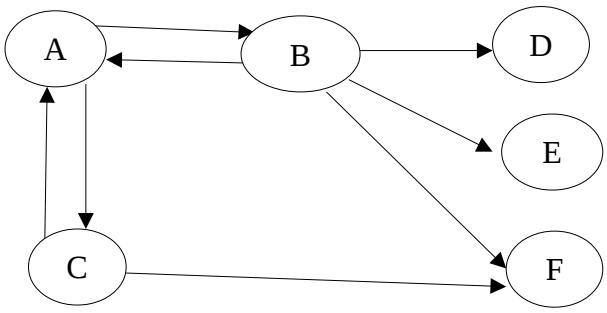
[Total Marks 80]

i. Q.1 is compulsory
ii. Attempt any three from the remaining
iii. Assume suitable data

Q.1	(a)	Explain Edit distance measure with an example.	(5)
	(b)	When it comes to big data how NoSQL scores over RDBMS.	(5)
	(c)	Give difference between Traditional data management and analytics approach Versus Big data Approach	(5)
	(d)	Give Applications of Social Network Mining	(5)
Q.2	(a)	What is Hadoop? Describe HDFS architechure with diagram.	(10)
	(b)	Explain with block diagram architechure of Data stream Management System.	(10)
Q.3	(a)	What is the use of Recommender System. How is classification algorithm used in recommendation system.	(10)
	(b)	Explain the following terms with diagram 1) Hubs and Authorities 2) Structure of the Web	(10)
Q.4	(a)	What do you mean by Counting Distinct Elements in a stream. Illustrate with an example working of an Flajolet – Martin Algorithm used to count number of distinct elements.	(10)
	(b)	Explain different ways by which big data problems are handled by NoSQL.	(10)
Q.5	(a)	Describe Girwan – Newman Algorithm. For the following graph show how the Girvan Newman algorithm finds the different communities.	(10)



	(b)	What is the role of JobTracker and TaskTracker in MapReduce.Illustrate Map Reduce execution pipeline with Word count example.	(10)
Q.6	(a)	Compute the page rank of each page after running the PageRank algorithm for two iterations with teleportation factor Beta (β)value = 0.8	(10)



	(b)	What are the challenges in clustering of Data streams. Explain stream clustering algorithm in detail.	(10)

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

Note: 1. Question 1 is compulsory.
2. Attempt any 3 from Q2 to Q6.
3. Indicate your answer with various sketches whenever necessary.

Q1 Attempt any **four**. **[20]**

(a) State PEAS Description for online English tutor.

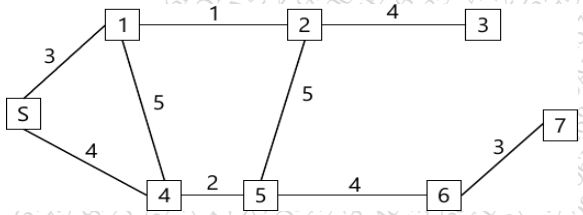
(b) Differentiate between Soft and Hard computing.

(c) Give Local and Global heuristic function for block world problem.

(d) Give different membership functions of fuzzy logic.

(e) Determine (alfa) α-level sets and strong α-level sets for the following fuzzy sets. A={(1,0.2), (2,0.5), (3, 0.8), (4,1), (5, 0.7), (6,0.3)}

Q2 (a) Consider the graph given in Figure 1 below. Assume that the-initial state is S and the goal state is 7. Find a path from the initial state to the goal state using A* Search. Also report the solution cost. The straight line distance heuristic estimates for the nodes are as follows: h(1)=14, h(2)=10, h(3)=8, h(4)=12, h(5)=10, h(6)=10, h(S)=15. **[10]**



(b) The law says that it is a crime for an American to sell weapons to hostile nations. The country Nono, an enemy of America, has some missiles, and all of its missiles were sold to it by Colonel West, who is American. **[10]**
Prove that Col. West is a criminal using resolutfion technique.

