W 2586

M.E. DEGREE EXAMINATION, JANUARY 2007.

First Semester

CAD/CAM

ED 1627 — INDUSTRIAL ROBOTICS AND EXPERT SYSTEMS

(Common to M.E. Computer Aided Design and M.E. Engineering Design)

(Regulation 2005)

Time : Three hours | Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is work volume? How it is determined?

2. How the positions of the end of the arm are represented?

3. What are the types of hydraulic actuators used in robotics?

4. What is positional feedback?

5. What is a sensor? List its types.

6. What are transducers?

7. What is a workcell? List the robot cell layouts.

8. Explain workcell controller.

9. Classify robot programming methods.

10. List the application areas of artificial intelligence.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain the consideration in workcell design. (8)

    (ii) Describe the possible robot applications in manufacturing industries. (8)

    Or

    (b) (i) With examples differentiate between direct and inverse kinematics. (10)

    (ii) With figure explain the working mechanism of CCD cameras. (6)

12. (a) (i) Explain the three degrees of freedom associated with the (1) Body and arm motions (2) Wrist. (8)

    (ii) Describe the motion scheme for designating robot configurations. (8)

    Or

    (b) Explain the forward and reverse transformation of the 2–degree of freedom arm. (16)

13. (a) Sketch a pneumatic circuit to control different motions of (i) Cylindrical coordinate robot (ii) Cartesian coordinate system. (8 + 8)

    Or

    (b) (i) What are the types of grippers? Explain a venturi device used to operate a suction cup. (4 + 4)

    (ii) Explain the main components of the hydraulic power supply. (8)

14. (a) Explain the following :
    (i) Inductive proximity switch
    (ii) Acoustic sensor
    (iii) Artificial skin
    (iv) Pattern recognition. (4 × 4)

    Or

    (b) (i) Explain the functions of a vision processor. Explain the steps necessary in the image processing. (8)

    (ii) Describe the importance of training of vision system and its types. (8)

(a) (i) Explain the leadthrough programming methods. (8)

(ii) Discuss the goals of AI. (8)

Or

(b) (i) What are the possible schemes for problem representation in AI. Explain any one of them. (8)

(ii) Explain Robot motion interpolation. (8)

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