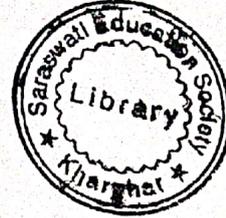




- N.B. 1. Question No.1 is compulsory.  
2. Attempt any four questions out of remaining six questions.  
3. Assume suitable data whenever necessary and justify the same.  
4. Figures to the right indicate full marks.



1. (a) Give all the steps involve in recognition methodology and briefly explain each. 10  
(b) Explain the following region growing algorithm with suitable example. 10  
    1. Centroid Linkage  
    2. Hybrid Linkage  
    3. Single Linkage
2. (a) Explain border tracking algorithm with suitable example. 10  
(b) What is control strategies ? Discuss the two major form of control Hierarchical and Heterarchical. 10
3. (a) Explain 'thinning' and 'thickening' with the help of examples. 10  
(b) Explain Hough transform with example. Mention all its merits and demerits. 10
4. (a) Apply 'iterative' and 'classical' connected component labeling algorithm on following image 10

0	0	0	0	0	0	0	1	1	0
0	1	1	0	0	0	1	1	1	0
0	1	1	1	0	1	1	1	1	0
0	0	1	1	0	0	0	1	1	0

- (b) Explain back-tracking algorithm with suitable example. 10
5. (a) What is signature segmentation? Obtain the horizontal, vertical and diagonal



signature of the binary image segment shown below.

10

			1	1	1	1	1				
		1	1	1							
			1	1	1					1	1
1				1	1	1				1	1
1	1									1	1
	1										
			1	1	1	1					
			1	1	1	1					

(b) Explain inverse perspective projection.

10

6. (a) Explain knowledge based vision? Explain different forms of knowledge representation used in computer vision.

10

(b) Explain Run length implementation of algorithm with suitable example.

10

7. (a) what is principal component analysis

5

(b) What is zero crossing edge detector

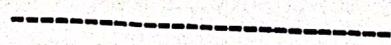
5

(c) Explain Least Square method of curve fitting algorithm.

5

(d) Explain view class matching.

5



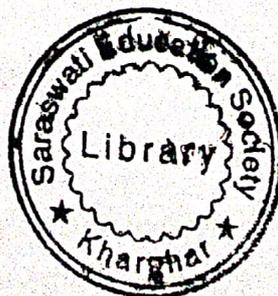
(3 hours)

Total Marks: 80

- N.B.
1. Question No. 1 is compulsory
  2. Attempt any three out of remaining
  3. Assume suitable data if necessary and justify the assumptions
  4. Figures to the right indicate full marks

- Q1 A Compare IIR systems with FIR systems. 05  
 B State whether  $x[n] = \sin(n\pi/3)$  is an energy or power signal with proper justification. 05  
 C If  $x[n] = \{1, 2, 2, 1, 3, 1\}$  is a periodic signal. Plot it in circular representation for  
 i)  $x[-n]$     ii)  $x[n-2]$     iii)  $x[n+2]$     iv)  $x[-(n-2)]$     v)  $x[-(n+2)]$  05  
 D State BIBO stability criterion for LTI systems. Determine the range of values of 'p' and 'q' for the stability of LTI system with impulse response:  

$$h[n] = \begin{cases} p^n & n < 0 \\ q^n & n > 0 \end{cases}$$
 05
- Q2 A Check whether the system  $y[n] = a^n u[n]$  is: 10  
 i) Static or Dynamic  
 ii) Linear or Non-linear  
 iii) Causal or Non-Causal  
 iv) Shift variant or Shift Invariant  
 B Check the periodicity of the following signals and if periodic, find their fundamental period. 10  
 i)  $\cos(n/6) \cdot \cos(n\pi/6)$   
 ii)  $\sin(2\pi n/3) + \cos(2\pi n/5)$
- Q3 A Determine the output response of the LTI system using time domain method whose input is  $x[n] = 3\delta[n+1] - 2\delta[n] + \delta[n-1] + 4\delta[n-2]$  and  $h[n] = 2\delta[n-1] + 5\delta[n-2] + 3\delta[n-3]$ . 10  
 B If a continuous time signal  $x(t) = \sin(2\pi \times 2000t) + 2\sin(2\pi \times 1000t)$  is sampled at 8000 samples/sec. Find out the 4-point DFT of it. Sketch the phase and magnitude spectrum. 10
- Q4 A Explain any five properties of DFT. 10  
 B Compute linear convolution of the causal sequences  $x[n] = \{2, -3, 1, -4, 3, -2, 4, -1\}$  and  $h[n] = \{2, -1\}$  using overlap save method. 10



