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: 130018

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – NOV. / DEC. 2025
Fifth Semester
Computer Science and Engineering
U23CTV27 – AI FOR INDUSTRIAL APPLICATIONS
(Regulation 2023)

Time: Three Hours | Maximum: 100 Marks

Answer ALL the questions

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

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	List down a few characteristics of an ideal problem-solving agent.	2	K1	CO1
2.	Differentiate between Machine Learning and Expert Systems.	2	K2	CO1
3.	What is feature engineering in Machine Learning?	2	K1	CO2
4.	List two applications of CNNs in industrial vision.	2	K2	CO2
5.	What is anomaly detection in predictive maintenance?	2	K1	CO3
6.	Give two advantages of AI-based visual inspection in quality control.	2	K2	CO3
7.	Define Reinforcement Learning with an example in robotics.	2	K1	CO4
8.	What are Digital Twins in process optimization?	2	K2	CO4
9.	Mention two challenges in deploying AI in supply chain systems.	2	K1	CO5
10.	Differentiate between Edge AI and Cloud AI deployment.	2	K2	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.		Questions	Marks	KL	CO
11.	a)	Explain the types of AI (Machine Learning, Deep Learning, Expert Systems) with suitable industrial applications.	13	K2	CO1
		(OR)			
	b)	Discuss the ethical considerations and regulatory challenges in Industrial AI.	13	K2	CO1
12.	a)	Explain supervised vs. unsupervised learning with examples. Discuss their relevance in industrial AI.	13	K2	CO2
		(OR)			
	b)	Describe the working of CNNs and RNNs. Explain their applications in industrial vision and time-series forecasting.	13	K3	CO2
13.	a)	Given machine failure logs every 200 hours and sensor degradation patterns, design a time-series model to predict failure at 50-hour intervals. Calculate expected Mean Absolute Error (MAE) if predictions deviate by ±5 hours.	13	K2	CO3
		(OR)			
	b)	Discuss anomaly detection and automated visual inspection in manufacturing industries.	13	K2	CO3
14.	a)	Consider a warehouse robot with a grid map. It receives +10 reward for reaching a charging station, –5 penalty for hitting obstacles, and –1 for each time step. Formulate the RL state–action–reward structure and explain the Q-learning update for one step.	13	K2	CO4
		(OR)			
	b)	What are Digital Twins? Explain their use in process monitoring and smart manufacturing with suitable diagrams.	13	K2	CO4
15.	a)	A retailer sells 1000 units/week on average but faces ±200 fluctuations. Using a simple ML regression model, predict demand for next week given promotional activity increases sales by 15%. Calculate the expected demand and safety stock required.	13	K3	CO5
		(OR)			
	b)	Explain the challenges in AI deployment in industries. Compare Edge AI, Cloud AI, and On-Premises solutions.	13	K3	CO5

PART – C

(1 x 15 = 15 Marks)

Q.No.		Questions	Marks	KL	CO
16.	a)	Given vibration sensor data of size 10GB collected every second for 6 months, propose an AI pipeline. Estimate storage, preprocessing time, and ML model (LSTM vs. Random Forest). Compare accuracy vs. latency tradeoffs in deployment.	15	K2	CO3
		(OR)			
	b)	A retail supply chain is struggling with fluctuating demand and high logistics costs. Suggest how AI can optimize demand forecasting, inventory management, and route planning. Highlight deployment strategies and risks.	15	K3	CO5