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B.E / B. Tech (Full Time) END SEMESTER EXAMINATIONS April / May 2019

INDUSTRIAL ENGINEERING
Semester 5

IE8501 – MANUFACTURING AUTOMATION

(Regulation 2012)

Time: 3 Hours

Answer ALL Questions

Max. Marks 100

PART-A (10 x 2 = 20 Marks)

1. What are the types of automation?
2. List any two production concepts with mathematical notations.
3. Define 'variables' and 'parameters'.
4. What is ladder logic diagram?
5. What are the sub components of an automated production line?
6. What is the concept of line unbalancing?
7. List the motion command statements of APT language.
8. Draw the general configuration of a polar and Cartesian coordinate robot manipulator.
9. List any four methods of automatic data capture?
10. What are the industrial applications of AGVS?



Part – B (5 x 16 = 80 marks)

(Question No.11 is Compulsory and sub-divisions carry equal marks)

11. i) What are the automation strategies of a manufacturing system? Explain any two.
ii) The following data apply to the operation of a particular automated manufacturing system:

Direct labor rate	= \$10.00/h
Number of operator required	= 1
Applicable labor factory overhead	= 50%
Capital investment in system	= \$300000
Service life	= 10 years
Salvage value	= \$30000
Applicable machine factory overhead rate	= 30%

The system is operated one shift (2000 h/yr). Use a rate of return of 25% to determine the appropriate hourly rate for this worker-machine system.

12. a) i) Explain about computer – process control system.
ii) Explain about multi-level interrupt systems.

(OR)

- b) i) What are the different types of actuators used in automated systems? Explain about electrical actuators.
ii) Explain the three phases of Analog-to-Digital Conversion.
13. a) i) Explain the work part transfer mechanisms for the linear transfer systems with diagram?
ii) Analyze a transfer line and derive expressions for its performance measure without storage buffer, using upper bound approach.

(OR)

- b) i) Draw a general configuration of an automated assembly line with a brief explanation about its components.
ii) Analyze a two stage production line with buffer to prove its buffer storage effectiveness.
14. a) i) What are the components of NC system? Explain the functions of machine control unit.
ii) Explain the different types of NC words with appropriate example.

(OR)

- b) i) Explain the different types of joints and links of a robot manipulator with sketches.
ii) What is an end effector? Explain the different types of grippers used in robotic applications.
15. a) i) Explain the vehicle control and guidance system of an AGVS.
ii) Explain the quantitative analysis of a carousel storage system.

(OR)

- b) i) Explain the working principles of an AS/RS with its sketch.
ii) Explain a two dimensional width modulated bar code technology.

