

BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT

(Autonomous Institute under Visvesvaraya Technological University, Belagavi)

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Course Code

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Fourth Semester B.E. Degree Examinations, July 2026

INTRODUCTION TO DATA SCIENCE

(CSE-Data Science)

Duration: 3 hrs

Max. Marks: 100

- Note:** 1. Answer any FIVE full questions choosing ONE full Question from each Module.
2. Missing data, if any, may be suitably assumed

<u>Q. No</u>	<u>Question</u>	<u>Marks</u>	<u>(RBT:CO: PI)</u>
<u>Module-1</u>			
1.	a. Describe data science and explain its various applications along with its societal impacts.	06	(2:1:1.6.1)
	b. Write a program to generate a bar chart illustrating the number of awards won by each movie using the given dataset. movies = ["Annie Hall", "Ben-Hur", "Casablanca", "Gandhi", "West Side Story"] num_oscars = [5, 11, 3, 8, 10]	06	(3:1:2.6.3)
	c. Define vectors. Develop functions to perform the following operations: (i) Vector_add() (ii) Vector_subtract() (iii) Vector_sum() (iv) Scalar_multiply()	08	(3:1:2.6.3)
(OR)			
2.	a. Define matrix. Implement the matrix functions for (i) shape() (ii) get_row() (iii) get_column() (iv) make_matrix()	08	(3:1:2.6.3)
	b. Implement variance(), Standard Deviation() and interquartile range() functions in python.	06	(3:1:2.6.3)
	c. Write simple statistic functions, central tendencies such as mean and median and mode.	06	(3:1:2.6.3)
<u>Module-2</u>			
3.	a. Apply the concept of p-Hacking and demonstrate an A/B test using a suitable example.	06	(3:2:2.6.3)
	b. Demonstrate the use of gradient descent by applying it to estimate parameters in a suitable example.	07	(3:2:2.6.3)
	c. Apply different methods to import data into Python and convert it into appropriate formats: (i) Using stdin and stdout (ii) Reading basic text and delimited files	07	(3:2:2.6.3)
(OR)			
4.	a. Implement a Python program to apply data cleaning and munging techniques on a given dataset.	08	(3:2:2.6.3)

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| b. | Apply techniques to explore single, two-, and multi-dimensional data with suitable examples. | 06 | (3:2:2.6.3) |
| c. | Use named tuples and data classes to solve a programming problem with suitable examples. | 06 | (3:2:2.6.3) |

Module-3

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| 5. | a. | Apply the concept of machine learning to a real-world scenario and demonstrate the differences between supervised and unsupervised learning with suitable examples. | 07 | (3:3:2.6.3) |
| | b. | Apply the concepts of overfitting and underfitting to a given machine learning model and demonstrate their impact on model performance using suitable examples. | 07 | (3:3:2.6.3) |
| | c. | Analyse the bias-variance trade-off in a given machine learning model. | 06 | (3:3:2.6.3) |

(OR)

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| 6. | a. | Apply Naive Bayes classification to a real-world problem such as spam detection. | 07 | (3:3:2.6.3) |
| | b. | Explain the working of the k-Nearest neighbours algorithm with an example. | 07 | (2 :3: 1.6.1) |
| | c. | Explain simple linear regression and its use in prediction problems. | 06 | (2 :3: 1.6.1) |

Module-4

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| 7. | a. | Explain the concept of decision trees and how they are used for classification and prediction. | 06 | (2 :4: 1.6.1) |
| | b. | Illustrate the basic structure of a perceptron and how it serves as the building block for more complex neural networks. | 08 | (2 :4: 1.6.1) |
| | c. | Explain the use of tensors and the abstraction of layers in building deep learning models. | 06 | (2 :4: 1.6.1) |

(OR)

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| 8. | a. | Describe the k-means clustering process and methods for selecting the appropriate number of clusters. | 06 | (2 :4: 1.6.1) |
| | b. | Discuss the concept of random forests and their advantages over individual decision trees. | 06 | (2 :4: 1.6.1) |
| | c. | Analyse the backpropagation process in training neural networks. | 08 | (3:4:2.6.3) |

Module-5

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| 9. | a. | Explain the fundamentals of natural language processing and its applications. | 06 | (2 :5: 1.6.1) |
| | b. | Explain word vectors and their role in representing textual data. | 06 | (2 :5: 1.6.1) |
| | c. | Explain the concept of network analysis and its importance. | 08 | (2 :5: 1.6.1) |

(OR)

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| 10. | a. | Describe the PageRank algorithm and its application in ranking web pages. | 08 | (2 :5: 1.6.1) |
| | b. | Use recommender system techniques to suggest items based on user preferences. | 06 | (3 :5: 2.6.3) |
| | c. | Analyse social network graphs using centrality measures. | 06 | (3 :5: 2.6.3) |

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