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| **DIT UNIVERSITY , DEHRADUN**   |  |  | | --- | --- | | **B.TECH (CSE)** | **: ENDTERM EXAMINATION,ODD SEM 2022-23 (SEM V)** | | | | | | | | | | | | | |
| **Roll No.** |  |  |  |  |  |  |  |  |  |  |  |  |
| **Subject Name: Artificial Intelligence** | | | | | | | | | | | | |

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| **Time: 3 Hours** | **Total Marks: 100** |
| **Note: All questions are compulsory. No student is allowed to leave the examination hall before the completion of the exam.**  **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Q.1)** | **Attempt all Parts :** | | **BTL** | **CO** | |  | (a) | Describe decision tree with suitable figure. | L2 | CO1 | |  | (b) | What is substitution process? Find the most general unifier (if exist) for (add (x, y, z), add (2, 4, 8)) using the unification algorithm. | L3 | CO4 | |  | (c) | Define Prolog and explain its features. How is it different from other programming languages? | L2 | CO1 | |  | (d) | In Reinforcement Learning, explain the following:  Action, State, Reward, Policy and Value. | L2 | CO1 | |  |  | **[4 x 5= 20]** |  |  | |  | | |  |  | | **Q.2)** | **Attempt all Parts :** | | **BTL** | **CO** | |  | (a) | Define List in Prolog. Write programs in prolog to perform the following operations in list:  (i) Find the number of elements in a list.  (ii) Append | L3 | CO4 | |  | (b) | For the given propositional logics show that:  a) (p ∧ q) → r and (p → r) ∧ (q → r) are not logically equivalent.  b) ¬(p → q) ↔ (p ∧ ¬q) is a tautology. | L3 | CO2 | |  | (c) | Explain rule based system with various components. | L2 | CO1 | |  | (d) | What is the difference between Probability and Certainty factor? Also, explain with the help of an example the method to compute certainty factor. | L2 | CO3 | |  |  | **[4 x 5= 20]** |  |  | |  | | |  |  | | **Q.3)** | **Attempt any two parts :** | | **BTL** | **CO** | |  | (a) | Explain supervised learning and unsupervised learning with suitable example of each. Also, discuss two types of supervised learning and unsupervised learning. | L2 | CO3 | |  | (b) | Define FOL. Discuss four FOL inference rules for the quantifiers. Write example of each to support your explanation. | L2 | CO1 | |  | (c) | Translate the following sentences into FOL:  a. Some people are either religious or pious  b. Every number is either negative or has a square root  c. Every connected and circuit-free graph is a tree  d. Some numbers are not real  e. Not all that glitters is gold. |  | CO4 | |  |  | **[2 x 10= 20]** |  |  | |  | | |  |  | | **Q.4)** | **Attempt any two parts :** | | **BTL** | **CO** | |  | (a) | Consider the following information.  charlie studies csc135  olivia studies csc135  jack studies csc131  arthur studies csc134  kirke teaches csc135  collins teaches csc131  collins teaches csc171  juniper teaches csc134  X is a professor of Y if X teaches C and Y studies C.  Represent above information in Prolog (.pl file) and then create and answer following queries:  (i) What does charlie study?  (ii) Who are the students of professor kirke?  (iii) Who studies csc135? | L3 | CO1 | |  | (b) | (i) Illustrate learning based agent with its four components.  (ii)Calculate the output of the neuron Y for the network shown using binary sigmoidal activation function and bipolar sigmoidal activation function.  Obtain the output of the neuron Y for the network shown using activation function.  (i) binary sigmoidal (ii) bipolar sigmoidal. | L3 | CO2 | |  | (c) | Explain constraint satisfaction problem and apply CSP to solve following crypt-arithmetic problem: COCA + COLA = PEPSI. | L3 | CO2 | |  |  | **[2 x 10= 20]** |  |  | |  | | |  |  | | **Q.5)** | **Attempt any two parts :** | | **BTL** | **CO** | |  | **(a)** | Define the fuzzy logic. If A and B are two fuzzy sets with membership functions μA(x) = {0.2, 0.5, 0.6, 0.1, 0.9} μB(x) = {0.1, 0.5, 0.2, 0.7, 0.8} Then find out the values of  1. μA ∩ B(x)  2. μA U B(x)  3. (μA (x))’  4. μA × B(x) | L3 | CO2 | |  | (b) | Explain the following terms in genetic algorithm with suitable figure: Population, Chromosome, Gene and Allele.  Give the output of the following:  (i) Apply single point crossover    (ii) Apply Two-point crossover    (iii) Apply N point crossover | L3 | CO2 | |  | (c) | (i) Explain different types of symbolic reasoning.  (ii) We have a new burglar alarm installed at home. It is fairly reliable at detecting a burglary, but also responds on occasion to minor earthquakes. We have two neighbours, John and Mary, who have promised to call when they hear the alarm. John nearly always calls when he hears the alarm but sometimes confuses the telephone ringing with the alarm and calls then too. Mary, likes loud music and often misses the alarm altogether. Given the evidence of who has or has not called we would like to estimate the probability of burglary.  a) Find the probability that the alarm has not sounded and a burglary has happened but earthquake has not occurred and both John and Mary called.  b) Find the probability that the alarm has sounded and a burglary has happened but earthquake has not occurred and John has called but Mary has not called. | L3 | CO4 | |  |  | **[2 x 10= 20]** |  |  | | -----END OF PAPER ---- | | |  |  | | |