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| **DIT UNIVERSITY DEHRADUN**   |  |  | | --- | --- | | **B.TECH (ME)** | **MID TERM EXAMINATION, ODD SEM 2024-25 (SEM VII)** | | | | | | | | | | | | | |
| **Roll No.** |  |  |  |  |  |  |  |  |  |  |  |  |
| **Subject Name: An Introduction to Machine Learning** | | | | | | | | | | | | |

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| **Time: 2 Hours** | **Total Marks: 50** |
| **Note: All sections are compulsory. No student is allowed to leave the examination hall before the completion of the exam.**  **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**   |  |  |  |  | | --- | --- | --- | --- | | **SECTION A : Attempt any four questions from the following : [4 x 5= 20]** | | | | |  | | **BTL** | **CO** | | **Q.1)** | Compare data analysis and data analytics. Write a short note on classification of data analytics based on the phase of workflow and the kind of analysis required. | **I** | **1** | | **Q.2)** | Define machine learning. Briefly explain the use of machine learning. | **II** | **1** | | **Q.3)** | Define Bias and Variance in the context of model evaluation. What is the relationship between them, and how does it affect model performance? | **II** | **1** | | **Q.4)** | Define Supervised Learning. Differentiate between classification and regression analysis with examples. | **I** | **2** | | **Q.5)** | Write a Matlab (or Python) code to perform linear regression to predict house prices based on square footage and number of rooms. Use a dataset (assumed or generated) with at least 10 records and calculate the mean squared error (MSE) of the model. | **II** | **2** | | **SECTION B : Attempt any three questions from the following : [3 x 10= 30]** | | | | |  | | **BTL** | **CO** | | **Q.6)** | Explain the high-level view of machine learning with a suitable diagram. Discuss the machine learning systems classification based on whether they are trained with human supervision with examples. | **II** | **1** | | **Q.7)** | Write the steps involved in an end-to-end machine learning project. Describe the main challenges associated with the machine learning projects. (Use suitable diagrams, wherever needed). | **II** | **1** | | **Q.8)** | Considering univariate regression, explain the concepts of hypothesis, cost function, and gradient descent algorithm. Highlight the significance of learning rate with a suitable diagram. | **II** | **2** | | **Q.9)** | Describe support vector machines (SVM) and the various kernel types used in SVM. Highlight a case study for prediction using SVM. | **II** | **2** | | **Q.10)** | Discuss a mechanical engineering problem where machine learning can be applied. Propose a supervised learning approach to solve the problem and outline the steps involved in designing the learning system. | **II** | **2** | | **-----END OF PAPER ----** | |  |  | | |