

(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) $x(n-1) \cdot \delta(n-3)$
- (v) $x(n) \cdot u(n-2)$
- 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

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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.

(3 Hours)

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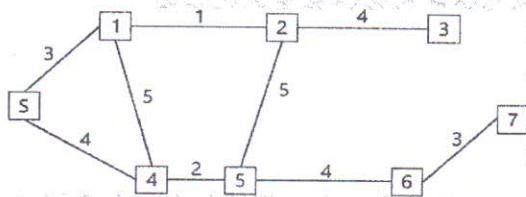
- Note:**
1. Question 1 is compulsory.
 2. Attempt any 3 from Q2 to Q6.
 3. Indicate your answer with various sketches whenever necessary.

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. Prove that Col. West is a criminal using resolution technique. [10]

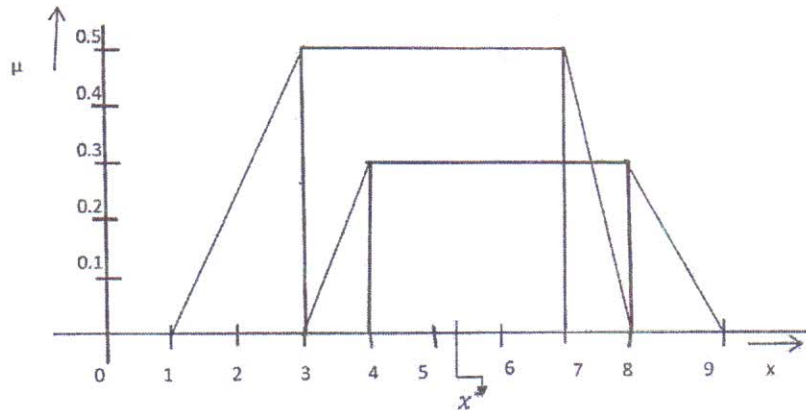
- Q3 (a) Implement AND function using perceptron networks for bipolar inputs and targets. [10]
- (b) Explain fuzzy controller system for a tipping example. Consider service and food quality rated between 0 and 10. use this to leave a tip of 25%. [10]

- 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]

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$[0\ 0\ 11]$, $[1\ 0\ 0\ 0]$, $[0\ 11\ 0]$ 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 [10]
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.

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

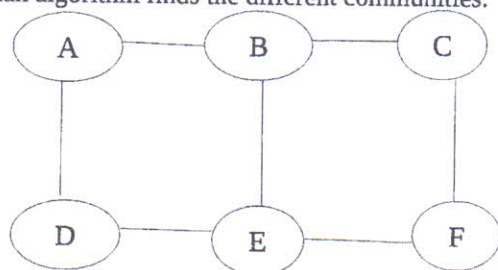
- (a) Genetic algorithm
- (b) ANFIS
- (c) Hill Climbing algorithm
- (d) Wumpus world knowledge base
- (e) Different types of Neural Networks

(3 Hours)

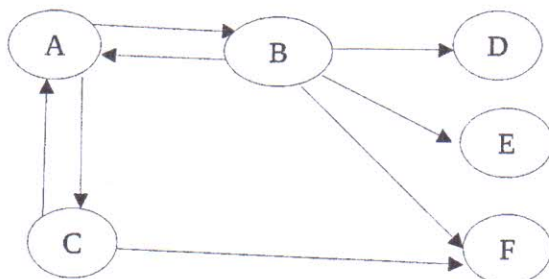
[Total Marks 80]

- 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 architecture with diagram. (10)
- (b) Explain with block diagram architecture 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 (10)
- 1) Hubs and Authorities
 - 2) Structure of the Web
- 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 Girvan – 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)

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- 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
