(2 ½ Hours)   [Total Marks: 75]
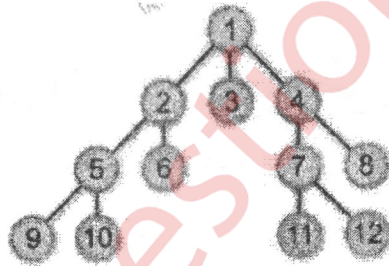
N.B.   1) All questions are compulsory.
        2) Figures to the right indicate marks.
        3) Illustrations, in-depth answers and diagrams will be appreciated.
        4) Mixing of sub-questions is not allowed.

Q. 1   Attempt ANY FOUR from the following: (20M)
(a)   Write States, Initial States, Actions, Transition Model, Goal Test and Path Cost for 8-Queens problem.
(b)   Explain the concept of Depth Limited Search Strategy with suitable example.
(c)   Explain Episodic and Sequential properties of the Task environment along with suitable example.
(d)   Explain the role of Neuroscience field in the foundation of Artificial Intelligence.
(e)   Write short note on Model Based Agents.
(f)   Consider the graph given below. Use Breadth First Search Strategy to traverse by considering Node 1 as starting node and Node 10 as goal node.

Q. 2   Attempt ANY FOUR from the following: (20M)
(a)   What is Feed Forward Neural Network? Write note on Multi-Layer Feed Forward Neural Network.
(b)   What is Regularization? Explain Ridge Regression Technique.
(c)   How does Polynomial Regression model non-linear relationships in data? Why is it effective?
(d)   Explain the architecture of Fuzzy Logic System.
(e)   Write a short note on Gradient Descent.
(f)   What is Reasoning in Artificial Intelligence? Explain Inductive Reasoning with suitable example.

Q. 3 **Attempt ANY FOUR from the following:** (20M)
(a) Explain the concept of Unsupervised Learning.
(b) Write note on Naïve Bayes Model.
(c) Explain the concept of Hidden Markov Model.
(d) Explain the concept of Q-Learning.
(e) Write a short note on Statistical Learning.
(f) Consider the database given below.

Transaction ID	Items
T1	Butter, Curd, Jam
T2	Butter, Curd, Jam, Cake
T3	Curd, Jam, Nuts
T4	Butter, Jam, Cake, Nuts
T5	Cake, Nuts

Calculate:
    i) Support (Butter)
    ii) Support (Curd, Jam)
    iii) Confidence (Butter, Jam)
    iv) Confidence (Jam, Nuts)
    v) Lift (Curd, Jam)

Q. 4 **Attempt ANY FIVE from the following:** (15M)
(a) Write PEAS for Refinery Controller and Satellite Image Analysis System.
(b) Explain Thinking Rationally approach of AI.
(c) Explain the concept of hyperplane and margin with respect to Support Vector Machine.
(d) What is Universal Quantifier? Give example of it.
(e) Explain the concept of Active Reinforcement Learning.
(f) What is Market Basket Analysis?

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