

Name:

Enrolment No:



## UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, December 2020

Programme Name: B. Tech. / All Branches

Course Name : Artificial Intelligence

Course Code : MRAI0201

Nos. of page(s) : 04

Semester : III

Time : 03 Hrs

Max. Marks: 100

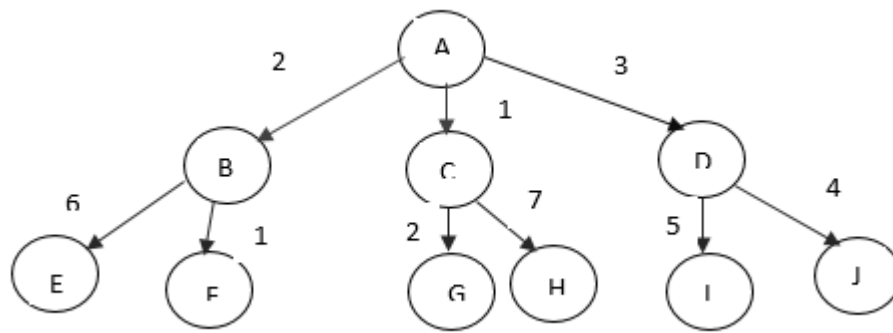
Instructions: Attempt all the questions

### SECTION A

(15 X 2 = 30 Marks)

| S. No. |   | Marks | CO  |
|--------|---|-------|-----|
| Q 1    | (a) The area of AI that investigates methods of facilitating communication between people and computers is<br>(i) Robotics (ii) Decision Support (iii) Symbolic Processing (iv) Natural Language Processing<br><br>(b) Particle Swarm optimization algorithm comes under which category of metaheuristic algorithm<br>(i) Evolutionary (ii) Swarm Intelligence (iii) Physics based (iv) Human based | 5 M   | CO1 |
| Q 2    | (a) Which search method takes less memory?<br>(i) Depth-First Search (ii) Breadth-First search (iii) Optimal search<br>(iv) Linear Search<br><br>(b) Which search is implemented with an empty first-in-first-out queue?<br><br>(i) Depth-first search (ii) Breadth-first search (iii) Bidirectional search<br>(iv) None of these   | 5 M   | CO2 |

|                                      |   |             |            |
|--------------------------------------|---|-------------|------------|
| Q 3                                  | <p>(a) Which of the following primitive defines the statement “Building of new Information from old”.</p> <p>(i) ATRANS (ii) MTRANS (iii) PROPEL (iv) MBUILD</p> <p>(b) Which of the following represents the first order logic form of the following statement?</p> <p style="text-align: center;"><b>“Ram lives in red house”</b></p> <p>(i) lives (Ram, house) <math>\wedge</math> colour (house, red)</p> <p>(ii) lives (Ram, house) <math>\vee</math> colour (house, red)</p> <p>(iii) lives (house, Ram) <math>\vee</math> colour (house, red)</p> <p>(iv) lives (house, Ram) <math>\wedge</math> colour (house, red)</p> | <b>5 M</b>  | <b>CO3</b> |
| Q 4                                  | <p>(a) What are the limitations of the semantic networks?</p> <p>(i) Intractability (ii) Lack in expressing some of the properties (iii) Incomplete (iv) Has memory constraints</p> <p>(b) Convert into FOL form: <b>UPES is an academic institution</b></p> <p>(i) academic institution(UPSE) (ii) UPES(academic institution) (iii) UPES<math>\rightarrow</math> academic institution (iv) None of these</p>   | <b>5 M</b>  | <b>CO3</b> |
| Q 5                                  | <p>(a) Which of the following words cannot be used as variable names or identifiers?</p> <p>(i) yield (ii) assert (iii) nonlocal (iv) all of these</p> <p>(b) What is the answer to this expression, <b>22 % 3</b></p> <p>(i) 7 (ii) 1 (iii) 0 (iv) 3</p>   | <b>5 M</b>  | <b>CO4</b> |
| Q 6                                  | <p>(a) What is the output of the following expression?</p> <p style="text-align: center;"><b>X=1+2**3/4*5</b></p> <p>(i) 10 (ii) 11 (iii) 12 (iv) 13</p> <p>(b) Which one of the following is a valid Python if statement</p> <p>(i) if a&gt;=2: (ii) if (a&gt;=2) (iii) if (a=&gt;2) (iv) if a&gt;=(2)</p>   | <b>5 M</b>  | <b>CO4</b> |
| <b>SECTION B (10 X 5 = 50 Marks)</b> |   |             |            |
| Q 7                                  | <p>Consider the tree shown in figure 1. The numbers on the arcs are the arc length; the heuristic estimates of B = 4, C = 3 and D = 2; all other states have a heuristic estimate of 0. Assume that the children of a node are explained in alphabetical order when no other order is specified by the search and that the goal is state J. No visited or expanded lists are used. In what order would the states be expanded by each type of search (DFS, BFS, best-first search and A*). Write only the sequence of states expanded by each search.</p>   | <b>10 M</b> | <b>CO2</b> |



