



## End Term (Odd) Semester Examination November 2025

Roll no.....

Name of the Course and semester: BCA 3<sup>rd</sup> Semester

Name of the Paper: DSE-2 Foundations of Artificial Intelligence

Paper Code: TBC 311

Time: 3 hour

Maximum Marks: 100

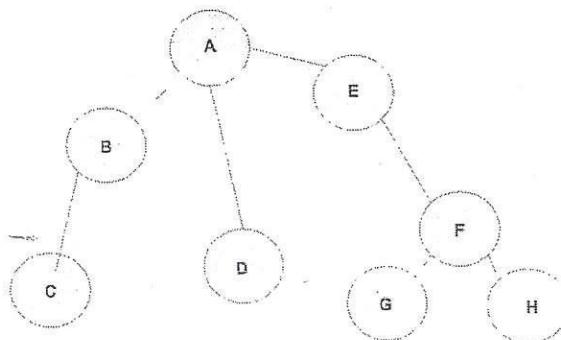
**Note:**

- (i) All the questions are compulsory.
- (ii) Answer any two sub questions from a, b and c in each main question.
- (iii) Total marks for each question is 20 (twenty).
- (iv) Each sub-question carries 10 marks.

Q1.

(2X10=20 Marks)

a. Elaborate the Depth First Search (DFS) algorithm. Apply DFS algorithm on following graph, show all operations to find the goal state:



Find out the time complexity if node 'G' is goal node and node 'A' is start node.

CO3

b. Elaborate on the state space representation in AI. What are the key elements of state space representation. State these elements when using 8-puzzle problem.

CO2

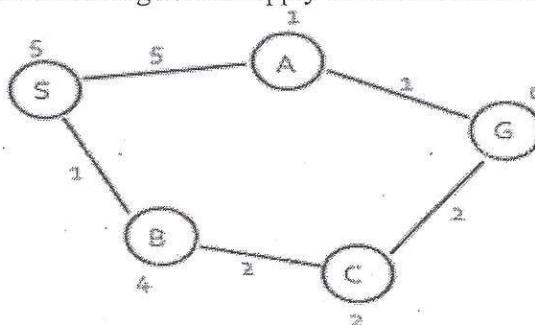
c. State the difference between AI, ML and Deep learning on the basis of their application areas in emerging computer science trend.

CO1

Q2.

(2X10=20 Marks)

a. State and explain best first search algorithm. Apply best first search algorithm on following graph



Find out the cost value and path returned by the algorithm.

CO4



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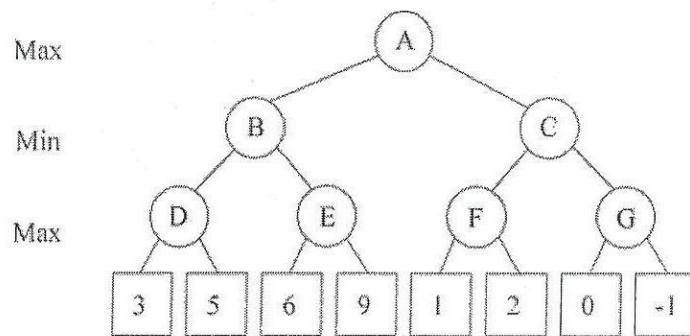
b. Discuss and draw the architecture of intelligent agent. Explain goal based and learning agent with real life examples. CO2

c. What do you mean by Particle Swarm Optimization (PSO) algorithm. Discuss mathematical model for the algorithm. Also, discuss advantages and disadvantage of the algorithm. CO3

Q3.

(2X10=20 Marks)

a. State the Minimax algorithm. Use the Alpha-Beta pruning algorithm to prune the following game tree:



Show all final alpha and beta values computed at root, each internal node explored, and at the top of pruned branches. CO6

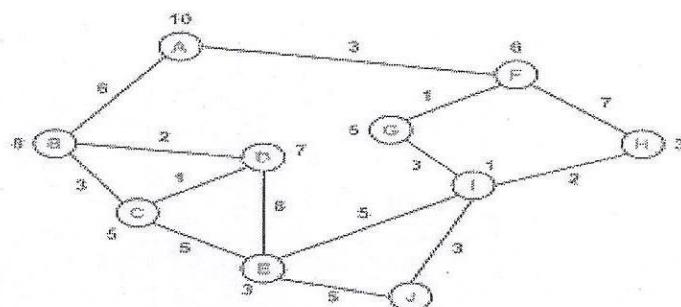
b. What do you mean by heuristic search. How heuristic is useful in artificial intelligence. List down some of the heuristic search algorithms in AI. CO2

c. Elaborate the term Genetic algorithm. Draw flow diagram for the Genetic algorithm. What are the various operators used in Genetic algorithm. CO4

Q4.

(2X10=20 Marks)

a. State and explain A\* algorithm. Consider the following graph:



Find the most cost-effective path from start state 'A' to final state 'J' using A\* algorithm. CO5



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- b. Discuss Bayesian decision theory for decision making. Explain with suitable example. CO3
- c. Differential between the following:  
a) Human intelligence and Artificial Intelligence  
b) Machine Learning and Deep Learning CO2

Q5.

(2X10=20 Marks)

a. What are the different types of knowledge? Explain various Knowledge Representation issues in detail by using associated example. CO3

b. Translate following into predicate logic

- i. Marcus was a man.
- ii. Marcus was a Pompeian.
- iii. All Pompeians were Romans.
- iv. Caesar was a ruler.
- v. All Romans were either loyal to Caesar or hated him. CO5

c. Discuss Hill Climbing algorithm. What are the disadvantages of Hill Climbing algorithm. Discuss with suitable example. How you can overcome the disadvantages of this algorithm. CO4

Note For the question paper setters:

- Question paper should cover all the COs of the course.
- Please specify COs against each question.