

TE Sem V C-Scheme R-19 Winter 2025
25/11/25

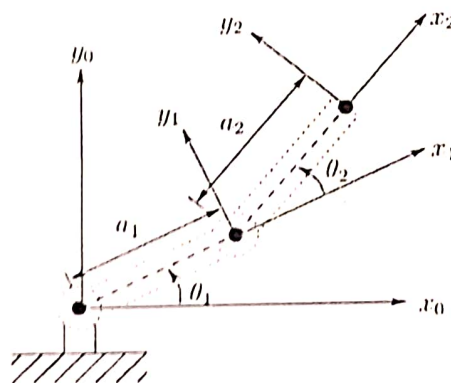
(Total Marks: 80)

(Time: 3 Hours)

Note:

1. A Question one is Compulsory
2. Attempt any **three** out of the remaining Five questions.
3. Assume suitable data if necessary.

- Q1. Answer any **FOUR** of the following: (20)
- a. Define homogeneous transformation with one example.
 - b. What are the types of robot end-effectors? Give examples.
 - c. Differentiate between high-level and low-level vision
 - d. What is motion interpolation in robot programming?
 - e. State the importance of robot learning in intelligent systems.
 - f. List any four applications of robots in material handling.
- Q.2 (a) Explain the role of control loops and feedback components in robotic systems (10)
- (b) Describe various actuators used in industrial robots with examples (10)
- Q.3 (a) Discuss proximity and range sensors. How are they applied in robotic systems? (10)
- (b) Explain robotic cell design and its control considerations. (10)
- Q.4 (a) Derive forward kinematics using homogeneous transformations for a SCARA manipulator (10)
- (b) A one degree of freedom manipulator with rotary joint is to move from 113° to 210° in 7 seconds. Find the coefficients of the cubic polynomial to interpolate a smooth trajectory. (10)
- Q.5. (a) Describe the process of image segmentation and its significance in robot vision (10)
- (b) Obtain the inverse kinematic solution for 2- DOF planar Arm shown below (10)



- Q. 6 (a) What is state space search in robot intelligence? (5)
- (b) Explain the use of predictive logic in task planning. (5)
- (c) Discuss the economic and social impacts of industrial robotics
- (d) What are the steps involved in problem reduction for task planning?