

SECOND SEMESTER M. TECH (EMBEDDED CONTROL AND AUTOMATION) END SEMESTER EXAMINATIONS MAY 2024 ROBOTIC SYSTEMS (ICE 5410)

Ti	me:3 Hours 07-05-2024	MAX. MAR		KS: 50	
	Instructions to Candidates:				
	 Answer ALL the questions. Assume all missed data. 				
Q.No.	Description	М	со	PO'S	BL
1A	As applied to robot vision what is object recognition? Differentiate various object recognition types.	3	2	2,3	3
1B	Differentiate ultrasonic sensor and infrared sensor used in mobile robot.	3	2	2, 3	3
1C	Derive the joint angles of the robotic manipulator, if link lengths, position (x_2 , y_2) and orientation(α) at M_2 are known.	4	3	2, 4	4



- 2A For an image digitized at 128 points per line and 128 levels, 8 bit A to 4 2 2, 3 4 D conveter is used to indicate various shades. Evaluate the reduction in data volume if the image is stored in black and white using data reduction technique.
- 2B Analyze the manipulator end effector selection and design 4 2 2, 3 3 consideration for a chemical industry.

2C	For very light load operations suggest which robot is suitable and mention the drive used in those.	2	1	1, 2	2
3A	Derive the Jacobian for Selective Compliance Assembly Robot Arm (SCARA).	5	3	2, 4	3
3B	Discuss three phases of task planning. Elaborate with an application for each.	2	4	5	3
3C	Derive dynamics of single link manipulator.	3	3	2,3	3
4A	Plan the 4-3-4 trajectory and obtain the solution for a robotic operation.	6	4	5	4
4B	Differentiate between navigation and autonomy as applied to mobile robot.	4	4	5	3
5A	For die casting application suggest the robot work cell design with a schematic.	3	5	4, 5	2
5B	Write a code in high level language to pick and place an object after detecting the object.	5	4	5	4
5C	How LIDAR is helpful to detect in obstacle avoidance.	2	4	5	3