Total No. of Questions: 6 *Total No. of Printed Pages:3*

Enrollment No.....

Faculty of Engineering
End Sem Examination December 2024
ME3EL29 AI in Manufacturing

Programme: B.Tech. Branch/Specialisation: ME

Duration: 3 Hrs. **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d. Assume suitable data if necessary. Notations and symbols have their usual meaning.

			Marks	BL	PO	CO	PSO
Q.1	i.	Which of the following is a component of artificial intelligence? (a) Data mining (b) Internet protocols (c) Inference engines (d) Word processing	**1**	1	1,2,3, 4,5,12	1	1, 3
	ii.	What human mental capability does AI aim to replicate in reasoning? (a) Sensory perception (b) Vision processing (c) Stereotyping (d) Emotional responses	**1**	1	1,2,3, 4,5,12	1	1, 3
	iii.	Which of the following is a feature of PROLOG? (a) Object-oriented programming (b) Pattern matching (c) Functional programming (d) Scripting	**1**	1	1,2,3, 4,5,12	1	1, 3
	iv.	In PROLOG, data types are best characterized as: (a) Dynamic arrays (b) Predicates and facts (c) Byte streams (d) Class templates	**1**	1	1,2,3, 4,5,12	1	1, 3

v.	What is a key characteristic of an expert system? (a) It uses brute force calculations (b) It learns autonomously without prior data (c) It simulates human expert decision-making (d) It is based purely on numerical data	**1**	1	1,2,3, 4,5,12	1	1, 3		
vi.	Which of the following strategies is used for inference in expert systems? (a) Random sampling (b) Genetic algorithms (c) Forward and backward chaining (d) Decision trees	**1**	1	1,2,3, 4,5,12	1	1, 3		
vii.	Which programming language is commonly used for developing expert systems? (a) Python (b) CLIPS (c) JavaScript (d) HTML	**1**	1	1,2,3, 4,5,12	1	1, 3		
viii.	What is a typical application of expert systems in manufacturing? (a) Game development (b) Website design (c) Process control (d) Social media analytic	**1**	1	1,2,3, 4,5,12	1	1, 3		
ix.	What is the primary function of an artificial neural network in manufacturing? (a) Creating aesthetic designs (b) Optimizing tool selection (c) Encrypting data (d) Managing social networks	**1**	1	1,2,3, 4,5,12	1	1, 3		
x.	Which technology is used for handling uncertain data in manufacturing processes? (a) Blockchain (b) Decision trees (c) Fuzzy logic (d) Cloud computing	**1**	1	1,2,3, 4,5,12	1	1, 3		
Q.2	i.	Define artificial intelligence.	**2**	1	1,2,3, 4,5,12	1	1, 3	
	ii.	What do you mean by reasoning?	**3**	1	1,2,3, 4,5,12	1	1, 3	
	iii.	In what ways AI can be a threat to humanity?	**5**	2	1,2,3,4, 5, 6,7,11,12	2	1, 3	

OR	iv.	What are the components of AI?	**5**	2	1,2,3,4, 5,6,7,11 ,12	2	1, 3	
Q.3	i.	What do you mean by a query?	**2**	1	1,2,3, 4,5,12	1	1, 3	
	ii.	Describe all the data types in PROLOG.	**8**	2	1,2,3, 4,5,12	3	1, 3	
OR	iii.	Give a PROLOG programme for a board of directors, showing three hierarchical levels and each employee having two subordinates, one engineer and one technician.	**8**	3	1,2,3,4, 5,6,7,12	4	1, 3	
Q.4	i.	Define an expert system.	**2**	1	1,2,3, 4,5,12	1	1, 3	
	ii.	Explain forward chaining and backward chaining.	**8**	2	1,2,3,4, 5,6,7,11 ,12	2	1, 3	
OR	iii.	Explain prepositional logic and predicate logic with examples.	**8**	2	1,2,3,4, 5,6,7,11 ,12	2	1, 3	
Q.5	i.	Define a shell.	**2**	1	1,2,3, 4,5,12	1	1, 3	
	ii.	Write a CLIPS program on material selection with CAD.	**8**	3	1,2,3, 4,5,12	5	1, 3	
OR	iii.	Write a CLIPS program on CAPP.	**8**	3	1,2,3, 4,5,12	5	1, 3	
Q.6		Write short notes on any two:						
	i.	Artificial neural networks	**5**	2	1,2,3,4, 6,5,7,11 ,12	2	1, 3	
	ii.	Fuzzy logics	**5**	2	1,2,3, 4,5,12	3	1, 3	
	iii.	Genetic algorithms	**5**	3	1,2,3,4, 5,6,7,12	4	1, 3	

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Marking Scheme
ME3EL29 (T) AI in Manufacturing (T)

Q.1	i)	c) Inference Engines	**1**
	ii)	d) Emotional Responses	**1**
	iii)	b) Pattern Matching	**1**
	iv)	b) Predicates and Facts	**1**
	v)	c) It simulates human expert decision-making	**1**
	vi)	c) Forward and Backward Chaining	**1**
	vii)	b) CLIPS	**1**
	viii)	c) Process Control	**1**
	ix)	b) Optimizing tool selection	**1**
	x)	c) Fuzzy Logic	**1**
Q.2	i.	Definition	**2**
	ii.	Definition	**3**
	iii.	Explanation	**5**
OR	iv.	Components	**5**
Q.3	i.	Definition	**2**
	ii.	Datatypes	**8**
OR	iii.	Sample Program	**8**

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% Facts representing the hierarchy
% Format: manager(Manager, Subordinate).

% Level 1: Board of Directors
manager(board_of_directors, ceo).

% Level 2: CEO's subordinates (two managers)
manager(ceo, manager_1).
manager(ceo, manager_2).

% Level 3: Each manager has two subordinates (one engineer and one technician)
manager(manager_1, engineer_1).
manager(manager_1, technician_1).
manager(manager_2, engineer_2).
manager(manager_2, technician_2).

% Additional facts to represent employee roles
role(board_of_directors, 'Board of Directors').
role(ceo, 'CEO').
role(manager_1, 'Manager').
role(manager_2, 'Manager').
role(engineer_1, 'Engineer').
role(engineer_2, 'Engineer').
role(technician_1, 'Technician').
role(technician_2, 'Technician').

% Rules to determine if X is a superior of Y
superior(X, Y) :- manager(X, Y).
superior(X, Y) :- manager(X, Z), superior(Z, Y).

% Rules to determine if X and Y are colleagues (i.e., share the same manager)
colleague(X, Y) :- manager(Z, X), manager(Z, Y), X \= Y.
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Q.4	i.	Definition	**2**
	ii.	Forward Chaining **4M** Backward Chaining **4M**	**8**
OR	iii.	Predicate Logic **4M** Propositional Logic **4M**	**8**
Q.5	i.	Definition	**2**
	ii.	Program	**8**
OR	iii.	Program	**8**
Q.6			
	i.	Short Note	**5**
	ii.	Short Note	**5**
	iii.	Short Note	**5**

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