



11. (a) (i) Outline the components and functions of any one of the basic kinds of agent programs. (8)

(ii) Fig.11 a(ii) shows a 15-node state space. Node 12 is the goal node. Work out the order in which the nodes will be visited for

(1) Breadth first search and

(2) Depth first search

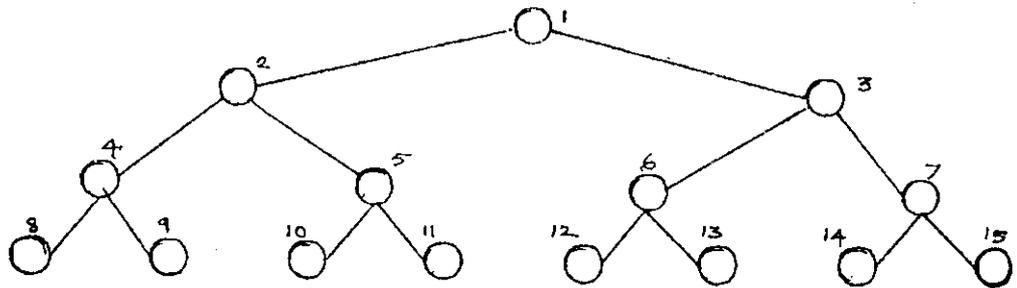


Fig. 11(a) (ii). A 15-node Tree

(8)

Or

(b) (i) Explain the main points concerning

(1) The PEAS specification of the task environment of an agent, and

(2) The dimensions along which the properties of task environments are categorized. (8)

(ii) Describe the procedure for performing Iterative deepening depth first search. Assume a tree configuration of your choice and a depth limit of 2. (8)

12. (a) (i) Refer to Fig. 12 (a) (i). Work out the sequences in which A\* search will proceed from the initial state at 'C' and reach goal 'G'. For each node in each stage obtain cost estimates, viz. :

$g(n)$  = cost of moving from the initial state to node 'n'.

$h(n)$  = cost of moving from node 'n' to the goal.

$$f(n) = g(n) + h(n)$$

In fig. 12 (a) (i), the numeral by the side of an arc, gives the cost of moving from the node at one end of the arc to that at the other end.

The numeral at a node is the  $h(n)$  for that node. (8)

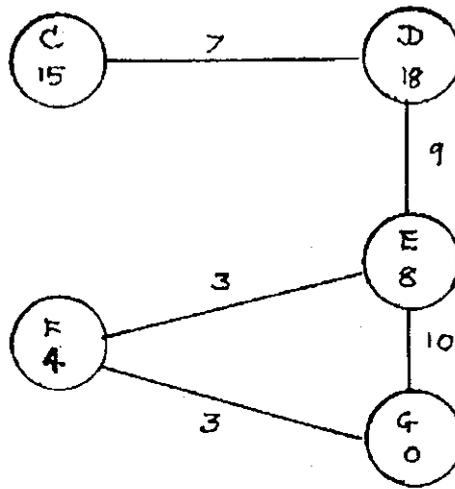


Fig.12 (a) (i)

- (ii) Explain the main steps of the Hill climbing search algorithm. (8)

Or

- (b) (i) Explain how a constraint satisfaction problem (CSP) may be solved. (8)
- (ii) Describe any one algorithm for determining optimal moves in an adversarial search (games). (8)

13. (a) (i) Outline the main steps of the knowledge engineering process for creating a knowledge base in first order logic. (8)

(ii) Represent the following sentences in first order logic :

(1) All teachers of sigma engineering college (SEC) love their students.

(2) No student lacks the potential for achievement (Pfa)

(3) C1 is the child of F1

F1 is the father of C1.

(4) Engineering students are eligible to become student members (SM) of Indian Society for Technical Education. (ISTE).

You may use the following basic vocabulary for the First Order Logic

sentences :

Teacher (x, SEC); student (y,x) ;

Student (x); Lacks (x, Pfa);

Engg student (x); Eligible (x, SM, ISTE)

Other predicates needed for the first order logic sentences may be defined and used by you appropriately. (8)

Or

(b) (i) Converting the following first order logic sentences to conjunctive normal form (CNF) and then applying resolution rule prove the validity of the conclusion  $C(x,y)$  :

$A(x)$

$B(y)$

$A(x) \wedge B(y) \Rightarrow C(x,y)$

A,B,C are predicates. You may use the substitutions  $x/K_1$  and  $y/K_2$  suitably. (8)

- (ii) Given the following first order definite clauses, show how forward chaining may be used to answer the query, " Is R(K3) true ? " .

$P(K1)$

$Q(K3, K1, K2)$

$P(K1) \wedge Q(K3, K1, K2) \Rightarrow R(K3)$

P, Q, R are predicates. K1, K2, K3 are constants. (8)

14. (a) (i) Outline the different forms of learning. (8)
- (ii) Explain the main points of explanation based learning (EBL). Indicate how prior knowledge is used in this technique. (8)

Or

- (b) (i) Using a simple model, describe the main points concerning the composition and functioning of a normal network. (8)
- (ii) Outline the main points of reinforcement learning. Indicate how this enables an agent to act successfully in a given environment. (8)
15. (a) (i) Describe the main points of the steps of communication between a speaker and a hearer. (8)
- (ii) Consider the sentence : " The auditorium is full" the associated lexicon and grammar are as follows :

Article → The		S → NP VP
Noun → auditorium		NP → Article Noun
Verb → is		VP → Verb Adj.
Adj. → full		

Draw the parse tree. Indicate how top down passing and bottom up passing are carried out. (8)

Or

- (b) (i) Outline the main characteristic of the process of Information Retrieval (IR) which would help to meet the information needs of a user. (8)
  - (ii) Explain the main points concerning machine translation of text from one natural language to another. (8)
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