Reg.No.:												

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]
Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

Question Paper Code: 50007

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – NOV. / DEC. 2024

Fifth Semester

Computer Science and Engineering

U19CS519 – ARTIFICIAL INTELLIGENCE

(Regulation 2019)

Time: Three Hours Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels	K1 – Remembering	K3 – Applying	K5 - Evaluating
(KL)	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	State different search strategies used in AI.	2	K2	CO1
2.	Differentiate Depth first search and Breadth first search.	2	K2	CO1
3.	Give an example of a knowledge representation using Predicate Logic.	2	K3	CO2
4.	Showcase the different types of knowledge.	2	K1	CO2
5.	Compare and contrast Forward Chaining and Backward Chaining as inference methods. In which scenarios would one method be preferable over the other?	2	K2	CO3
6.	How does the Dempster - Shafer Theory handle uncertainty differently compare to Bayesian Theory?	2	K2	CO3
7.	List out the main limitation of the STRIPS planning system compared to more advanced planning systems.	2	K2	CO4
8.	In Statistical Learning, justify what type of data is primarily used to make predictions or decisions.	2	K3	CO4
9.	Infer the primary components of the architecture of an expert system.	2	K2	CO5
10.	Discuss the main function of the DART expert system in medical diagnosis.	2	K3	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.		Questions	Marks	KL	CO
11.	a)	Explain the characteristics of a Production System in AI. Discuss the specialized Production Systems and their applications, with a focus on how they differ from general-purpose systems.	13	K2	CO1
		(OR)			
	b)	Analyze the role of Heuristic Functions in improving the efficiency of search algorithms. How do these functions impact the performance of Hill Climbing and other search strategies?	13	K3	CO1
12.	a)	Compare and contrast different knowledge representation techniques in AI, focusing on predicate logic and structured representation. Discuss the strengths and limitations of each approach in the context of game playing and AI problem-solving.	13	K3	CO2
		(OR)			
	b)	Explain the concept of structured representation of knowledge in AI. How does it differ from other forms of knowledge representation, and what advantages does it offer in game playing scenarios?	13	K2	CO2
13.	a)	Discuss the differences between forward chaining and backward chaining inference methods in AI. How are these methods used in production-based and frame-based systems for knowledge inference? Provide examples to illustrate their applications.	13	K2	CO3
		(OR)			
	b)	Infer the role of Bayesian Networks in artificial intelligence. How do they improve decision-making in complex, uncertain environments? Provide examples of real-world applications.	13	K3	CO3
14.	a)	Evaluate the limitations of basic plan generation systems like STRIPS and how K-STRIPS, address these issues. Additionally, analyse the role of strategic explanations ("Why", "Why not", and "How") in refining the learning process within AI planning systems, and discuss how these explanations can impact the system's adaptability and decision-making capabilities.	13	K3	CO4
		(OR)			
	b)	Illustrate the effectiveness of Reinforcement Learning compared to Statistical Learning in AI. Discuss how about various Reinforcement Learning methods and their application in various domains.	13	K2	CO4

Q.No.		Questions	Marks	KL	CO
15.	a)	Discuss the significance of meta-knowledge in the architecture of expert systems. How does meta-knowledge enhance the decision-making process and adaptability of an expert system? Provide relevant examples.	13	K2	CO5
		(OR)			
	b)	Elaborate the role and importance of knowledge acquisition in expert systems. How do expert systems like MYCIN, DART, and XCON utilize different knowledge acquisition techniques to build and refine their knowledge bases? Evaluate the impact of expert systems shells on simplifying the development and deployment of such systems.	13	K3	CO5

PART – C

(1 x 15 = 15 Marks)

Q.No.		Questions	Marks	KL	CO
16.	a)	Consider the given scenario: A healthcare company is developing an AI-based medical diagnosis system to assist doctors in identifying diseases based on patient symptoms, lab results, and medical history. The system uses various AI techniques, including production systems for decision-making, knowledge representation through predicate logic, and inference mechanisms like forward and backward chaining. The company aims to enhance the system's accuracy by incorporating advanced search strategies, heuristic functions, and machine learning models. Justify the following questions with answers: i. Explain how production systems can be used in the medical diagnosis system to help identify diseases based on patient data. ii. Discuss the role of predicate logic in representing medical knowledge within the diagnosis system. iii. Compare and contrast forward chaining and backward chaining as inference mechanisms in the diagnosis process. Which would be more effective in real-time diagnosis and why? iv. Analyze how heuristic functions could improve the efficiency of the search strategies used in the system for identifying potential diagnoses. v. Describe how reinforcement learning could be integrated into the system to enhance its ability to learn from new data and improve diagnosis accuracy over time.	15	K3	CO5

(OR)

b) Consider the following scenario and justify with answers: 15 K3 CO4

An autonomous vehicle company is developing an AI system to navigate vehicles safely through complex environments. The system uses a combination of AI techniques, including knowledge representation for understanding road rules and traffic conditions, planning and learning for generating and optimizing routes, and expert systems for real-time decision-making. The AI system must handle various challenges, such as unexpected obstacles, changing weather conditions, and dynamic traffic scenarios, requiring the use of advanced AI methods like Bayesian networks, fuzzy reasoning, and meta-knowledge.

i. Explain how knowledge representation techniques, such as frame-based systems, are used to model traffic rules and road conditions in the autonomous vehicle system.

ii. Discuss how the STRIPS planning system can be applied to generate and optimize routes for autonomous vehicles. What are the benefits of using STRIPS in this context?

iii. Analyze the role of Bayesian networks in handling uncertainty and making decisions under unpredictable driving conditions. How do they contribute to the safety and reliability of the vehicle?

iv. Evaluate how fuzzy reasoning can be applied to the autonomous vehicle system for making decisions in situations with ambiguous or incomplete information. Provide an example scenario.

v. Describe how expert systems can be integrated into the autonomous vehicle system to assist in real-time decision-making. How does meta-knowledge contribute to the effectiveness of these expert systems?