Reg. No.																

Question Paper Code	14624

M.E. / M.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2026

Second Semester

M.E. - Industrial Safety Engineering

24PISPC205 - MACHINE LEARNING AND ARTIFICIAL INTELLIGENCE FOR INDUSTRIAL SAFETY

Regulations - 2024

Duration: 3 Hours | Max. Marks: 100

PART – A (i) (MCQ)
(16 × 1 = 16 Marks)
Answer ALL Questions

		Marks	K – Level	CO
1.	Which learning method uses examples to infer rules? a) Deductive learning b) Inductive learning c) Random learning d) Genetic learning	1	K1	CO1
2.	Why are decision trees easy to interpret? a) They use machine code b) They follow a flowchart-like structure c) They avoid attributes d) They require no data	1	K2	CO1
3.	A machine monitoring system assumes that high vibration levels indicate possible equipment failure. This assumption is an example of a) Goal state b) Inductive bias c) Search operator d) Version space	1	K3	CO1
4.	In an industrial safety monitoring system, a perceptron is mainly used for a) Data storage b) Binary classification c) Chemical processing d) Robot maintenance	1	K1	CO2
5.	Genetic Algorithms are useful in industrial safety optimization because they a) Search for optimal solutions efficiently b) Remove all safety rules c) Avoid calculations d) Ignore fitness values	1	K2	CO2
6.	A smart factory system searches among many possible safety rules to identify the best accident prediction model. Which concept is applied? a) Hypothesis space search b) Random search c) Semantic mapping d) Depth-first traversal	1	K3	CO2
7.	In industrial safety, artificial vision systems are mainly used for a) Music processing b) Detecting unsafe conditions c) Increasing machine speed d) Printing reports	1	K1	CO3
8.	LISP is preferred in AI applications because a) It supports symbolic computation b) It avoids calculations c) It removes learning models d) It is used only for hardware	1	K2	CO3
9.	An industrial safety expert system uses logical rules to recommend emergency actions during gas leakage. Which AI language is most suitable? a) PROLOG b) LISP c) SQL d) COBOL	1	K3	CO3

10.	Knowledge representation in industrial safety AI mainly helps to a) Store safety-related information b) Increase machine weight c) Reduce electricity only d) Avoid monitoring	*1*	*K1*	*CO4*
11.	Fuzzy logic-based temperature monitoring systems can a) Handle varying heat conditions effectively b) Detect only exact temperatures c) Ignore thermal risks d) Remove alarms	*1*	*K2*	*CO4*
12.	A chemical plant AI system links concepts such as "Fire → Smoke → Alarm → Evacuation." Which representation technique is applied? a) Semantic network b) Random search c) Blind learning d) Depth-first search	*1*	*K3*	*CO4*
13.	The sigmoid activation function is commonly used in a) Back Propagation Networks b) Operating systems c) Network routing d) Data compression	*1*	*K1*	*CO5*
14.	A neural network fails to learn properly because the learning rate is set too high. What is the likely effect? a) Stable convergence b) Oscillation in learning c) No weight updates d) Immediate accuracy	*1*	*K2*	*CO5*
15.	A factory robot analyzes multiple paths to transport hazardous materials safely while avoiding restricted zones. Which AI capability related to GPS systems is demonstrated? a) Problem solving and search b) Random learning c) Blind search d) Data compression	*1*	*K3*	*CO6*
16.	A factory monitoring system detects moving forklifts and warns nearby workers to avoid collisions. Which AI application is demonstrated? a) Real object detection and recognition b) Random classification c) Blind memorization d) Manual reasoning	*1*	*K3*	*CO6*

PART – A (ii) (Short Answer Questions)
(6 × 3 = 18 Marks)
Answer ALL Questions

17.	Identify the role of attribute selection in decision tree learning.	*3*	*K3*	*CO1*
18.	Construct a basic neural network and label the parts.	*3*	*K3*	*CO2*
19.	Classify different applications of AI used in modern industries.	*3*	*K4*	*CO3*
20.	Distinguish the features of PROLOG and LISP.	*3*	*K4*	*CO4*
21.	Infer the role of hidden layers in ANN architecture.	*3*	*K3*	*CO5*
22.	Dissect the purpose of reinforcement learning in industrial safety applications.	*3*	*K4*	*CO6*

PART - B (Descriptive Answer Questions)
(6 × 11 = 66 Marks)
Answer ALL Questions

23.	a)	Implement the procedure of candidate elimination algorithm under the perspective of industrial safety with suitable examples.	*11*	*K3*	*CO1*
		OR			
	b)	Identify various heuristic search algorithms to solve AI problems and illustrate the working of anyone algorithm with a suitable example.	*11*	*K3*	*CO1*

24.	a)	Illustrate the steps involved in the back propagation algorithm for training a neural network.	*11*	*K3*	*CO2*
		OR			
	b)	Demonstrate Temporal Difference Learning and apply it in prediction and control problems.	*11*	*K3*	*CO2*
25.	a)	Analyze the historical background and development of Artificial Intelligence and evaluate its impact on modern technology.	*11*	*K4*	*CO3*
		OR			
	b)	Examine reasoning methods used in AI systems and analyze their effectiveness in decision making.	*11*	*K4*	*CO3*
26.	a)	Discover various knowledge representation techniques and evaluate their effectiveness in Artificial Intelligence applications.	*11*	*K4*	*CO4*
		OR			
	b)	Analyze the structure, representation, and applications of semantic networks in Artificial Intelligence.	*11*	*K4*	*CO4*
27.	a)	Apply the concepts of neural network architecture to design a simple Artificial Neural Network model.	*11*	*K3*	*CO5*
		OR			
	b)	Demonstrate on simple variations of Back Propagation Networks and their applications.	*11*	*K3*	*CO5*
28.	a)	Illustrate the role of picture processing in identifying defective industrial components.	*11*	*K3*	*CO6*
		OR			
	b)	Demonstrate how factory vision systems monitor Personal Protective Equipment compliance.	*11*	*K3*	*CO6*