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RV COLLEGE OF ENGINEERING®

(An Autonomous Institution affiliated to VTU)
V Semester B. E. Fast Track Examinations July-19

Computer Science and Engineering

ARTIFICIAL INTELLIGENCE (ELECTIVE)

Time: 03 Hours

Maximum Marks: 100

Instructions to candidates:

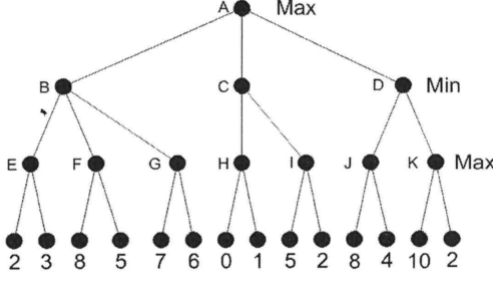
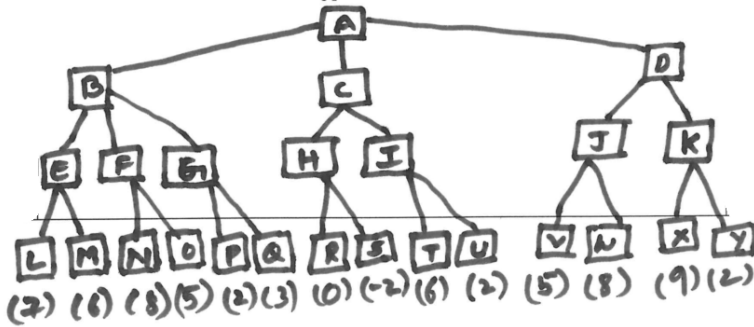
1. Answer all questions from Part A. Part A questions should be answered in first three pages of the answer book only.
2. Answer FIVE full questions from Part B. In Part B question number 2, 7 and 8 are compulsory. Answer any one full question from 3 and 4 & one full question from 5 and 6

PART-A

1	1.1	What is Cognitive Modeling approach to AI?	02
	1.2	List and mention the functions of different types of agents in artificial intelligence.	02
	1.3	What is PAC-learning algorithm?	02
	1.4	Which search agent operates by interleaving computation and action?	01
	1.5	Differentiate informed and uninformed search strategies.	02
	1.6	What capabilities a computer need to possess to pass Turing Test?	02
	1.7	Define constraint satisfaction problem.	02
	1.8	What is cross validation in learning? Mention its purpose.	02
	1.9	Consider the following Bayesian network, where F stands for Flu and C stands for Coughing. Find P(C).	
		$P(F) = 0.1$ $P(C F) = 0.8$ $P(C \bar{F}) = 0.3$	02
	1.10	Diabetic Retinopathy is a disease that affects 80% people who have diabetes for more than 10 years. 5% of the India population have been suffering from diabetes for more than 10 years. What is the joint probability of finding an Indian suffering from Diabetes for more than 10 years and also has Diabetic Retinopathy.	02
	1.11	Write Baye's formula for 2 variables.	01

PART-B

2	a	Writ PEAS description of the task environment for the following.	
	i.	Playing soccer	
	ii.	Bidding on an item at an auction	
	iii.	Playing a tennis match	06
	b	Briefly discuss the four approaches of AI definition.	04
	c	Explain Utility Based Agent with the help of a neat diagram.	06

3	a	<p>Discuss alpha – beta pruning of a search and perform alpha – beta pruning on following tree:</p> 	08
	b	<p>Explain how back tracking search is used in solving constraint satisfaction problem with an example.</p>	08
		OR	
4	a	<p>Explain MINMAX algorithm. Consider following game tree, apply MINMAX algorithm to show the moves. Suppose the first player is maximizing player.</p> 	08
	b	<p>Explain A* search algorithm with an example.</p>	04
	c	<p>What is a heuristic functions? Propose some heuristic function for following problems:</p>	
		<p>i. 8 – puzzle problem</p>	
		<p>ii. 8 – queen problem</p>	04
5	a	<p>Illustrate and explain forward chaining inference in first order logic.</p>	06
	b	<p>Explain unification algorithm. Trace the operation of the unification algorithm on each of the following pairs of literals and write the results:</p>	
		<p>i. Knows (John , x), Knows (John, Jane)</p>	
		<p>ii. Knows (John, x), Knows (y, Bill)</p>	
		<p>iii. Knows (John, x), Knows (y, mother (y))</p>	
		<p>iv. Knows (John, x), Knows (x, Elizabeth)</p>	10
		OR	
6	a	<p>Write the steps to convert a First Order Logic statement into Conjunctive Normal Form CNF form. Convert $(p \Rightarrow q) \Leftrightarrow (p \Rightarrow r)$ into CNF form.</p>	10
	b	<p>Write First Oder Logic (FOL) expressions for following statements:</p>	
		<p>i. All birds except penguins fly</p>	
		<p>ii. Brothers are sibling</p>	
		<p>iii. One's mother is one's female parent</p>	06

7	a	Briefly explain different types of learning in field of machine learning.	05
	b	What is ensemble learning? Explain boosting ensemble method.	07
	c	What is overfitting? Mention the techniques used to reduce overfitting.	04

8	a	<p>Given the full joint distribution calculate the following</p> <p>i. $P(\text{catch}) = 0.012+0.072+0.016+0.144 =$</p> <p>ii. $P(\text{Cavity} \vee \sim \text{Toothache}) =$ $0.012+0.576+0.016+0.064+0.144+0.108$</p> <p>iii. $P(\text{Cavity} \text{Toothache})=P(\text{Cavity} \wedge \text{Toothache})/P(\text{Toothache})=(0.12+0.576)/$</p> <p>iv. $P(\text{rain} \text{cloudy} \wedge \text{sprinkler})$</p> <table border="1"> <tr> <td></td><th colspan="2">Toothache</th><th colspan="2">\simToothache</th></tr> <tr> <td></td><th>Catch</th><th>\simCatch</th><th>Catch</th><th>\simCatch</th></tr> <tr> <th>Cavity</th><td>0.012</td><td>0.576</td><td>0.016</td><td>0.064</td></tr> <tr> <th>\simCavity</th><td>0.072</td><td>0.008</td><td>0.144</td><td>0.108</td></tr> </table>		Toothache		\sim Toothache			Catch	\sim Catch	Catch	\sim Catch	Cavity	0.012	0.576	0.016	0.064	\sim Cavity	0.072	0.008	0.144	0.108	10
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	b	<p>Explain importance of Bayesian network. Given the Bayesian network calculate $P(j, m, a, \sim b, \sim e)$.</p>																					

The diagram shows a Bayesian network with five nodes: Burglary, Earthquake, Alarm, JohnCalls, and MaryCalls. Burglary and Earthquake are parents of Alarm. Alarm is a parent of JohnCalls and MaryCalls. Each node has an associated probability table.

Burglary table:

B	P(B)
T	.001

Earthquake table:

E	P(E)
T	.002

Alarm table:

B	E	P(A B,E)
T	T	.95
T	F	.94
F	T	.29
F	F	.001

JohnCalls table:

A	P(J A)
T	.90
F	.05

MaryCalls table:

A	P(M A)
T	.70
F	.01

06