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MCS–224

MASTER OF COMPUTER APPLICATIONS (MCA-NEW)

Term-End Examination

June, 2024

MCS-224 : ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

Time : 3 Hours *Maximum Marks : 100*

Weightage : 70%

Note : *Question No.* ***1*** *is compulsory. Attempt any* ***three*** *questions from the rest.*

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1. (a) Compare Artificial Narrow Intelligence (ANI), Artificial General Intelligence (AGI) and Artificial Super Intelligence (ASI). 6

(b) Explain Chinese room test as Criticism to Turing test, with suitable example. 5

(c) Write steps to transform FOPL (First Order Predicate Logic) to PNF (Prenex Normal Form). Apply the steps to transform $\forall_x(\mathrm{Q}(x) \rightarrow \exists_x \mathrm{R}(x, y))$ to PNF. 6

(d) Explain forward chaining systems with suitable example. 6

(e) Draw block diagram for the machine learning cycle. Also list the steps involved in machine learning cycle. 6

(f) Explain the working of FP growth algorithm. Give advantages of FP growth over Apriori Algorithm. 6

(g) Compare clustering and classification. Give suitable example for each. Also, list the algorithms for each. 5

2. (a) Compare descriptive, predictive and prescriptive analytics, performed under machine learning. 6

   (b) Explain Min-Max search algorithm with suitable example. Give properties of Min-Max search algorithm. Also, write its advantages and disadvantages. 7

   (c) Write and explain Depth First Search (DFS) algorithm. Give time and space complexity of DFS algorithm. Also give its advantage and disadvantage. 7

3. (a) Given C(x) = "X is a used car dealer", and H(x) = "X is honest" then translate the following into English sentences : 5

   (i) $\exists_x$ C(x)

   (ii) $\exists_x$ H(x)

   (iii) $\forall_x$ C(x) $\rightarrow \sim$ H(x)

   (iv) $\exists_x$ (C(x) $\wedge$ H(x))

   (v) $\exists_x$ (H(x) $\rightarrow$ C(x))

(b) What do you understand by the term 'Resolution' in AI ? Discuss the utility of Resolution mechanism in AI. Apply it to conclude 'Raman is mortal' from the knowledge given below : 7

(i) Every man is mortal

(ii) Raman is a man

(c) Write short notes on any *two* of the following, with suitable example for each : 8

(i) Frames

(ii) Scripts

(iii) Semantic nets

4. (a) Compare model-free reinforcement learning with mode-based reinforcement learning. Also, discuss the sub-classes of model-free reinforcement learning. 6

(b) Write and explain Bayes' theorem. Also, write and explain Naive Bayes' algorithm with suitable example. 7

(c) Write short notes on any *two* of the following (give example for each) : 7

(i) Support Vector Machines
(ii) Support Vector Regression
(iii) Polynomial Regression

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

(a) Principal Component Analysis

(b) Apriori Algorithm

(c) Hierarchical Clustering

(d) Generative Adversarial Networks

(e) Auto Encoders