



10ME61/ME617

Sixth Semester B.E. Degree Examination, July/August 2021
Computer Integrated Manufacturing

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions.

1.
 - a. Define Automation. List atleast four advantages and disadvantages of automation. (06 Marks)
 - b. Explain the different types of automation giving examples for each. (06 Marks)
 - c. In a ABC manufacturing company a part is produced in a batch size of 40 units. The batch has to undergo 10 operations to complete the production. If the average set up time is 6 hours/operation, average operation time is 10 min and average non-operation time is 8 hours/operation. Then determine :
 - i) Manufacturing lead time in number of days if the plant runs for 8 hours shift/day.
 - ii) Production rate of the plant. (08 Marks)
2.
 - a. Sketch and explain the following work part transfer mechanisms :
 - i) Geneva mechanism
 - ii) Belt drive conveyor mechanism. (10 Marks)
 - b. Write a note on Automation for Machining operations. (06 Marks)
 - c. List out the objectives of Automated flow lines. (04 Marks)
3.
 - a. Explain the upper bound and lower bound approach in analyzing transfer lines without storage buffer. (08 Marks)
 - b. Explain in brief the partial automation in a flow line. (04 Marks)
 - c. The ideal cycle time of an 16 station transfer line is 1.4min. The average down time per line will be 6min and the probability of breakdowns per cycle is equal for all cycles and is equal to 0.004. Determine production rate and line efficiency by considering both upper bound and lower bound approaches. (08 Marks)
4.
 - a. Explain the following with reference to line balancing :
 - i) Cycle time
 - ii) Line efficiency
 - iii) Total work content
 - iv) Workstation
 - v) Balance delay. (10 Marks)
 - b. A single model assembly line has to produce a component which has a annual demand of upto 1,20,000 components per year. The line will operate 48 weeks/year , 6 shifts/week and 8 hours/shift. Manning level will be one worker per station. The work content is reduced to its corresponding work elements as listed in table below. The efficiency of the line is 96% and the repositioning time per cycle will be 0.06min.

Element	1	2	3	4	5	6	7	8	9	10	11	12
Time 'Te' in min	0.3	0.4	0.8	0.1	0.2	0.15	0.38	0.6	0.5	0.25	0.18	0.32
Immediate Predecessor	-	-	1	1,2	2	3	3	3,4	6,7,8	5,8	9,10	11

Determine i) Total work content time.

ii) Hourly production rate to achieve the demand.

iii) Cycle time.

iv) Theoretical minimum number of workers required on the line.

v) Service time for which the line must be balanced. (10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

- 5 a. Explain the functions of the following devices in part feeding mechanism.
i) Hopper ii) Parts feeder iii) Selector iv) Feed track
v) Escapement and placement devices. (10 Marks)
- b. A 12 – station assembly machine has an ideal cycle time of 18 sec. The fraction defect rate each of the stations is 0.01 and the probability that the defect will jam is 0.5. When a breakdown occurs it takes 2 min for the system to put back into operation. Cost to operate the assembly machine is Rs 2000/hour. Other costs are ignored. Determine
i) Average production rate of all assemblies.
ii) Yield of good products.
iii) Average production rate of good products.
iv) Uptime efficiency.
v) Cost per unit. (10 Marks)
- 6 a. Define Process planning and explain the contents of a process plan. (06 Marks)
b. Explain Capacity planning , with a neat block diagram. (06 Marks)
c. List and explain the various inputs and outputs of a material requirement planning system. (08 Marks)
- 7 a. Explain CNC Milling centres. (10 Marks)
b. List and explain atleast five features and capabilities of a modern CNC machine control unit. (10 Marks)
- 8 a. With neat sketches, explain the various types of Robot configurations. (12 Marks)
b. Explain the Typical industrial and Non – industrial applications of robot. (08 Marks)