**Figure 1**

|             |  |                    |                   |
|-------------|--|--------------------|-------------------|
|             | <p style="text-align: center;"><b>Figure 1</b></p>   |                    |                   |
| <p>Q 8</p>  | <p>What is a script? List the components of scripts. Develop a railway ticket reservation script. The following scenes can be considered for the script.</p> <p>(a) Entering the railway station<br/>         (b) Reserving the ticket<br/>         (c) Checking the ticket<br/>         (d) Leaving the station</p> | <p><b>10 M</b></p> | <p><b>CO3</b></p> |
| <p>Q 9</p>  | <p>(a) Write a Python program to generate Fibonacci series.<br/>         (b) Draw a flow chart and write a python program to enter a number and print small if the number is less than 5, print medium if the number is between 5 and 10, print large if the number is greater than 10.</p>                          | <p><b>10 M</b></p> | <p><b>CO4</b></p> |
| <p>Q 10</p> | <p>Differentiate the following:</p> <p>(a) Depth first search and Breadth first search algorithm<br/>         (b) Best first search and A* algorithm<br/>         (c) MIN-MAX algorithm and Alpha-Beta Pruning algorithm<br/>         (d) A* and AO* algorithm</p>   | <p><b>10 M</b></p> | <p><b>CO2</b></p> |
| <p>Q 11</p> | <p>Elucidate No Free Lunch Theorem. Illustrate the mathematical model and pseudo code of genetic algorithm.</p>  | <p><b>10 M</b></p> | <p><b>CO1</b></p> |

**SECTION C****(20X1 = 20 Marks)**

|      |  |             |            |
|------|--|-------------|------------|
| Q 12 | <p>(a) Explain the concept of resolution in predicate logic. Consider the following facts:</p> <ul style="list-style-type: none"><li>(a) John likes all kinds of pets.</li><li>(b) Dogs are pets.</li><li>(c) Cats are pets.</li><li>(d) Any animal anyone owns and is not killed is a pet.</li><li>(e) Reji owns a goat and is still alive.</li><li>(f) Vinod owns everything Reji owns.</li></ul> <p>(i) Translate the facts into formulae in predicate logic.<br/>(ii) Convert the formulae into clausal form.<br/>(iii) Prove that Jack likes goats using resolution</p> <p>(b) What do you understand by semantic network? Express the following statements as semantic network in short form.</p> <ul style="list-style-type: none"><li>(i) A house is a (kind of) building</li><li>(ii) A house has at least one storey (the number of storeys of a house is one or more)</li><li>(iii) A house is used for living in</li><li>(iv) A single-storey dwelling is a (kind of) house</li><li>(v) A single-storey dwelling has one storey</li><li>(vi) My house is an instance of a single-storey dwelling</li><li>(vii) My house has its roof colour red.</li><li>(viii) My house has its walls made of brick</li></ul> | <b>20 M</b> | <b>CO3</b> |
|------|--|-------------|------------|