Reg. No.																

Question Paper Code	13947

B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2025

Seventh Semester

Mechanical Engineering

20MEEL707 - INDUSTRIAL ROBOTICS AND MATERIAL HANDLING SYSTEMS

Regulations - 2020

Duration: 3 Hours | Max. Marks: 100

PART - A (MCQ) (10 × 1 = 10 Marks)

Answer ALL Questions

		Marks	K – Level	CO
1.	Degrees of Freedom in robots refers to: (a) Number of directions a robot can move (b) Temperature range (c) Power supply options (d) Programming languages	1	K1	CO1
2.	Which manipulator mimics the human arm? (a) SCARA (b) Cartesian (c) Spherical (d) Articulated	1	K1	CO1
3.	The term "object recognition" means: (a) Moving parts only (b) Identifying objects via images (c) Transmitting data (d) Networking	1	K1	CO2
4.	A robot for underwater work usually has: (a) No vision (b) Special sensors and cameras (c) Magnetic grippers only (d) Wheels	1	K1	CO2
5.	Mechanical grippers work by: (a) Magnetic force (b) Vacuum (c) Jaws/fingers (d) Welding	1	K1	CO3
6.	Gripper design involves: (a) Only material selection (b) Force, shape, and object type (c) Only surface finish (d) Power connection	1	K1	CO3
7.	Robot testing means: (a) Software debugging only (b) Performance validation & bench marking (c) Sensor calibration (d) Power analysis	1	K1	CO4
8.	Robotization impacts: (a) Productivity only (b) Society, jobs, safety (c) Only on management roles (d) Only on students	1	K1	CO4
9.	Material handling refers to: (a) Storage only (b) Movement, protection, storage, and control of materials (c) Production only (d) Communication	1	K1	CO5
10.	Flexible automation in handling implies: (a) Easily reprogrammable (b) Fixed sequence only (c) Manual handling (d) Non-automated	1	K1	CO6

PART - B (12 × 2 = 24 Marks)

Answer ALL Questions

		Marks	K – Level	CO
11.	Define work volume of a robot.	2	K1	CO1
12.	What is meant by repeatability in robots?	2	K1	CO1
13.	List two image representation techniques used in robot vision.	2	K1	CO2
14.	What are underwater robots?	2	K1	CO2
15.	What is a mechanical gripper?	2	K1	CO3
16.	Differentiate internal and external grippers.	2	K2	CO3
17.	What is Accuracy and reliability?	2	K1	CO4
18.	What is ROI?	2	K1	CO4

19.	Differentiate external and internal logistics.		2	K2	CO5
20.	List the technologies used in Vehicle guidance.		2	K1	CO5
21.	List four conventional Material handling equipments.		2	K1	CO6
22.	What is ASRS?		2	K1	CO6

PART - C (6 × 11 = 66 Marks)

Answer ALL Questions

23.	a)	Describe the different types of Industrial robots with a neat sketch.	11	K2	CO1
		OR			
	b)	Describe how robots are used in loading and unloading station.	11	K2	CO1
24.	a)	What is a robotic vision system and explain its main components?	11	K2	CO2
		OR			
	b)	Explain the construction and working of robots in the welding process. Also, list its advantages and disadvantages.	11	K2	CO2
25.	a)	An Industry wants to install robots for pick and place operations. They are the leading manufacturer of Glass and its components. Select a suitable gripper for this operation. Explain with a neat sketch its working and various components involved. Justify how it will be useful for the Glass industry.	11	K3	CO3
		OR			
	b)	Explain passive grippers and its types. Illustrate, with a neat sketch, the construction and working of a magnetic gripper when used for handling steel sheets in an automated press line.	11	K3	CO3
26.	a)	Explain how to calculate the payback period of the robots when an industry installs Robots on its shop floor for the loading and unloading section. Consider all the costs involved in it.	11	K2	CO4
		OR			
	b)	Explain the various factors influencing robot selection for a manufacturing system.	11	K2	CO4
27.	a)	Explain Radio Frequency Identification method with a neat diagram.	11	K2	CO5
		OR			
	b)	Explain three types of Automated Guided Vehicle system with a neat diagram.	11	K2	CO5
28.	a)	Explain the principle of ASRS in terms of inventory control.	11	K2	CO6
		OR			
	b)	What is bar code technology? Explain how it is used in Part identification in moving conveyor systems.	11	K2	CO6