B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV/DEC 2022
Fifth Semester
Mechanical Engineering
20MEPC502 - ROBOTICS
(Regulations 2020)

Duration: 3 Hours   Max. Marks: 100

PART - A (10 × 2 = 20 Marks)
Answer ALL Questions

		Marks, K-Level, CO
1.	Define work volume of a robot.	2,K1,CO1
2.	Name the commonly used robot configurations.	2,K1,CO1
3.	Define End Effectors.	2,K1,CO2
4.	Give some example of robot End effectors.	2,K1,CO2
5.	Classify the types of tactile sensor.	2,K2,CO3
6.	Discuss the techniques involved in segmentation.	2,K2,CO3
7.	Differentiate joint space and world space.	2,K2,CO4
8.	Give any two limitations of on-line robot programming.	2,K2,CO4
9.	How does operating cost associated with a robot?	2,K2,CO5
10.	Which type of robot is commonly used for pick and place operation?	2,K2,CO5

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

11. a) Explain the following
    (i) History of robots.   7,K1,CO1
    (ii) Types of automation.   6,K1,CO1

    OR

    b) Describe about various DOF and joints associated with industrial robots.   13,K1,CO1

12. a) Describe briefly the working of various types of stepper motor with its sketches.   13,K1,CO2

    OR

    b) Describe various types of Gripper mechanisms.   13,K1,CO2

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create   **11540**

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13. a) Explain the following range sensing techniques
    (i) Triangulation's technique.   7,K2,CO3
    (ii) Structured lighting approach.   6,K2,CO3

                              OR

    b) Discuss about the various types of cameras in robotic system.   13, K2,CO3

14. a) Derive the forward and reverse transformation of 4-Degree of freedom   13, K2,CO4
    in three dimensions using DH convention.

                              OR

    b) (i) Explain the teach pendant for Robot system.   7,K2,CO4

    (ii) Explain Lead through methods.   6,K2,CO4

15. a) How economic analysis is done in Payback method? Explain with   13,K2,CO5
    examples.

                              OR

    b) Discuss the various applications of robots in industries.   13,K2,CO5

PART - C (1 × 15 = 15 Marks)

16. a) Sketch the different types of Robot Coordinate System.   15,K3,CO6

                              OR

    b) The total investment required for a new robot installation is Rs. 65,000   15,K3,CO6
    including the price of tooling robot and accessories. The estimate
    expense on annual maintenance robot operating and programming is
    Rs. 5500 for one shift operation and Rs. 7500 for two shift operation.
    The robot replaces one worker whose salary and other benefits amount
    to be Rs.28,000 per annum.

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create   **11540**