ECE 11/11/16 A.N

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

Question Paper Code : 80314

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2016.

Sixth Semester

Electronics and Communication Engineering

EC 6003 — ROBOTICS AND AUTOMATION

(Regulations 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is degree of freedom?

2. Write are the Benefits of industrial robot.

3. Name the common imaging device used for robot vision system.

4. Brief about tactile sensor.

5. Draw the block diagram of manipulator and mention its building blocks.

6. What are the merits and demerits of magnetic gripper?

7. Determine the coordinates of robot having arm length of 500 mm, its initial position is (5,10) and rotates at an angle of 30 deg. Clockwise.

8. What are the basic methods of robot programming?

9. Differentiate palletizing and depalletizing.

10. List some non-manufacturing application areas of robotics.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain the various generations of robots. (12)

(ii) State Asimov's laws of robotics. (4)

Or

(b) (i) With help of sketch describe pitch, yaw and roll motion of a robot wrist. (8)

(ii) Discuss about Dynamic stabilization of robots. (8)

12. (a) Describe the various types of Drive system for robots and their limitations. (16)

Or

(b) Explain the working two types of proximity and Range sensors. (16)

13. (a) (i) Discuss the function of gripper with a help of sketch and explain the working of mechanical gripper used for robots. (10)

(ii) Mention the advantages and disadvantages of different types of grippers. (6)

Or

(b) (i) Explain force control of the manipulator. (8)

(ii) Design a pneumatic control circuit of a robot with neat sketch. (8)

14. (a) (i) A point $P(7,3,2)^T$ is attached to a frame $(\overline{n}, \overline{o}, \overline{a})$ and is subjected to the transformations described next. Find the coordinates of point relative to the reference frame at the conclusion of transformations. (8)

(1) rotation of 90° about z axis.

(2) followed by a rotation of 90° about y axis.

(3) followed by translation[4,-3,7]. (8)

(ii) Discuss about hill climbing technique of robot. (8)

Or

(b) Discuss the different input to an inverse kinematic algorithm and explain the solution of simple inverse kinematic algorithm. (16)

15. (a) Enumerate the function of robots in manufacturing and non-manufacturing applications. (16)

Or

(b) Write short notes on:

(i) Robot cell layouts. (8)

(ii) Selection of a Robot. (8)
