



P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

Fifth Semester, B.E. - Mechanical Engineering

Semester End Examination; Dec. - 2019

Industrial Automation

Time: 3 hrs

Max. Marks: 100

Note: Answer FIVE full questions, selecting ONE full question from each unit.

UNIT - I

- 1 a. With a neat block diagram, explain briefly the manufacturing support systems in a typical production system. 8
- b. Illustrate and explain USA principle. 6
- c. With a neat sketch, explain the elements of an automated system. 6
- 2 a. Briefly explain the following strategies for Automation and process improvement:
- i) Combined operation ii) Simultaneous operations iii) Increased flexibility 10
- iv) On-line inspection v) Plant operation control
- b. Briefly explain any two advanced automation functions. 8
- c. Describe Discrete Control System. 2

UNIT - II

- 3 a. Illustrate Sensor. Describe the following measuring devices used in automation:
- i) Linear Variable differentiate transformer ii) Piezoelectric transducer 10
- iii) Proximity switch iv) Tactile sensor
- b. A digital-to-analog converter uses a reference voltage of 100 V and has 5 bit precision in three successive sampling instants, 0.5 sec apart, the data contained in a binary register are the following:

Instant	Binary Data
1	101000
2	101010
3	101101

10

Determine;

- i) The decoder output values for the three sampling instants
- ii) The voltage signals between instants 2 and 3 for a zero-order hold
- iii) The voltage signals between instants 2 and 3 for a first-order hold
- 4 a. With a neat sketch, briefly explain the working principle of a rotating electric motor write the formula to evaluate back emf with notations. 10
- b. With a neat sketch describe the concept of manually operated machine and semi-automated machines. 6

- c. Compare Continuous control and discrete control in industries. 4

UNIT - III

- 5 a. Describe the following terms:
- i) Cellular Manufacturing 5
 - ii) Group technology and list out one of its typical application
- b. Write a neat sketch, briefly explain the composite part concept of part families. 7
- c. With a neat diagram, explain the FMS loop layout and rectangular layout system. 8
- 6 a. Define production flow analysis. List out the four steps involved in production flow analysis and briefly illustrate any two steps with an example. 10
- b. Describe parts classification and coding and also illustrate the reasons for coding scheme. 5
 - c. Define the term FMS, explain any two of the principle benefits. 5

UNIT - IV

- 7 a. With a neat sketch, briefly explain the Coordinate Measuring Machines (CMM). 10
- b. Define Automated Inspection, with a neat sketch. Describe the action resulting from automated inspection. 7
 - c. Illustrate On-line/ Post-process inspection 3
- 8 a. With a neat diagram, briefly explain basic functions of a machine vision system. 10
- b. Describe the functional characteristics of CMM probe. 5
 - c. List out any five typical industrial inspection tasks. 5

UNIT - V

- 9 a. With a neat diagram, briefly explain the typical sequence of process required in part planning during fabrication. 8
- b. Illustrate any four benefits derived from computer-automated process planning. 4
 - c. Write a short note on Generative CAPP systems. 8
- 10 a. Explain retrieval CAPP system with an illustration. 7
- b. With a neat sketch, explain two stages of capacity planning. 6
 - c. Briefly explain Just-In-Time production systems. 7

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