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| **DIT UNIVERSITY DEHRADUN**   |  |  | | --- | --- | | **B.TECH (CSE/IT)** | **END TERM EXAM, EVEN 2024-25 SEM:VI** | | | | | | | | | | | | | |
| **Roll No.** |  |  |  |  |  |  |  |  |  |  |  |  |
| **Subject Name: Artificial Intelligence** | | | | | | | | | | | | |

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| **Time: 3 Hours** | **Total Marks: 100** |
| **Note: No student is allowed to leave the examination hall before the completion of the exam.**  **Answers from a section must be written together and must not be mixed with answers from other section.**  **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **SECTION 1: Attempt any five questions in SECTION 1: [5 x 8= 40]** | | | | | |  | | | | | **Q.1.1)** | Explain Supervised, unsupervised and reinforcement learning. **[8 marks]** | | | | **Q.1.2)** | Let A(x) and B(x) be two fuzzy sets with the following values **[8 marks]**  A= {(X1, 0.7), (X2, 0.5), (X3, 0.2), (X4, 0), (X5, 0)};  B= {(X1, 0.6), (X2, 0.4), (X3, 0.3), (X4, 0.1)};  C= {(X1, 0.5), (X2, 0.3), (X3, 0.4), (X4, 0.2)}.  Calculate: (i) , (ii) , (iii) iv)  (v) vi)  vii) viii) | | | | **Q.1.3)** | (a) What are the components of AI agents? **[3 marks]** | | | | (b) Explain the mechanism of Fuzzy architecture. What is membership function? **[5 marks]** | | | | **Q.1.4)** | Explain different types of reasoning. Elaborate with examples. **[8 marks]** | | | | **Q.1.5)** | (a) Explain in detail Bayes Theorem with formula. **[4 marks]** | | | | (b) In a hospital, 80% of patients admitted with respiratory issues have pneumonia, while 20% have asthma. The probability of experiencing shortness of breath for pneumonia is 0.90, and for asthma, it is 0.60. If a patient reports shortness of breath, find the probability that they have pneumonia. **[4 marks]** | | | | **Q.1.6)** | Explain in detail with proper diagrams the different types of Intelligent agents. **[8 marks]** | | | | **SECTION 2: Attempt any four questions in SECTION 2: [4 x 15= 60]** | | | | | |  | | | | | **Q.2.1)** | (a) Differentiate between Iterative deepening depth first search and depth limited search with diagrammatic representation. **[5 marks]** | | | | (b) Apply BFS and DFS to the graph shown in Fig. 1 and find out the traversal sequence in each case using node A as source node. **[Note: Show steps in detail.] [10 marks]**    Fig 1 | | | | **Q.2.2)** | (a) Apply A\* algorithm to the graph shown in Fig. 2 and find the optimal path and path cost from source node S to goal node G. **[Note: Show each step in detail] [8 marks]**    Fig. 2 | | | | (b) Explain different logical connectives with examples. Verify ¬ (P ∧ Q) and (¬P) ∨ (¬Q) are logically equivalent. **[7 marks]** | | | | **Q.2.3)** | (a) Explain the various quantifiers in first order logic with examples **[5 marks]** | | | | (b) Apply cryptarithmetic to solve the following: **[10 Marks]** | | | | **Q.2.4)** | (a) Explain with example different types of planning. **[6 marks]** | | | | (b) For the goal stack planning shown in Fig. 3, define the predicates representing the initial and goal states. Using goal stack planning, determine the sequence of steps required to achieve the goal state from the start state. Represent each state using predicate logic. **[9 marks]**    Fig.3 | | | | **Q.2.5)** | (a) Explain the mechanism of forward and backward pass with diagrammatic example in backpropagation neural network. **[7 marks]** | | | | (b) Design a basic perceptron for an artificial neural network and implement the following functions, specifying the values of weights, bias, threshold, and activation function in each case: (i) NAND function, (ii) XOR function **[8 marks]** | | | | **-----END OF PAPER ----** | |  |  | | |