Reg. No.															

B.Tech. DEGREE EXAMINATION, NOVEMBER 2023

Fifth Semester

18ECE332T – PRINCIPLES OF ARTIFICIAL INTELLIGENCE

(For the candidates admitted from the academic year 2020-2021 to 2021-2022)

Note:

(i) **Part - A** should be answered in OMR sheet within first 40 minutes and OMR sheet should be handed over to hall invigilator at the end of 40th minute.

(ii) **Part - B & Part - C** should be answered in answer booklet.

Time: 3 hours | Max. Marks: 100

PART – A (20 × 1 = 20 Marks)

Answer **ALL** Questions

	Marks	BL	CO	PO
1. Turning test used in which of the following definitions of Artificial Intelligence (AI)? (A) Acting Humanly (B) Thinking Humanly (C) Acting Rationally (D) Thinking Rationally	1	2	1	1
2. In Artificial Intelligence (AI), PEAS is _____ (A) Performance Environment Agent State (B) Performance Environment Actuator Sensors (C) Performance Environment Agent State (D) Performance Environment Actuator State	1	2	1	1
3. Select the ODD one from the following (A) Depth first search (B) Breadth First Search (C) Uniform Cost (D) Greedy Search	1	2	1	1
4. If the agent has no sensor, the nature of the environment is (A) Fully observable (B) Partially Observable (C) Unknown (D) Unobservable	1	2	1	1
5. The inference mechanisms used in knowledge based agent are (A) TELL, ACT (B) TELL, ASK (C) POP, PUSH (D) TELL, PUSH	1	1	2	1
6. Using modus Ponens rule, if (Wumpus Ahead ∧ Wumpus Alive) ⇒ and (Wumpus Ahead ∧ Wumpus Alive) _____ can be inferred (A) Wumpus Ahead (B) Wumpus Alive (C) Shoot (D) Wumpus Ahead ∧ Wumpus Alive	1	2	2	1
7. In the 4 × 4 Wumpus world if there is breeze in (1,1) write the possibility of location of pits using propositional logic can be written as (A) $B_{1,1} \Leftrightarrow (P_{1,2} \wedge P_{2,1} \wedge P_{1,1})$ (B) $B_{1,1} \Leftrightarrow (P_{1,2} \vee P_{2,1})$ (C) $B_{1,1} \Leftrightarrow (P_{1,2} \wedge P_{2,1})$ (D) $B_{1,1} \Leftrightarrow (P_{1,2} \vee P_{2,1} \wedge P_{1,1})$	1	1	2	1

8. "Everyone who loves all animals is loved by someone", an be represented in conjunctive normal form as 1 2 2 1

(A) $\forall_x [\forall_y$ (Animal (y) $\Rightarrow$ Loves (x,y)] $\Rightarrow (\exists_y$ Loves (y,x)]

(B) $\forall_x [\forall_y$ (Animal (y) $\Rightarrow$ Loves (x,y)] $\Rightarrow (\exists_y$ Loves (y,x)]

(C) $\forall_x [\forall_y$ (Animal (y) $\Rightarrow$ Loves (x,y)] $\Rightarrow (\forall\exists_y$ Loves (y,x)]

(D) $\exists_x \exists_y$ (Animal (y) $\Rightarrow$ Loves (x,y)] $\Rightarrow (\exists_y$ Loves (y,x)]

9. What is the effect of the following action schema Action (Fly (P_1, SFO, JFK), At (P_1, SFO) $\wedge$ Plane (P_1) $\wedge$ Airport (SFO) $\wedge$ Airport (JFK) 1 2 3 1

(A) Effect : ΓAt (P_1, SFO) $\wedge$ At (P_1, JFK)

(B) Effect : At (P_1, SFO) $\wedge$ ΓAt (P_1, JFK)

(C) Effect : At (P_1, SFO) $\wedge$ At (P_1, JFK)

(D) Effect : ΓAt (P_1, SFO) $\wedge$ ΓAt (P_1, JFK)

10. _____ is used for implementing planning algorithm 1 1 3 1

(A) ADL

(B) Strips

(C) Predicate Logic

(D) First Order Logic

11. Select the correct one from the following 1 2 3 1

(A) In Planning, First – Order state descriptions Literals must be grand and function – free

(B) In Planning, First – order state descriptions, Literals must be either Positive / Negative and function free

(C) In planning, First – order state descriptions, Literals must be ground and have function

(D) In planning, First – order state descriptions, Literals must have more than one literal and function free

12. ADD list always contains 1 1 3 1

(A) Positive Literals

(B) Negative Literals

(C) Both Positive and Negative Literals

(D) Functions

13. If X and Y are independent events, then which of the following is correct with respect to the joint probability 1 2 4 1

