

2025

M.Tech. 1st Semester Examination
COMPUTER SCIENCE WITH AI

Paper : MCIC402X0

[Data Science Using Python]

Full Marks : 100

Time : Three Hours

*The figures in the margin indicate full marks.
Candidates are required to give their answers
in their own words as far as practicable.*

Group - A

Answer any *five* questions : $2 \times 5 = 10$

1. What do you mean by structured, unstructured and semi-structured data? [CO1]
2. What is batch normalization? [CO3]
3. What are the main components of Data Science?[CO1]
4. Name any four applications of Data Science. [CO1]
5. Differentiate between single-layer perceptron and multilayer perceptron (MLP). [CO3]
6. What is dictionary? Give an example in Python. [CO1]

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7. Define overfitting and mention one method to prevent it. [CO1]
8. What is precision in classification problems? [CO2]

Group - B

Answer any *four* questions : $15 \times 4 = 60$

9. Explain Data Science in detail. Discuss its lifecycle. Discuss Exploratory Data Analysis (EDA). Explain the common techniques used in EDA. $2+5+3+5$ [CO1]
10. Explain and compare supervised and unsupervised learning with examples. Discuss the challenges faced in Data Science and how they can be addressed. Describe the role and responsibilities of a data scientist in an organization. $5+(3+3)+4$ [CO1]
11. Compare Data Science and Data Analytics. Discuss different types of Data Analytics (descriptive, diagnostic, predictive, and prescriptive). Explain various data visualization techniques and their importance in decision-making. $4+6+5$ [CO2]
12. Explain Business Intelligence (BI). Describe its components and role in organizational decision-making. Explain the challenges of Big Data and the techniques used to handle them. $4+(3+3)+5$ [CO4]
13. Consider a multi-class classification problem where there are three classes A, B and C with test images of 100 each and a machine learning model correctly classify 80

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images of A class, 90 images of B class, and 70 images of C class.

- (a) Calculate TP, TN, FP, and FN.
 - (b) Also calculate accuracy, precision, recall, f1 score.
7+8 [CO2]
14. (a) Explain the limitations of Multilayer Perceptron model for image classification task.
- (b) Derive the formula for computing the output size of a convolution layer.
- (c) An input image of size 64×64 is convolved with a 5×5 filter, stride = 1, padding = 0. Calculate the output feature map size. 7+4+4 [CO3]
15. (a) Compare among tuple, list, and array.
- (b) What is recursive function? Write a recursive function to calculate GCD of two numbers.
- (c) Distinguish between while and for loop.
4+(2+4)+5 [CO1]
16. (a) Draw and explain Convolutional Neural Network.
- (b) What is pooling? Explain max and average pooling with examples.
- (c) Explain the concept of drop out. 7+5+3 [CO3]

Internal Assessment - 30 marks
