

Roll No.

Total Pages : 4

BT-7/D-17

37026

ARTIFICIAL INTELLIGENCE

Paper : IT-473

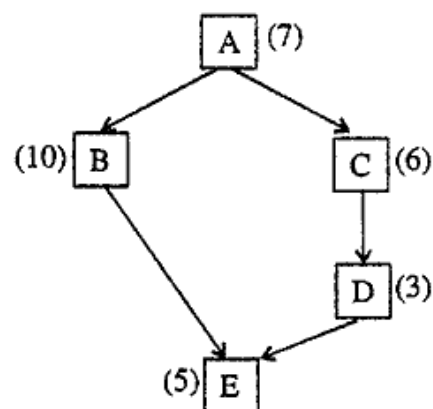
Time : Three Hours]

[Maximum Marks : 100

Note : Attempt any *five* questions. All questions carry equal marks.

1. (a) Give an example of an admissible heuristic for the 8-puzzle. 10
- (b) The AO* algorithm, in step 2(C)i, requires that a node with no descendants in S be selected from S, if possible. How should the manipulation of S be implemented so that such a node can be chosen efficiently ? Make sure that your technique works correctly on the following graph, if the cost of node E is changed :

10



2. (a) Implement the Alpha-beta search procedure. Use it to play a simple game such as tic-tac-toe. 10
- (b) How would the min-max algorithms have to be modified to be used by a program playing a three or four-person game rather than a two-person one ? 10
3. (a) If a problem-solving search program were to be written to solve each of the following types of problems, determine whether the search should proceed forward or backward :
 - (i) Water jug problem.
 - (ii) Blocks world.
 - (iii) Natural language understanding. 10
- (b) Show how a JTMS/ATMS could be used in medical diagnosis. Consider rules such as, "If you have a runny nose, assume you have a cold unless it is allergy season." 10
4. The classic example of non-monotonic reasoning involves birds and flying. In particular, consider the following facts :
 - * Most things do not fly.
 - * Most birds do fly, unless they are too young or dead or have a broken wing.
 - * Penguins and ostriches do not fly.
 - * Magical ostriches fly.
 - * Tweety is a bird.
 - * Chirpy is either a penguin or an ostrich.
 - * Feathers is a magical ostrich.

Use one or more of the non-monotonic reasoning systems to answer the following questions :

- Does tweety fly ?
- Does chirpy fly ?
- Does feathers fly ?
- Does paul fly ?

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5. The sliding tile puzzle consists of three black tiles, three white tiles, and an empty space in the configuration shown in figure below : <http://www.kuonline.in>

B	B	B		W	W	W
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Figure

The puzzle has two legal moves with associated costs. A tile may move into an adjacent empty location. This has a cost of 1. A tile can hop over one or two other tiles into the empty position. This has a cost equal to the number of tiles jumped over. The goal is to have all the white tiles to the left of all the black tiles. The position of the blank is not important.

Analyse the state space with respect to complexity and looping.

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5. Consider the problem of swapping the contents of two registers, A and B. Suppose that there is available the single operator ASSIGN (x, v, lv, ov), which assigns the value v , which is stored in location lv , to location x , which previously contained the value ov :

ASSIGN (x, v, lv, ov)

P : CONTAINS (lv, v) \wedge CONTAINS (x, ov)

D : CONTAINS (x, ov)

A : CONTAINS (x, v)

Assume that there is at least one additional register, C, available.

- (a) What would STRIPS do with this problem ?
- (b) What would TWEAK do with this problem ?
- (c) How might you design a program to solve this problem ?

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7. (a) A sporting goods company believes that it might be losing potential new customers due to the lack of expertise, on the part of its sales force, in taking orders over the telephone. Might this be a good application for expert systems ? If so, how would you suggest that the resultant expert system's performance be validated ?

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- (b) How is machine learning distinguished from general knowledge acquisition ?

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8. For each of the following sentences, show a parse tree. For each of them, explain what knowledge, in addition to the grammar of English, is necessary to produce the correct parse.

-John wanted to go to the movie with Sally.

-John wanted to go to the movie with Robert Redford.

-I heard the story listening to the radio.

-I heard the kids listening to the radio.

-All books and magazines that come out quarterly have been removed from the shelves.

-All books and magazines that deal with controversial topics have been removed from the shelves.

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