(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)**

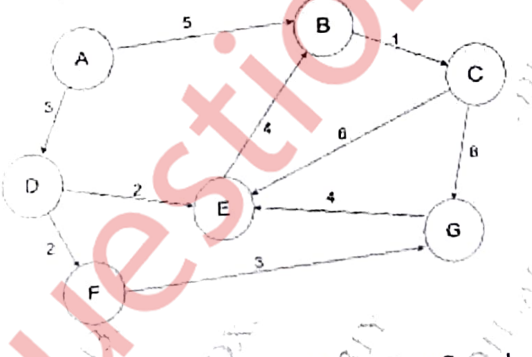
(a) Define AI. State any four applications of AI.

(b) What is PEAS? Mention it for Automated Taxi Driver and Soccer Playing Robot.

(c) Describe a Simple reflex Agent in detail.

(d) Explain following task environments with example.
i. Episodic vs. Sequential
ii. Deterministic vs. Stochastic

(e) Consider the following graph. Let the starting node be A and the goal node be G.



Find the Path Cost using Uniform Cost Search Algorithm.

(f) Explain A* search Algorithm. Also explain conditions of optimality of A*

Q. 2 Attempt ANY FOUR from the following: **(20M)**

(a) Write a short note on the AI Knowledge cycle.

(b) Explain Backpropagation Neural Network.

(c) Write a note on K-Nearest Neighbours.

(d) Explain any 5 membership functions of Fuzzy Logic Systems.

(e) What is Classification in Machine learning? Explain it with one example.

(f) Explain the concept of Regularization.

Q. 3 Attempt ANY FOUR from the following: **(20M)**

(a) Write a short note on the Hidden Markov Model.

(b) Explain Q- Learning in detail.

(c) What is Association rule mining?

(d) Explain Bayesian Learning with an example.

(e) Define Reinforcement Learning. Explain the various terms used in it.

(f) Explain the use of following Metrics used to evaluate the strength of Association Rule Mining with one example.
   i) Support
   ii) Confidence
   iii) Lift

Q. 4 Attempt ANY FIVE from the following: **(15M)**

(a) Explain Acting Rationally approach of AI.
(b) What are the essential Properties of Searching Algorithms?
(c) Differentiate between Inductive and Deductive Reasoning.
(d) Write a note on following
   i) Entropy
   ii) Information Gain
(e) What are hidden variables? Give example.
(f) Write a note on Unsupervised Learning

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