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B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

January / February 2025 Semester End Main Examinations

Programme: B.E. **Semester: V**

Branch: Electronics and Communication Engineering **Duration: 3 hrs.**

Course Code: 23EC5PE1AI / 22EC5PE1AI **Max Marks: 100**

Course: Introduction to AI

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

			UNIT - I	***CO***	***PO***	**Marks**
1	a)		Discuss the components and architecture of an intelligent system. How do modules such as perception, reasoning, and action coordination contribute to the overall functionality of the system?	***CO 1***	-	**8**
	b)		Analyze and explain the concept of Cognitive modeling and simulation in the context of Artificial Intelligence. How are these techniques used to develop and test AI algorithms? Provide examples.	***CO 3***	***PO 2***	**6**
	c)		Analyze the types of Machine Learning algorithms with proper flow diagram? Discuss the 'training Set' and 'test Set' in a Learning Model? How much data will you allocate for your training, validation, and test sets?	***CO 3***	***PO 2***	**6**
			OR			
2	a)		What are Artificial Intelligence and Intelligence systems? Briefly explain how AI Technique can be represented and list out any three task domains of AI systems.	***CO 1***	-	**6**
	b)		Define intelligence and discuss how it has been traditionally measured. How does Artificial Intelligence aim to replicate or simulate human intelligence?	***CO 3***	***PO 2***	**6**
	c)		Compare narrow AI and general AI. Provide examples of each type and discuss their respective capabilities and limitations.	***CO 3***	***PO 2***	**8**
			UNIT - II			
3	a)		Illustrate the process of using inference rules to produce predicate calculus expressions with step-by-step examples, highlighting the logical deductions made.	***CO 1***	-	**6**

		b)	Discuss the concept of state space in the context of the 8-puzzle problem and analyze how it captures all possible configurations using "move blank" operations.	***CO 1***	-	**6**
		c)	Analyze the role of inference rules in predicate calculus and how they contribute to logical reasoning. Provide examples to illustrate their importance in deriving new logical expressions.	***CO 3***	***PO 2***	**8**
			OR			
	4	a)	Compare and contrast the Data-Driven and Goal-Driven Search Strategies for State Space Search. How the decision is chosen between data- and goal-driven searches.	***CO 1***	-	**6**
		b)	Compare and contrast the predicate calculus with the propositional calculus, highlighting the advantages and capabilities that predicate calculus offers for representing and reasoning about properties and relationships in the world. Provide a critical analysis of the differences between these two formalisms.	***CO 1***	-	**6**
		c)	Analyze the role of the predicate calculus in artificial intelligence and discuss its advantages in representing knowledge systems.	***CO 3***	***PO 2***	**8**
			UNIT - III			
	5	a)	Explain the nature of heuristics with example. What is the effect of heuristics accuracy? Discuss any 2 uninformed search algorithms with examples. List Advantages and Disadvantages	***CO 1***	-	**8**
		b)	Illustrate the concept of heuristic search and its significance in problem-solving. Provide any two examples of heuristic search algorithms.	***CO 1***	-	**6**
		c)	In a survey of 250 television viewers. 88 like to watch news. 98 like to watch sports. 94 like to watch comedy. 33 people like to watch news and sports. 31 like to watch sports and comedy. And 35 like to watch news and comedy. 10 people like to watch all three. Suppose a person from this group is picked at random: a. What is the probability that they watch news but not sports? b. What is the probability that they watch news or sports but not comedy? c. What is the probability that they watch neither sports nor news	***CO 3***	***PO 2***	**6**
			OR			
	6	a)	Discuss the A* and AO* search algorithm with suitable example. Give the proof of optimality of A*. Analyze the limitations in the algorithm?	***CO 1***	-	**6**
		b)	What is the power of heuristic search? Or advantages of heuristic function? Describe Depth first search and breadth first search algorithms.	***CO 1***	-	**6**

		c)	In manufacturing a product, 85% of the products that are produced are not defective. Of the products inspected, 10% of the good ones are seen as defective and not shipped whereas only 5% of the defective products are approved and shipped. If a product is shipped, what is the probability that it is defective?	***CO 3***	***PO 2***	**8**
			UNIT - IV			
	7	a)	Explain the concept of expert systems in artificial intelligence and discuss their significance in problem-solving domains	***CO 1***	-	**6**
		b)	Compare and analyze expert systems with traditional programming approaches, highlighting the advantages and limitations of using expert systems for problem-solving.	***CO 1***	-	**6**
		c)	Discuss the ethical considerations surrounding the use of expert systems in sensitive domains such as healthcare or finance, analyzing the implications of relying on automated expert advice.	***CO 3***	***PO 2***	**8**
			OR			
	8	a)	Explain the future trends and potential advancements in expert systems, discussing how emerging technologies such as deep learning and cognitive computing may influence the development of next-generation expert systems.	***CO 1***	--	**6**
		b)	Discuss the challenges of maintaining and updating knowledge bases in expert systems over time, and analyze strategies for ensuring the relevance and accuracy of the knowledge stored.	***CO 1***	-	**6**
		c)	Discuss the applications of expert systems in real-world scenarios, providing examples of industries or domains where expert systems have been successfully deployed.	***CO 3***	***PO 2***	**8**
			UNIT - V			
	9	a)	Illustrate the basic principles of genetic algorithm and how it works. Apply genetic algorithm to solve a real-world optimization problem and explain the steps taken.	***CO 1***	-	**6**
		b)	Illustrate the process of crossover in a Genetic Algorithm using a binary representation of individuals. Consider two parent individuals with binary strings 101101 and 110011. Perform a single-point crossover at position 3 to create two offspring. Show the resulting offspring after crossover and explain how genetic material is exchanged between parents in the crossover operation.	***CO 2***	***PO 1***	**6**
		c)	Illustrate the fundamental principles of Ant Colony Optimization (ACO) and how it mimics the behaviour of ants in nature. Apply ACO to solve a complex optimization problem and describe the steps involved in the optimization process.	***CO 2***	***PO 1***	**8**
			OR			
	10	a)	Illustrate the basic principles of genetic algorithm and how it works. Apply genetic algorithm to solve a real-world optimization problem and explain the steps taken.	***CO 1***	-	**6**

		b)	Consider the function F(x) = x2 where x is a real number in the range [0,31]. Use a Genetic Algorithm with a population size of 04 individuals to maximize the function F(x) within the given range.	***CO 2***	***PO1***	**6**
		c)	Illustrate the concept of crossover and mutation in genetic algorithm and how they contribute to the search process.	***CO 2***	***PO 1***	**8**

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