Code: 13A10802

R13

B.Tech IV Year II Semester (R13) Regular & Supplementary Examinations April 2018

ROBOTICS

(Electronics and Instrumentation Engineering)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

Provide a graph sheet only.

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1 Answer the following: (10 X 02 = 20 Marks)

(a) Specify the basic components in a robot.
(b) List any four different applications of vision system in automation.
(c) What is meant by robotic control?
(d) Draw the block diagram for variable structure control of a robotic arm.
(e) What are the end effectors? Give one example.
(f) What is the work envelope of a robot?
(g) What is meant by robotic kinematics?
(h) Specify the purpose of coordinate frames.
(i) State the applications of robots in four different fields.
(j) Specify application characteristics of assembly robots.

PART – B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

2 With schematic diagrams, explain any four different configurations of industrial robots.

OR

3 Discuss the working principle, characteristics and usage of tactile sensors of any two types.

UNIT – II

4 Discuss the role of transfer functions in robotics with examples.

OR

5 With a block diagram, explain the single axis PID controller.

UNIT – III

6 Discuss characteristics and functions of different types of robotic grippers, with examples and schematic diagrams.

OR

7 Sketch work envelope for any two different configurations of robots considering industrial applications.

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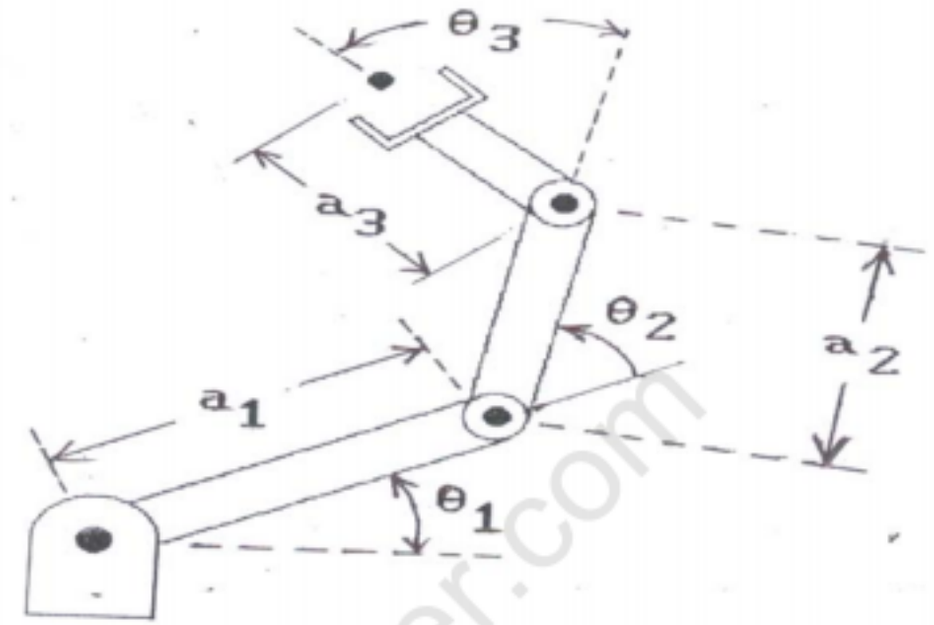
UNIT – IV

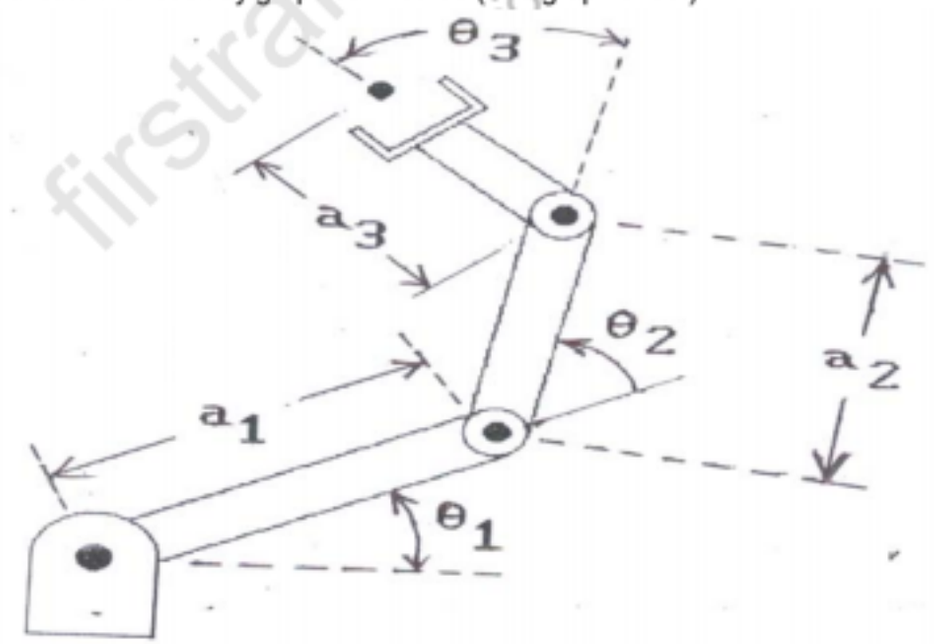
8 A simple 3 link articulated robotic configuration is given in below figure. Apply the homogeneous transformations and calculate the coordinates of TCP point. Draw this configuration on graph sheet and validate the result. Explain each step in the transformation with detailed diagram and transformation matrices.



Kinematic diagram of a 3-link articulated robot

OR

9 Applying forward kinematic methods, calculate the TCP point for an articulated robotic arm as given in below figure. Validate the result by graphical method (Use graph sheet).



Kinematic diagram of a 3-link articulated robot

($a_1 = 100\ mm, a_2 = 80\ mm,\ a_3 = 60\ mm$ and $\theta_1 = 30°,\ \theta_2 = 40°,\ \theta_3 = 70°$.

UNIT – V

10 Discuss the challenges and advantages of robotic welding processes.

OR

11 Discuss the role of remote controlled robots with a case study.

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