CBCS SCHEME

USN

21MT755

Seventh Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026

Robotics for Industry

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-1

1 a. Explain with the help of a neat figure, the three classes into which industrial automation is classified. **(10 Marks)**

b. What are the three laws of robotics – formulated by Isaac Asimov and explain the robotics in science fiction. **(10 Marks)**

OR

2 a. What is work volume? Discuss with a neat sketch work volume of Selective Compliance Assembly Robotic Arm (SCARA). **(10 Marks)**

b. Explain the different types of robot control systems? **(10 Marks)**

Module-2

3 a. Discuss with a neat sketch pneumatic drive system. **(10 Marks)**

b. A DC servomotor has a torque constant $K_t = 0.095$ N-m/A. Its voltage constant is $K_v = 0.11$ V(rad/sec). The armature resistance is $R_a = 1.6$ ohms. A terminal voltage of 24 V is used to operate the motor. Determine

(i) The starting torque generated by motor just as the voltage first applied.

(ii) The maximum speed at a torque of zero.

(iii) The operating point of motor when it connected to a load whose torque characteristic is $T_L = K_L w$ and $K_L = 0.007$ N-m/(rad/sec). Express the rotational speed as rev/min.

(iv) What is the power delivered by the motor at the operating point in watts and horsepower? **(10 Marks)**

OR

4 a. Explain the desirable engineering features of sensors and transducers. **(10 Marks)**

b. Briefly explain Proximity and Range sensors with a neat sketch. **(10 Marks)**

Module-3

5 a. What is manipulator path controller? Explain the types of manipulator path controllers. **(10 Marks)**

b. Explain with a neat sketch the Dynamic forces and torques for a TRR robot. **(10 Marks)**

OR

6 a. Discuss with the neat sketches any four types of grippers. **(12 Marks)**

b. Explain the factors that should be considered in selection of grippers. **(08 Marks)**

Module-4

7 a. Discuss the x-y-z coordinate motion of defining the position in space. (10 Marks)

b. What is motion interpolation? Explain circular interpolation method for robot. (10 Marks)

OR

8 a. Explain the capabilities and limitations of lead through methods. (08 Marks)

b. Write a short note on the following with respect to robot programming:
(i) WAIT, SIGNAL and DELAY
(ii) Branching (12 Marks)

Module-5

9 a. List and explain with a block diagram the basic devices used in the automated systems. (10 Marks)

b. Distinguish the different controller employed in Automated systems. (10 Marks)

OR

10 a. Discuss the robot applications in material handling process. (10 Marks)

b. Explain the role of robots in Assembly and Inspection. (10 Marks)

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