CBCS SCHEME

USN

21AD62

Sixth Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026
Data Science and Its Applications

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. 2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-1

1 a. Write python program using appropriate matplot lib attributes to plot line chart to the data set given below and draw the visualization?

```
#data set
data = {
    'Time': ['Jan', 'Feb', 'Mar', 'Apr', 'May', 'June', 'July', 'Aug', 'Sep', 'Oct',
             'Nov', 'Dec'],
    'Variable1' : [10, 20, 30, 40, 30, 20, 10, 20, 30, 40, 50, 60],
    'Variable2' : [15, 25, 35, 45, 35, 25, 15, 25, 35, 45, 55, 65]
    }
```
(06 Marks)

b. Describe Baye's theorem in detail with an example. **(07 Marks)**

c. Illustrate Simpson's Paradox with an example. **(07 Marks)**

OR

2 a. Write python program to add two vectors and multiply a vector by a scalar. **(06 Marks)**

b. Describe normal distribution in detail with an example. **(07 Marks)**

c. Illustrate Central Limit Theorem with a neat diagram. **(07 Marks)**

Module-2

3 a. Describe A/B test with an example. **(06 Marks)**

b. Explain how gradient descent is used to fit parameterized models. **(07 Marks)**

c. Explain Cleaning and Mugging of data with an example. **(07 Marks)**

OR

4 a. Describe Bayesian inference in detail. **(06 Marks)**

b. Explain minibatch and stochastic gradient descent in detail. **(07 Marks)**

c. Explain tqdm library and rescaling of data with an example. **(07 Marks)**

Module-3

5 a. Explain overfitting and underfitting in detail with an example. **(06 Marks)**

b. Discuss the nearest neighbor model in detail. **(07 Marks)**

c. Explain the use of logistic function in logistic regression in detail. **(07 Marks)**

OR

6 a. Explain Support Vector Machine in detail. **(06 Marks)**

b. Discuss Bias-Variance Tradeoff in detail. **(07 Marks)**

c. Explain the standard errors of regression coefficients. **(07 Marks)**

Module-4

7 a. Explain feed forward neural network in detail with a neat diagram. **(06 Marks)**

b. Discuss bottom-up hierarchical clustering approach with an example. **(07 Marks)**

c. Write python program to compute softmax and cross-entropy in deep learning. **(07 Marks)**

OR

8 a. Explain Random Forest with example. **(06 Marks)**

b. Discuss Decision Space for a two-input preceptor. **(07 Marks)**

c. Explain entropy of a partition and creating a decision tree. Draw the decision tree for hiring. **(07 Marks)**

Module-5

9 a. Explain Matrix Multiplication and Centrality Concept. **(06 Marks)**

b. Discuss Gibb's Sampling in detail. **(07 Marks)**

c. Explain with suitable example the word clouds and recommending what's popular? **(07 Marks)**

OR

10 a. Explain the Concept of Grammars with suitable example. **(06 Marks)**

b. Explain the steps for page rank algorithm. For the given data endorsements

[(0, 1), (1, 0), (0, 2), (2, 0), (1, 2), (2, 1), (1, 3), (2, 3), (3, 4), (5, 4), (5, 6), (7, 5), (6, 8), (8, 7), (8, 9)]

Draw the data scientists network of endorsement and sized by page rank. **(07 Marks)**

c. Explain item bases collaborative filtering. **(07 Marks)**

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