[TURN OVER]



- Q5 A Compute circular convolution of the causal sequences  $x[n] = \{1, -1, 1, -1\}$  and  $h[n] = \{1, 2, 3, 4\}$  using radix-2 DIT FFT method. 10
- B If the DFT of  $x[n]$  is  $X(k) = \{2, -j3, 0, j3\}$  using DFT properties, find: 10
- i) DFT of  $x[n-2]$
  - ii) Signal energy
  - iii) DFT of  $x^*[n]$
  - iv) DFT of  $x^2[n]$
  - v) DFT of  $x[-n]$
- Q6 A Explain the significance of Carl's Correlation Coefficient Algorithm in digital signal processing. Evaluate Carl's Coefficient for two causal sequences  $x[n] = \{2, 4, 4, 8\}$  and  $y[n] = \{1, 1, 2, 2\}$ . 10
- B i) Calculate the percentage saving in calculations in a 64 point radix-2 FFT systems with respect to the number of complex additions and multiplications required, when compared to direct DFT system. 5
- B ii) Write a detailed note on DSP processor. 5

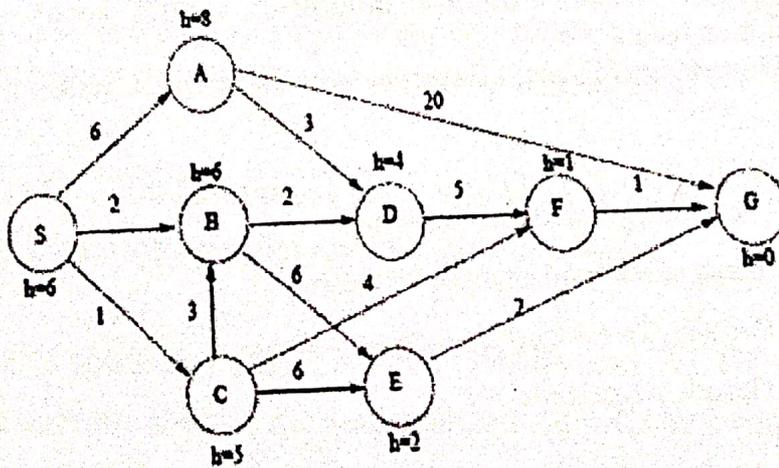
(3 Hours)

Total Marks : 80

- N.B. 1. Question No. 1 is compulsory  
 2. Attempt any three (3) out of remaining five (5) questions  
 3. Assume suitable data if necessary and justify the assumptions  
 4. Figures to the right indicate full marks

- Q1 Attempt an four (4) from the following [05]
- [A] Define AI. What are applications of AI? [05]
  - [B] Define heuristic function. Give an example heuristics function for 8-puzzle problem. Find the heuristics value for a particular state of the Blocks World Problem. [05]
  - [C] Compare Model based Agent with Utility based Agent. [05]
  - [D] What are the problems/frustrations that occur in hill climbing technique? Illustrate with an example [05]
  - [E] What is supervised learning and unsupervised learning? Give example of each. [05]

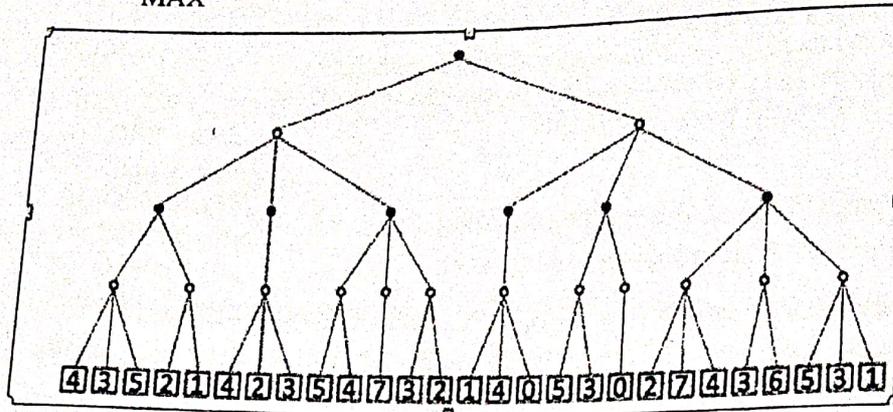
- Q2 [A] Consider the search problem below with start state S and goal state G. The transition costs are next to the edges and the heuristic values are next to the states. What is the final cost using A\* search. [10]



