Reg. No. : | | | | | | | | | | |

Question Paper Code: 39508

B.E. / B.Tech. DEGREE EXAMINATION, APRIL 2019

Elective

Electronics and Instrumentation Engineering

01UEI908 - ROBOTICS AND AUTOMATION

(Regulation 2013)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 2 = 20 Marks)

1. What is meant by degrees of freedom?
2. What is meant by gearing ratio?
3. List the types of hydraulic actuator.
4. Define Robot manipulators.
5. Name various end-effectors of the robot that are used for industrial applications.
6. Give the basic types of robot programming languages.
7. Compare forward and reverse kinematics.
8. What is segmentation in robot kinematics?
9. Mention the most commonly used device for feeding and orienting small parts in automated assembly operations.
10. What are the factors to be considered for selection of robot?

PART - B (5 x 16 = 80 Marks)

11. (a) Explain the working of any two robot actuators with neat sketches. (16)

Or

(b) (i) State the Asimov's laws of robotics. (6)

(ii) Discuss about the different industrial robot controls and dynamic performance. (10)

12. (a) (i) Contrast the pneumatic and electric drives with range, merits and demerits. (6)

(ii) Explain the magnetic and tactile sensors in Robotics. (10)

Or

(b) A certain potentiometer is to be used as the feedback device to indicate position of the output link of a rotational robot joint. The excitation voltage of the potentiometer equals 5.0V, and the total wiper travel of the potentiometer is 300 degree, the wiper arm is directly connected to the rotational joint so that a given rotation of the joint corresponds to an equal rotation of the wiper arm.

(i) Determine the voltage constant of the potentiometer, Kp.

(ii) The robot joint is activated to a certain angle, causing the wiper position to be 38 degree. Determine the resulting output voltage of the potentiometer.

(iii) In another actuation of the joint, the resulting output voltage of the potentiometer is 3.75V. Determine the corresponding angular position of the wiper and the output link. (16)

13. (a) Discuss about electronic and pneumatic manipulators. Explain about the design considerations of end- effectors in the robot. (16)

Or

(b) Explain in detail about various actuating mechanisms of mechanical actuator with neat sketch. (16)

14. (a) Discuss in detail about the general considerations adopted in robot material handling. (16)

Or

(b) With the neat diagram, explain how robots are very useful in Chemical and Nuclear plants. (16)

15. (a) Illustrate the operations of robots in manufacturing industrial applications. (16)

Or

(b) Design a Robot work cell to sort, assemble and solder the components in PCB manufacturing. (16)