PVP 20

Code: 20ME4702E

IV B.Tech - I Semester – Regular / Supplementary Examinations
OCTOBER 2024

INDUSTRIAL ROBOTICS
(MECHANICAL ENGINEERING)

Duration: 3 hours Max. Marks: 70

Note: 1. This paper contains questions from 5 units of Syllabus. Each unit carries 14 marks and have an internal choice of Questions.
2. All parts of Question must be answered in one place.

BL – Blooms Level CO – Course Outcome

			BL	CO	Max. Marks
UNIT-I					
1	a)	What are the major components of a robotic system? Briefly explain their functions.	L2	CO1	7 M
	b)	Discuss the construction and working of a stepper motor with neat sketch.	L3	CO1	7 M
OR					
2	a)	List and explain Design considerations of Grippers.	L2	CO1	7 M
	b)	Define Industrial Robot, Work Volume and discuss Robot Joints.	L2	CO1	7 M
UNIT-II					
3	a)	What are fundamental rotation matrices? Obtain the 3 fundamental rotation matrices for rotations about X, Y and Z axes.	L3	CO2	7 M

	b)	What is forward and reverse kinematics of a robot? Explain with a neat sketch.	L3	CO2	7 M
OR					
4	a)	Find the forward kinematic solution for the R-R planar manipulator.	L3	CO2	7 M
	b)	What is robot dynamics? Explain the importance of Robot Dynamics in Robotics.	L3	CO2	7 M
UNIT-III					
5	a)	What is trajectory planning in robotics? Briefly discuss the methods of Trajectory Planning?	L3	CO3	7 M
	b)	Explain about lead through programming in Robots.	L2	CO3	7 M
OR					
6	a)	It is desired to have the first joint of a six-axis robot go from initial angle of 30^o to a final angle of 75^o in 5 seconds. Using a third-order polynomial, calculate the joint angle at 1, 2, 3, and 4 seconds.	L3	CO3	10 M
	b)	Explain WAIT, SIGNAL and DELAY commands used in Robot programming.	L3	CO3	4 M
UNIT-IV					
7	a)	Discuss any two position sensors used in robotics and their applications.	L2	CO4	7 M
	b)	Explain the construction, working of force and torque sensor used in robotics.	L2	CO4	7 M

OR					
8	a)	Explain the construction, working and importance of acoustic sensor used in robotics.	L2	CO4	7 M
	b)	Discuss the features of the robot vision system.	L3	CO4	7 M
UNIT-V					
9	a)	Explain the features of a robot for an automobile industry to carry out welding operation.	L3	CO4	7 M
	b)	Explain with neat sketch the application of robot in the following areas. Discuss them in details with respect to the type of robot configuration and drive system used. i)Inspection ii) Assembly operation	L3	CO4	7 M
OR					
10	a)	Discuss the recent development in mobile robots and micro bots.	L3	CO4	7 M
	b)	How can industrial robots be utilized to minimize downtime and increase production uptime in manufacturing facilities?	L3	CO4	7 M