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B.E / B.Tech (Full Time) DEGREE END SEMESTER EXAMINATIONS, APRIL / MAY 2013

INDUSTRIAL ENGINEERING

Fifth Semester

IE9305 Manufacturing Automation

(Regulation 2008)

14

Time: 3 Hours

Answer ALL Questions

Max. Marks 100

PART-A (10 x 2 = 20 Marks)

1. What are the features of fixed automation?
2. What are the cost components to be considered in computing manufacturing cost?
3. What are the functions of an automated manufacturing system?
4. Compare discrete Vs. continuous control.
5. What are the components of a CNC system?
6. Draw the wrist control of a robot joint showing its pitch, roll and yaw.
7. What is bar code technology?
8. What are the features of conveyors?
9. How computers can improve the productivity of design process?
10. List the 'ground rules' considered in designing a graphics software.

Part – B (5 x 16 = 80 marks)
(each sub division carries 8 marks)

11. i) Draw an AS/RS and explain its control features.
ii) Quantitatively analyse an AGVS for its performance measure.
12. a) i) Explain the automation strategies.
ii) The break-even point is to be determined for two methods of production, a manual method and an automated method. The manual method requires two operators at \$9.00/h each. Together, they produce at a rate of 36 units/h. The automated method has an initial cost of \$125,000, a 4-year service life, no salvage value, and annual maintenance costs of \$3000. No labor (except for maintenance) is required to operate the machine, but the machine consumes energy at the rate of 50 KW when running. Cost of electricity is \$0.05/KWh. If the production rate for this automated machine is 100 units/h, determine the break-even point for the two methods if a 25% rate of return is required.

OR

- b) i) Explain various methods of evaluating investment alternatives.
ii) The average part produced in a certain batch manufacturing plant must be processed through an average of six machines. There are 20 new batches of

parts launched each week. Other pertinent data are as follows:

Average production time = 6 min

Average setup time = 5 h

Average batch size = 25 parts

Average non-operation time per batch = 10 h

There are 18 machines in the plant. The plant operates an average of 70
production

hours per week. Scrap rate is negligible. Determine the average level of work-in
process in the plant

13. a) i) Explain the linear control system with spring-mass-damper system as example.
ii) Explain about the sensors used in automated manufacturing systems.

OR

- b) i) Explain about the actuators used in automated manufacturing systems.
ii) Explain the working principles of programmable logic controllers.

14. a) i) Explain the computer assisted part programming method with examples.
ii) Explain about adaptive control in machining.

OR

- b) i) What are the robot configurations? Draw the sketches of any three configurations.
ii) Explain the applications of robots in assembly activities.

15. a) i) Explain about the importance of manufacturing database.
ii) Explain about two dimensional transformations of the graphic elements.

OR

- b) i) Explain the types of solid modeling with example.
ii) Explain about three dimensional transformations of the graphic elements.