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Question Paper Code	12582
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B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2024

Seventh Semester

Electronics and Instrumentation Engineering
20EIPC701 - ROBOTICS AND AUTOMATION

Regulations - 2020

Duration: 3 Hours

Max. Marks: 100

PART - A (10 × 2 = 20 Marks)

Answer ALL Questions

	Marks	K- Level	CO
1. Describe the three laws of robotics.	2	K2	CO1
2. What is Degree of Freedom? Identify the importance of it.	2	K1	CO1
3. Mention the various application of robot manipulator in an industry.	2	K2	CO2
4. Distinguish between Hydraulic and pneumatic drives.	2	K2	CO2
5. Compare and contrast the end-effectors from the viewpoint of their functions.	2	K2	CO3
6. Identify the limitations of magnetic grippers.	2	K2	CO3
7. What are the methods to obtain the jacobian for a six –link manipulator with rotator joints?	2	K1	CO4
8. Discuss any four differences between serial and parallel manipulators.	2	K2	CO4
9. Write the importance of Machine interface in robotics.	2	K1	CO5
10. What are the uses of PID controllers in Robotics?	2	K1	CO5

PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

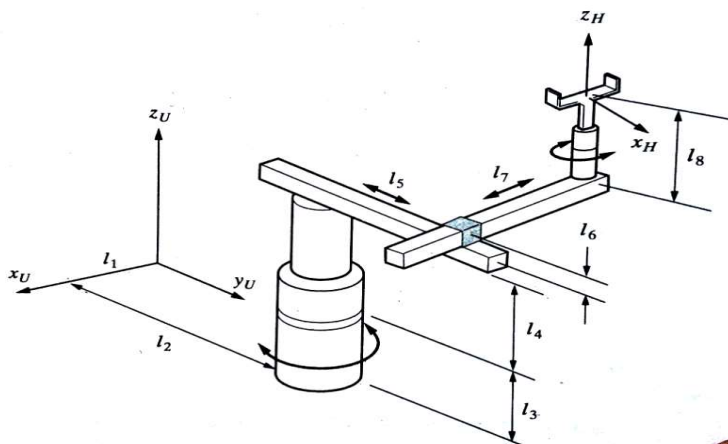
11. a) Classify the robots based on its functionality. Also mention the specifications of the same.	13	K2	CO1
OR			
b) With the help of a neat sketch, explain the basic components of a robot connected as a system.	13	K2	CO1
12. a) Classify the types of sensors used for robotic operation in man machine interface with neat illustration. Describe about their features and their area of application.	13	K2	CO2
OR			
b) Describe in detail about the Machine vision systems in robotics.	13	K2	CO2
13. a) With neat sketch describe the vacuum grippers in terms of their principles and uses.	13	K2	CO3

OR

- b) Describe in detail the construction of manipulators with its dynamics and force control. 13 K2 CO3
14. a) A point P in space is defined as $P = (2, 3, 5)^T$ relative to frame B which is attached to the origin of the reference frame A and is parallel to it. Apply the following transformations to frame B: (a) Rotate 90° about x-axis, then, (b) Rotate 90° about local a-axis, then, (c) Translate 3 units about y-axis, 6 units about z-axis, and 5 units about x-axis. Find the P matrix after transformations. Plot the points in the 3-D grid of Cartesian space. 13 K3 CO4

OR

- b) Discuss about the advantages and disadvantages of lead through programming in detail. 13 K2 CO4
15. a) For the given 4 DOF robot as shown below, assign the coordinate frames based on D-H representation. Fill out the parameters table containing θ , d, a, and α . Write an equation in terms of A matrices that show how UTH can be calculated. 13 K4 CO5



OR

- b) Describe in detail the robot cell design. 13 K2 CO5

PART - C (1 × 15 = 15 Marks)

16. a) Express the concepts of forward kinematics and inverse kinematics in the context of manipulators. Disclose their applications with two, three, and four degrees of freedom in robotics. 15 K3 CO4

OR

- b) Identify the basic characteristics needed for Sensors. List the various sensors used in the field of robot and explain any one in detail. 15 K3 CO2