

# SUPPLEMENTARY EXAMINATION

THIRD SEMESTER [MCA], SEPTEMBER-OCTOBER, 2023

Paper Code: MCA-203

Subject: Artificial Intelligence and Machine Learning

Time: 03:00 Hrs

Maximum Marks: 75

Note: Attempt any five questions including question 1, which is compulsory.

**Q1.** Answer the following briefly: (2.5×10 = 25)

- (a) Summarize four main approaches to Artificial Intelligence (AI).
- (b) Explain Artificial Intelligence based on functionality.
- (c) Compare Local maxima and Global maxima in Hill Climbing Algorithm.
- (d) Outline the concept of non-monotonic reasoning with example.
- (e) Explain Multiple Linear Regression (MLR) with mathematical representation.
- (f) Examine the importance of confusion matrix. Why it is useful in AI.
- (g) Compare and contrast Total sum of squares, Sum of Square of Residuals and Sum of square of Regression.
- (h) Explain Unsupervised learning algorithms.
- (i) Why recommender systems are used?
- (j) Distinguish between feed forward and back propagation algorithm.

### UNIT - 1

**Q2. (a)** Identify seven problem characterization by giving any example. (6.5)

**(b)** Trace the constraint satisfaction procedure to solve the following cryptarithmic problem: (6)

$$\begin{array}{r}
 \text{S E N D} \\
 + \text{M O R E} \\
 \hline
 \text{M O N E Y} \\
 \hline
 \end{array}$$

**OR**

**Q3. (a)** Given an initial and final state of 8 puzzle problem. Find the most cost-effective path to reach the final state from initial using A\* algorithm. (6.5)

Initial State			Goal State		
1	2	3	2	8	1
8		4		4	3
7	6	5	7	6	5

**(b)** Define state spaces in AI. Why are they useful? Write state space for any suitable problem of your choice. (6)

**UNIT - 2**

**Q4. (a)** Check the validity of the following implications via truth table. **(6.5)**

$$P \rightarrow (Q \rightarrow R) \text{ equivalent to } (P \rightarrow Q) \rightarrow (P \rightarrow R)$$

**(b)** Explain the following term providing an example **(6)**

1. Modus Ponens
2. Modus Tollens

**OR**

**Q5. (a)** Summarize approaches to Knowledge Representation (KR). **(6.5)**

**(b)** Show that the following propositions are valid. **(6)**

$$[\forall xP(x) \rightarrow Q] \text{ equivalent to } [\exists xP(x) \rightarrow Q]$$

**UNIT - 3**

**Q6. (a)** Differentiate between supervised and unsupervised learning algorithms with **(6.5)**  
examples

**(b)** Describe underfitting and overfitting problems in Machine Learning. **(6)**

**OR**

**Q7. (a)** What are various Machine Learning problems? **(6.5)**

**(b)** State the difference between Bias and Variance. Why both of them are important. **(6)**

**UNIT - 4**

**Q8. (a)** Explain activation function. Why they are important in neural networks. **(6.5)**

**(b)** Explain Recommender Systems by providing latest example? **(6)**

**OR**

**Q9. (a)** Explain Principal Component Analysis (PCA), what problems this algorithm address **(6.5)**  
in machine learning problems.

**(b)** Define ensemble learning approaches. Differentiate between Boosting and Bagging. **(6)**

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