

Code No: 07A71811

**R07**

**Set No. 2**

**IV B.Tech I Semester Examinations, December 2011**

**CAD-CAM**

**Common to Aeronautical Engineering, Metallurgy And Material Technology**

**Time: 3 hours**

**Max Marks: 80**

**Answer any FIVE Questions**

**All Questions carry equal marks**

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1. Derive the relationship between a point and its scaled counterpart  $p^*$  if  $P$  is scaled uniformly about a given point  $Q$  which is not the origin. [16]
2. What are the differences between MRP and Manufacturing Resource Planning? Explain. [16]
3. (a) What is meant by numerical control of machine tools? Explain.  
(b) List the nature of jobs that are suitable for NC manufacturing. [8+8]
4. (a) What are the different types of geometric relations? Why would you use them in 3D geometric modeling?  
(b) How can you define a sketch plane? [8+8]
5. Describe the similarities and dissimilarities of GT layout with Product layout. [16]
6. (a) Specify a digitizer for the CAD application and justify your choice  
(b) What are the various constructional methods employed in the making of a digitizer? [16]
7. Discuss the various network topologies used in CIM. Explain their relative advantages and disadvantages. [16]
8. A cubic Bezier curve is to be divided by a designer into two segments. Find the modified polygon points for each segment. [16]

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1. (a) What is the difference between GOTO and GO/TO commands used in APT.  
(b) Give a list of various computer-aided part programming languages. [8+8]
2. What do you understand by the form element method of geometric construction? Specify the applications of this method of modeling in comparison to that of the variant type. [16]
3. What do you mean by Lean Manufacturing? Explain its advantages in detail. [16]
4. Let us assume that you are in an office or a computer lab. If you look around you, there are many objects that serve as good CAD models. Classify each of the following objects as 2<sup>1</sup>/<sub>2</sub>D, composite 2<sup>1</sup>/<sub>2</sub>D, or 3D models: keyboard, mouse, mouse cable, computer monitor, printer, chair, computer tables, a cell phone, a printer cable, your backpack, trash paper basket, and computer-system box. [16]
5. (a) Develop the form code of the Optiz system for the part shown in figure 5 below. All dimensions are in mm.  
(b) Describe the CODE System used in GT. [8+8]

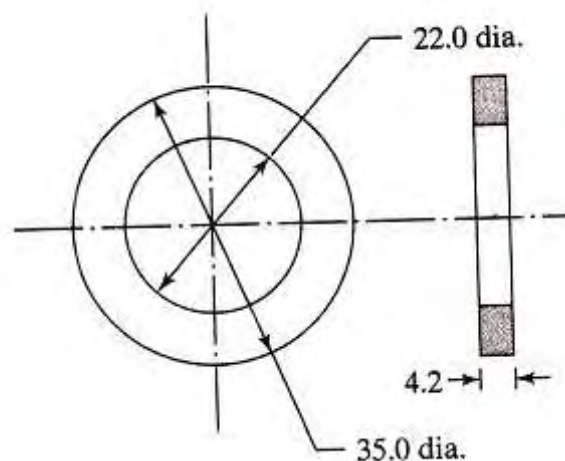


Figure 5

6. Discuss the following operational issues related to FMS.
  - (a) Tool management
  - (b) Pallet and fixture allocation. [8+8]

7. Three point sets in  $E^2$  define three valid polygonal solids  $S_1$ ,  $S_2$  and  $S_3$ . The three solids are bounded by three boundary sets  $bS_1$ ,  $bS_2$  and  $bS_3$  given by their corner points as:  $bS_1 := \{(2, 2), (5, 2), (5, 5), (2, 5)\}$ ,  $bS_2 = \{(3, 3), (7, 3), (7, 6), (3, 6)\}$  and  $bS_3 = \{(4, 1), (6, 1), (6, 4), (4, 4)\}$ . Find  $S_1 \cup S_2 \cup S_3$ ,  $S_1 \cap S_2 \cap S_3$  and  $S_1 - S_2 - S_3$ . [16]
8. A line is connecting the origin of the MCS of a model and a point  $P(1, 2, 3)$ . Find three different ways to rotate the line so that it coincides with the  $Z$  axis of the MCS. [16]

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1. Give a classification of the different surfaces that can be used in geometric modeling applications. [16]
2. Describe the role of GT in CAPP. [16]
3. Describe the following with respect to the CIM.
  - (a) Process monitoring and control
  - (b) Quality control and
  - (c) Shop floor control. [5+5+6]
4. Write the part program to drill the holes in the part shown in the figure 4. The part is 12.0 mm thick. Cutting speed = 100 m/min and feed = 0.06 mm/rev. Use the lower left corner of the part as the origin in the x-y axis system. Write the NC part program. Use absolute positioning. All dimensions are given in mm. [16]

