Reg. No.																

Question Paper Code	14653

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

Fifth Semester

Mechanical Engineering

20MEPC502 - ROBOTICS

Regulations - 2020

Duration: 3 Hours | Max. Marks: 100

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

		Marks	K – Level	CO
1.	The work envelope of a robot defines a) Payload capacity b) Reachable workspace c) Speed of robot d) Accuracy only	1	K1	CO1
2.	The coordinate system commonly used for articulated robots is a) Cartesian b) Cylindrical c) Polar d) Joint coordinate system	1	K2	CO1
3.	The payload of a robot refers to a) Maximum speed b) Maximum load carried c) Reach accuracy d) Robot memory	1	K1	CO1
4.	Vacuum grippers are mainly used for handling a) Rough surfaces b) Flat and smooth objects c) Heavy shafts d) Hot metals	1	K1	CO2
5.	Stepper motors are preferred because they provide a) Continuous random motion b) Precise incremental motion c) Hydraulic motion d) Oscillatory motion	1	K2	CO2
6.	Which drive system provides highest positional accuracy? a) Pneumatic drive b) Hydraulic drive c) Electrical drive d) Mechanical drive	1	K1	CO2
7.	Optical encoders are used to measure a) Speed and position b) Temperature c) Humidity d) Pressure	1	K1	CO3
8.	Frame grabber is used in a) Pneumatic system b) Hydraulic system c) Image acquisition d) Servo control	1	K1	CO3
9.	Piezoelectric sensors are commonly used for measuring a) Force and vibration b) Temperature c) Voltage d) Humidity	1	K1	CO3
10.	Forward kinematics determines a) Joint angles from position b) Robot speed only c) End effector position from joint variables d) Payload only	1	K2	CO4

11.	Jacobian matrix relates		1	K2	CO4
	a) Position and force	b) Velocity and force			
	c) Torque and speed	d) Pressure and displacement			
12.	Trajectory generation is associated with		1	K2	CO4
	a) Path planning	b) Image processing			
	c) Sensor calibration	d) Payload control			
13.	VAL is a		1	K1	CO5
	a) Sensor	b) Robot programming language			
	c) Robot drive	d) Coordinate system			
14.	Economic justification of robots includes		1	K1	CO5
	a) Return on investment	b) Machine color			
	c) Weight only	d) Height only			
15.	AC servo motors are mainly used for		1	K1	CO6
	a) Precision control	b) Welding only			
	c) Lubrication	d) Cooling systems			
16.	Compliance sensors are used to measure		1	K2	CO6
	a) Flexibility and force interaction	b) Temperature			
	c) Humidity	d) Voltage			

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

Answer ALL Questions

17.	Illustrate the importance of robot specifications in industrial applications.	3	K2	CO1
18.	Outline the selection criteria for end effectors in industrial robots.	3	K2	CO2
19.	Experiment with the role of position and range sensors in robotic applications.	3	K3	CO3
20.	Apply the trajectory generation techniques in robot programming.	3	K3	CO4
21.	Explain the economic benefits of robots in automated production systems.	3	K2	CO5
22.	Develop a robotic automation concept for material handling applications.	3	K3	CO6

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

Answer ALL Questions

23.	a)	Select the anatomy, coordinate systems, classifications and specifications of industrial robots with suitable applications.	11	K3	CO1
		OR			
	b)	Illustrate the need, functions and applications of robots in modern industrial sectors.	11	K3	CO1
24.	a)	Compare and apply various robot drive systems with suitable industrial applications.	11	K3	CO2
		OR			
	b)	Develop the different robotic grippers and end effectors for industrial automation applications.	11	K3	CO2

25.	a)	Identify the various sensors used in robotics and explain their role in machine vision systems.	*11*	*K3*	*CO3*
		OR			
	b)	Build the image processing and object recognition techniques used in robotic inspection and navigation systems.	*11*	*K3*	*CO3*
26.	a)	Construct the forward and inverse kinematics of robotic manipulators with suitable derivations.	*11*	*K3*	*CO4*
		OR			
	b)	Develop robot programs using VAL language and analyze trajectory generation methods for robotic applications.	*11*	*K3*	*CO4*
27.	a)	Organize the role of industrial robots in flexible manufacturing and automated production systems.	*11*	*K3*	*CO5*
		OR			
	b)	Identify and apply the economic analysis and automation benefits of robots in industrial applications.	*11*	*K3*	*CO5*
28.	a)	Develop a robotic material handling system using AGV technology for a smart factory environment.	*11*	*K3*	*CO6*
		OR			
	b)	Identify the advantages and limitations of robotic automation in modern industries.	*11*	*K3*	*CO6*