Reg. No. : ☐☐☐☐☐☐☐☐☐☐☐

# R 3489

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2007.

Seventh Semester

Mechatronics Engineering

MH 1401 — ROBOTICS AND MACHINE VISION SYSTEM

(Regulation 2004)

Time : Three hours                                         Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1.  What is meant by workspace?

2.  What is meant by degeneracy?

3.  What is inverse Kinematics?

4.  Name any four proximity sensors used in robotics.

5.  What is meant by actuation force?

6.  What are the limitations of hydraulic drive systems?

7.  What is the purpose of thresholding in analysis?

8.  Define the term 'feature extraction'.

9.  State any two techniques used for object recognition.

10. What is the purpose of structured lighting?

PART B — (5 × 16 = 80 marks)

11. (a) (i) How do you classify robots? (4)

    (ii) Describe the basic structure of a robotic system with neat sketches. (12)

Or

(b) (i) Briefly explain the working of Cartesian coordinate robot. (8)

    (ii) Describe the various types of drives used in robots. (8)

12. (a) (i) Describe robot kinematics with suitable illustrations. (12)

    (ii) What are homogeneous transformation matrices? (4)

Or

(b) (i) How do you determine the velocity and forces in robot transformation? (10)

    (ii) Describe trajectory planning with suitable examples. (6)

13. (a) (i) What are robot end effectors? How do you classify them? (10)

    (ii) Describe robot and end effector interface with examples. (6)

Or

(b) Describe the various types of gripper mechanisms with neat sketches. (16)

14. (a) (i) What is machine vision? (4)

    (ii) Describe the various functions of machine vision system. (12)

Or

(b) Briefly explain on :

    (i) Filtering.

    (ii) Edge detection.

    (iii) Segmentation.

    (iv) Morphology. (16)

15. (a) Describe the various feature extraction techniques with examples. (16)

Or

(b) (i) Discuss feature of lighting in machine vision system. (10)

    (ii) What are the applications of vision systems? (6)

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