



Fifth Semester B.E./B.Tech. Degree Examination, June/July 2025
Artificial Intelligence for Mechatronics

Time: 3 hrs.

Max. Marks: 100

*Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.**2. M : Marks , L: Bloom's level , C: Course outcomes.*

Module – 1				M	L	C
Q.1	a.	Explain intelligence and the two important components of Intelligence – Learning and communication.		10	L2	CO1
	b.	With the help of block diagram, explain expert systems and its functional blocks.		10	L2	CO1
OR						
Q.2	a.	Outline the features of swarm intelligence systems and mention their applications.		10	L2	CO1
	b.	With a neat diagram, explain Artificial Neural Network(ANN) with an analogy to biological neural network. Mention the application of ANN.		10	L2	CO1
Module – 2						
Q.3	a.	Summarize the two stages of robot vision with a neat block diagram.		10	L3	CO2
	b.	Explain the elements of averaging operation in image processing with suitable example.		10	L2	CO2
OR						
Q.4	a.	Explain the combination of averaging and edge enhancement with mathematical function.		10	L2	CO2
	b.	Illustrate the scene analysis with different types of representations for lines at junctions.		10	L2	CO2
Module – 3						
Q.5	a.	What are end effectors? Classify the types of end effectors used in robotic applications.		10	L2	CO3
	b.	With a neat sketch, explain the simplified kinematic model of a robot.		10	L2	CO3
OR						
Q.6	a.	Explain the localization method using Extended Kalman Filter (EKF) with a neat diagram.		10	L2	CO3
	b.	Illustrate the various types of robot perception and mention the relevant expressions.		10	L2	CO3

Module - 4

Q.7	a.	Outline the cell decomposition method used in path planning with cell classification.	10	L2	CO4
	b.	Illustrate the Voronoi diagrams based graph techniques to optimize the free space in path planning.	10	L3	CO4

OR

Q.8	a.	Explain the process of workspace and configuration space representation with a neat diagram.	10	L2	CO4
	b.	Quantify the probabilistic road maps based graph techniques to optimize the free space in path planning and briefly explain the same.	10	L3	CO4

Module - 5

Q.9	a.	Derive an expression for PD and PID controller in dynamic state model of the robot.	10	L3	CO5
	b.	List and explain three-layer architecture in robotic software hybrid architecture.	10	L2	CO5

OR

Q.10	a.	With the help of Augmented Finite State Machine (AFSM), explain the subsumption robotic architecture.	10	L3	CO5
	b.	With a neat diagram, illustrate the pipeline architecture with all the relevant stages involved.	10	L2	CO5
