## BE2-R3: ARTIFICIAL INTELLIGENCE AND APPLICATION

**NOTE:**

1. **Answer question 1 and any FOUR questions from 2 to 7.**
2. **Parts of the same question should be answered together and in the same sequence.**

**Time: 3 Hours** **Total Marks: 100**

**1.**

a) Define Horn's clause. What are its implications?

b) In Baye's net, what is the metric used to score candidate's networks if the network structure is not known? Explain.

c) What is a uniform cost search? Write down its difference with Breadth-First-Search.

d) Explain semantic grammar used in parsing phase of natural language processing. Write down its advantages and disadvantages.

e) Among the semantic net and frame, which structure is mostly used and why?

f) What is the strategy used in MINIMAX procedure? How can you include two bounds in the above procedure?

g) Differentiate between forward reasoning and backward reasoning. What are the factors that influence to use any one of the two?

**(7x4)**

**2.**

a) Give the architecture of expert system. Describe the functions of each component.

b) In A * algorithm the heuristic has to always underestimate. Justify your answer. Illustrate the conditions where A * produces optimum result.

**(10+8)**

**3.**

a) What is Hill Climbing approach with reference to heuristic search? How does it vary from Generate and Test method? When does this method fail to find the solution explain?

b) State how to solve 8-puzzle problem using Hill Climbing? State a heuristic function that makes this work? Assuming that the following start and goal state, draw the state space graph for 8-puzzle problem.

| | | |
|---|---|---|
| 1 | 2 | 3 |
| 8 | 5 | 6 |
| 4 | 7 | |

| | | |
|---|---|---|
| 1 | 2 | 3 |
| 4 | 5 | 6 |
| 7 | 8 | |

**(9+9)**

**4.**

a) What is the Best First Search procedure? Mention the heuristic function of this procedure? "This procedure is very similar to the procedure for Steepest Ascent Hill Climbing with two exceptions" – write down the exceptions.

b) Rewrite the following sentences into first order predicate logic:

i) Coconut crunchy is a biscuit.

ii) Mary is a child who likes Coconut crunchy

iii) John loves children who take biscuit

iv) John loves Mary

And convert each one of them into Well Formed Formula (WFF).

**(9+9)**

**5.**

a) Discuss Explanation Based Learning with the help of tree structure. Give appropriate example for this.

b) How can you classify knowledge representation? Write down their desirable characteristics.

**(9+9)**

**6.**

a) What are the drawbacks in the Back propagation Training algorithm? Explain the ways to overcome the local minima problem.

b) After your annual check up, the doctor has both good and bad news for you. The bad news is that you tested positive for serious disease and that test is 99% accurate (i.e. probability of testing positive gives you that you have the disease 0.99.) The good news is that this is a rear disease striking only 1 in 10 thousand. What is the change you actually have the disease.

c) Find a most general unifier (m.g.u) for w={P(a,x,f(g(y))), P(z,f(z),f(u))}

**(6+6+6)**

**7.**

a) Write a PROLOG/LISP program to find the largest element of a list.

b) Write a PROLOG/LISP program to find all prefixes of a list.

c) What is a Hopfield Network? How is it used in learning a network?

**(6+6+6)**