Graphic Era
HILL UNIVERSITY
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End Term (Even) Semester Examination May-June 2025

Roll no. 2261514

Name of the Program and semester: B.Tech (C.S.E.) V Sem
Name of the Course: Machine Learning
Course Code: TCS-509/ TCS-504

Time: 3 hour

Maximum Marks: 100

Note:

(i) All the questions are compulsory.
(ii) Answer any two sub questions from a, b and c in each main question.
(iii) Total marks for each question is 20 (twenty).
(iv) Each sub-question carries 10 marks.

Q1. (2X10=20 Marks) CO1

a. Compute, Mean, Median, Mode, Range, Average Deviation, Absolute Deviation, Squared Deviation, Standard Deviation, Total Sum of Squares for the following dataset.
{18, 22, 33, 11, 9, 4}

b. What do you understand by Supervised, Unsupervised and Reinforcement Machine Learning? Explain the real time scenarios with examples where all these types of Machine Learning can be implemented.

c. Give detailed explanation of the following (Give syntax and example of each)-

- List
- Tuple
- Dictionary

Q2. (2X10=20 Marks) CO2

a. Explain the term Decision Tree in Machine Learning. How it is different from Random Forest. Explain the challenges that occur in the implementation of Decision Trees, and also give the solution to overcome these challenges.

b. assume s is a collection containing 14 examples, [9+, 5−]. of these 14 examples, suppose 6 of the positive and 2 of the negative examples have Wind = Weak, and the remainder have Wind = strong. What will be the information gain on attribute wind?

c. Consider the following data set of experience and salary of five employees. Compute the y-intersect and slope of the best-fitting line for Linear Regression.

Experience	Salary
10	21
14	33
12	27
10	22
8	23

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Q3. (2X10=20 Marks) CO3

a. Consider a simple two-dimensional dataset with the following data points:

Data Points:

1. (2, 3)
2. (2, 5)
3. (3, 4)
4. (4, 2)
5. (5, 3)
6. (5, 5)
7. (6, 4)
8. (6, 6)

Where ε (epsilon) = 1.5 and MinPoints = 3
Using DBSCAN form clusters and identify Core, Noise, border and outlier (if available).

b. What do you understand with the term outliers. How it will affect the output. Suggest Some solutions for solving the problem of outliers.

c. Explain *RELU, Sigmoid* and Softmax activation functions with help of their working suitability and equations.

Q4. (2X10=20 Marks) CO4

a. List the difference between an autoencoder and PCA in terms of dimensionality reduction?

b. Define the Models given below-
1) YOLO
2) ALEXNET
3) VGG-16 and VGG-19
4) MOBILE NET.

c. Explain deep learning and how is it different from traditional machine learning? What are the advantages of deep neural networks over shallow ones?

Q5. (2X10=20 Marks) CO5

a. How can reinforcement learning be used to improve the control of autonomous vehicles, like self-driving cars or drones?

b. What trade-offs exist between bias and variance in model design? How do you identify and correct high bias vs high variance?
c. Explain the role of the agent and the environment in reinforcement learning? How do they interact at each time step?