(A) P(x,y) = P(x/y) P(x)

(B) P(x,y) = P(y) P(y) P(y/x)

(C) P(x,y) = P(x) P(y)

(D) P(x,y) = P(x) + P(y)

14. In _____, the state and reward of the next state depend only on present state 1 2 4 1

(A) Bayesian Network

(B) Recurrent Neural Network

(C) Markov Process

(D) Convolution Neural Networks

15. Bayes rule can be used to _____ 1 1 4 1

(A) Solve Queries

(B) Increase complexity of a query

(C) Decrease the complexity of a query

(D) Answer probabilistic queries

16. Bayes rule is [select the correct one] 1 2 4 1

(A) $P\left(\frac{A}{B}\right)=\frac{P(A)P(B/A)}{P(B)}$

(B) $P\left(\frac{A}{B}\right)P(B)=P\left(\frac{B}{A}\right)$

(C) $P\left(\frac{B}{A}\right)=P(A)\,P\left(\frac{A}{B}\right)$

(D) $P\left(\frac{A}{B}\right)=P\left(\frac{B}{A}\right)P(B)$

17. _____ is stated as predicting the value of a state variable at some time t is in the past, given evidence from t and from other times up to the present — 1 1 5 1
    (A) Recognition (B) Smoothing
    (C) Segmentation (D) Extraction

18. Select the odd one from the following — 1 2 5 1
    (A) Solar Cell (B) Camera
    (C) Piezo Electric (D) Sonar

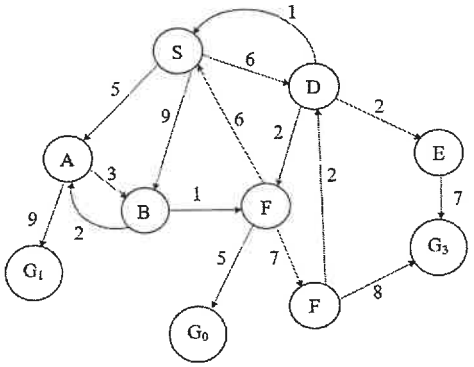
19. _____ is the process of breaking an image into groups, based on similarities of the pixels — 1 1 5 1
    (A) Recognition (B) Classification
    (C) Segmentation (D) Detection

20. Finite State Machines (FSM) possess internally timers are called — 1 2 5 1
    (A) Augmented FSM (B) Subsumption
    (C) Generic Robot (D) C++ for Embedded System (CES)

PART – B (5 × 4 = 20 Marks)

Answer **ANY FIVE** Questions

	Marks	BL	CO	PO
21. Find the path cost for the given graph from start node to any one of the goal nodes (G_1, G_{21}, G_3) using depth first search	4	4	1	1



22. Explain the basic parameters of Genetic Algorithm. — 4 3 2 1

23. Explain proposition logic inference rules — 4 3 2 1
    i. Modus Ponens
    ii. And elimination with example

24. What are the types of reasoning explain with example. — 4 3 2 1

25. Explain AND – OR search algorithm — 4 3 4 1

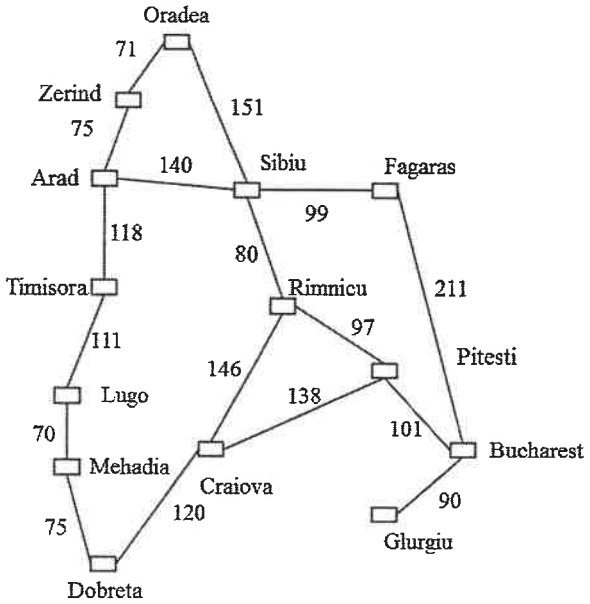
26. Explain the Dynamic Bayesian Network Structure — 4 3 4 1

27. Explain the preprocessing steps involved in image processing applications. — 4 3 5 1

PART – C (5 × 12 = 60 Marks)

