A Reg. No. : | | | | | | | | | | |

Question Paper Code: 59509

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2018
Elective

Electronics and Instrumentation Engineering

15UEI909 - ROBOTICS AND AUTOMATION
(Regulation 2015)

Duration: Three hours Maximum: 100 Marks

PART A - (10 x 1 = 10 Marks)

1. A robot arm that moves along three independent axes, each of which is straight and perpendicular to the other two, employs _____ CO1- R

   (a) Revolute geometry

   (b) Spherical coordinate geometry

   (c) Cartesian coordinate geometry

   (d) Cylindrical coordinate geometry

2. Spherical coordinates can uniquely define the position of a point in up to _____ CO1- R

   (a) One dimension (b) Two dimensions (c) Three dimensions (d) Four dimensions

3. The problem with electric drive is/are _____ CO2 -R

   (a) Low stiffness

   (b) Increased backlash, cost and weight

   (c) Motor needs breaking devices

   (d) Need stiffness and breaking devices, increased backlash, cost and weight.

4. Frame grabber is used to CO2- R

(a) archeive the image (b) segment the image

(c) process the image (d) capture and store the image

5. Magnetic gripper is used only for _____ materials CO3- R

(a) Stainless steel (b) Non-ferrous (c) Ferrous (d) Plastic

6. End effectors can be classified into two categories which are _____ CO3 -R

(a) Elbows and wrists (b) Grippers and end of arm tooling

(c) Grippers and wrists (d) End of arm tooling and elbows

7. Physical structure of robot which moves around, is called _____ CO4- R

(a) Link (b) Manipulator (c) Joints (d) End-effector

8. Identify which of the following statements is *not* true in the case of inverse kinematics problem, it is much more complex because _____ CO4- R

(a) The equation to be solved are in general nonlinear in joint variables

(b) Multiple solutions may exist

(c) There might be no admissible solutions

(d) Unique solution may exist

9. Selective Compliance Assembly Robot Arm (SCARA) robot is very suitable in _____ kind of operations. CO5- R

(a) Single Operations (b) Assembly Operations

(c) Translatory Operations (d) Rotary Operations

10. _____ type of robot control used in spot-welding applications. CO5- R

(a) Point to point (b) Sequential (c) End point (d) Continuous path

PART – B (5 x 2= 10Marks)

11.	Recall the three laws of Robotics stated by Asimov.	CO1- R	
12.	Indicate the advantages of the electric drives.	CO2- R	
13.	Classify the grippers used in robotic manipulator.	CO3- R	
14.	Identify the features / capabilities of second generation robot languages.	CO4- R	
15.	List the design considerations for the implementation of robot to perform a task in industry.	CO5- R	

PART – C (5 x 16= 80Marks)

16.	(a)	Explain about any four configurations of robots.	CO1- App	(16)
		Or		
	(b)	Differentiate between the various generations of robots.	CO1 -App	(16)
17.	(a)	Execute how the proximity and range sensors can be built using (i) Optical devices (ii) Acoustical devices	CO2 -App	(16)
		Or		
	(b)	Differentiate between hydraulic and pneumatic actuator based on working principle and components.	CO2- Ana	(16)
18.	(a)	Analyze the working principle of magnetic and vacuum cup grippers.	CO3 -Ana	(16)
		Or		
	(b)	Derive the forward kinematics equation using the homogenous transformation for the three link planar (3R) manipulator.	CO3 -Ana	(16)

19.	(a)	Explain the different types of programming language used in robotics.	CO4- U	(16)
		Or		
	(b)	Determine the manipulator Jacobian for the 3-DOF articulated arm.	CO4 -Ana	(16)
20.	(a)	Explain the any two applications of robots in manufacturing processes.	CO5- U	(16)
		Or		
	(b)	Explain the any two robot work cell design configurations in robot applications.	CO5- U	(16)