



P.E.S. College of Engineering, Mandya - 571 401
 (An Autonomous Institution affiliated to VTU, Belagavi)
Fifth Semester, B.E. - Industrial and Production Engineering
Semester End Examination; Feb. - 2021
Computer Integrated Manufacturing

Time: 3 hrs

Max. Marks: 100

Course Outcomes

The Students will be able to:

CO1: Explain the mathematical models, the terms used in mathematical models, and different types of transfer mechanisms used.

CO2: Define the upper bond and lower bond approach, Work station process time, Cycle time, precedence constraints, Precedence diagram, Balance delay methods of line balancing, explain the effect of storage in industry.

CO3: Design the assembly systems and parts feeding devices.

CO4: Explain the role and importance of AGV, CAPP and MRP.

CO5: Explain the different elements of CNC, the steps involved in writing the CNC part programming and the concept of robots, robot configuration and different robot motion.

Note: I) PART - A is compulsory. Two marks for each question.

II) PART - B: Answer any Two sub questions (from a, b, c) for Maximum of 18 marks from each unit.

Q. No.	Questions	Marks	BLs	COs	POs
I : PART - A		10			
I a.	List the objectives of Automated Flow Lines.	2	L1	CO1	PO1
b.	What are the Reasons for Downtime?	2	L1	CO2	PO1
c.	Write the Formula to calculate the Cost Per Assembly of the Products and explain the Terms used in it.	2	L1	CO3	PO1
d.	Define Bill of Materials.	2	L1	CO4	PO1
e.	Write two Advantages and Disadvantages of CNC Machines.	2	L1	CO5	PO1
II : PART - B		90			
UNIT - I		18			
1 a.	Define Automation and explain the Types of Automation.	9	L2	CO1	PO1
b.	List and explain with a sketch any two types of Flow Line Configuration used in the industries.	9	L2	CO1	PO1
c.	With a sketch, explain the following methods:	9	L2	CO1	PO1
	i) Geneva Wheel Mechanism ii) Roller Conveyer Transfer System				
UNIT - II		18			
2 a.	i) Differentiate between Upper Bound Approach and Lower Bound Approach.	4	L3	CO2	PO1
	ii) Write a note on Buffer Storage.	5	L1	CO2	PO1
b.	A 16 station transfer line has 2 stages of 8 stations each. The ideal cycle time of each stage is 1.2 min. All the stations in the line have the same probability of stopping, $p = 0.006$. Assume that the downtime is 8 min and constant when a breakdown occurs. Using the upper bound approach, compute the line efficiency for the buffer storage capacities of:	9	L3	CO2	PO1,3
	i) $b = 0$ ii) $b = \infty$ iii) $b = 15$ iv) $b = 35$				

- c. A new product is to be assembled in a plant, the data gives the precedence relationship and element times:

Element #	1	2	3	4	5	6	7	8
Time T_e in Min	1	0.5	0.8	0.3	1.2	0.2	0.5	1.5
Predecessor	-	-	1, 2	2	3	3, 4	4	5, 6, 7

9 L3 CO2PO1,3

Using Largest Candidate Rule Method,

- i) Construct the precedence diagram for this job
- ii) If the ideal cycle time is to be 1.5 min, what is the minimum number of work stations required?
- iii) Calculate the Balance Delay

UNIT - III

18

- 3 a. Explain the following with a sketch:

- i) Carousel Assembly System
- ii) Single Station Assembly System

9 L2 CO3 PO1

- b. With a sketch, explain the elements of Parts Delivery Systems.

9 L2 CO3 PO1

- c. A 12 station dial type assembly line has an ideal cycle time of 0.2 min. The base part is automatically loaded to the first station and components for assembly are added at each station. The fraction defect rate at each of the 12 stations is $q = 0.01$, and the probability that a defect will jam the line is $m = 0.4$. The average downtime for every jam is 3 min. Determine;

9 L3 CO3PO1,3

- i) The average Production Rate
- ii) The Yield of good Assemblies and Defective Assemblies
- iii) The uptime efficiency of the line
- iv) If the cost of operating the line is Rs. 1500/hr, what is cost per unit? Given raw material cost per unit is Rs. 60 and the tooling cost is Rs. 5/unit.

UNIT - IV

18

- 4 a. Write a note on Vehicle Guidance and Routing.

9 L1 CO4 PO1

- b. Explain the methods of AGVs System Management.

9 L2 CO4 PO1

- c. With a block diagram, explain the approaches used for designing CAPP systems.

9 L2 CO4 PO1

UNIT - V

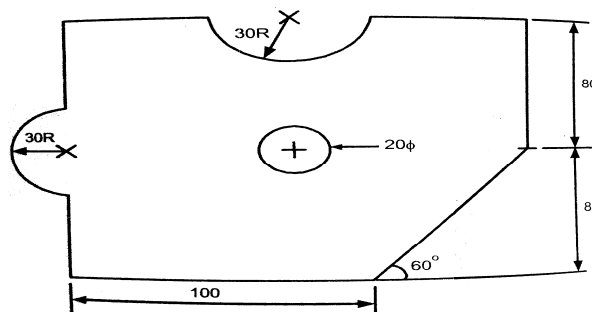
18

- 5 a. With a sketch, explain the following process:

12 L2 CO5 PO1

- i) Horizontal Machining Centre
- ii) Vertical Machining Centre

- b. Figure below shows the details of a component to be machined. The machining involves profile milling and drilling. For both take speed as 500 rpm, feed as 75 mm/min and the thickness is 20 mm. Write the manual part program for machining the component.



6 L1 CO5 PO1

- c. List and explain the basic components of a Robot.

6 L2 CO5 PO1