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Question Paper Code : 40838

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2021.

Sixth/Seventh Semester

Mechanical Engineering

ME 8691 — COMPUTER AIDED DESIGN AND MANUFACTURING

(Common to Mechatronics Engineering)

(Regulations 2017)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is meant by CAD system architecture?
2. What are the design related tasks performed by modern computer?
3. Draw the second order continuity curve.
4. Why B-rep modeling approaches are widely followed than CSG approach?
5. Compare the data exchange standards IGES and PDES.
6. State the needs for data exchange standards.
7. What do you mean by machining centre with respect to NC machines?
8. What is the difference between manual part programming and computer assisted part programming?
9. Why FMS is popular for metal cutting applications?
10. List the roles of group technology in CAD/CAM integration.

PART B — (5 × 13 = 65 marks)

11. (a) A triangle has coordinates with A(5, 2), B(3, 5), and C(7, 5).
- First rotate the triangles by about the origin and then translate the triangle 2 units in x direction and 2 units in y direction.
 - Then translate the triangle 2 units in x direction and 2 units in y direction and then rotate by about the origin.
- Obtain the resultant for both cases and write your inferences.

Or

- (b) (i) Discuss how CIM can act as a enabling technology for concurrent engineering. (9)
- (ii) List the benefits and applications of CAD. (4)
12. (a) (i) Explain the basic curve fitting techniques. (7)
- (ii) Explain the importance of geometric modeling in CAD. (6)

Or

- (b) Explain with suitable example, how a solid model is generated using boundary representation and write the advantages of solid modeling.
13. (a) Explain about the various layers of GKS.

Or

- (b) State the need and requirements of the product exchange between dissimilar CAD/CAM systems. Describe the step methodology.
14. (a) Explain the part program segment given below. Draw the trajectory of table motion that this program seeks to create.

N0010G90;
N0011G01X1Y2;
N0011G01X2Y2;
N0013G91;
N0014G01X1;
N0015G92X2Y2;
N0016G01X1Y1

Or

- (b) Explain the working of a NC machine tool with the help of a diagram. Also state advantage and limitations of NC machines.

15. (a) Explain the composite part concept in cellular manufacturing.

Or

- (b) Explain the concept of OPITZ coding system with example.

PART C — (1 × 15 = 15 marks)

16. (a) Using Bresenham's circle drawing algorithm, construct a circle whose radius is 4 units and centre is (8, 8).

Or

- (b) A flexible manufacturing cell consists of a load/unload station and two machining workstations. The load/unload station is station 1. Station 2 Performs milling operations and consists of one server (one CNC milling machine). Server 3 has one server that performs drilling (one CNC drill press). The three stations are connected by a part handling system that has one work carrier. The mean transport time is 2.5 min. The FMC produce three parts A,B and C. The part mix fractions and process routings for the three parts are presented in table below. The operation frequency = 1.0 for all operations.

Part, <i>i</i>	Part mix,	Operation, <i>k</i>	Description	Station, <i>i</i>	Process time, (min)
A	0.2	1	Load	1	3
		2	Mill	2	20
		3	Drill	3	12
		4	Unload	1	2
B	0.3	1	Load	1	3
		2	Mill	2	15
		3	Drill	3	30
		4	Unload	1	2
C	0.5	1	Load	1	3
		2	Mill	3	14
		3	Drill	2	22
		4	Unload	1	2

Determine :

- Maximum production Rate of the FMC,
- Corresponding production rates of each product,
- Utilization of each machine in the system, and
- Number of busy servers at each station.