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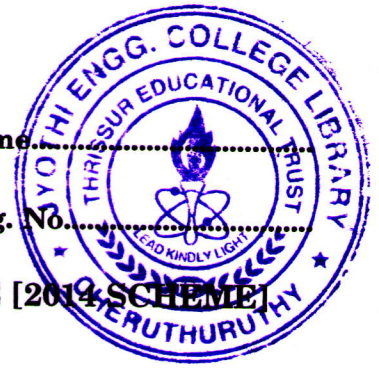
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SEVENTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2017

Mechanical Engineering

ME 14 704 (E) – INDUSTRIAL AUTOMATION

Time : Three Hours

Maximum : 100 Marks

Part A

Answer any **eight** *questions.*

Each question carries 5 marks.

I. 1. What is meant by programmable automation? State any *three* examples and benefits programmable automation.

2. What is the role of data register in control systems used in automation?

3. What is sequence control? Name any *two* examples.

4. Compare the features of contact and non-contact sensors.

5. Differentiate proximity and range sensors. Give their applications.

6. How do you select a robot for inspection applications? Name any *three* important factors to be considered.

7. What are the benefits, limitations and applications of SCARA type robots?

8. What are multiple grippers? What are its applications?

9. How do you select a transfer machine in a hostile and remote environments?

10. What is the need for automating product inspection in a processing industry?

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*

Each question carries 15 marks.

MODULE I

1. What are the requirements of a control system used in an automated system as means of control and inspection? Describe with an example.

(15 marks)

Or

2. (a) Under what circumstances is a closed loop positioning system preferable to an open loop system?

(b) Explain the tools generally used for analysis of control system.

(8 + 7 = 15 marks)

Turn over

MODULE II

3. (a) What are the types of joints used in robots? Describe various types of robot motions with neat sketches.

    (b) What are the functions of sensors in robotics? Explain the working of any *one* type of torque sensor with illustrations.

                                                                    (8 + 7 = 15 marks)

Or

4. (a) What are the basic components of a vision system? Briefly describe each with illustrations.

    (b) Describe the three light-source locations used in vision applications.

                                                                    (10 + 5 = 15 marks)

MODULE III

5. Explain forward and inverse kinematics associated with robot. Derive the expressions for reverse transformation of the 2-degree of freedom manipulator.

                                                                    (15 marks)

Or

6. (a) Describe robot language structure and show its components as a block diagram.

    (b) Briefly describe various knowledge representation techniques and their limitations.

                                                                    (8 + 7 = 15 marks)

MODULE IV

7. (a) Describe briefly about the impact of robotics in manufacturing and future scope of robots in Indian industries.

    (b) What types of applications are included in material handling? Give the desired characteristics of robots employed in material handling with examples.

                                                                    (7 + 8 = 15 marks)

Or

8. (a) "The in-plant transport determines the most economical degree of automation." Comment on this.

    (b) Also describe various transportation tools used for assembly automation.

                                                                    (6 + 9 = 15 marks)

                                                                    [4 × 15 = 60 marks]