R22 Regulation *Subject code:4P7FB*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A+' Grade)

B.Tech VII Semester Regular/Supplementary Examinations, October 2026

ARTIFICIAL INTELLIGENCE

(IT)

Maximum Marks: 60 Date:28.10.2026 Duration: 3 hours

Note: **1.This question paper contains two parts A and B.**
2. Part A is compulsory which carries 10 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks (10X1M=10 Marks)		Marks	CO	BTL
1.a)	Define an Intelligent Agent.	1M	1	1
b)	How does a heuristic function assist a search algorithm?	1M	1	2
c)	What is the purpose of Alpha–Beta Pruning in adversarial search?	1M	2	1
d)	Define a Constraint Satisfaction Problem (CSP).	1M	2	1
e)	What is the role of unification in First-Order Logic inference?	1M	3	2
f)	Define Knowledge Engineering in First-Order Logic.	1M	3	1
g)	What is Ontological Engineering?	1M	4	1
h)	What is the purpose of a Planning Graph in classical planning?	1M	4	1
i)	State Bayes' Rule.	1M	5	1
j)	How does a Bayesian Network represent uncertain knowledge?	1M	5	2

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	BTL
2	Explain the A* search algorithm and analyze the role of heuristic functions in A* search.	10M	1	2
	OR			
3	a) Explain Hill-climbing search and simulated annealing search as local search techniques. b) Explain Iterative Deepening Depth-first Search and Bidirectional Search with suitable examples.	5M 5M	1	2 2
4	a) Explain the Alpha–Beta Pruning algorithm for adversarial search with a suitable example. b) Explain Constraint Satisfaction Problems and analyze the role of Backtracking Search in solving CSPs.	5M 5M	2	2 3
	OR			
5	a) Explain Propositional Logic and illustrate its use in representing knowledge in the Wumpus World.	5M	2	2

	b) Explain Proof by Resolution, Forward Chaining, and Backward Chaining as inference methods in Propositional Logic.	5M		2
6	a) Consider the following interpretation of a First-Order Logic domain: • Domain = {1, 2, 3, 4, 5} • P(x): "x is even" • Q(x): "x > 2" Determine whether each of the following statements is True or False, giving suitable justification: 1. $\forall x\ (P(x) \rightarrow Q(x))$ 2. $\exists x\ (P(x) \wedge Q(x))$ 3. $\forall x\ (P(x) \vee Q(x))$ b) Explain the process of Knowledge Engineering in First-Order Logic.	5M 5M	3	2 2
	OR			
7	Explain Forward Chaining, Backward Chaining, and Resolution in First-Order Logic with suitable examples.	10M	3	2
8	a) Consider the following knowledge: • Every student is a person. • Every person is a living being. • Every student studies at least one course. • Ravi is a student. • Ravi studies Artificial Intelligence. Using suitable category and object relationships, represent the above knowledge and determine whether the following statements can be inferred: 1. Ravi is a person. 2. Ravi is a living being. 3. Ravi studies a course. Give suitable justification for each inference. b) Explain the algorithms for Planning with State-Space Search. Discuss the forward and backward search approaches used in state-space planning with suitable examples.	5M 5M	4	3 2
	OR			
9	a) Consider the following knowledge: • Birds normally have wings. • Penguins are birds. • Penguins normally do not fly. • Tweety is a penguin. Using reasoning with default information, determine whether the following statements can be inferred: 1. Tweety has wings. 2. Tweety can fly. Give suitable justification for each inference.	5M	4	3

	b) Explain Planning Graphs and discuss their main components and characteristics.	5M		2
10	a) Explain Basic Probability Notation and Inference Using Full Joint Distributions with suitable examples. b) Apply Bayes' Rule to the following probabilistic reasoning problem: A disease affects 1% of a population. A diagnostic test correctly identifies a person with the disease 90% of the time. However, the test also gives a positive result for 5% of people who do not have the disease. If a randomly selected person tests positive, calculate the probability that the person actually has the disease.	5M 5M	5	2 3
	OR			
11	Explain the Semantics of Bayesian Networks and briefly discuss Dempster–Shafer Theory.	10M	5	2