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RV COLLEGE OF ENGINEERING®

(An Autonomous Institution affiliated to VTU)

V Semester B. E. Examinations March / April-2023

Computer Science and Engineering

ARTIFICIAL INTELLIGENCE (ELECTIVE)

Time: 03 Hours ***Maximum Marks: 100***

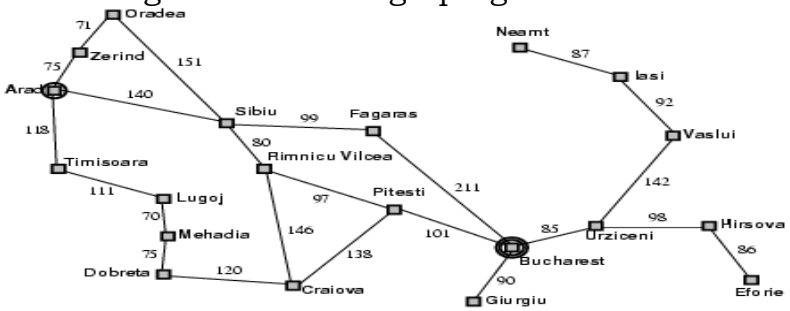
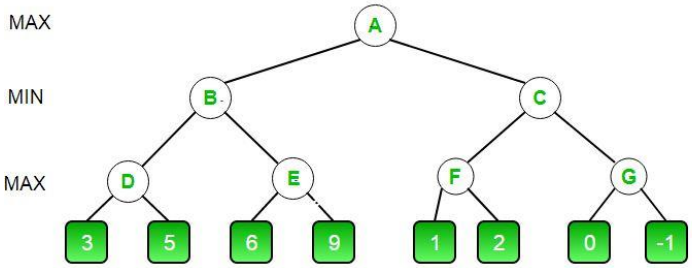
Instructions to candidates:

1. Answer all questions from Part A. Part A questions should be answered in first three pages of the answer book only.
2. Answer FIVE full questions from Part B. In Part B question number 2, 7 and 8 are compulsory. Answer any one full question from 3 and 4 & one full question from 5 and 6

PART-A

1	1.1	Distinguish between Human Intelligence and Machine Intelligence.	02
	1.2	Define Constraint Satisfaction Problem.	02
	1.3	List any two issues that are addressed by Memory Bound heuristic algorithms.	02
	1.4	Mention any two features of Informed Search Strategies.	02
	1.5	What is the space complexity of BFS.	01
	1.6	Construct a Bayesian network for the following car's electrical system problem statement: • The fire alarm usually goes off when there's a fire • When the alarm rings everyone usually exits together • Most of the time there's smoke when there's a fire • Someone sometimes pulls the fire alarm "as a joke" • The fire trucks usually come when the alarm goes off • Sometimes everyone exits together for a picnic	02
	1.7	Given that the disease meningitis causes a patient to have stiff neck 60% of time, the prior probability that a patient has stiff neck is 1/40,000 and prior probability that any patient has a stiff neck is 1/10. Calculate the probability that a patient has meningitis given stiff neck.	02
	1.8	For each of the following pairs of expressions, state which substitution, if any, is a most general unifier. • $p(x,x)$ and $p(a,y)$ • $p(x,x)$ and $p(f(y),z)$	02
	1.9	State the modus ponens inferencing rule in predicate calculus.	01
	1.10	Differentiate weak AI and Strong AI.	02
	1.11	What are the three main components of calculating Bayesian probabilities?	02

PART-B

2	a	With a neat diagram explain the concept of a agent with an example.	05
	b	Give *PEAS* description of the task environment for the following: i) Vacuum cleaner ii) Automated Car Driving.	05
	c	Describe Utility Based Agent with an example.	06
3	a	Apply A^* Search algorithm for the graph given below:  	08
	b	Differentiate between Informed and Uninformed search strategies.	04
	c	Write a note on brief history of *AI*.	04
		OR	
4	a	Describe Mini-Max algorithm.	05
	b	Explain Depth First Search and Depth Limited Search with an algorithm	06
	c	Apply alpha-beta pruning for the following graph:  	05
5	a	Justify with an example why it is a good heuristic to choose the variable that is most constrained, but the value that is least constraining in a *CSP* search	06
	b	Represent the following sentences in First Order Logic: i) Everyone who loves animals is loved by some one ii) Anyone who kills animal is loved by no one iii) Jack loves all animals iv) Either Jack or curiosity killed the cat, who is named Tuna. v) Did curiosity kill cat?	10
		OR	
6	a	Explain forward chaining and backward chaining. List merits and demerits of each.	08
	b	Differentiate First Order logic and Propositional logic with an example.	04
	c	Write the predicate calculus expressions for the following statements: i) Men who are intelligent have knowledge. ii) If it does not rain tomorrow, Jack will go for trekking.	04

7	a	What is weak AI? Explain.	05
	b	Explain different types of learning.	06
	c	Briefly discuss Alternative Shapes Constraint Language.	05
8	a	Given the full joint distribution calculate the following: i) $P(\text{rain})$ ii) $P(\text{rain } V \text{ sprinkler})$ iii) $P(\text{rain} \mid \text{sprinkler})$ iv) $P(\text{rain} \mid \text{cloudy } V \text{ sprinkler})$	10
	b	With the help of a pseudo code discuss the exact inference by enumerations.	06

	$Sprinkler$		$\sim Sprinkler$	
	$Cloudy$	$\sim Cloudy$	$Cloudy$	$\sim Cloudy$
$rain$	0.108	0.012	0.072	0.008
$\sim rain$	0.016	0.064	0.144	0.576