Code No: R203203G **R20** SET -1

III B. Tech II Semester Regular Examinations, July -2023
INDUSTRIAL ROBOTICS
(Mechanical Engineering)

Time: 3 hours Max. Marks: 70

Answer any **FIVE** Questions **ONE** Question from **Each unit**
All Questions Carry Equal Marks
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UNIT-I

1. a) Explain ''CAD/CAM and Robotics''. [7M]
   b) List the types of drive systems used in Robots? Explain. [7M]

(OR)

2. a) What is work volume? Explain the various components of industrial robot. [7M]
   b) What are end effectors? Explain the requirements and challenges of end effectors. [7M]

UNIT-II

3. a) Discuss about the salient features of electric motor with limitations. [7M]
   b) Discuss the performance characteristics of actuators. Compare electrical, pneumatic & hydraulic actuators for their characteristics. [7M]

(OR)

4. a) Explain the different types of electrical drives used in robot actuation. [7M]
   b) Explain the working principle of resolvers. [7M]

UNIT-III

5. a) With neat sketches explain about pure translation and pure rotation. [7M]
   b) Find the transformation matrices for the following operations on the point $-5i + 4j + 7k$.(i) Rotate 45^o about z-axis and then translate 4 units along y-axis,(ii). Translate 2 units along z-axis and rotate 60^o about y-axis. [7M]

(OR)

6. a) How does direct kinematics differ from inverse kinematics? [7M]
   b) Obtain the D-H link parameters for the manipulator shown in figure 1. [7M]

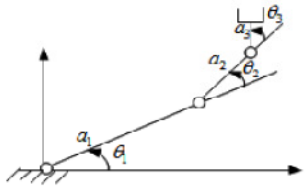

Figure 1

UNIT-IV

7. a) Explain about Fifth order polynomial trajectory planning. [7M]
   b) It is desired to have the first joint of a six axis robot for from initial angle of 30^0 to final angle of 75^0 in 5 sec. and assume that initial acceleration and final deceleration will be 5 degree/sec^2. Using fifth order polynomial trajectory planning. [7M]

(OR)

8. a) Discuss the textural robot language structure with the help of block diagram. [7M]
   b) Describe the relative merits and demerits of different textual robot languages. [7M]

UNIT-V

9. a) With block diagram briefly explain a robotic vision system. [7M]
   b) Describe stamping press operation using robot with application. [7M]

(OR)

10. a) Explain the digitizing function in Machine Vision. [7M]
    b) Discuss briefly about the robot inspection. [7M]

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