Q3 (a) Implement AND function using perceptron networks for bipolar inputs and targets. **[10]**

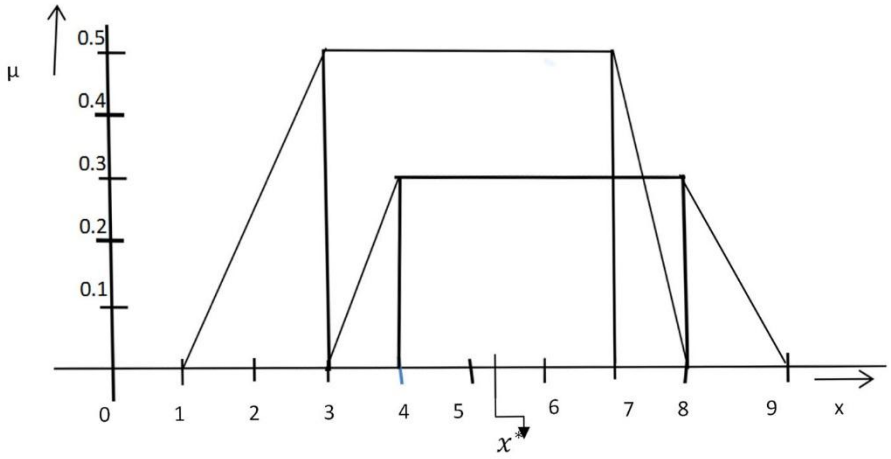
(b) Explain fuzzy controller system for a tipping example.Consider service and food quality rated between 0 and 10. use this to leave a tip of 25%. **[10]**

Q4 (a) Design a Mc-Culloh Pitts model for XOR Gate. **[10]**

(b) Construct kohonen Self-organizing map to cluster the four given vectors, **[10]**

[0 0 11], [1 0 0 0], [0 11 0] and [0 0 0 1]. The number of cluster formed is two. Assume an initial learning rate of 0.5.

Q5 (a) Explain defuzzification techniques. Apply defuzzification by using Center of Gravity (CoG) method on the following: **[10]**



(b) Explain planning problem in AI. What are different types of planning? Consider problem of changing a flat tire. The goal is to have a good spare tire properly mounted on to the car's axle, where the initial state has a flat tire on the axle and a good spare tire in the trunk. Give the ADL description for the problem. **[10]**

Q6 Write Short notes on following **(Any Four)** **[20]**

(a) Genetic algorithm

(b) ANFIS

(c) Hill Climbing algorithm

(d) Wumpus world knowledge base

(e) Different types of Neural Networks

Time: 3 Hours **Marks: 80**

Note:- Q 1 is compulsory

Solve any three from remaining

Each question carries 20 marks

Q1] Solve any four

A] Explain different application of mobile computing.

B] Explain concept of frequency reuse with clustering.

C] Explain IP mobility.

D] Explain characteristics of GSM standards.

E] Explain in short voice over LTE.

Q 2] a] Explain in detail GSM architecture.

B] Explain in short different algorithm used for authentication and privacy in GSM.

Q3] a] Explain hidden station and exposed station problem with solution in WLAN.

B] How is packet delivery achieved to and from mobile node?

Q 4] a] Explain DSDV routing protocol used in ad-hoc network.

B] Explain protocol architecture of IEEE 802.11.

Q 5] a] Explain Bluetooth protocol stack in detail.

B] Explain different security threats in WLAN and discuss the available solutions.

Q 6] A] Explain different components used in LTE architecture with diagram.

B] Explain various nodes present in E-UTRAN architecture.

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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**	

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

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----------

Time: 3 Hours **Marks: 80**

N:B (1) Question 1 is Compulsory.
(2) Attempt any three from the remaining questions.
(3) Figures to the right indicate full marks.

Q.1 Attempt any four **5*4=20M**

A What is information system? Explain the necessary element with neat diagram
B Define Big Data and discuss its basic characteristics?
C Explain the Ethical issues and threats of information security?
D Describe how social computing inspires customer service
E Differentiate between computer network wired and wireless technology

Q.2 A List the types of Information system? Explain in brief **10M**
B Discuss competitive advantage achieved in Information System **10M**

Q.3 A Explain the architecture of Data mart and Data warehouse in an organization **10M**
B Discuss the Impact of BI on Decision Making. **10M**
10M

Q.4 A What are the potential benefit of social commerce to the customers and to the business? **10M**
B What are major security threats to the information system? Discuss the measures taken to control information security. **10M**

Q.5 A Discuss the significance of social computing in marketing in detail **10 M**
B What are the functional areas of Information system. Explain in detail **10 M**

Q.6 A Define CRM. Describe the different types of CRM **10M**
B Design MIS for the Educational System **10M**

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