Duration: 3hrs   **[Max Marks:80]**

N.B. : (1) Question No 1 is Compulsory.
      (2) Attempt any three questions out of the remaining five.
      (3) All questions carry equal marks.
      (4) Assume suitable data, if required and state it clearly.

Q1   Attempt any **FOUR**   [20]

  A Explain Applications of Machine Learning.

  B Explain cross validation, overfitting and under fitting for ML model.

  C Calculate eigenvalues for following matrix

$$A = \begin{bmatrix} 1 & 2 & 9 \\ 12 & 11 & 2 \\ 0 & 0 & 5 \end{bmatrix}$$

  D What is Regularized Regression?

  E Justify, Perceptron works only for linear separable problem.

Q2 A Total 16 docs are there for a query, 8 are relevant and 8 are non-relevant [10]
      documents.

      10 documents retrieved by query. Calculate precision, recall and draw confusion

      matrix

1	2	3	4	5	6	7	8	9	10
D1	D2	D3	D4	D5	D6	D7	D8	D9	D10
yes	yes	no	yes	no	no	no	no	no	yes

  B Explain the steps of developing a Machine Learning Application   [10]

Q3 A Obtain derivation for simple linear regression using Least Square Method. [10]

  B What is concept of Singular Value Decomposition (SVD) and give its [10]
      applications.

Q4 A Demonstrate steps for Multiple linear Regression along with example. [10]

  B Explain Logistic Regression Model. [10]

Q5 A What is mean by soft assignment and hard assignment to clusters? Explain [10]
      Expectation Maximization Algorithm

  B Explain Delta Learning Rule (LMS-Widrow Hoff) with example for AND gate [10]
      (Note: Bipolar AND gate). Min one epoch is required.

Q6 A Explain Hebbian Rule along with an example. [10]

  B Write a short note on Principal Component Analysis [10]

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