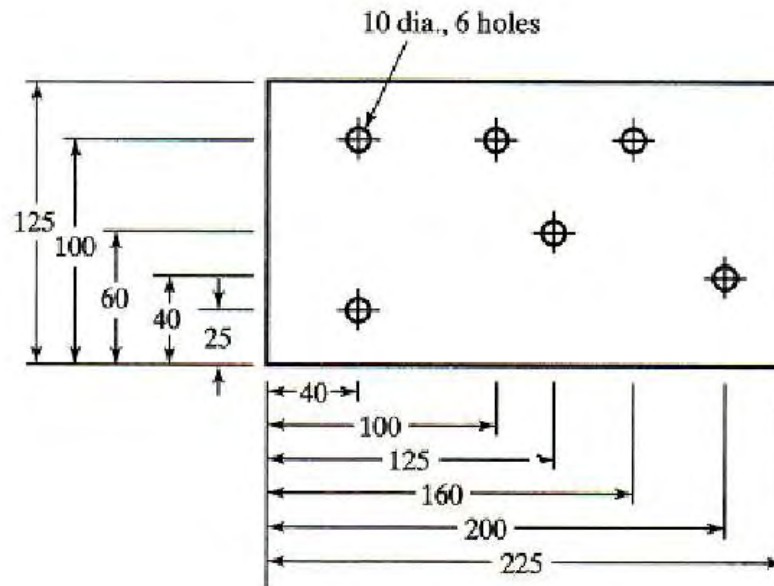


Figure 4

5. Describe the following operational issues related to FMS.
  - (a) Scheduling and dispatching
  - (b) Machine loading. [8+8]

6. Explain why the homogeneous coordinate system is generally used in graphics in place of a normal coordinate system, in particular for software implementation. Give an example to illustrate the advantage. [16]
7. Explain the following facilities in Autodesk inventor with an example  
Line / spline, Circle / ellipse, arc, rectangle, fillet / chamfer, point, hole center, polygon, mirror. [16]
8. A physical space of (0, 0) to (225, 125) in mm is to be displayed on screen with a resolution of 1280 x 1024 pixels with an aspect ratio of 1. Find the necessary mapping required from physical coordinates to pixels. Also determine the pixel coordinates (only end points and no interpolations) of a line whose physical coordinates of end points are (65, 55) and (160, 80). [16]

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1. (a) Discuss the objectives and structure of CAD database.  
(b) Explain briefly the various database models used in CAD environment. [8+8]
2. Explain the concept of layers in AutoCAD. [16]
3. How does JIT maintain minimum inventory? Explain its principle. [16]
4. What is meant by sweep? Discuss in detail the various types of sweep techniques available for 3D geometric construction. [16]
5. Describe the methods of defining elements in computer graphics. [16]
6. (a) What factors must be considered while selecting a classification and coding system?  
(b) Discuss the advantages and the limitations of OPITZ code system. [8+8]
7. The outline of the cam in the following figure 7 is to be machined in an end milling operation, using a 12.5-mm diameter end mill with two teeth. The part is 7.5 mm thick. Write the complete APT program for this job, using a feed rate = 80 mm/min and a spindle speed = 500 rev/min. Postprocessor call statement is MACHIN/MILL, 03. Assume the rough outline for the part has been obtained in a band saw operation. Ignore clamping issues in the problem. All dimensions are in mm. [16]

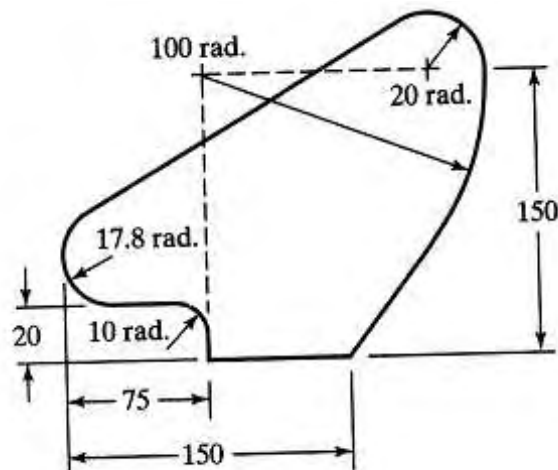


Figure 7

8. A flexible machining system consists of two machining workstations and a load/unload station. Station 1 is the load/unload station. Station 2 performs milling operations and consists of two servers (two identical CNC milling machines). Station 3 has one server that performs drilling (one CNC drill press). The stations are connected by a part handling system that has four work carriers. The mean transport time is 3.0 min. The FMS produces two parts. A and B. The part mix fractions and process routings for the two parts are presented in the table below. Compute the production rate, manufacturing time and waiting time when the number of units in the system is 4. [16]

| Part | Part Mix | Operation | Description | Station | Process time (min) |
|------|----------|-----------|-------------|---------|--------------------|
| A    | 0.4      | 1         | Load        | 1       | 4                  |
|      |          | 2         | Mill        | 2       | 30                 |
|      |          | 3         | Drill       | 3       | 10                 |
|      |          | 4         | Unload      | 4       | 2                  |
| B    | 0.6      | 1         | Load        | 1       | 4                  |
|      |          | 2         | Mill        | 2       | 40                 |
|      |          | 3         | Drill       | 3       | 15                 |
|      |          | 4         | Unload      | 1       | 2                  |

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