A **Reg. No. :** | | | | | | | | | | | | |

Question Paper Code: U7305

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2025

Professional Elective

Mechanical Engineering

21MEV305 – AI & EXPERT SYSTEMS

(Regulations 2021)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. The idea of emulating human cognitive processes in AI refers to CO1- U

   (a) Automating physical tasks

   (b) Storing human emotions

   (c) Mimicking how humans learn, reason, and solve problems

   (d) Improving CPU performance

2. What does "elementary knowledge" in AI typically include? CO1- U

   (a) Deep learning algorithms (b) Procedural programming only

   (c) Basic facts, rules, and relationships (d) Quantum computing logic

3. Which of the following is the correct prefix notation in LISP for adding two numbers 5 and 3? CO1- U

   (a) (+ 5 3) (b) (5 + 3) (c) add (5, 3)) 5 + 3

4. WFRS in formal symbolic logic refers to: CO1- U

   (a) Weak Formal Rule Structures (b) Well-Formed Rule Syntax

   (c) Well-Formed Formula Structures (d) Weighted Formula Reasoning System

5. Which of the following is an example of an OOP language? CO1- U

   (a) Prolog (b) Lisp (c) Python (d) SQL

6. In AI, which of the following is used to represent structured knowledge? CO1- U

(a) SQL databases (b) Graphs, Frames, and Semantic Nets

(c) Switch statements (d) REST APIs

7. What is the main purpose of indexing in knowledge organization? CO1- U

(a) Compressing data (b) Organizing data for fast retrieval

(c) Encrypting knowledge (d) Translating data

8. What is the role of memory organization in AI knowledge systems? CO1- U

(a) Reducing program length (b) Efficient retrieval and integration of structured knowledge

(c) Hardware configuration (d) GUI design

9. What is the main function of image transformation in pattern recognition? CO1- U

(a) Encrypting image files (b) Converting one image format to another

(c) Enhancing features for better recognition Compressing data

10. What is the role of knowledge validation in AI systems? CO1- U

(a) To gather user preferences

(b) To remove all rules

(c) To ensure the accuracy and reliability of acquired knowledge

(d) To create redundant data

PART – B (5 x 2= 10 Marks)

11. Explain the term 'knowledge search trade-off'. CO1- U

12. Differentiate between LISP and PROLOG. CO1- U

13. What are object classes in Object-Oriented Programming? CO1- U

14. Define retrieval technique with an example. CO1- U

15. Name any two learning methods and explain briefly. CO1- U

PART – C (5 x 16= 80 Marks)

16. (a) Identify real-life applications where emulation of human cognitive processes such as perception, memory, and reasoning are effectively used in AI-powered systems. CO2-App (16)

Or

(b) Identify the role of predicate logic in building AI systems capable of reasoning about structured data, such as legal documents or contracts. CO2-App (16)

17.	(a)	Apply the syntax and numerical functions of LISP to create a program that calculates the factorial of a number using recursion.	CO2-App	(16)
		Or		
	(b)	Develop a simple PROLOG program that performs family relationship queries and contrast its logic-based inference with that of procedural LISP.	CO2-App	(16)
18.	(a)	Apply object classes, messages, and methods to construct an object-oriented knowledge base for simulating a smart home automation system.	CO3-App	(16)
		Or		
	(b)	Identify different search problems in path finding with suitable strategies to solve them and explain in detail.	CO3 -App	(16)
19.	(a)	Identify the role of memory organization systems in expert systems and demonstrate how integrated knowledge improves decision-making performance.	CO4-App	(16)
		Or		
	(b)	Apply the concepts of linguistic knowledge and parsing strategies to process morphologically rich languages for AI-based translation tools.	CO4-App	(16)
		Or		
20.	(a)	Construct a speech recognition pipeline using AI models that converts spoken commands into text for a virtual home assistant.	CO5-App	(16)
	(b)	Develop an intelligent learning system using ID3 or INDUCE algorithms to classify materials based on properties like strength, conductivity, or corrosion resistance.	CO6-App	(16)