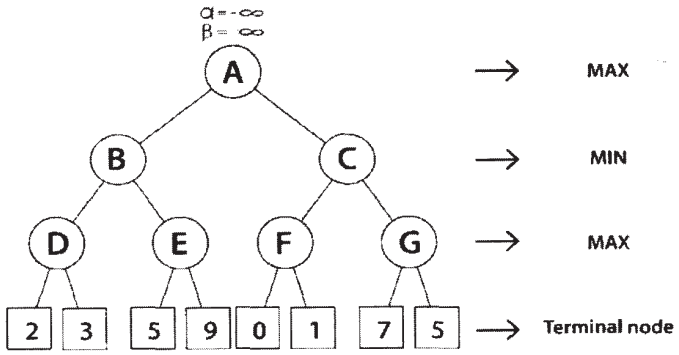
(c) Consider the following game tree and find the maximum value of the root node. Which nodes will be pruned according to the alpha-beta pruning procedure? (6)



[This question paper contains 8 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 5725 **L**

Unique Paper Code : 2344000022

Name of the Paper : Artificial Intelligence

Name of the Course : **Generic Elective**

Year of Admission : 2024 and Onwards (NEP-UGCF)

Semester : IV

Duration : 3 Hours Maximum Marks : 90

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** questions from **Section B**.
4. Parts of the question must be answered together.

Section A

1. (a) Determine whether the sentence is valid, contradictory or satisfiable. (2)

$$(P \rightarrow Q) \ V \ (Q \rightarrow R)$$

(b) What is unification? Are Q(x, y) and Q(a, f(z)) unifiable? If yes, find the most general unifier. (3)

(c) Write three limitations of Hill Climbing search method? (3)

(d) Give the conceptual dependency representation for the following: (3)

John gives Kate a flower.

(e) Define Modus ponens rule. Explain using an example. (3)

(f) Write a Prolog program to compute the sum of elements of a list, L. (4)

6. (a) How to handle unnecessary backtracking in Prolog? Write a Prolog program to implement the power (Num, Pow, Ans), where Num is raised to the power Pow to get Ans. (4)

(b) Define agent and differentiate between goal-based and utility-based agent with the help of a diagram. (5)

(c) Solve the following eryptarithmetic problem: (6)

YOUR

+ YOU

HEART

7. (a) What are the ethics of AI? Differentiate between Weak AI and Strong AI. (4)

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

(c) Define a frame. A university library system stores structured knowledge about books, authors, and borrowers using frame representation. Design frame for a "Book" with at least five slots, including default values or attached procedures where appropriate. (6)

5. (a) Differentiate between informed and uninformed search. (4)

(b) What is a Recursive Transition Network (RTN)? Give an example. (5)

(c) Based on the following statements : (6)

(i) Some patients like all doctors.

(ii) No patient like any quack.

Translate the above statements into clausal form. Use resolution to prove that "No doctor is a quack".

(g) Compare and contrast between Breadth First Search and Depth First Search algorithms. (4)

(h) Write the PEAS for Taxi Driving Agent. (4)

(i) Define the following terms : (4)

(i) Rational Agent

(ii) Deterministic environment

Section B

2. (a) Differentiate between Best First Search and A* Search algorithms. (4)

(b) Given the following grammar : (5)

$S \rightarrow NP\ VP$

$NP \rightarrow Det\ N \mid NP\ PP$

$VP \rightarrow V\ NP \mid VP\ PP$

$PP \rightarrow P\ NP$

Det → The | a

N → boy | stars | telescope

V → saw

P → with

Derive the parse tree for the sentence "The boy saw the stars with a telescope" using the above grammar.

(c) What is chomsky hierarchy of grammars? Give the properties of all its types of grammars. (6)

3. (a) What are alpha and beta cut offs? How alpha beta pruning is used to improve the efficiency of Minimax procedure. (4)

(b) Draw an associative network for the following sentences : (5)

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

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

(c) Convert the following statements into the corresponding First Order Predicate Logic :

(i) Some of my friends are not Perfect.

(ii) Every Student who works hard passes the exam.

(iii) All men are mortal. (6)

4. (a) Which of the following is not logically equivalent and why? (4)

(i) $((p \wedge q) \vee (\neg p \wedge \neg q))$ and $p \leftrightarrow q$

(ii) $((p \wedge q) \rightarrow r)$ and $((p \rightarrow r) \wedge (q \rightarrow r))$

(b) Compare and contrast between PL and FOPL. (5)