



**B.E DEGREE EXAMINATIONS: MAY 2018**

(Regulation 2015)

Sixth Semester

**COMPUTER SCIENCE AND ENGINEERING**

U15CST601: Artificial Intelligence

**COURSE OUTCOMES**

- CO1:** Demonstrate awareness of intelligent agents and problem solving using uninformed, informed and local search methods
- CO2:** Describe about adversarial search and constraint satisfaction problem solving
- CO3:** Develop knowledge about usage of propositional logic and first order logic for making inferences
- CO4:** Describe the use of planning and simple decision making
- CO5:** Explain about various learning methods
- CO6:** Make use of programming languages to implement AI problems

**Time: Three Hours**

**Maximum Marks: 100**

**Answer all the Questions:-  
PART A (10 x 1 = 10 Marks)**

1. Match the following

CO1 [K1]

List I		List II	
A.Rational agent		i. Filtering algorithm	
B .agent		ii. agent function	
C. agent program		iii. does right thing	
D. tracking uncertain events		iv. perceives and acts in an environment	

- |    | A   | B  | C   | D  |
|----|-----|----|-----|----|
| a) | ii  | i  | iii | iv |
| b) | iii | iv | ii  | i  |
| c) | ii  | iv | iii | i  |
| d) | iii | i  | ii  | iv |

2. Which search uses the problem specific knowledge beyond the definition of the problem?

CO1 [K<sub>2</sub>]

- |                         |                       |
|-------------------------|-----------------------|
| a) Informed search      | b) Depth-first search |
| c) Breadth-first search | d) Uninformed search  |

3. What is the term used for describing the judgmental or commonsense part of problem solving? CO2 [K<sub>1</sub>]
- a) Heuristic b) Critical  
 c) Value based d) Analytical
4. The term \_\_\_\_\_ is used for a depth-first search that chooses values for one variable at a time and returns to previous level when it reaches the leaf node. CO2 [K<sub>1</sub>]
- a) Forward search b) Backtrack search  
 c) Hill algorithm d) Reverse-Down-Hill search
5. Which is called as single inference rule? CO3 [K<sub>2</sub>]
- a) Reference b) Resolution  
 c) Reform d) None of the mentioned
6. What will backward chaining algorithm return? CO3 [K<sub>1</sub>]
- a) Additional statements b) Substitutes matching the query  
 c) Logical statement d) All of the mentioned
7. What are taken into account of state-space search? CO4 [K<sub>1</sub>]
- a) Post-conditions b) Pre-conditions  
 c) Effects d) Both Preconditions & Effects
8. \_\_\_\_\_ theory describes how a rational agent should act CO4 [K<sub>1</sub>]
- a) Utility theory b) Expected utility  
 c) Normative theory d) Learning
9. Decision Tree is a CO5 [K<sub>1</sub>]
- a) Flow-Chart b) Structure in which internal node represents test on an attribute, each branch represents outcome of test and each leaf node represents class label
- c) Flow-Chart & Structure in which internal node represents test on an attribute, each branch represents outcome of test and each leaf node represents class label d) Graph
10. Where is the bayes rule used? CO5 [K<sub>2</sub>]
- a) Solving queries b) Increasing complexity  
 c) Decreasing complexity d) Answering probabilistic query

**PART B (10 x 2 = 20 Marks)**

**(Answer not more than 40 words)**

- |  |     |                   |
|--|-----|-------------------|
| 11. Outline four basic kinds of agent programs.                            | CO1 | [K <sub>2</sub> ] |
| 12. Name the factors used to choose the best search algorithm.             | CO1 | [K <sub>2</sub> ] |
| 13. How do you define a game as a kind of search problem?                  | CO2 | [K <sub>2</sub> ] |
| 14. Define CSP.  | CO2 | [K <sub>1</sub> ] |
| 15. Define knowledge base.   | CO3 | [K <sub>1</sub> ] |
| 16. Distinguish between forward chaining and backward chaining.            | CO3 | [K <sub>2</sub> ] |
| 17. When does a mutual relation hold between two actions at a given level? | CO4 | [K <sub>2</sub> ] |
| 18. What is rational agent?  | CO1 | [K <sub>1</sub> ] |
| 19. Illustrate the decision network for the airport sitting problem.       | CO5 | [K <sub>2</sub> ] |
| 20. What is reinforcement learning?  | CO5 | [K <sub>2</sub> ] |

**Answer any FIVE Questions:-**

**PART C (5 x 14 = 70 Marks)**

**(Answer not more than 300 words)**

**Q.No. 21 is Compulsory**

- |  |     |                   |
|--|-----|-------------------|
| 21. Describe the concept of learning using decision trees with a suitable example.   | CO5 | [K <sub>2</sub> ] |
| 22. With neat schematic diagram explain the basic principle of different kinds of agent programs used in intelligent systems.  | CO1 | [K <sub>2</sub> ] |
| 23. Explain Alpha-Beta pruning algorithm with suitable example.  | CO2 | [K <sub>2</sub> ] |
| 24. Consider a vocabulary with the following symbols:<br>Occupation(p,o):Predicate.person p has occupation o<br>Customer(p1,p2 ):Predicate. Person p1 is a customer of person p2<br>Boss(p1,p2 ):Predicate.person p1 is a boss of person p2<br>Doctor,surgeon,lawyer,actor: constants denoting occupations<br>Emily,Joe:constants denoting people<br>Use the symbols to write the following assertions in first order logic:<br>a) Emily is either a surgeon or a lawyer<br>b) Joe is an actor, but he also holds another job<br>c) All surgeons are doctors | CO3 | [K <sub>3</sub> ] |

- d) Joe does not have a lawyer
- e) Emiley has a boss who is a lawyer
- f) There exists a lawyer al of whose customers are doctors
- g) Every surgeon has a lawyer

25. Consider the problem of changing a flat tire. The goal is to have a good spare tire properly mounted onto the car's axle, where the initial state has a flat tire on the axle and a good spare tire in the trunk. There are four actions: removing the spare from the trunk, removing the flat tire from the axle, putting the spare on the axle and leaving the car unattended overnight. We assume that the car is parked in a bad neighborhood. So that the effect of leaving it overnight is that the tires disappear. Write PDDL description to solve this planning problem. CO4 [K<sub>3</sub>]
26. Explain how Bayesian N/W useful to represent knowledge in uncertain domain using burglary alarm problem? CO5 [K3]
27. Discuss in detail about heuristic search strategies with example. CO1 [K<sub>2</sub>]

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