MASTER OF COMPUTER

APPLICATIONS (MCA-NEW)

Term-End Examination

December, 2023

MCS-224 : ARTIFICIAL INTELLIGENCE AND

MACHINE LEARNING

Time : 3 Hours *Maximum Marks : 100*

Note : *Question No.* **1** *is compulsory. Attempt any*

three questions from the rest.

1. (a) Differentiate between clustering and classification technique. List any *two* algorithms for each. 6

   (b) Explain Turing test with suitable example.

5

(c) What is skolomization ? What is the utility of skolomization ? Skolomize the following expression : 6

$$\exists_{x_1} \exists_{x_2} \forall_{y_1} \forall_{y_2} \exists x_3 \forall_{y_3} P(x_1, x_2, x_3, y_1, y_2, y_3)$$

(d) Explain backward chaining system with a suitable example. 6

(e) Differentiate between Lazy learners and Eager learners in classification problem. Also, list the algorithms used for each type of learners, respectively. 6

(f) Explain the term 'Dimensionality Reduction'. Name the general techniques used to perform it. Also give merits and limitation of dimensionality reduction. 6

(g) Explain the working of partition based clustering. Mention any *two* methods used for partition based clustering.   5

2. (a) Compare artificial intelligence, machine learning and deep learning.   6

(b) What do you understand by state space in AI ? What is its utility ? Write production rules for state space representation of water jug problem.   7

(c) Write and explain Breadth First Search (BFS) algorithm. Discuss its space and time complexity. Also, give advantage and disadvantage of BFS algorithm.   7

3. (a) Differentiate between predicate and propositional logic. If $P(x) \rightarrow$ "x is a rational number" and $Q(x) \rightarrow$ "x is a real

number" then symbolize the following

sentences :   5

(i) Every rational number is a real

      number

(ii) Some real numbers are rational

(iii) Not every real number is a rational

       number

(b) Explain the concept of resolution and

      unification in AI, with suitable example for

      each.   7

(c) Explain rule based systems in AI. Give

      advantages and disadvantages of rule

      based systems. Also, give the *two*

      important sources of uncertainty in rule

      based systems.   8

4. (a) Explain reinforcement learning with the help of a block diagram. Explain the role of each component of block diagram. 6

(b) Compare classification and regression techniques of supervised learning. Explain the various metrics used for evaluating the classification model. 7

(c) Differentiate between the following (give example for each) : 7

(i) Logistic regression and Linear regression

(ii) K-NN algorithm and K-means algorithm

5. Explain any *four* of the following with suitable example for each : 4×5=20

(a) Linear Discriminant Analysis

(b)   FP tree growth

(c)   Density based clustering

(d)   Restricted Boltzmann Machines

(e)   Convolutional Neural Networks