Reg. No.															

Question Paper Code	14360

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

Seventh Semester

Mechanical Engineering

20MEEL707 - INDUSTRIAL ROBOTICS AND MATERIAL HANDLING SYSTEMS

Regulations - 2020

Duration: 3 Hours | Max. Marks: 100

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

		Marks	K – Level	CO
1.	Load handling capacity of a robot refers to _____. a) Robot speed b) Maximum load carried by the robot c) Number of joints d) Power consumption	1	K1	CO1
2.	Which factor is important while selecting a robot for machine loading? a) Colour of robot b) Payload capacity c) Shape of controller d) Brand label	1	K3	CO1
3.	CNC machine loading by robots helps to improve _____. a) Manual errors b) Production efficiency c) Machine vibration d) Tool wear	1	K2	CO1
4.	Object recognition helps robots to identify _____. a) Work pieces b) Bearings c) Boilers d) Turbines	1	K2	CO2
5.	Software considerations in robotics mainly involve _____. a) Robot programming and control b) Machine painting c) Tool grinding d) Manual handling	1	K3	CO2
6.	Robots used for cleaning in hazardous environments are primarily aimed at: a) Increasing production speed b) Replacing human workers in dangerous conditions c) Reducing the cost of robots d) Improving aesthetic appeal	1	K2	CO2
7.	Which type of gripper is most suitable for handling thin, flat, non-porous sheets? a) Mechanical gripper b)Vacuum gripper c) Magnetized gripper d) Hook	1	K1	CO3
8.	In a robot gripper, what does the factor of safety K_1 depend on? a) The speed of the robot b) The weight of the object and friction coefficient c) The color of the object d) The type of actuator	1	K1	CO3
9.	Active grippers require _____ for operation. a) External power b) Manual force c) Cooling water d) Lubricants	1	K2	CO3
10.	Robot selection mainly depends on _____. a) Payload requirement b) Paint colour c) Machine size d) Building height	1	K1	CO4
11.	A robot cost $100,000 to install. It saves $40,000 per year in labor and $10,000 in material waste. What is the payback period? a) 1 year b) 2years c) 3years d) 4years	1	K3	CO4

12.	How does robotization primarily impact manufacturing costs? a) Increases labor costs b) Increases maintenance costs c) Reduces operating costs by decreasing scrap and increasing throughput d) Eliminates the need for electricity	*1*	*K2*	*CO4*
13.	The Scara robots is especially designed for assembly automation and uses _____ axes of motion. Column operations a) Three b) Nine c) Four d) Five	*1*	*K3*	*CO5*
14.	Which technology is frequently used in modern warehouses to identify and track items without line-of-sight? a) Barcode b) RFID c) Industrial Truck d) Conveyor	*1*	*K1*	*CO5*
15.	An automobile manufacturing company plans to reduce manual material transfer and improve production efficiency by introducing a driverless transportation system integrated with robots. Which material handling system is most suitable for this application? a) Conveyor system b) Automated Guided Vehicle (AGV) c) Industrial truck d) Crane and hoist	*1*	*K3*	*CO6*
16.	A warehouse uses robotic systems for automatic storage, retrieval, and identification of products without direct human intervention. Which combination of technologies best supports this application? a) Hoist and monorail b) Conveyor and crane c) ASRS and RFID technology d) Industrial truck and barcode label only	*1*	*K3*	*CO6*

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

17.	Illustrate the working of a robot-centered cell used in FMS environments.	*3*	*K3*	*CO1*
18.	Assess the importance of image processing techniques in robotic quality control applications.	*3*	*K4*	*CO2*
19.	Differentiate the force requirements of robotic grippers used in various material handling applications.	*3*	*K4*	*CO3*
20.	Examine the importance of speed and accuracy in robot performance evaluation.	*3*	*K4*	*CO4*
21.	Demonstrate the use of AGVs in advanced material handling systems.	*3*	*K3*	*CO5*
22.	Illustrate the working of radio frequency identification technology in inventory management.	*3*	*K3*	*CO6*

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

23.	a)	Illustrate the different types of industrial robots and compare their applications in robotic material handling systems.	*11*	*K3*	*CO1*
		OR			
	b)	Demonstrate the process of robotic material transfer in automated production systems with neat sketches.	*11*	*K3*	*CO1*
24.	a)	Demonstrate the working principle of robotic vision systems used in industrial inspection applications.	*11*	*K3*	*CO2*
		OR			
	b)	Utilize robotic systems for underwater applications and explain their operational benefits.	*11*	*K3*	*CO2*

25.	a)	Investigate the design considerations for robotic grippers with multiple degrees of freedom.	*11*	*K4*	*CO3*
		OR			
	b)	Compare various types of grippers used in robotics system and explain its application with neat sketch.	*11*	*K4*	*CO3*
26.	a)	Demonstrate pay back and rate of return method of economic analysis while implementing robots in industry.	*11*	*K3*	*CO4*
		OR			
	b)	Illustrate the impact of robotisation on industrial productivity and operational efficiency.	*11*	*K3*	*CO4*
27.	a)	Examine the working and applications of conventional material handling systems such as industrial trucks, conveyors, and cranes.	*11*	*K4*	*CO5*
		OR			
	b)	Examine the functions and advantages of Automated Storage and Retrieval Systems (ASRS) in warehouse automation.	*11*	*K4*	*CO5*
28.	a)	Implement robots in continuous arc welding processes for industrial automation.	*11*	*K3*	*CO6*
		OR			
	b)	Demonstrate the applications of barcode technology in industrial material handling systems.	*11*	*K3*	*CO6*