



10ME766

Seventh Semester B.E. Degree Examination, Jan./Feb. 2023

**Robotics**

Time: 3 hrs.

Max. Marks:100

**Note:** Answer any FIVE full questions, selecting at least TWO questions from each part.

**PART – A**

- 1 a. With a help of neat sketches, explain the different types of joints used in robot manipulator. (10 Marks)  
b. Explain briefly the “history of robotics”. (10 Marks)
- 2 a. With a neat sketch, explain the representation of joints and links using D-H parameters. (14 Marks)  
b. With a neat sketch PUMA560 manipulator. (06 Marks)
- 3 a. With a neat sketch, determine the equation of angular velocity for 2-R manipulators. (10 Marks)  
b. Write a note on :  
i) Singularities of 2R manipulators  
ii) Jacobian of serial manipulator. (10 Marks)
- 4 a. Using Lagrangian equation derive the equation of a motion of a planar 2R manipulator. (10 Marks)  
b. Discuss the Euler-Lagrange formulation of a robot manipulation. (10 Marks)

**PART – B**

- 5 a. Compare the joint space scheme with a Cartesian space scheme for robotics. (12 Marks)  
b. Explain in brief the trajectory planning for orientation. (08 Marks)
- 6 a. With a block diagram and transfer functions explain the position and rate feedback of a single line manipulator. (10 Marks)  
b. List and explain any three types of controllers. (10 Marks)
- 7 a. Compare the features of hydraulic, pneumatic and electric actuator used in robots. (12 Marks)  
b. Explain with a neat sketch construction and operation of 4 pole stepper motor. (08 Marks)
- 8 a. Explain with a neat sketch principle and construction of inductive proximity sensor. (10 Marks)  
b. Explain the features of sensor used in robots. (06 Marks)  
c. Explain with a neat sketch any type of position sensor. (04 Marks)

\* \* \* \* \*

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.