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| **Q. No** | **Module- 3** |
|  | Examine Wumpus World game problem and explain the steps involved by the agent in the Wumpus World. |
|  | List all the basic symbols used in proposition logic and represent below sentence using proposition symbols.  a. It is cold and dark  b. If I study hard then I get rich  c. Logic is not easy  d. I am breathing if and only if I am alive |
|  | Describe the forward-chaining and backward-chaining algorithms for propositional logic with suitable examples. |
|  | Show the following arguments is valid or not using Truth Table approach  i) If it is humid then it will rain and since it is humid today it will rain  ii) If it is hot and humid then it is not raining |
|  | Explain Wumpus world game problem with diagram and PEAS representation. |
|  | Why proposition logic is required? List all the basic facts about proposition logic with an example. |
|  | Write the Pseudocode for Knowledge Based agent. Describe the components of Knowledge Based System with an example. |
|  | Define the role of Propositional Logic in AI. Translate the following into propositional logic:  a) If it rains, then the ground is wet.  b) It is not raining or it is cloudy. |
|  | Define the resolution principle in FOL. Provide a step-by-step example using resolution refutation to prove a conclusion. |
|  | Given the following facts: 1. John likes all kinds of food. 2. Apples and vegetables are food. 3. Anything anyone eats and isn't killed by is food. 4. Anil eats peanuts and is still alive. 5. Harry eats everything that Anil eats.  prove by resolution that John likes peanuts. |
|  | Explain the syntax and semantics of First Order Logic. Provide suitable examples. |
|  | Define Universal and Existential Instantiation and give examples for both. Prove the  following using Backward and Forward chaining: “As per the law, it is a crime for an American to sell weapons to hostile nations. Country E, an enemy of America, has some missiles, and all the missiles were sold to it by Solan, who is an American citizen”. Prove that “Solan is criminal”. |
|  | Explain First order Logic that converts FOL to propositional logic through Instantiation methods |
|  | Explain in detail Modus Ponens and how it impact inference rules. |
|  | Write the algorithm for Unification process |
|  | Explain in detail resolution principle with suitable examples |

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| **Q. No** | **Module-4** |
|  | Discuss about the language of propositions in probability assertions. |
|  | Find a model for Probability of any Proposition. |
|  | Discuss Basic Probability Notations and define the product rule in basic probability notation. |
|  | Distinguish conditional and unconditional probabilities with examples. |
|  | Define & prove the Bayes’ rule. |
|  | Discuss the cause of uncertainty. |
|  | Given the Join the Probability Distribution Calculate    1. P(Cavity) 2. P(Toothache) 3. P(Cavity V Toothache) 4. P(Cavity | Toothache) |
|  | List and explain basic probability notations used in AI, such as joint, marginal, and conditional probabilities. |
|  | Discuss the problem of Uncertainty and how agents act under uncertainty with one example. |
|  | Explain the concept of Full joint Probability distribution. |
|  | Define Bayes' rule and explain independence in conditional probability with one example |
|  | Explain the concept of independence with suitable AI-based examples. |
|  | Define Bayes’ Theorem. Derive the formula and explain each term using a real-world AI use case. |
|  | What is a full joint probability distribution (FJPD)? Represent the FJPD of two binary variables A and B and discuss how it can be used for inference. |

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| **Q. No** | **Module-5** |
|  | List & explain the types of learning. |
|  | Explain supervised learning and unsupervised learning with examples. |
|  | Define Machine Learning. Explain the various components of a learning system. How do they interact to form a complete machine learning pipeline? |
|  | Discuss the different types of learning in machine learning systems with suitable examples. |
|  | Differentiate between supervised, unsupervised, and reinforcement learning with appropriate use cases and algorithms. |
|  | Discuss the Inductive Learning Framework. Explain its components and workflow  with an example. |
|  | Explain the working of Support Vector Machines (SVM). How does Support Vector Regression differ from classification SVMs? |
|  | Explain K-means and Fuzzy C-means clustering algorithms with examples. |
|  | Discuss the Deductive Learning Framework. Explain its components and workflow  with an example. |
|  | Demonstrate with real world examples for clustering techniques |