B.Sc.

2024

COMPUTER SCIENCE — HONOURS

Paper : DSE-A-1 and DSE-A-2

The figures in the margin indicate full marks.

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

Paper : DSE-A-1

(Digital Image Processing)

Full Marks : 50

Answer ***question no.*** **1** and ***any four*** from the rest.

1. Answer ***any five*** questions: 2×5

(a) Compute the city block distance and chessboard distance between two points P(5, 2) and Q(1, 5).

(b) Given an image, how do you generate its negative image?

(c) Mention four applications of image processing.

(d) Why is noise smoothing required in image processing?

(e) What is the role of the Fourier transformation in image processing?

(f) Explain in brief the applications of segmentation.

(g) State the purposes of file format.

(h) Compare brightness and contrast.

2. (a) What is image thresholding?

(b) Write an algorithm to automatically decide the threshold value for image thresholding.

(c) Explain how mean filter can be used on an image. 2+4+4

3. Explain sampling and quantization with appropriate example. 5+5

4. (a) What is image histogram?

(b) Draw a histogram for the below image containing 8-intensity levels.

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

(c) Discuss region-based image segmentation techniques. 2+3+5

Please Turn Over

5. (a) Why is histogram equalization required for digital image processing?

(b) Perform histogram equalization on the following 8×8 image. The gray level distribution of the image is given below. 3+7

Gray level	0	1	2	3	4	5	6	7
Number of Pixels	8	10	10	2	12	16	4	2

6. (a) What do you understand by image enhancement?

(b) Compare between image enhancement and image restoration techniques.

(c) Describe the fundamental steps of image processing. 2+3+5

7. (a) What is image derivative? Explain how image derivative is used for edge detection.

(b) Write down the filter masks that use horizontal and vertical line detection. (2+4)+(2+2)

8. (a) Mention the drawbacks of inverse filtering.

(b) Explain four arithmetic and logical operations on an image.

(c) Differentiate between lossless and lossy image compression. 2+6+2

Paper : DSE-A-2

(Data Mining and Its Application)

Full Marks : 50

Answer ***question no.*** **1** and ***any four*** questions from the rest.

1. Answer ***any five*** questions : 2×5

(a) What are the two techniques to perform multi-class classification?

(b) What is cross-validation?

(c) What is the need of data integration?

(d) What is the significance of a Test Set?

(e) What is data reduction?

(f) What do you mean by data transformation?

(g) What is data pre-processing?

(h) What is a data-warehouse?

2. (a) What is supervised learning? "Classification is a supervised learning algorithm."— Justify this statement.

(b) "Logistic Regression is a Classification Algorithm."— Do you agree or disagree with this statement? Justify your answer. (2+4)+4

3. (a) Differentiate between a data-warehouse and a database.

(b) Write a short note on OLAP and OLTP with a suitable example. 4+6

4. (a) Describe the steps involved in Naive Bayes Classifier.

(b) What is meant by dimensionality reduction? Discuss its importance. 6+4

5. (a) What is clustering? Is it supervised or unsupervised learning technique? Justify your answer.

(b) Consider the following points (2,1), (2,3), (4,5), (10,11), (11,14), (12,13). Perform clustering on these points using the k-means algorithm. Assume k = 2. (1+1+2)+6

6. (a) Explain how and why you break the dataset in training and testing.

(b) Explain some of the important terms related to neural network learning like perceptron, activation function etc. (2+2)+(4+2)

7. (a) What is parametric learning? How is it different from non-parametric learning algorithm?

(b) Discuss the importance of data cleaning in data mining. (3+3)+4

Please Turn Over

(0782+0923)

8. Write short notes on (***any two***) : 5×2

(a) Logistic regression

(b) Web mining

(c) Neural networks

(d) Failures of decision support system.
