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**Third Semester M.Tech. Degree Examination, Dec.2013/Jan.2014**  
**Automation in Manufacturing**

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions.

- 1 a. Briefly explain ten strategies for automating a production system to improve productivity and performance of various production activities. (10 Marks)
- b. The ABC Company is planning to introduce a new product line and will build a new factory to produce the parts and assemble the final products for the product line. The new product line will include 100 different models. Annual production of each model is expected to be 1000 units. Each product will be assembled of 600 components. All processing of parts and assembly of products will be accomplished in one factory. There are an average of 10 processing steps required to produce each component, and each processing step takes 30 sec. Each final unit of product takes 3 hours to assemble. All processing operations are performed at work cells that each includes a production machine and a human worker. Products are assembled on single workstations consisting of two workers each. If each work cell and each work station require 200 ft<sup>2</sup>, and the factory operates one shift (2000 hr/yr), determine (i) how many production operations, (ii) how much floor space and (iii) how many workers will be required in the plant. (10 Marks)

- 2 a. Six products are to be processed through a certain type of work center. Pertinent data are given in the following table:

Product	Weekly demand	Production Rate (Units / hr)
1	800	10 (units/hr)
2	900	15
3	600	12
4	1500	20
5	950	10
6	1000	10

Determine the number of work centers required to satisfy this demand, given that the plant works 10 shifts per week and there are 7 hr available for production on each work center for each shift. It is observed that only one operation is to be performed on one product.

- (10 Marks)
- b. Describe the classification of costs in manufacturing. Also discuss the break down of costs for a manufactured product. (10 Marks)
- a. What are the basic elements of an automated system? Explain the relationship among these elements with a neat sketch. (10 Marks)
- b. Explain the various advanced functions of an automated system to enhance the safety and performance of the equipment. (10 Marks)
- 4 a. What are the capabilities of computer control? Explain them briefly. (10 Marks)
- b. With a neat block diagram, explain the levels of industrial process control. (10 Marks)
- 5 a. Define Lean production and briefly explain the principles of lean production. (10 Marks)
- b. Explain the process of generating a rout sheet automatically using variant computer aided process planning. (10 Marks)

- 6 a. Explain the operation of hydraulic circuit to control the speed of a hydraulic motor using a pressure compensated flow control valve with a neat circuit diagram. (08 Marks)
- b. With a neat circuit diagram, explain the working principle of air pilot control of a double-acting cylinder. (12 Marks)
- 7 a. Explain MPL cylinder sequencing circuit for the control of two double acting cylinders. (12 Marks)
- b. Explain how fluid logic control can be applied to control two handed press control system with its circuit diagram. (08 Marks)
- 8 a. Discuss about various input and output PLC modules. (08 Marks)
- b. List merits and demerits of programmable logic controllers. (12 Marks)

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