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First Semester M.Tech. Degree Examination, June/July 2016
Automation in Manufacturing Systems

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions.

- 1 a. Explain information – processing – activities of a manufacturing support system. (10 Marks)
b. Explain the following concepts of product – production relationships.
i) Production quantity ii) Product variety
iii) Product complexity iv) Part complexity. (10 Marks)
- 2 a. Develop the mathematical models for the following production concepts.
i) Production rate ii) Production capacity iii) Manufacturing lead time (12 Marks)
b. Determine the appropriate hourly rate for the work center whose production data are :
Direct labor rate = \$ 10/hr
Factory overhead rate on labor = 60%
Rate of return = 20%
Factory overhead rate on machine = 50%
Capital investment in machine = \$ 100,000
Service life of the machine = 8 year
Salvage value in = 8year = 0
And the work center will be operated one 8 – hr shift, 250 day/yr. (08 Marks)
- 3 a. What are the advanced automation functions of an automated industry? Explain them briefly. (12 Marks)
b. Explain the hierarchy of automation levels with examples. (08 Marks)
- 4 a. Explain the capabilities of compute process control system. (10 Marks)
b. List various control strategies of continuous process control system. Explain any one approach with a neat sketch. (10 Marks)
- 5 a. Explain the characteristics of Agile manufacturing and Lean production. (12 Marks)
b. Explain the methodology of automated route sheet preparation by generative CAPP system. (08 Marks)
- 6 a. With a neat block diagram explain Electro- Hydraulic servo system. (10 Marks)
b. What are the factors to be considered for analyzing or designing a pneumatic circuit? Explain them briefly. (10 Marks)
- 7 a. With a neat circuit diagram explain how accumulator can be used as an emergency power source. (10 Marks)
b. Write a PLC program for the following time delay off industrial application. A motor and its lubrication pump motor are both running. Lubrication for main motor bearing is required during motor coast – down. After the main motor is shut off, the lubricating pump remains on for a time corresponding to coast down time. (a lubricating pump remains on for 20 seconds after the main system is shut down). (10 Marks)
- 8 Briefly explain the following concepts of PLC.
a. PLC logic functions b. Timers and counters
c. PLC input – output modules d. Micro PLC (20 Marks)

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