Reg. No.



(A constituent unit of MAHE, Manipal)

VI SEMESTER B.TECH (ELECTRICAL & ELECTRONICS ENGINEERING)

END SEMESTER EXAMINATIONS, MAY 2023

ARTIFICIAL INTELLIGENCE [ELE 4061]

REVISED CREDIT SYSTEM

Time: 3 H	lours	Date: 01 JUNE 2023	Max. Marks: 50
Instruction	ns to Candidates:		
*	Answer ALL the questions.		
*	Missing data may be suitably	assumed.	

- **1A.** Identify the PAGE descriptors for a part-picking robot application. **(02)**
- **1B.** The speed and agility levels of 20 college athletes and their training details are as given below.

Assess a new athlete with a speed 6.75 and agility 3.00 and determine the training details using KNN algorithm. Assume K=3.

ID	SPEED	AGILITY	TRAINING
			DETAILS
1	2.5	6	NO
2	3.5	5.25	NO
3	2.75	7.5	YES
4	4.5	5	NO
5	3	3.25	NO
6	4	4	NO
7	2	7	YES
8	8.5	8	YES
9	6.25	9.5	YES
10	5	2.5	NO

(05)

1C. Discover the optimal path from node A to G using a greedy best-first search algorithm.



(03)

- 2A. "Bi-directional search is advantageous compared to unidirectional search". Justify this statement considering the time complexity of the search algorithms.
- For the given data show in the table, apply Naïve Bayes classifier, to 2B. predict the target value "buy a car or not", for the input attributes BLUE, SEDAN, AUDI, EV. Clearly show all the steps.

EX NO	COLOUR	TYPE	BRAND	FUEL	BUY OR NOT
1	RED	HATCHBACK	HONDA	PETROL	NO
2	BLACK	SEDAN	ΤΟΥΟΤΑ	DIESEL	NO
3	BLUE	SUV	TATA	CNG	NO
4	GREEN	SUV	AUDI	EV	BUY
5	RED	SUV	ΤΟΥΟΤΑ	HYBRID	BUY
6	RED	SEDAN	TATA	EV	BUY
7	BLACK	HATCHBACK	AUDI	EV	BUY
8	YELLOW	SUV	ΤΟΥΟΤΑ	HYBRID	NO
9	GREEN	SEDAN	HONDA	DIESEL	NO
10	RED	SEDAN	HONDA	PETROL	NO

(05)

(03)

(04)

(02)

- 2C. Consider the following problem: You are given two jugs, a four-liter one and a three-liter one, a pump that has unlimited water which you can use to fill the jug, and a plant to which water may be poured. Neither jug has any measuring markings on it. Develop a solution tree using state space to get exactly two liters of water in the four-liter jug.
- 3A. Compute the truth value of a using truth-table a: $(A \rightarrow B) \rightarrow (A \rightarrow \neg B)$ (02)
- 3B. Solve: USA+USSR=PEACE using constraint satisfaction problem. Clearly show all the steps.
- Using the A* algorithm solve the given 8 puzzle problem. Clearly write **3C** the solution and cost functions. The initial state and goal states are as given below.

2	3	4	1	2	3
8	6	2	8		4
7		5	7	6	5

Initial State

Goal State

(04)

(03)

- Illustrate the concept of free and bound variables with suitable 4A. examples.
- Consider the following game tree. Search for the optimal solution **4B** using α - β pruning technique. Clearly show α and β values at each node. Which nodes would not be examined?



(04)

4C. Develop the solution tree using AO* logic for the unit cost graph by exploring all the solution paths. Also obtain the root node heuristic value.(3)



(03)

(02)

5A. Analyze the given weighted graph and deduce DFS and BFS solution path. Note that the start node is S and goal node is G. Evaluate the better technique and optimal path.



5B.



Given the following data for all **true** cases for the given DAG. P(S)= 0.3 P(C/S)= 0.5P(B/S)=0.4

(04)

P(X/C,S):

	- /	
С	S	P(X)
Т	Т	1
Т	F	0.9
F	Т	0.2
F	F	0

P(D/C,B):

С	В	P(D)
Т	Т	1
Т	F	0.5
F	Т	0.6
F	F	0.2

P(H/X,S,D):

Х	S	D	P(H)
Т	Т	Т	1
Т	Т	F	0.95
Т	F	Т	0.8
Т	F	F	0.4
F	Т	Т	0.7
F	Т	F	0
F	F	Т	0.2
F	F	F	0

Evaluate the following conditions and calculate the joint probabilities:

- a. Person is admitted to the hospital, but neither he smokes nor he has bronchitis
- b. Person is admitted to the hospital because of severe bronchitis only
- c. Person is admitted to the hospital with negative X-ray reports but smokes along with dyspnoea
- d. Person suffers from dyspnoea, but he neither smokes nor he has bronchitis
- **5C.** Consider the following statements:

If A stole the books, then B was not guilty. Either A stole the books or went to market. If A goes to the market, then B gets ice-cream. Therefore if B was not guilty then he gets ice-cream.

- a) Compose these sentences in propositional logic
- b) Formulate them in Conjunctive Normal Form
- c) Prove by resolution

(04)