Code: 9A03702 **R09**

B.Tech IV Year I Semester (R09) Supplementary Examinations June 2016

AUTOMATION & ROBOTICS

(Common to ME & MCT)

Time: 3 hours Max. Marks: 70

Answer any FIVE questions

All questions carry equal marks

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1 Using Lagrange-Euler formulation, derive the expression for the joint torques or forces of a planar PR robotic manipulator.

2 Explain about various types of automation.

3 (a) What are the features of robotics in Arc welding? Explain.
(b) What are the benefits of robot spray painting? Explain.

4 Discuss the following:
(a) Qualitative analysis.
(b) Forward and inverse kinematics.

5 (a) Define degree of freedom and explain.
(b) What are flexible assembly lines explain?

6 A stepper stone motor is to be used to drive each of the three linear axes of a Cartesian coordinate robot. The motor output shaft will be connected to a screw thread with a screw pitch of 3 mm. It is desired that the control resolution of each of the axes be 0.6 mm.
(a) To achieve this control resolution, how many step angles are required on the stepper motor?
(b) What is the corresponding step angle?
(c) Determine the pulse rate that will be required to drive a given joint at a velocity of 7.5 cm/sec.

7 Write short notes on following:
(a) Joint integrated motion.
(b) Skew motion.

8 Describe hardware components for automation and process control.

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