

Q. P. Code : 622701

(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:

$$h[n] = p^n ; n < 0$$

$$= q^n ; n \geq 0$$

 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-Casual
 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 10
 , whose input is $x[n] = 3\delta[n+1] - 2\delta[n] + \delta[n-1] + 4\delta[n-2]$ and
 $h[n] = 2\delta[n-1] + 5\delta[n-2] + 3\delta[n-3]$.
 B If a continuous time signal $x(t) = \sin(2\pi \times 2000t) + 2\sin(2\pi \times 1000t)$ is 10
 sampled at 8000 samples/sec. Find out the 4-point DFT of it. Sketch the phase
 and magnitude spectrum.
 Q4 A Explain any five properties of DFT. 10
 B Compute linear convolution of the causal sequences $x[n] = \{2, -3, 1, -4, 3, -2, 4, -1\}$ 10
 and $h[n] = \{2, -1\}$ using overlap save method.

[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
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May-17

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.

Q3)

- 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)

Q4)

- 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)

- Q5)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)

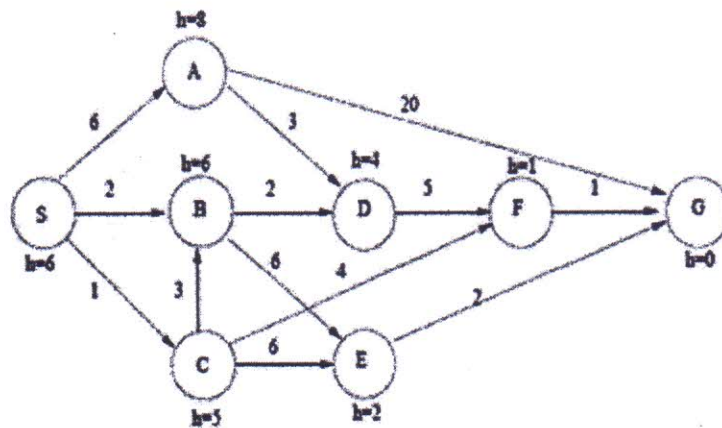
- a) SHA-1
- b) Timing and Storage Covert Channel
- c) Session Hijacking and Spoofing
- d) Blowfish
- f) S/MIME

(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

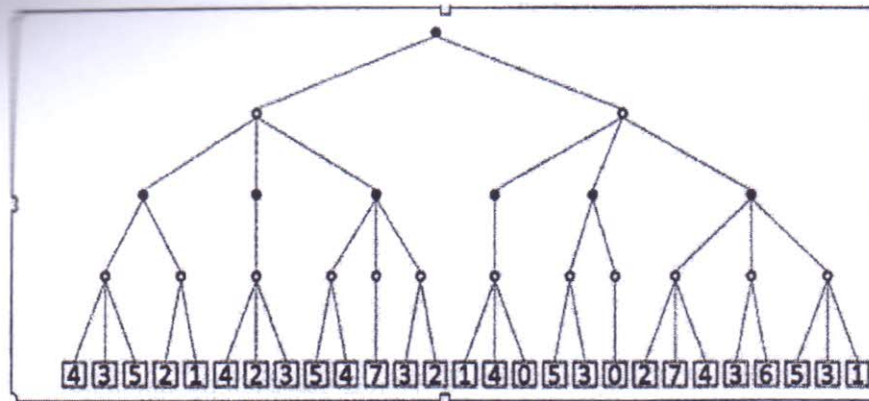
- Q1 Attempt an four (4) from the following
- [A] Define AI. What are applications of AI? [05]
[B] Define heuristic function. Give an example heuristics function for 8-puzzle problem. Find the heuristics value for a particular state of the Blocks World Problem. [05]
[C] Compare Model based Agent with 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] Illustrate 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.

- Represent the above sentences in first order predicate logic (FOPL).
- Convert them to clause form
- 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]

- Steps in Natural Language Processing
- Decision Tree Algorithm with an example
- Genetic Algorithms

QP CODE : 811901

(3 Hours)

[Total Marks : 80

- N.B. (1) Question No. 1 is **Compulsory**.
 (2) Attempt any **THREE** questions out of remaining questions.
 (3) Assume any suitable data if required with justification.

Q. 1 Answer the followings: 20

- a) Explain any one color model.
 b) Discuss unitary matrix with example.
 c) Explain lowpass spatial filtering.
 d) Explain basic morphological operations.

Q.2 a) Explain any five zero memory point operations. 10
 b) Perform histogram equalization and draw new equalized histogram of the following image data. 10

Gray level	0	1	2	3	4	5	6	7
Number of pixels	550	900	650	150	300	250	110	90

Q. 3 a) Find the DCT of the given image using matrix multiplication method: 10

0	3	3	1
3	1	2	1
3	2	4	2
1	1	2	1

b) What is segmentation? Explain (i) Region Growing (ii) Region Splitting (iii) Thresholding. 10

Q. 4 a) Explain: The first difference makes the chain code invariant to rotation. 10

b) Write 8 x 8 HADAMARD transform matrix and its signal flow graph. Using Butterfly diagram, compute HADAMARD transform for $x(n) = \{1, 2, 1, 2, 1, 2, 3, 4\}$ 10

Q. 5 a) Classify Image Compression methods in detail along with the different redundancies that can be present in digital images. 10

b) Given 10

F =

10	44	16
10	14	48
11	10	22

Find 3-bit IGS coded image and calculate compression factor, BPP and MSE.

Q. 6 Write notes on (Any two) 20
 a) Moments with examples. (b) Edge linking using Hough transform.
 c) Fidelity criteria. (d) Homomorphic filter..

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.