Answer **ALL** Questions

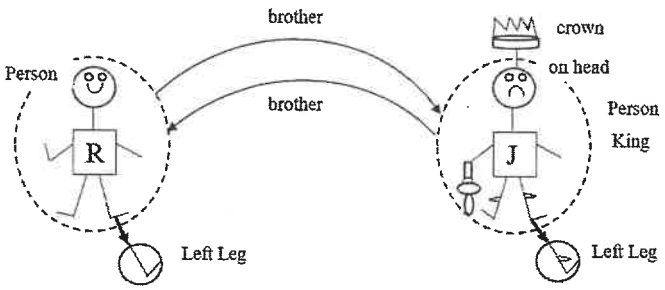
		Marks	BL	CO	PO
28. a.	Discuss the following i. Fully observable and partial observable environment ii. Competitive and Co-operative Environment iii. Simple Reflex Agent iv. Goal based Agent	12	4	1	1
	(OR)				
b.	Find the path from Arad to Bucharest using Greedy search Algorithm	12	4	1	1



Heuristic table:

Arad	366	Hirsova	151	Rimnicu	193
Bucharest	0	Iasi	226	Sibiu	253
Craiova	160	Lugoj	244	Timiseare	329
Dobrete	242	Mehadia	241	Urziceni	80
Eforie	161	Neamt	234	Vaslui	199
Fagras	176	Oradea	380	Zerind	374
Giurgiu	77	Pitesti	10		

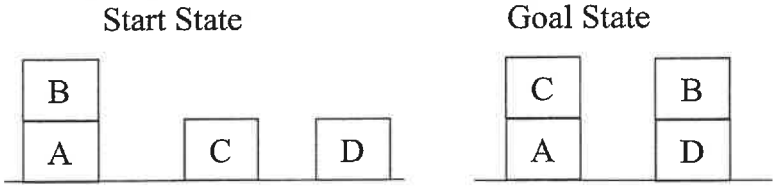
29. a.	What is Knowledge Engineering Process? Explain the algorithm involved for constructing full adder circuit	12	3	3	1
	(OR)				
b. i.	Write First Order Logic (FCL) to describe the relation of the following.	6	4	3	1



R = Richard J = John

ii. The law says that it is a crime for an American to sell weapons to hostile nations. The country Nono, an enemy of America, has some missiles and all of its missiles were sold to it by Colonel West, Who is American. Prove West is a criminal using First Order Logic with forward and backward chaining algorithm. 6 4 3 1

30. a. Apply goal stack planning algorithm to reach goal state from start state for the example given below 12 4 4 1



(OR)

b. Explain forward search space and backward search space algorithm. Write the limitations of forward search space planning algorithm with an example. 12 3 4 1

31. a. Explain Bayesian network and its semantics with an example 12 3 5 1

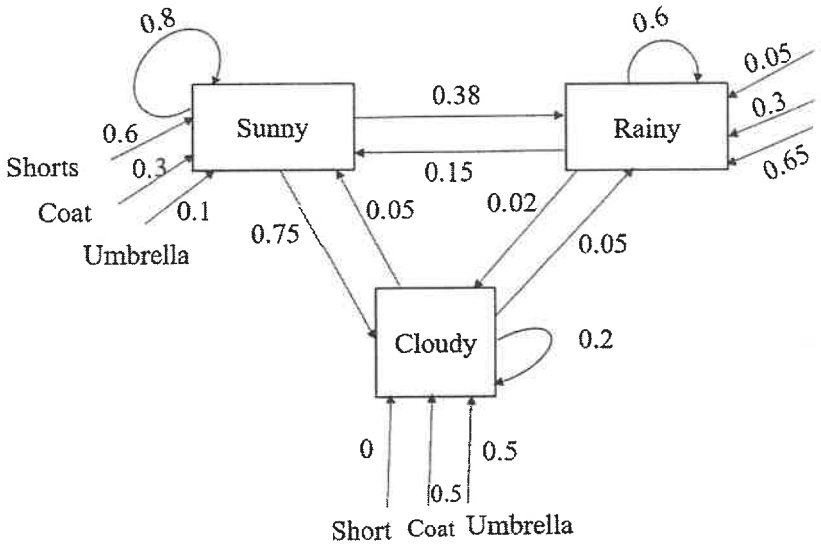
(OR)

b. Explain the following 3 5 1

i. Markov and Hidden Markov model 2

ii. Emission Probability 2

iii. Transition state diagram and calculate the probability of wearing shorts if weather is sunny? 8



32. a. Explain early processing methods in image processing application 12 3 5 1

(OR)

b. Explain the hardware architecture of Robotics in details. 12 3 6 1

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