Reg. No. : ☐☐☐☐☐☐☐☐☐☐☐☐

Question Paper Code : Q 2746

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2009.

Seventh Semester

Mechanical Engineering

ME 1008 — ROBOTICS

(Common to Production Engineering and Automobile Engineering)

(Regulation 2004)

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1.   What is meant by robot anatomy?

2.   What are the three degrees of freedom associated with the arm and body motion?

3.   List the types of drives used in robots.

4.   What is a RCC device? For what purpose is it used in a robot?

5.   Classify the position sensors.

6.   Brief on the working of inductive type proximity sensor.

7.   Perform the following transformation on point (25, 10, 20) : Trans(8, 5, 0).

8.   What is the command used to execute the speed of the robot in VAL programming?

9.   Calculate the payback period for a robot project with the following data

     Net annual cash flow Rs. 45,000.

     Investment cost Rs. 1,00,000.

10. Which data are required to perform economic analysis of a robot project?

PART B — (5 × 16 = 80 marks)

11. (a) (i) List four common robot configuration and explain with neat sketch. (8)

(ii) Draw the types of joints used in robots and explain its application. (8)

Or

(b) (i) Write a sample specification of a robot. (8)

(ii) Write the notation scheme for designating robot configuration and illustrate with simple sketches. (8)

12. (a) (i) With a neat sketch explain the working of a AC servo drive. (8)

(ii) Explain the working of a stepper motor. (8)

Or

(b) List the types of end effectors and illustrate with sketches. (16)

13. (a) List the internal state sensors and explain its functioning (any two) with neat sketches. (16)

Or

(b) (i) Write down three functions of a vision system and explain with a suitable sketch. (8)

(ii) For an image digitized at 128 points per line and 128 lines, determine (1) the total number of bits to represent the grey level values required if an 8 bit A/D converter is used to indicate various shades of gray (2) the reduction in data volume if only black and white values are digitized. (8)

14. (a) List the commands used in VAL II programming and describe its functions. (16)

Or

(b) (i) Write down the capabilities and limitations of Lead through method of programming. (8)

(ii) With an example differentiate forward and inverse kinematics. (8)

15. (a) List and explain indirect costs and savings in a robot application project. (16)

Or

(b) Explain the logical sequence of steps in implementing robotics. (16)

2 Q 2746