# Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058, India
(Autonomous College Affiliated to University of Mumbai)

## End Semester Examination

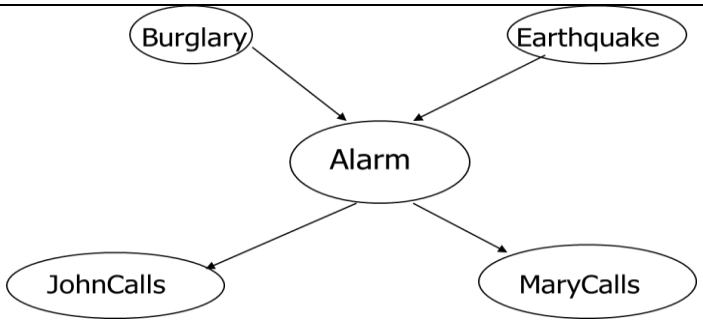
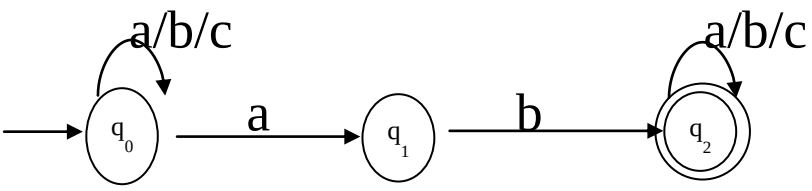
Nov 2020

Max. Marks: 60 Duration: 2 Hrs.
Semester: III Class: S.Y.
Course Code: MCA43 Branch: M.C.A.
Name of the Course: Artificial Intelligence

Instruction:
(1) All questions are compulsory
(2) Draw neat diagrams
(3) Assume suitable data if necessary

| Q. No. | | Max. Mark | CO-BL |
|---|---|---|---|
| Q. 1 a) | Fill in the blanks<br>i) Artificial intelligence is mimicking _____.<br>ii) Bayesian network is _____ graph.<br>iii) A frame represents _____.<br>iv) A semantic network is an irregular graph that has _____ in vertices and _____ on arcs | 5 | 1-2 |
| 1 b) | What are the types of agents? Describe the structure of agents and their architecture.<br>OR<br>Specify the task environment using PEAS. | 5 | 1-2 |
| | | | |
| Q. 2 a) | Write a comparison between following. (Any Two) (Write any three points of differentiations only)<br>a) Breadth First Search and Depth First Search<br>b) Depth Limited Search and Depth First Iterative Deepening<br>c) Branch & bound and A* search<br>d) Forward and backward chaining. | 6 | 2-2 |
| 2 b) | Consider the water jug problem: you are given 2 jugs, a 4 gallon and 3-gallon jugs. Neither has any measuring mark in it. There is a pub that can be used to fill the jugs with the water. How can you get exactly 2-gallon of water into a 4-gallon of jug? State the production rules for water jug problem.<br>OR<br>Explain Alpha beta pruning with appropriate example | 6 | 2-4 |

<table>
<tr>
<td>2 c)</td>
<td>Explain the concept of minimax algorithm with suitable example.<br>OR<br>Solve the following 15-puzzle problem Using branch and bound technique, up to 3 iterations.<br>Initial state:<br>
<table>
<tr><td></td><td>1</td><td>2</td><td>3</td></tr>
<tr><td>5</td><td>6</td><td>11</td><td>4</td></tr>
<tr><td>10</td><td>9</td><td>7</td><td>8</td></tr>
<tr><td>12</td><td>13</td><td>14</td><td>15</td></tr>
</table>
<br>Goal state:<br>
<table>
<tr><td>1</td><td>2</td><td>3</td><td>4</td></tr>
<tr><td>5</td><td>6</td><td>7</td><td>8</td></tr>
<tr><td>9</td><td>10</td><td>11</td><td>12</td></tr>
<tr><td>13</td><td>14</td><td>15</td><td></td></tr>
</table>
</td>
<td>6</td>
<td>2-4</td>
</tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr>
<td>Q. 3 a)</td>
<td>Using the suggested abbreviations (the capitalized words), translate each of the following into the language of predicate logic.<br>i) All HORSES and COWS are FARM animals.<br>ii) All CATS and DOGS make EXCELLENT pets.<br>iii) RAINY days and MONDAYS always get me DOWN.<br>iv) CATS and DOGS are the only SUITABLE pets.<br>v) The only PERSONS INSIDE are MEMBERS and GUESTS.<br>vi) The only CATS and DOGS that are SUITABLE pets are the ones that have been HOUSE-trained.<br>vii) CATS and DOGS are the only ANIMALS that are SUITABLE pets.<br>viii) CATS and DOGS that have RABIES are not SUITABLE pets.<br><br>OR<br>Consider the following probabilities and find the complete probability distribution over P(fever, cold, flu, malaria)<br><br>P(¬fever | cold, ¬flu, ¬malaria) = 0.6<br>P(¬fever | ¬cold, flu, ¬malaria) = 0.2<br>P(¬fever | ¬cold, ¬flu, malaria) = 0.1</td>
<td>6</td>
<td>3-4</td>
</tr>
</table>

| | | | |
|---|---|---|---|
| 3 b) | Consider the following Rommmate world,<br>i) Convert sentences in FOL<br>ii) Convert the knowledgebase in CNF<br>iii) Conclude that "Sprinklers are on" ? (Use resolution )<br>– Your roommate is wet<br>– If your roommate is wet, it is because of rain, sprinklers, or both<br>– If your roommate is wet because of sprinklers, the sprinklers must be on<br>– If your roommate is wet because of rain, your roommate must not be carrying the umbrella<br>– The umbrella is not in the umbrella holder<br>– If the umbrella is not in the umbrella holder, either you must be carrying the umbrella, or your roommate must be carrying the umbrella<br>– You are not carrying the umbrella | 4<br>2<br>3 | 3-4 |
| 3 c) |  <br>Consider the above Bayesian network of probability, in this context explain types of inferences.<br>i) Diagnosis inferences<br>ii) Causal inferences<br>iii) Intercausal inferences<br>iv) Mixed inferences<br>**OR**<br>Draw a frame system for hotel room. (consider the room with your own assumptions. | 6 | 3-4 |
| 3 d) | "Moti, the white dog on the porch, eats a bone."<br>Draw a conceptual graph for above knowledgebase.<br>OR<br>  | 3 | 3-4 |

| | | | |
|---|---|---|---|
| | Give any three strings which are accepted by above automata. | | |
| | | | |
| Q 4 a) | In terms of Blocks world domain, give the forward state space planning. | 4 | 4-3 |
| 4 b) | Write the detailed case study on any of the AI application. | 4 | 5-3 |