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10ME757

Seventh Semester B.E. Degree Examination, Jan./Feb. 2021
Automation in Manufacturing

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, selecting at least TWO questions from each part.

PART – A

- 1 a. List and explain ten automation strategies. (10 Marks)
- b. Sketch and explain four functions of manufacturing support systems. (10 Marks)
- 2 a. Define the following production concepts:
 - (i) Manufacturing lead time
 - (ii) Capacity
 - (iii) Production rate
 - (iv) Utilization and availability
 - (v) Work in process (10 Marks)
- b. A production machine operates 80 hr/week (two, shifts, 5 days) at full capacity. Its production rate is 20 unit/hr. During a certain week, the machine produced 1000 parts and was idle the remaining time. (i) Determine the production capacity of the machine (ii) What was the utilization of the machine during the week under consideration? (04 Marks)
- c. Suppose that all costs have been compiled for a certain manufacturing firm for last year. The summary is shown in table below. The company operates two different manufacturing plants plus a corporate head quarters. Determine (i) The factory over head rate for each plant (ii) The corporate overhead. These rates will be used by the firm in the following year.

Expense Category	Plant(1) \$	Plant(2) \$	Corporate Head Quarter \$	Total \$
Direct labor	800,000	400,000		1,200,000
Materials	2,500,000	1,500,000		4,000,000
Factory expense	2,000,000	1,100,000		3,100,000
Corporate expense			7,200,000	7,200,000
Total	5,300,000	3,000,000	3,000,000	15,500,000

(06 Marks)

- 3 a. Explain with a block diagram, the basic elements of an automated system. (10 Marks)
- b. Explain the five levels of automation with a block diagram. (10 Marks)
- 4 a. What is a production machine? Explain with sketches the three types of production machines. (10 Marks)
- b. What are the factors influencing the classification of manufacturing systems? Explain multi-station cells with suitable examples. (10 Marks)

PART – B

- 5 a. What do you mean by PFA? Explain basic steps involved in PFA. (10 Marks)
- b. Explain the benefits of FMS. (05 Marks)
- c. List the various types of FMS layouts. (05 Marks)

- 6 a. With a block diagram, explain Taguchi's offline and online quality control system. (10 Marks)
b. Explain Robust design and Taguchi loss function. (10 Marks)
- 7 a. Differentiate between contact and non contact inspection technologies. (05 Marks)
b. List the applications of CMM. (05 Marks)
c. Explain image processing and analysis. (05 Marks)
d. Explain ultrasonic inspection technique. (05 Marks)
- 8 Write short notes on the following:
a. Concurrent engineering
b. Just-in-time production
c. Lean manufacturing
d. Agile manufacturing (20 Marks)
