

Code: AE6T6FE-A, CS6T5FE-B, EC6T6FE-F, EE6T6FE-F

III B.Tech-II Semester–Regular/Supplementary Examinations–March 2018

ROBOTICS

(Common for AE, CSE, ECE & EEE)

Duration: 3 hours

Max. Marks: 70

PART – A

Answer *all* the questions. All questions carry equal marks

11x 2 = 22 M

1. a) What are the Major areas of Robot applications in industries?
- b) Define Automation and Mechanization.
- c) How to decide the introduction of a robot for a particular job?
- d) Define the following terms:
(i) Wrist roll (ii) Wrist pitch
- e) What is an end effector in a robot?
- f) Represent the transformation matrices for rotation about x, y and z-axes.
- g) Differentiate between forward kinematics and inverse kinematics of robot?
- h) What are the desirable characteristics of an actuator used in a robotic application?
- i) List the important characteristics one should check while selecting a sensor?
- j) List different Programming Languages used in Robotics.

k) What are the advantages and disadvantages of online programming?

PART – B

Answer any *THREE* questions. All questions carry equal marks.

3 x 16 = 48 M

2. a) Discuss in detail the three classes of industrial automation.

10 M

b) What are the characteristics of future robot tasks? Explain.

6 M

3. What are the basic components of a robotic system? Explain the functions of each of the components with a diagram.

16 M

4. a) Given the point $a_{uvw} = (4, 2, 7)^T$ with respect to the rotated OUVW coordinate system, determine the corresponding point a_{xyz} with respect to the reference coordinate system if it has been rotated 45° about the OX-axis. 10 M

b) Derive the forward kinematic equations for planar RRR(3R) manipulator.

6 M

5. a) Give the comparison between Hydraulic, Pneumatic and electrical actuators.

8 M

b) Discuss the principle and working of optical encoders used as position sensors in industrial robots.

8 M

6. a) What is the difference between lead through and walk through programming? 8 M

b) Explain the application of robots in material handling. 8 M