

JK LAKSHMIPAT UNIVERSITY, JAIPUR
INSTITUTE OF ENGINEERING AND TECHNOLOGY
End Term Examination (Regular/ BackLog), November-December 2017
B. Tech in Computer Science Engineering, Semester VII

Roll No.....

CSE703 : ARTIFICIAL INTELLIGENCE

Time: 3 hours

Max. Marks: 100

Instructions to students:

1. Do not write anything other than your roll number on question paper.
 2. Assume suitable data wherever required and mention it clearly.
 3. Writing appropriate units, nomenclature, and drawing neat sketches/schematics/ flow chart wherever, required are an integral part of the answer.
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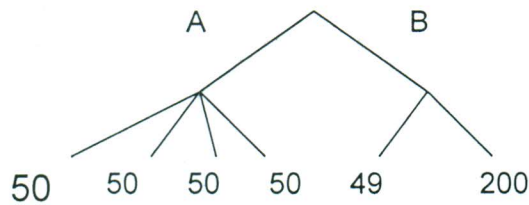
Q.1A Objective type multiple choice questions (10 questions @ 1 mark)

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- i. The traveling salesman problem involves n cities with paths connecting the cities. The time taken for traversing through all the cities, without knowing in advance the length of a minimum tour, is
(a) $O(n)$; (b) $O(n^2)$; (c) $O(n!)$; (d) $O(n/2)$; (e) $O(2n)$.
- ii. Fuzzy logic is a form of a) Two-valued logic; b) Crisp set logic; c) Many-valued logic; d) Binary set logic
- iii. Accuracy in machine learning is
a) The percentage of predictions that are correct;
b) The percentage of positive predictions that are correct;
c) The percentage of positive cases that were predicted as positive;
d) The percentage of negative cases that were predicted as negative;
- iv. What is a Cybernetics?
(a) Study of communication between two machines
(b) Study of communication between human and machine
(c) Study of communication between two humans
(d) Study of Boolean values
(e) Study of communication between logic circuits.
- v. Knowledge may be
I. Declarative.
II. Procedural.
III. Non-procedural.
(a) Only (I) above
(b) Only (II) above
(c) Only (III) above

- (d) Both (I) and (II) above
 (e) Both (II) and (III) above.

vi Given a choice between moves A and B in the following tree, which would minimax choose (assuming MAX is to move at the root)?



a) A; b) B ; c) None of them are feasible

vii In A* approach evaluation function is

- a) Heuristic function
 b) Path cost from start node to current node
 c) Path cost from start node to current node + Heuristic cost
 d) Average of Path cost from start node to current node and Heuristic cost

viii Which of the following statements is *not* true of Bayesian learning?

- a) Prior knowledge can be combined with observed data to determine hypotheses
 b) They can accommodate hypotheses that make probabilistic predictions
 c) It is computationally feasible to estimate the required probabilities by counting in training data
 d) New instances can be classified by combining the predictions of multiple hypotheses, weighted by their probabilities

ix Which is used to improve the performance of heuristic search?

- a) Quality of nodes; ; b) Quality of heuristic function; c) Simple form of nodes;
 d) None of the mentioned

x What kind of observing environments are present in artificial intelligence?

- d) a) Partial; b) Fully; c) Learning; d) Both a & b

Q.2 Short answer type questions (4 questions @ 2.5 marks)

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- i. What do you understand by Knowledge and Deduction? Explain giving an example.
- ii. List the 4 properties any Knowledge Representation system should possess.
- iii. Define in your own words: (a) intelligence, (b) agent, (c) rationality
- iv. Can following computer systems be considered as instances of artificial intelligence? Justify your Answer.
 - Voice-activated telephone menus.
 - Internet routing algorithms that respond dynamically to the state of the network.

Q.3A Give a PEAS description of Car moving on a road without human driver.

