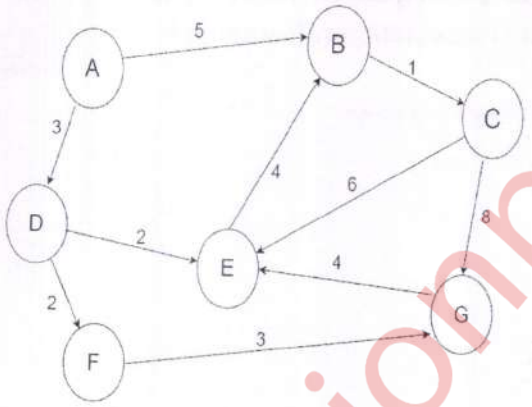
(2 ½ Hours) [Total Marks: 75]

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) Give brief explanation about foundation of AI.
(b) Differentiate between informed and uninformed search.
(c) Define Intelligent agent and explain structure of agent with diagram.
(d) Elaborate 8-puzzle problem with its States, Initial State, Actions, Transition Model and Goal state.
(e) Explain Depth First Search Algorithm with example.
(f) Consider the following graph and given heuristic values. Use the greedy best first search technique and find the path and path cost. Let the starting node be A and the goal node be G.



State	h(n)
A	5
B	3
C	6
D	2
E	3
F	4
G	0

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

(a) Explain the key concepts of propositional logic and demonstrate with examples.
(b) Discuss the various stages of the Knowledge Cycle in AI.
(c) What is bias and variance in the context of machine learning? Discuss the bias-variance trade-off.
(d) Define an Artificial Neural Network and explain its key components.
(e) Give a brief explanation of multi linear regression.
(f) Describe how a Support Vector Machine works, along with an example.

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

(a) What is association rule mining? Give applications of it.
(b) Discuss the concept of reinforcement learning along with its different types.
(c) Give an overview of Hidden Markov Model and discuss its steps.
(d) Explain the Naïve Bayes Classifier and discuss its underlying assumptions.
(e) Provide a detailed explanation of Q-learning and how it works.

(f) For the given transaction data set find the following-
Support(Cheese)
Support(Bread, Cheese)
Confidence(Bread=>Milk)
Lift(Bread=>Milk)
Lift(Cheese=> Juice)

Transaction ID	Items Brought
100	Bread, Cheese
200	Bread, Cheese, Juice
300	Bread , Milk
400	Cheese, Juice, Milk

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

(a) What does PEAS stand for? Explain it with an example.
(b) Explain Discrete vs. Continuous task environment with suitable example.
(c) Define entropy and information gain, and discuss their significance briefly.
(d) List and discuss the types of reasoning.
(e) How do supervised and unsupervised learning differ? Provide a comparison.
(f) What is support, confidence and lift in association rule mining?

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