(i) Translate the above statements A1 to A4 into clausal form.

(ii) Show that the predicate supports(book,cup) is true using resolution.

[This question paper contains 8 printed pages.]

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 **four** questions from **Section B**.

4. Parts of the question must be answered together.
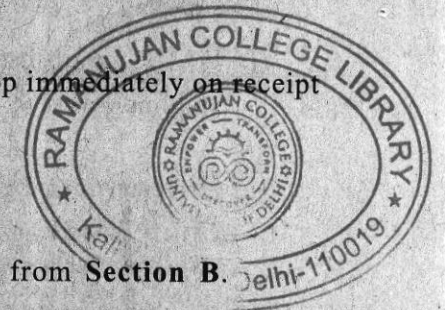
SECTION A

1. (a) Explain uses of Cut-Fail predicates in PROLOG.

(2)

(b) Is it possible to compute $P(A|{\sim}B)$ when you are only given $P(A)$, $P(B|A)$, and $P(B)$? Explain your answer. (2)

(c) What do you understand by Closed World Assumption. Explain using suitable example? (3)

(d) Transform the following sentence into conjunctive normal form : (3)

$$P \lor ({\sim}P \,\&\, Q \,\&\, R)$$

(e) What do you understand by Means Ends Analysis? Explain using suitable example? (3)

(f) Is the problem decomposable. Justify the statement. (3)

(g) Differentiate between Model based agent and Utility based agent. (3)

(h) Explain the architecture of the problem solver with a TMS. (3)

(i) Differentiate between deterministic and non-deterministic parser with the help of suitable diagram. (4)
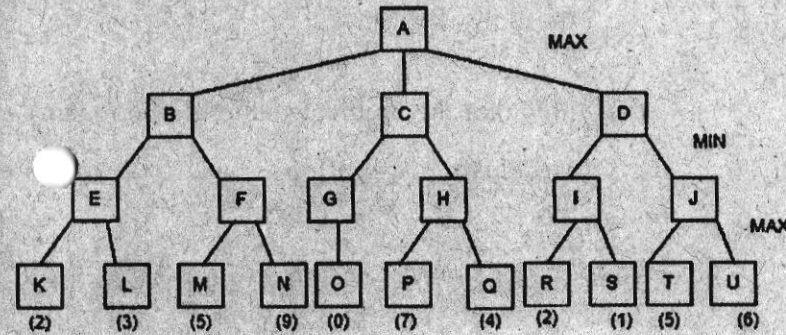
What move should be chosen and why? Which nodes will be pruned according to the alpha-beta pruning procedure? Give justification of each.

(b) Question - Given the following information for a database : (5)

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

P.T.O.

(c) Given the formulae : (3)

E1: A → B

E2: ~B

G: ~A

Prove that G is the logical consequence of E1 and E2.

6. (a) Transform the following formula to Prenex Normal Form : (4)

$$\forall xy(\exists z\ P(x, z)\ \&\ P(y, z)) \rightarrow \exists u\ Q(x, y, u)$$

(b) Draw a pictorial definition for the linguistic variable TALL giving your own subjective values for TALL variables and their values. (4)

(c) Explain the following sentence as conceptual dependency structure. (2)

"Susan gave the keys to Peter".

7. (a) Consider the following game tree in which static scores are all from the first player's point of view : (5)

(j) Draw an associative network for the following sentences : (4)

　　(i) The car is red and has a powerful engine.

　　(ii) The cake is delicious and has a creamy frosting.

(k) Write a script for going to a museum. (5)

SECTION B

2. (a) Create a frame network for transportation methods and give one complete frame for any one type transportation method which includes the slots for the main component parts, their attributes and relations between parts. (5)

(b) Transform the following into disjunctive normal form (3)

$$P \rightarrow ((Q\&R) \leftrightarrow S)$$

(c) Express the following structure as a conceptual graph structure:

"Dog scratches its ear with its paw" (2)

3. (a) Develop a parse tree for the sentence "I saw the man with a telescope" using the following rules : (4)

S -> NP VP

NP -> N | DET N | NP PP

VP -> V | VP PP

PP -> PREP NP

N -> I | man | telescope

V -> saw

DET -> the

PREP -> with

(b) Draw the RTN to implement the grammar given above. (3)

(c) Write schemata for default reasoning using the sentence: If someone is adult and it is consistent to assume that adults can vote, infer that person can vote. (3)

4. (a) Give the similarities and differences between Best First Search and A* algorithm. Under what conditions A* algorithm provide an optimal solution? (5)

(b) Using Constraint Satisfaction algorithm. Solve the following cryptarithmetic problem. (3)

$$
\begin{array}{r}
T\ W\ O \\
+\ T\ W\ O \\
\hline
F\ O\ U\ R \\
\hline
\end{array}
$$

(c) Differentiate between a static and dynamic environment of an agent. (2)

(a) Explain the following terms with respect to fuzzy sets : (4)

    (i) Dilation

    (ii) Concentration

(b) Write a Prolog program to implement GCD of two numbers. (3)