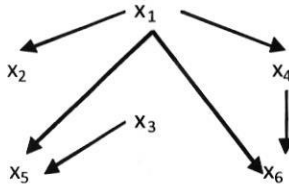
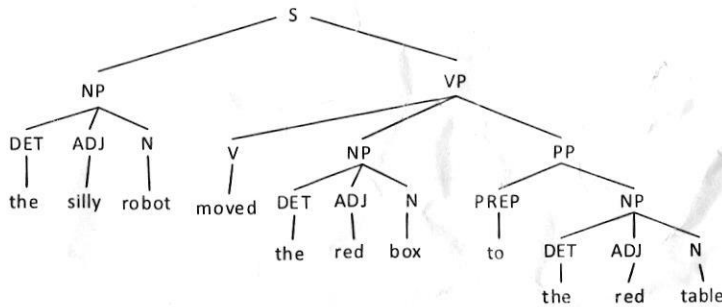


6. (a) Write the joint distribution of $x_1, x_2, x_3, x_4, x_5,$ and x_6 as a product of the chain conditional probabilities for the following causal network : (3)



- (b) What do you understand by alpha-beta cutoffs. Describe the method of alpha-beta pruning using these cutoffs with the help of an example. (4)
- (c) Explain, why should the heuristic function of A* underestimate? (3)
7. (a) What is the use of “cut” utility in Prolog? (2)
- (b) Describe Water-Jug problem and give its suitable state space representation. (4)
- (c) Based on the context free grammar represented by the following parse tree, draw the corresponding Recursive Transition Network (RTN). (4)



(1400)

[This question paper contains 6 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 2211

IC

Unique Paper Code : 32341601

Name of the Paper : Artificial Intelligence

Name of the Course : B.Sc. (H) Computer Science

Semester : VI

Duration : 3 Hours

Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. **Section A** is compulsory.
3. Attempt any 4 of questions from **Section B**.
4. Parts of a question must be answered together.

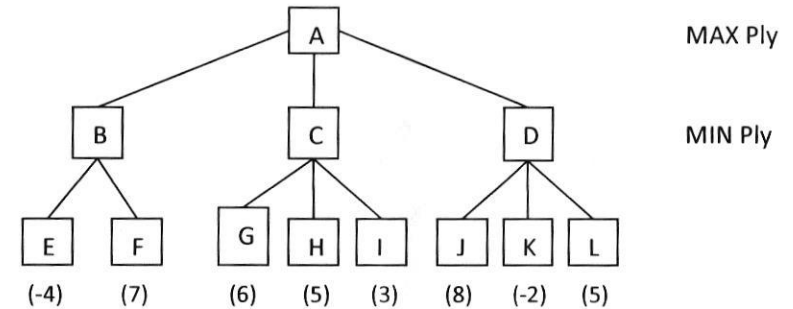
SECTION A

1. (a) What is a Horn clause? Give an example. (2)
- (b) In the following expression, add parenthesis at appropriate places (as per operators precedence).

$$P \ \& \ Q \ V \ \sim \ R \ \& \ S \ \rightarrow \ \sim \ T \ V \ X \ \rightarrow \ Y$$
 (2)

P.T.O.

- (c) How FOPL is better than Propositional logic? (2)
- (d) Describe the following terms :
- (i) Rationality
- (ii) Software Agent (4)
- (e) Give the architecture of a problem solver with a Truth Maintenance System. (3)
- (f) Write a Prolog program to calculate the length of a given list, L. (4)
- (g) Describe the limitations of Hill climbing search. (3)
- (h) Define the PEAS for taxi Driver Agent. (3)
- (i) Define Heuristic Search technique. What is the role of a heuristic function? (4)
- (j) Find whether the following set is unifiable or not? If unifiable, find most general unifier (m.g.u.).
 $\{S(x, Ram), S(y, Sita)\}$ (2)
- (k) Give the conceptual dependency representation for the following :
 Ram gave Sita for a pencil. (2)



5. (a) What do you understand by default reasoning in knowledge representation? (2)
- (a) How a problem is solved using Mean-Ends Analysis. Explain in your own words. (2)
- (c) Given the following information for a database:
- A1. If x is on top of y, y supports x.
- A2. If x is above y and they are touching each other, x is on top of y.
- A3. A cup is above a book.
- A4. A cup is touching a book.
- (i) Translate the statements A1 through A4 into clausal form.
- (ii) Show that the predicate supports (book, cup) is true using resolution. (6)

3. (a) Write a script for watching a movie in a cinema hall. (5)

(b) Find the probability of the event A when it is known that some event B occurred. From experiments, it has been determined that $P(B|A) = 0.84$, $P(A) = 0.2$, and $P(B) = 0.34$. (3)

(c) Determine if the following sentence S is satisfiable, contradictory or valid.

$$S : P \rightarrow Q \rightarrow \sim P \quad (2)$$

4. (a) Solve the crypt arithmetic problem :

$$\begin{array}{r} \text{TWO} \\ + \text{TWO} \\ \hline \text{FOUR} \end{array} \quad (4)$$

(b) Transform the following sentence into CNF :-

$$(\sim A \ \& \ B) \vee (A \ \& \ \sim B) \ \& \ C \quad (3)$$

(c) Consider the following game tree with ply depth 2, in which the indicated scores are from the MAX player's point of view. What move should MAX choose, and why? (3)

- (l) Develop a parse tree for the sentence "Raja slept on the sofa" using the following rules: (4)

S \rightarrow NP VP

NP \rightarrow N | DET N

VP \rightarrow V | PP

PP \rightarrow PREP NP

N \rightarrow Raja | sofa

V \rightarrow slept

DET \rightarrow the

PREP \rightarrow on

SECTION B

2. (a) Define utility based agents and list their benefits. (5)
- (b) Elaborate on the additional capabilities of an Augmented Transition Network (ATN) as compared to a Recursive Transition Network (RTN). (2)
- (c) Draw an associative network for the following sentence :

Tweety is a Yellow bird that has wings and tail. (3)