Reg. No. : ☐☐☐☐☐☐☐☐☐☐☐☐☐

Question Paper Code : 31546

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2013.

Seventh Semester

Mechanical Engineering

ME 2028/IC 1404/080120060/10177 MEE 22/10122 MEE 22 — ROBOTICS /
INDUSTRIAL ROBOTICS

(Common to Production Engineering and Automobile Engineering)

(Regulation 2008 / 2010)

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is RIA definition of Robot?

2. Define work volume of manipulator.

3. State limitations of stepper motor as a drive system for a robot.

4. What is meant by gray scale?

5. What do you mean by internal state sensor?

6. Define robot vision.

7. What do you mean by interlock in robotics?

8. State the reasons for homogeneous transformations.

9. Write short note on RGV.

10. List out various methods used in economic analysis of robot.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Enumerate five different types of mechanical joints used in robot. (8)

      (ii) Explain with a neat sketch Selective Compliance Assembly Robot Arm. (8)

Or

(b) (i) Draw a three degree of freedom wrist assembly and explain possible configurations for orienting the object. (8)

      (ii) Present a brief survey on how robots are applied in inspection work. (8)

12. (a) Discuss the salient features, capabilities, application, merits and limitations of non servo and servo controlled robots. (16)

Or

(b) (i) Explain the following types of grippers and their applications with necessary sketches. (1) Vaccum Grippers (2) Magnetic grippers. (8)

      (ii) Explain about selection and design considerations of gripper. (8)

13. (a) (i) Explain the following in the context of robot vision. (1) Digital convolution (2) Mono and stereo vision. (8)

      (ii) Explain what basic characteristics a sensory device should possess? (8)

Or

(b) (i) Enumerate about the measuring distances using ultrosonic proximity sensors. (8)

      (ii) Explain how image segmentation helps to improve the quality of the images in a vision system. (8)

14. (a) Write in detail about the forward and inverse kinematics. (16)

Or

(b) (i) Draw a sketch of four axis robot and show various joint motions. (8)

      (ii) Discuss about the advantages and disadvantages of Lead through programming method. (8)

15. (a) (i) Explain the procedure of applying the any one method in the economic analysis of robots. (8)

      (ii) Explain the obstacle detection and avoidance in AGV's. (8)

Or

(b) Explain the factors to be considered for industrial applications of robot. (16)