Reg. No. [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]

Question Paper Code | **12281**

B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2023
Seventh Semester
Electronics and Instrumentation Engineering
(Common to Instrumentation and Control 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.	Compare Robotics and Robot.	*2,K2,CO1*
2.	Explain Work Volume.	*2,K1,CO1*
3.	Define Tactile sensor.	*2,K1,CO2*
4.	What do you mean by segmentation?	*2,K1,CO2*
5.	Classify the types of mechanical gripper.	*2,K2,CO3*
6.	What are End effectors?	*2,K1,CO3*
7.	Explain the term forward kinematics.	*2,K2,CO4*
8.	Arrange the generations of robot programming languages.	*2,K1,CO4*
9.	Draw the block diagram of PID control scheme.	*2,K1,CO5*
10.	What is palletizing?	*2,K1,CO5*

PART - B (5 × 13 = 65 Marks)
Answer ALL Questions

11. a) (i) Classify the various types of links used in robots and explain in detail.   *10,K2,CO1*

(ii) Discuss degrees of freedom of a robot.   *3,K2,CO1*

OR

b) Discuss with figure the features, advantages, limitations and applications of any two Robot configurations   *13,K2,CO1*

12. a) Discuss response, range, accuracy and sensitivity in relation to robot sensors. Explain the working principle of proximity sensor.   *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   **12281**

13. a) Classify the different types of mechanical gripper with simple sketches along with its industrial application. *13,K2,CO3*

OR

b) Describe the gripper force analysis and gripper design with neat diagrams. *13,K2,CO3*

14. a) An LL robot has two links of variable length. Assuming that the origin of the global coordinate system is defined at joint J1, determine the following. *13,K3,CO4*
      (i)   The coordinate of the end effector point if the variable link lengths are 3m and 5m.
      (ii)   Variable link lengths if the end effector is located at (3, 5).
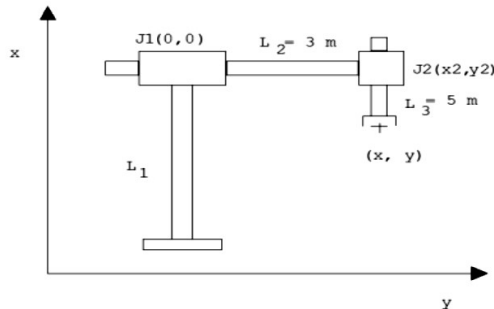
OR

b) Briefly explain the Robot Programming Languages in detail. *13,K2,CO4*

15. a) Analyze the application of inline robot cell in multiple robots and machine interference. *13,K2,CO5*

OR

b) Describe the dynamic model of 2 DOF manipulator using the Lagrange – Euler formulation. *13,K2,CO5*

PART - C (1 × 15 = 15 Marks)

16. a) (i) Explain singularity and redundancy in kinematics. *7,K2,CO4*
    (ii) Discuss the need of robots and automation in Die Casting applications. *8,K2,CO5*

OR

b) (i) Elucidate on the importance of robot kinematics *8,K2,CO4*
    (ii) Discuss the need of robots in Palletizing applications. *7,K2,CO5*