- [B] Explain the architecture of Expert System. What are advantages and limitations of Expert System? [10]
- Q3 [A] Explain with example various uninformed search techniques. [10]
- [B] Illustrate Forward chaining and backward chaining in propositional logic with example [10]

[TURN OVER]

Q4 [A] Apply alpha-Beta pruning on following example considering first node as MAX [10]



[B] Explain a partial order planner with an example. [10]

Q5 [A] Consider the following facts about dolphins: [10]

Whoever can read is literate. Dolphins are not literate. Some dolphins are intelligent.

- (i) Represent the above sentences in first order predicate logic (FOPL).
- (ii) Convert them to clause form
- (iii) Prove that "Some who are Intelligent cannot read" using resolution technique

[B] What is Uncertainty? Explain Bayesian Network with example [10]

Q6 Write short note on any two of the following: [20]

- (i) Steps in Natural Language Processing
- (ii) Decision Tree Algorithm with an example
- (iv) Genetic Algorithms

Q.P. Code : 621800

(3 Hours)

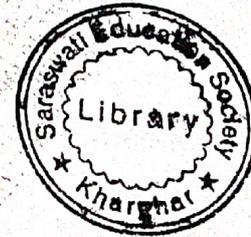
[Total Marks : 100]

N.B. : (1) Question No.1 is compulsory.

(2) Solve any four questions from remaining.

(3) Assume suitable data if necessary stating it clearly.

- |        |  |    |
|--------|--|----|
| 1. (a) | What is hidden node terminal problem in WLAN?  | 5  |
| (b)    | List multiple access techniques. Explain in brief.                                     | 5  |
| (c)    | What is multipath fading.  | 5  |
| (d)    | Describe in brief wireless ATM?  | 5  |
| 2. (a) | Draw neat diagram of GPRS system architecture with interfaces and describe in details. | 10 |
| (b)    | What is Mobile TCP?  | 10 |
| 3. (a) | Describe GSM security services.  | 10 |
| (b)    | Distinguish between WAP2.0 and WAP.1x.   | 10 |
| 4. (a) | List and describe channel allocation techniques.                                       | 10 |
| (b)    | What is Hand-off? List & explain types of Hand-off.                                    | 10 |
| 5. (a) | What is IMT-2000? Explain key points of IMT-2000.                                      | 10 |
| (b)    | Describe Bluetooth system architecture in details.                                     | 10 |
| 6. (a) | What is CDMA? Compare between CDMA and WCDMA.  | 10 |
| (b)    | Describe various mobile communication satellite systems.                               | 10 |
| 7.     | Write short notes (Any Three) :  | 20 |
| (a)    | Mobile IP  |    |
| (b)    | IEEE 802.11 variants   |    |
| (c)    | Mobile Agents  |    |
| (d)    | Threats and security in Mobile Computing   |    |



Q.P. Code : 790700

( 3 Hours )

[Total Marks : 80

N.B. : (1) Question No.1 is compulsory.

(2) Solve any three out of five remaining questions.

1. (a) Explain hard limit and soft limit activation function. 5  
 (b) Explain Mc Culloch Pitts neuron model with the help of an example. 5  
 (c) Explain fuzzy extension principle with the help of an example. 5  
 (d) Explain linear separable and non-linearly separable pattern with example. 5
2. (a) What is learning in neural networks? Differentiate between supervised and unsupervised learning. 10  
 (b) What are the different types of encoding, selection, crossover, mutations of GA. Explain each type with suitable examples. 10
3. (a) Explain error back propagation training algorithm with the help of a flowchart. 10  
 (b) Explain any four defuzzification methods with suitable example. 10
4. Design a fuzzy controller to determine the wash time of domestic washing machine. Assume that input is dirt and grease on clothes. Use three descriptors for input variables and five descriptors for out variables. Derive set of rules for control the action and defuzzification. The design should be supported by figures. Show if the clothes are soiled to larger degree the wash time will be more and vice-versa. 20
5. (a) Prove the following identities : 10  
 (i) For unipolar continuous activation  

$$f'(net) = 0 (1 - 0)$$
  
 (ii) For bipolar continuous activation function  

$$f'(net) = 0 (1 - 0^2)/2$$
  
 (b) Explain learning vector quantization Algorithm. 10
6. Write short notes on any two : 20  
 (a) Kohonen self-organizing feature maps.  
 (b) ANFIS architecture.  
 (c) Newton Method.



