

M.Phil 1st Semester Examination, 2019

COMPUTER SCIENCE

[Elective-II]

PAPER—COS-114

Full Marks : 50

Time : 2 hours

The figures in the right-hand margin indicate marks

Candidates are required to give their answers in their own words as far as practicable

Illustrate the answers wherever necessary

(*Multimedia Security*)

GROUP — A

Answer any **two** questions out of four questions : 2×2

1. What is the application of Watermarking Schemes ?

2. What do you mean by digital right management ?
3. What is DCT ?
4. What do you mean by Digital Forensics ?

GROUP – B

Answer any **two** questions out of four questions : 8 × 2

5. What do you mean by staganalysis ? Write any blind staganalysis scheme.
6. What do you understand by watermarking, cryptography and steganography. State their relation.
7. Explain any cryptographic scheme used in multimedia security.
8. Explain the process of audio and video watermarking scheme.

GROUP – C

Answer any **two** questions out of four questions : 10 × 2

(3)

9. Write brief about DRM products and LAW.
10. Describe any one digital watermarking protocol.
11. Describe any one digital Scrambling scheme.
12. Explain Spread spectrum watermarking scheme.

[*Internal Assessment* : 10 Marks]

(*Soft Computing*)

Answer any **four** questions : 10 × 4

1. (a) Give a schematic diagram of an ANN model and explain each block.
(b) What do you mean by linearly inseparable ?
(c) Explain the sigmoidal activation function. 5 + 3 + 2
2. (a) Explain supervised, unsupervised and reinforcement learning.
(b) Explain the ADALINE network.
(c) Write down the Bidirectional Associative Memory (BAM) algorithm. 3 + 3 + 4

3. (a) Explain the Hopfield Network.

(b) Write down the Self Organizing feature Map (SOM) algorithm. 5 + 5

4. (a) Given

$$\tilde{A} = \{(x_1, 0.4)(x_2, 0.8)(x_3, 0.6)\}$$

$$\tilde{B} = \{(x_1, 0.2)(x_2, 0.6)(x_3, 0.9)\}$$

Find (i) $\tilde{A} \oplus \tilde{B}$ (ii) $\tilde{A} - \tilde{B}$.

(b) Is $((P \Rightarrow Q) \wedge (Q \Rightarrow P) = (P = Q))$ a tautology?

(c) Given

(i) $C \vee D$

(ii) $\sim H \Rightarrow (A \wedge \sim B)$

(iii) $(C \vee D) \Rightarrow \sim H$

(iv) $(A \wedge \sim B) \Rightarrow (R \vee S)$

Can $(R \vee S)$ be inferred from above?

(2 + 2) + 3 + 3

(5)

5. (a) What do you mean by fuzzification ?
(b) What is reproduction in connection with GA ?
(c) Explain any three reproduction methods in shortly. $2 + 2 + (2 \times 3)$
6. (a) What are the applications of soft computing ?
(b) Explain crossover operator.
(c) Design AND gate using an ANN model. $3 + 5 + 2$

[*Internal Assessment* : 10 Marks] .

(*Data Compression*)

Answer any **four** questions : 10×4

1. (a) What is data compression ?
(b) What is the application of it ?
(c) What is the difference between loss-less and lossy compression ?

(d) What is entropy? How can we calculate entropy of a random variable? $2 + 2 + 3 + 3$

2. (a) Explain Shannon Fano algorithm.

(b) Obtain codes of each symbol using Shannon Fano algorithm for a file containing symbols :

XYXYZYYZXXPXYXZP $5 + 5$

3. (a) What is the limitation of Huffman Coding?

(b) Compare Huffman and dynamic Huffman coding.

(c) What is prefix code? Explain with an example.

(d) What is conditional entropy? $2 + 3 + 3 + 2$

4. (a) What is modeling in data compression?

(b) Distinguish between dictionary based and statistical model for data compression.

(c) Explain JPEG compression technique with a block diagram. $2 + 3 + 5$

5. Consider a file containing symbols :

PQPRQQRPPSPQPRS

- (a) Find out frequency of all symbols.
- (b) Construct Huffman tree.
- (c) Obtain code of each symbol.
- (d) Encode the stream.
- (e) Calculate the compression ratio without considering frequency table. $1 + 3 + 2 + 2 + 2$

6. Write short notes on :

10

- (i) SSIM
- (ii) Compression and decompression time
- (iii) PSNR
- (iv) Space saving.

[*Internal Assessment : 10 Marks*]

(*Audio Processing*)Answer any **four** questions : 10×4

1. Write purposes of Lossy Audio Compression. How does it differ from Lossless Audio Compression. What is compression ratio ? Write any of the audio compression techniques. $2 + 2 + 2 + 4$
2. Define sampling rate. What is Quantization ? How quantization is related with sampling rate ? – Discuss. Discuss about audio quantization process. What is quantization error. $1 + 1 + 2 + 4 + 2$
3. Write importances of audio watermarking. Discuss about different audio watermarking attacks. 10
4. Write essential components of audio processing system. Write importances of Nyquist theorem in audio sampling. Find the size of the audio file having following properties :
 - Sampling rate = 44,100/second
 - Byte/sample = 2
 - Duration = 1 minute
 - Stereotype signal $3 + 3 + 4$

5. What is audio authentication ? Write the advantages of audio authentication. Discuss about an audio authentication process. 2 + 3 + 5

6. Write the basic principles of audio watermarking. What is payload. Write different parameters/ metrics for measuring audio quality. 10

7. Discuss about advantages and disadvantages of Lossy compression. Write challenges of audio compression techniques. How do you justify audio compression quality ? 4 + 3 + 3

[*Internal Assessment* : 10 Marks]
