USN | | | | | | | | | | |

10MAR31

Third Semester M.Tech. Degree Examination, December 2011
Automation in Manufacturing

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions.***

1 a. Explain different types of facilities and layouts used for different levels of production quantity and product variety, with necessary graphs. **(10 Marks)**

b. With a neat block diagram, explain the different functional elements of manufacturing support systems. **(10 Marks)**

2 a. An average of 20 new orders are started through a factory each month. On an average, an order consists of 50 parts to be processed through 10 machines in the factory. The operation time per machine for each part = 15 min. The non operation time per order at each machine averages 8 hr and the required setup time per order = 4 hr. There are 25 machines in the factory, 80% of which are operational at any time (the other 20% are in repair or maintenance). The plant operates 160hr/month. However, the plant manager complains that a total of 100 overtime machine hours must be authorized each month to keep up with the production schedule. i) What is the manufacturing lead time for an average order? ii) What is the plant capacity (on a monthly basis) and why must the overtime be authorized? iii) Determine the average level of work – in – process in the plant (given utilization of the plant is 100%). **(14 Marks)**

b. Explain the following production concepts, with necessary equations :
i) Production capacity ii) Manufacturing lead time. **(06 Marks)**

3 a. Name and explain the basic elements of an automated system. **(12 Marks)**

b. What are the different levels of automations? Explain them. **(08 Marks)**

4 a. Write a note on distributed control system (DCS). **(10 Marks)**

b. Mention different sensors and actuators used in control systems of industrial controls. **(10 Marks)**

5 a. Explain the principles of lean production. **(10 Marks)**

b. Explain the execution of retrieval CAPP system, with flow chart. **(10 Marks)**

6 Explain the following with necessary circuit :
a. Meter - in circuit b. Meter – out circuit
c. Bleed – off circuit d. Regenerative circuit. **(20 Marks)**

7 a. Discuss the working principle of a electro hydraulic system, with a neat sketch. **(10 Marks)**

b. What is PLC? With a neat block diagram, explain PLC system layout and connection. **(10 Marks)**

8 Write PLC program using Ladder logic diagram for following applications, with a clear layout sketch:
a. Drill press semi automatic operation **(08 Marks)**
b. Spray painting process system. **(12 Marks)**

*****