



'समानो मन्त्रः समितिः समानी'

UNIVERSITY OF NORTH BENGAL
BCA Honours 6th Semester Examination, 2023

DSE-P3-BACHELOR OF COMPUTER APPLICATION (63)

Time Allotted: 2 Hours

Full Marks: 40

*The figures in the margin indicate full marks.
All symbols are of usual significance.*

**The question paper contains DSE63:E1 and DSE63:E2 and DSE63:E3.
The candidates are required to answer any *one* from *three* courses.
Candidates should mention it clearly on the Answer Book.**

DSE63:E1

DIGITAL IMAGE PROCESSING

GROUP-A

Answer any *five* questions

1×5 = 5

1. Illustrate the term 'Image'.
2. Specify the need for image enhancement.
3. Give two applications of image segmentation.
4. Define compression ratio.
5. Write the equation to find relative data redundancy.
6. Define Histogram.
7. Write expression for Log and Gamma transformations.
8. What is meant by Erosion and dilation?

GROUP-B

Answer any *three* questions

5×3 = 15

9. Compose about 4 connectivity, 8 connectivity and m connectivity in pixels. 5
10. Construct the 2D Fourier transform and its inverse. 5
11. Formulate how the derivatives are obtained in edge detection. 5
12. Discuss the image smoothing filter with its model in the spatial domain. 5
13. Write a short note on Arithmetic coding. 5

GROUP-C

Answer any *two* questions

10×2 = 20

14. What are the components of digital image processing system? Write in detail about each block. 10

15. Explain the histogram equalization method of image enhancement. 10
16. Design the canny edge detector with necessary equation and also write its algorithm. 6+4
17. Solve the Huffman code and find the average length of the code and its redundancy for the source emits letters from an alphabet $A = \{a_1, a_2, a_3, a_4, a_5\}$ with probabilities $P(a_1) = 0.2, P(a_2) = 0.4, P(a_3) = 0.2, P(a_4) = 0.1$ and $P(a_5) = 0.1$. 10

DSE63:E2

INTRODUCTION TO DATA SCIENCES

GROUP-A

Answer any five of the following

1×5 = 5

1. Define regression.
2. What is a heat map?
3. Define data science.
4. Define outliers.
5. Explain the use of github in data science.
6. Explain the contrast between big data and data sciences.
7. What do you mean by pre-processing?
8. What does n -fold cross validation mean?

GROUP-B

Answer any three of the following

5×3 = 15

9. Explain about graphical analysis.
10. Discuss different data cleaning techniques.
11. Explain various data types available in R language.
12. Discuss the use of data science in various problem domains.
13. Explain the different stages in data science project.

GROUP-C

Answer any two of the following

10×2 = 20

14. Obtain probability distribution of X , where X is number of spots showing when a six-sided symmetric die (i.e. all six faces of the die are equally likely) is rolled. Simulate random samples of sizes 40, 70 and 100 respectively and verify the frequency interpretation of probability.
15. What are missing values? Write an R script to handle missing values in a dataset.
16. Consider the following data:
Height: 140, 142, 150, 147, 139, 152, 154, 135, 148, 147
Weight: 59, 61, 66, 62, 57, 68, 69, 58, 63, 62
Derive relationship coefficients and summary for the above data.

17. Discuss different loop structures in R with examples.

DSE63:E3

DATA MINING

GROUP-A

Answer any *five* questions

1×5 = 5

1. Define data mining.
2. What is a noisy data?
3. Give an example of a categorical attribute.
4. Name any two distance measures.
5. Define data cleaning.
6. What is an association rule?
7. Name any four data mining tools.
8. What is a classification problem?

GROUP-B

Answer any *three* questions

5×3 = 15

9. Discuss the major issues encountered in data mining.
10. Explain the decision tree algorithm with a suitable example.
11. Write a note on various data mining metrics.
12. Explain the process of clustering with categorical features.
13. Differentiate between Predictive and Descriptive data mining.

GROUP-C

Answer any *two* questions

10×2 = 20

14. Explain the process of data mining.
15. Discuss any two neural network based algorithms used in data mining.
16. Explain briefly any four data pre-processing methods.
17. Write short notes (any *two*):
 - (a) Rule-based algorithms
 - (b) Data mining tasks
 - (c) Clustering large databases
 - (d) Web mining.

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