

## BE2-R4: ARTIFICIAL INTELLIGENCE AND NEURAL NETWORKS

### NOTE:

1. Answer question 1 and any FOUR from questions 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) What are the problems associated with Hill climbing?
  - b) Describe the means end analysis approach to problem solving.
  - c) What is a semantic net? Explain with an example.
  - d) Explain briefly the MinMax search process by taking an example.
  - e) What is output of following PROLOG segment?  
alpha ([ ], M, M).  
alpha ([X|M1, M2, [X|M3]):- alpha (M1, M2, M3).  
? – alpha ([a, b, c], [c, d, e], P).
  - f) Name the Strips Style operators used in Blocks World Planning.
  - g) Draw Fuzzy membership function for speed which have three levels – slow, moderate and fast.  
**(7x4)**
  
2.
  - a) How will you represent resolution in Predicate logic?
  - b) Discuss the approaches for representation of knowledge in a particular domain?
  - c) Represent the following facts in predicate logic:
    - i) Marcus was a man.
    - ii) Marcus was a Pompeian.
    - iii) All men are mortal.
    - iv) All doctors are not quacks.
    - v) Everyone loves somebody.**(4+4+10)**
  
3.
  - a) A problem solving search can proceed either forward (from a known state to a desired goal state) or backward (from a goal state to a start state). What factors determine the choice of direction for a particular problem?
  - b) You are given two jugs, a 4-gallon one and a 3-gallon one. Neither have any measuring markers on it. There is a tap that can be used to fill the jugs with water. How can you get exactly 2 gallons of water into the 4-gallon jug? Solve the problem using State Space search.  
**(8+10)**
  
4.
  - a) Describe alpha-beta pruning algorithm.
  - b) Draw a Recursive Transition Network (RTN) to handle following sentences:
    - i) The small boy loves his big dog.
    - ii) Latika wants a cake.
    - iii) Ram is happy.
    - iv) Suresh knocked on the door near the stair case.Explain how **i)** and **iv)** are handled by your RTN.  
**(10+8)**

5.

- a) Define conflict resolution. Show how it is used in knowledge representation.
- b) Show how constraint satisfaction can be used to solve this problem. Show first four steps.
  - i)        S E N D
  - ii)      + M O R E
  - iii)     -----
  - iv)      M O N E Y
- c) Construct semantic network for the following sentences:
  - i)        Person is a mammal.
  - ii)      Pee is a person.
  - iii)     Pee is in team Brooklyn,
  - iv)      Pee's uniform color is blue.
  - v)       Zee is Pee's friend.
  - vi)     Zee is a person.

**(6+6+6)**

6.

- a) Block A is lying on table. Block B is lying on top of A and Block F is lying on table. Use Goal Stack planning to show how the state can be changed to a different one where both A and F are lying on table and block B is lying on top of F.
- b) Write a PROLOG segment which removes all occurrences of an element from a list. Thus given the list [T, K, M, K, P, T, K] and the element K, it should result in the list [T, M, P, T].

**(9+9)**

7.

- a) Explain A\* algorithm for searching path from initial State to Goal. Take a small example to illustrate.
- b) Explain the Back propagation algorithm in detail.

**(8+10)**