Paper / Subject Code: 89322 / Artifical Intelligence

Sem VI (R-2019 C Scheme) "ELS" May'2023

5|23

(3 hours) Total Marks: 80

N.B. 1. Question **No. 1** is compulsory
2. Attempt any **three** questions from remaining five questions
3. Assume suitable data if **necessary** and justify the assumptions
4. Figures to the **right** indicate full marks

Q.1 A Draw the diagrams of Goal-based and Utility based Agent 05

B Explain in brief components of Expert system 05

C Convert the following into CNF. 05

i. $((P \rightarrow Q) \wedge \neg Q) \rightarrow \neg P$

ii. $(\neg Q \rightarrow \neg P) \rightarrow (P \rightarrow Q)$

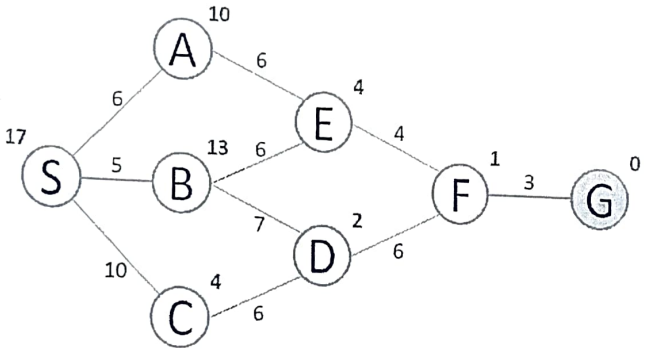
D A jar contains 4 red marbles, 3 blue marbles, and 2 yellow marbles. What is the probability that a red marble is selected and then a blue one **without and with** replacement? 05

Q.2 A Give a complete problem formulation along with the solution for the following problem. 10

"Three missionaries and three cannibals come to a river. A row boat that seats two is available. If the cannibals ever out-number the missionaries on either bank of the river, the missionaries will be eaten."

B Describe the Hill Climbing search. Explain its problem and solution in brief. 10

Q.3 A Perform the A* Algorithm on the following figure. Consider start Node as **'S'** and Goal node as **'G'**. Explicitly write down the queue at each step. 10



Node(n)	h(n)
S	17
A	10
B	13
C	4
D	2
E	4
F	1
G	0

B Describe in detail Alpha-Beta pruning 10

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Q.4 A An ice cream vendor sells three flavors: chocolate, strawberry, and vanilla. Forty five percent of the sales are chocolate, while 30% are strawberry, with the rest vanilla flavored. Sales are by the cone or the cup. The percentages of cones sales for chocolate, strawberry, and vanilla, are 75%, 60%, and 40%, respectively. For a randomly selected sale, define the following events: 10

Use Bayes' Theorem to solve the problem.
A1 = chocolate chosen, A2 = strawberry chosen, A3 = vanilla chosen
B = ice cream on a cone, B^C = ice cream in a cup

i. Find the probability that the ice cream was sold on a cone and was
   a. chocolate flavor
   b. strawberry flavor
   c. vanilla flavor
ii. Find the probability that the ice cream was sold in a cup and was chocolate flavor
iii. Find the probability that the ice cream was sold on a cone.
iv. Find the probability that the ice cream was sold in a cup.
v. Find the probability that the ice cream was chocolate flavor, given that it was sold on a cone

B Write a detail note on Reasoning in Belief Networks 10

Q.5 A What are the different types of planning. Illustrate with examples each type of planning. 10

B Write Short Notes on: 10
   i. Reinforcement Learning
   ii. Ensemble Learning.

Q.6 A For the fact given below : 10

"Anyone passing his history exams and winning the lottery is happy. But anyone who studies or is lucky can pass all his exams. John did not study but John is lucky. Anyone who is lucky wins the lottery."

Prove using Resolution "Is John happy?".

B Explain the following with examples: 10
   i. Syntax
   ii. Semantics
   iii. Tautology
   iv. Entailment

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