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| **DIT UNIVERSITY, DEHRADUN**   |  |  | | --- | --- | | **M. TECH (CSE)** | **: END TERM EXAMINATION, ODD SEM 2023-24 (SEM 1)** | | | | | | | | | | | | | |
| **Roll No.** |  |  |  |  |  |  |  |  |  |  |  |  |
| **Subject Name: Artificial Intelligence and Knowledge Representation** | | | | | | | | | | | | |

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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 :** | | |  | **(a)** | Explain the following environments with suitable example of each:   1. Static and dynamic 2. Single agent and multi agent | |  | **(b)** | Differentiate between unsupervised and reinforcement learning with suitable example of each. | |  | **(c)** | Illustrate semantic network representation technique used for knowledge representation with suitable example and diagram. | |  | **(d)** | Convert the following into FOL using quantifier  (i) Some students play badminton.  (ii) Not all actors like both Acting and Dancing.  (iii) All animals eat.  (iv) Every student respects his teacher.  (v) Only one student failed in Hindi. | |  |  | **[4 x 5= 20]** | |  | | | | **Q.2)** | **Attempt all Parts :** | | |  | **(a)** | Define PEAS and summarize PEAS description/representation for automated taxi driver (agent). | |  | **(b)** | Given two Parents P1= 1101100100110110 and P2= 1010111000011110 of length sixteen   1. Perform two-point crossover after fifth and tenth position. 2. Perform N point crossover after fifth, eighth, and fourteen bit. | |  | **(c)** | Describe root node, leaf node, splitting, pruning and parent/child node in decision Trees. | |  | **(d)** | Describe any five arithmetic operators using python program (with output). | |  |  | **[4 x 5= 20]** | |  | | | | **Q.3)** | **Attempt any two parts :** | | |  | **(a)** | Illustrate Environment, State, Q-value, Value and Action in reference to reinforcement learning. | |  | **(b)** | (i) Given two fuzzy sets A={(x,0.7), (y,0.4), (z,0.6)} and B={(x,0.4), (y,0.2), (z,0.3)}. Compute the Complement for each of them, Union, Intersection and Cartesian product  (ii) Define genotype, phenotype, decoding, encoding and genetic operators. | |  | **(c)** | You are given two jugs, a 4-gallon one and a 3-gallon one. Neither has any measuring mark on it. There is a pump that can be used to fill the jugs with water. How can you get exactly 2 gallons of water into the 4-gallon jug. Explain it with state space. | |  |  | **[2 x 10= 20]** | |  | | | | **Q.4)** | **Attempt any two parts :** | | |  | **(a)** | Describe Supervised Learning and Unsupervised learning with appropriate examples. | |  | **(b)** | (i) Solve the following problem using probabilistic approach. In a University, there are 80% of the faculties who like teaching and 50% of the faculties who like teaching and research, and calculate the percentage of faculties those who like teaching and also like research?  (ii) A doctor is aware that disease meningitis causes a patient to have a stiff neck, and it occurs 80% of the time. He is also aware of some more facts, which are given as follows:  The Known probability that a patient has meningitis disease is 1/30,000.  The Known probability that a patient has a stiff neck is 2%.  What is the probability that a patient has diseases meningitis with a stiff neck? | |  | **(c)** | Show that (p → q) ∧ (q → p) is logically equivalent to p ↔ q. Which of the following is/are atomic proposition and compound proposition  (i) 3+3 is 6.  (ii) It is not raining today, and street is not wet.  (iii) The Sun is cold.  (iv) Rohan is a faculty, and she works in Dehradun.  (v) 7 is a prime number. | |  |  | **[2 x 10= 20]** | |  | | | | **Q.5)** | **Attempt any two parts :** | | |  | **(a)** | Explain the following terms with suitable diagrams:   1. Model-Based Reflex agent 2. Utility Based Agents | |  | **(b)** | Describe rule-based system and its basic components with a suitable diagram. | |  | **(c)** | **(i) Find the MGU of {p(f(a), g(Y)) and p(X, X)}**  **(ii)Find the MGU of UNIFY(prime (11), prime(y))** | |  |  | **[2 x 10= 20]** | | **-----END OF PAPER ----** | | | | |