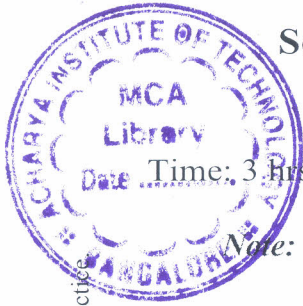


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Seventh Semester B.E. Degree Examination, June/July 2025
Computer Aided Design and Manufacturing

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. What is computer-integrated manufacturing? Briefly elaborate on CAD/CAM/CIM, mechanization and automation. (06 Marks)
- b. Explain the terms : (i) Manufacturing Lead Time (MLT)
(ii) Production Rate (R_p)
(iii) Production Time (T_p)

For all the three types of production systems along with their mathematical models.

(09 Marks)

- c. A machine shop operates 10 shifts per week and each shift of 10 hours. The machine shop consists of 8 machines and with a production rate of 12 units per hour for each machine.
 - (i) Determine the weekly production capacity of the machine.
 - (ii) If the mean time between failures of the machine is 1200 hours, mean time to repair is 24 hours and the utilization of the machines in the machine shop is 80%. Determine the weekly production capacity. (05 Marks)

OR

- 2 a. Explain general configuration of automated flow lines with a neat sketch. (06 Marks)
- b. What are buffer storage zones? Analyze the flow line / transfer line with and without storage buffer zones. (06 Marks)
- c. A 18 station transfer line is being proposed to machine a certain component currently produced by conventional methods. The production rate is 50 PC/hr with 100% efficiency on the line. From the similar transfer line, it is estimated that breakdown of all the types will occur at a frequency of 0.10 breakdown per cycle and the average down time will be 6.0 min. The cost of the starting material is Rs.6.00 per part. The line operates at a cost of Rs.90 per hour. For 50 parts, 20 cutting tools are used, which costs Rs.2.00 per tool. Determine the following : (i) Production rate (ii) Line efficiency (iii) Cost per unit piece produced on the line. (08 Marks)

Module-2

- 3 a. With a neat sketch, explain the computer aided design process and its significance in manufacturing. (08 Marks)
- b. Explain the following transformations :
(i) Translation (ii) Rotation (iii) Scaling (06 Marks)
- c. A line defined by the points (1, 1) and (2, 4) is rotated by 60° around z-axis with respect to the origin x-y plane. Determine the co-ordinates of the line after rotation. (06 Marks)

OR

- 4 a. With block diagram, explain the Retrieval type of CAPP systems. (08 Marks)
- b. What is MRP? Explain the different inputs of MRP with a block diagram. (08 Marks)
- c. Explain capacity planning with a neat block diagram. (04 Marks)

Module-3

- 5 a. What do you mean by AS/RS? Explain briefly about part identification system. (10 Marks)
 b. What is FMS? Briefly explain the types of Flexibility. (10 Marks)

OR

- 6 a. In a plant, a product is assembled as per the following data. Assume cycle Time as 16 minutes.
 (i) Construct precedence diagram.
 (ii) Determine the number of stations required to balance the line by using LCR method.
 (iii) Determine Balance Delay.

Work Element	1	2	3	4	5	6	7	8
$T_C(\text{min})$	10	5	8	3	11	3	5	15
Preceded by,	-	-	1, 2	2	3	3, 4	4	5, 6, 7

(14 Marks)

- b. Define and write the mathematical model of,
 (i) Total work content time (T_{WC})
 (ii) Cycle time (T_C)
 (iii) Smoothness Index (S.I)

(06 Marks)

Module-4

- 7 a. List out the advantages, limitations and applications of CNC's. (10 Marks)
 b. Write a part program to turn the profile of the part as shown in Fig. Q7 (b). (10 Marks)

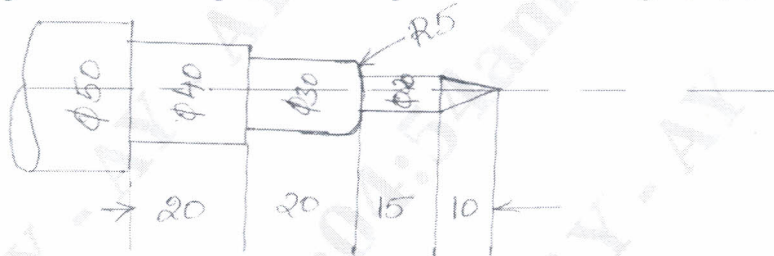


Fig. Q7 (b)

OR

- 8 a. Explain the different configurations of Robot with neat sketches. (10 Marks)
 b. What is work volume of a Robot? Draw and explain the work volume of the four configurations of robots. (10 Marks)

Module-5

- 9 a. Briefly explain the recent developments in manufacturing. (08 Marks)
 b. Discuss the basic principles of additive manufacturing and list various advantages, limitations of AM technique. (08 Marks)
 c. Explain the concept of slicing of 3D models. (04 Marks)

OR

- 10 Write a short note on :
 a. Evolution of Industry 4.0
 b. Big data and cloud computing for IoT.
 c. Supply chain optimization.
 d. Augmented Reality (AR) and Cyber security.

(20 Marks)
