

19 APR 2023

Reg. No.

Question Paper Code

11780

B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2023

Eighth Semester

Electronics and Instrumentation Engineering

EI8079 - ROBOTICS AND AUTOMATION

(Regulations 2017)

Duration: 3 Hours

Max. Marks: 100

PART - A (10 × 2 = 20 Marks)

Answer ALL Questions

- | | <i>Marks,
K-Level, CO</i> |
|--|-------------------------------|
| 1. Define workspace in Robotics. | 2,K1,CO1 |
| 2. State the Asimov's laws of robotics. | 2,K1,CO1 |
| 3. Which type of drive system is more suitable for heavy load robot application? | 2,K2,CO2 |
| 4. How will you apply machine vision system in robotics? | 2,K2,CO2 |
| 5. Draw the block diagram of manipulator and mention its building blocks. | 2,K1,CO3 |
| 6. Distinguish between gripper and tool. | 2,K2,CO3 |
| 7. Discuss on forward kinematics and reverse kinematics. | 2,K1,CO4 |
| 8. List out basic modes of operation in robot language structure. | 2,K1,CO4 |
| 9. Draw the block diagram of a PID control schemes. | 2,K1,CO5 |
| 10. How interfacing is provided in the design of robot assembly? | 2,K2,CO5 |

PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

11. a) Illustrate the various types of joints used in robots with an example. 13,K2,CO1

OR

- b) Label the dynamic stabilization of a robot body and explain in detail. 13,K2,CO1

12. a) Classify the types of hydraulic actuators used in robotics? Explain their characteristics. 13,K2,CO2

OR

- b) Describe the different stages of machine vision system and its types of illumination systems. 13,K2,CO2

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create

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13. a) What is the function of a manipulator? Sketch and explain a robotic manipulator arm. 13,K2,CO3

OR

- b) Describe with neat sketches the features, merits, limitations and applications of following grippers.

(i) Magnetic Gripper. 7,K2,CO3

(ii) Vacuum Gripper. 6,K2,CO3

14. a) Derive the forward and backward kinematic transformation of Cartesian robot LL manipulator with two degrees of freedom. 13,K2,CO4

OR

- b) Explain briefly the lead through programming method in detail. 13,K2,CO4

15. a) Describe the dynamic model of 2 DOF manipulator using the Lagrange – Euler formulation. 13,K2,CO4

OR

- b) Illustrate the various applications of robots in hazardous areas. Examine them in detail. 13,K2,CO5

PART - C (1 × 15 = 15 Marks)

16. a) Create a sensor which is used to determine that an object is close to another object before contact is made. Apply suitable principles and explain with neat diagrams. 15,K3,CO2

OR

- b) How a robot is used to service a production machine by transferring parts to and from the machine? Explain in detail. 15,K3,CO5