3 hrs.

80 marks

- Note :
1. Question 1 is compulsory.
  2. Attempt any 3 questions out of the rest.
  3. Make suitable assumptions whenever necessary and justify them
  4. Each question carries equal marks.

- Q1.
- a) Use the Play fair cipher with the keyword : "MEDICINE" to encipher the message "The greatest wealth is health". (5)
  - b) Explain key rings in PGP. (5)
  - c) Briefly define idea behind RSA and also explain (10)
    - 1) What is the one way function in this system?
    - 2) What is the trap door in this?
    - 3) Give Public key and Private Key.
    - 4) Describe security in this system.
- Q2)a) Explain DES, detailing the Feistel structure and S-block design (10)
- b) Consider a Voter data management system in E-voting system with sensitive and non-sensitive attributes. (10)
- 1) Show with sample queries how attacks ( Direct, Inference) are possible on such data sets
  - 2) Suggest 2 different ways to mitigate the problem.
- Q 3)
- a) Explain Diffie-Hellman Key exchange algorithm with suitable example. Also explain the problem of MIM attack in it (10)
  - b) What are Denial of Service attacks? Explain any three types of DOS attacks in detail (10)
- Q 4)
- a) IPSec offers security at n/w layer. What is the need of SSL? Explain the services of SSL protocol? (10)
  - b) What are the types of firewalls? How are firewalls different from IDS (10)
- Q 5)a) What are the various ways in which public key distribution is implemented. Explain the working of public key certificates clearly detailing the role of certificate authority. (10)
- b) Why are Digital Signatures & Digital certificates required? What is the significance of Dual Signature. (10)
- Q6 Attempt any 4 (20)
- a) SHA-1
  - b) Timing and Storage Covert Channel
  - c) Session Hijacking and Spoofing
  - d) Blowfish
  - f) S/MIME



- N.B. : (1) Question No. 1 is compulsory  
 (2) Solve any four questions from remaining six questions  
 (3) Assume suitable data if required.

1. Solve the following :-

20

- (a) Explain block diagram of Digital Image Processing.  
 (b) Justify : Laplacian is better than gradient for edge detection  
 (c) Prove that DT unit step signal is power signal.  
 (d) Obtain DIT-FFT of  $x(n) = \{2, 3, 4, 1\}$   
 (e) Obtain output of DT system for input  $x(n) = \{1, -2\}$  and impulse response

$$h(n) = \{1, 3, -2, 1\}$$



2. (a) Explain in brief Lossy compression methods.  
 (b) Explain image segmentation methods.

10  
10

3. (a) Obtain 8-pt DIT FFT of  $x(n) = \{1, 0, 2, 0, 3, 0, 4, 0\}$   
 (b) Find inverse Z Transform of

10  
10

$$X(Z) = \frac{1 + 3Z^{-1}}{1 + 3Z^{-1} + 2Z^{-2}} \text{ for all possible ROC s.}$$

4. (a) Explain image restoration and its applications.

10

- (b) Obtain DFT of Image

10

$$I = \begin{bmatrix} 1 & 2 & 2 & 1 \\ 1 & 3 & 2 & 1 \\ 2 & 3 & 3 & 4 \\ 1 & 3 & 2 & 3 \end{bmatrix}$$

[TURN OVER]



5. (a) Perform the histogram equalization and draw new equalized histogram of the following image data. 10

Gray level	0	1	2	3	4	5	6	7
No. of pixel	780	960	1023	81	122	656	329	245

- (b) Find the Huffman code for the following steam of 28 data points. 10  
{1, 1, 1, 1, 1, 2, 2, 2, 2, 2, 2, 3, 3, 3, 4, 4, 4, 4, 4, 5, 5, 5, 6, 6, 6, 6, 7, 7}

6. (a) Explain the homomorphic filtering. 10

- (b) For the 3.bit 4x4 size image perform following operations. 10

- (i) Thresholding  $T = 3$
- (ii) Negation
- (iii) Bit plane slicing for MSB and LSB planes
- (iv) Intensity level slicing with background,  $r_1 = 3$  and  $r_2 = 5$

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

7. Write short Notes on ( Any 2) 20

- (a) Classification of DT systems
  - (b) JPEG compression
  - (c) Hough Transform
  - (d) Wiener filter
-