Time: 3 Hours **Max. Marks: 80**

Instructions:

- Figures to the right indicate max marks.
- Draw appropriate diagram whenever applicable.
- Assume suitable data wherever applicable. State your assumptions clearly.
- **Question number 1 is compulsory.**
- Attempt **any Three** questions from remaining questions

Q.1 Solve any Four

A. Explain SVD and its applications? [05]
B. Differentiate between supervised and unsupervised learning. [05]
C. Explain Hebbian Learning rule [05]
D. Explain Perceptron model with Bias. [05]
E. Differentiate between Ridge and Lasso Regression [05]

Q.2 Solve the following

A. Draw a block diagram of the Error Back Propagation Algorithm and explain with the flow chart the Error Back Propagation Concept. [10]
B. Find a linear regression equation for the following two sets of data: [10]

X	Y
3	12
5	18
7	24
9	30

Q.3 Solve the following

A. Diagonalize the matrix A [05]

$$\begin{bmatrix} 1 & 5 \\ 4 & 2 \end{bmatrix}$$

B. Write short note on overfitting and underfitting of model [05]
C. What are activation functions? Explain Binary, Bipolar, Continuous, and Ramp activation functions. [10]

4. Solve the following

A. Explain Least-Squares Regression for classification. [10]

B. What is the curse of dimensionality? Explain PCA dimensionality reduction technique in detail. [10]

Q. 5 Solve the following

A. How to calculate Performance Measures by Measuring Quality of model. [10]

B. Explain the Perceptron Neural Network [10]

Q. 6.

A. Discuss the various steps of developing a Machine Learning Application. [10]

B. Write a short note on LMS-Widrow Hoff [05]

C. Explain the Maximization algorithm for clustering. [05]

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