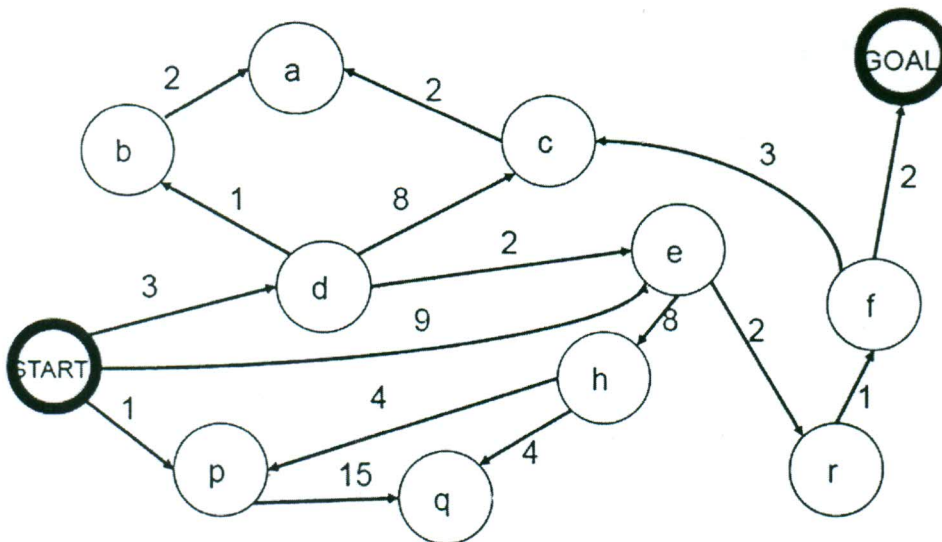
05

Q.3 B Write down the difference between Informed and Informed Search stating disadvantages and advantages of each. 05

Q.4A Write down State-Space Search Steps for 8-Puzzle Problem. 05

Q.4B Comment on the statement related to search algorithm: "Is the algorithm guaranteed to terminate". Give an example where algorithm need not Terminate. 05

Q.5A Perform Uniform cost search on the following graph. Uniform cost search is blind search. How? 05



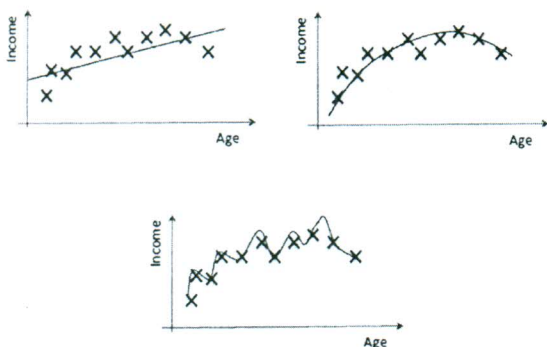
Q.5B Breadth First Search guarantees Solution but it may not be optimal. Prove the statement. 05

Q.6A Differentiate Between Supervised Learning and Unsupervised Learning Machine Learning Techniques giving one example of each. 05

Q.6B Explain the steps in application of Machine Learning Technique on a dataset. 05

OR

Q.6B Explain the concept of High Bias (under-fitting), Just Right and High Variance (over-fitting) with respect to following graphs. 05



- Q.7A Explain Speech Recognition/Image Processing with respect to following aspects. 05
1. Identify one utility.
 2. Characterize the operating environment.
 3. How can one evaluate the performance of the utility?
 4. What sorts of technologies are available to compare speeches?
- Q.7B Write predicates / rules for following Russel's Paradox: 05
- There is a single Barber in town.
 - Those and only those who do not shave themselves are shaved by barber.
- Who shaves the barber?
- OR
- Q.7B Assume internet Shopping Agent.
1. What are the percepts for this agent?
 2. Characterize the operating environment.
 3. What are the actions the agent can take?
 4. How can one evaluate the performance of the agent?
 5. What sort of agent architecture do you think is most suitable for this agent?
- Q.8A Given a full 5-gallon jug and an empty 2-gallon jug, the goal is to fill the 2-gallon jug with exactly one gallon of water. You may use the following state space formulation. State = (x,y) , where x is the number of gallons of water in the 5-gallon jug and y is # of gallons in the 2-gallon jug 10
- Initial State = $(5,0)$
- Goal State = $(*,1)$, where $*$ means any amount
- Create the search tree. Discuss which search strategy is appropriate for this problem.
- Q.9A Explain following critical Properties of Search Algorithm with respect to BFS, DFS, Uniform Cost Search and A* Algorithm. Completeness, Optimality, Time Complexity and Space Complexity. 10
- Q.9B Consider a vocabulary with the following symbols: 10
- Occupation(p, o): Predicate. Person p has occupation o .
- Customer(p_1, p_2): Predicate. Person p_1 is a customer of person p_2 . Boss(p_1, p_2): Predicate. Person p_1 is a boss of person p_2 .
- Doctor, Surgeon, Lawyer or, Actor: Constants denoting occupations. Emily, The: Constants denoting people.
- Use these symbols to write the following assertions in first-order logic:
- a. Emily is either a surgeon or a lawyer.
 - b. Joe is an actor, but he also holds another job,
 - c. All surgeons are doctors.
 - d. Joe does not have a lawyer (i.e., is not a customer of any lawyer).
 - e. Emily has a boss who is a lawyer.

OR

Q.9B

- What do you understand by Adversarial Search.
- What is the role of Minimax algorithm in Adversarial Search?
- Alpha-Beta Pruning over MiniMax Algorithm reduces Time complexity.
Comment on the statement showcasing pruning on the following graph:

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