

ED7102 Computer Applications in Design Question Bank

UNIT – I

Part A

1. Explain the factors, which inhibit the use of a very high resolution and a large number of colours for display in the case of raster scanning display devices? **(May/June 09)**
2. Give the general configuration of a CAD computer system.
3. In what ways CAD can help manufacturing activity? Discuss. **(May/June 09)**
4. CAD helps in integrating CAM- Justify this statement. **(May/June 09)**
5. How do you specify a plotter for graphics application?
6. Explain the four types of production. **(Nov 08, Jun 09)**
7. Briefly describe the types of storage devices used in computers. **(Nov 08, Jun 09)**
8. In design, what do you understand by synthesis and engineering analysis?
9. Explain how CAD helps to synthesize a product design and do engineering analysis for getting optimal design. **(June 09)**
10. Briefly explain the conventional process of the product cycle in the conventional manufacturing environment. **(Nov08)**
11. What is the structure of a computing system?
12. What do you understand by the CPU? **(Nov 08)**
13. List the advantages of computer aided design.
14. Bring out clearly the difficulties a design engineer has to face at each of the design stages if they are carried out manually. **(Nov 08)**
15. How does a CRT work?
16. What are the capabilities and limitations of directed beam refresh graphics terminal?
17. Write briefly on the secondary storage devices used in CAD System. **(Nov 08)**
18. What are the functions of an interactive graphic design workstation? **(Feb 08, May 04)**
19. Explain with the help of a neat sketch, how an image is generated on a computer terminal.
20. What are various output primitives?

Part B

1. Elaborate on the basic requirements that a CAD software has to satisfy. **(Feb 08, Mar 06)**
2. Describe the various database models which are generally used.
3. Explain the working of Random scan graphic terminal
4. Explain the working of Digitizers and Image scanners
5. Explain the working of CPU **(Feb 07)**
6. What are the reasons for implementing a computer aided design system.
7. With the help of a block diagram, explain the computer aided design process. **(Feb 07)**
8. Explain how an image is generated and maintained in a direct beam refresh terminal.
9. What is a digitizer? Explain how it can be used for transferring paper drawing to CAD system.
10. Explain the various output primitives

UNIT – II

Part A

1. What are normalized device co-ordinaters?
2. What is display file? Explain the structure of display file?
3. What is transformation? How many types of transformations are there to change the geometry?
4. What is a projection? Explain different types of projections?
5. What is clipping? Explain with the help of a diagram.
6. Explain Cohen-Sutherland algorithm for clipping of lines
7. Write down the different techniques for the hidden surface removal. Explain?
8. Explain the four types of production. **(Nov 08, Jun 09)**
9. Briefly describe the types of storage devices used in computers. **(Nov 08, Jun 09)**
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- 13 What is the structure of a computing system?
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Part B

1. A scaling factor of 2 is applied in the Y direction while no scaling is applied in the X direction to the line whose two end points are at coordinates (1, 3) and (3,6). The line is to be rotated subsequently through 300, in the counter clockwise direction. Determine the necessary transformation matrix for the operation and the new coordinates of the end points. **(May/June 09)**
2. The vertices of a triangle are situated at points (15, 30), (25, 35) and (5, 45). Find the coordinates of the vertices if the triangle is first rotated 100' counter clockwise direction about the origin and then scaled to twice its size. **(May/June 09)**
3. Explain the details of polygon clipping. Give its advantages compared to the line clipping. **(May/June 09)**
- 4.. What is the need for concatenation of transformations? Explain what care should be taken in such cases. **(Nov 08)**
5. Explain the method of back face removal. Give its advantages and limitations with reference to hidden line removal. **(Nov08)**
6. Explain the concept of obtaining a reflection about an arbitrary line starting from the plain reflection about an axis. How do you obtain the orthographic projections of 3D geometric data base? **(Nov 08)**
7. What is meant by Interactive Computer Graphics? Explain its various elements. **(Nov 08)**
- 8 Describe the various database models which are generally used. **(Feb 08)**
9. What are the different Radius graphic display devices? Explain?
10. List out different problems associated with raster graphic display device.

UNIT – III

Part A

1. Specify the three principal classifications of the geometric modeling systems and write in brief about each of them. **(May/June 09)**
2. For a cubic Bezier curve, carry a similar matrix formulation to a cubic spline. **(May/June 09)**
3. Given a point Q and a parametric curve in the Cartesian space, find the closest point P on the curve to Q. Hint: Find P such that (Q - P) is perpendicular to the tangent vector. **(May/June 09)**
4. Derive the cubic spline equations.
5. Explain the engineering application of cubic splines. **(May/June 09)**
6. Derive the condition for C_0 and C_1 continuity in a cubic Bezier composite surface of two patches. **(June 09)**
7. What are the types of surfaces that CAD/CAM systems use? **(Nov 08)**
8. What do you understand by the form element method of geometric construction?
9. Specify the applications of this method of modeling in comparison to that of the variant type. **(Nov 08)**
- 10 What are the limitations in utilizing the sweep method for geometric construction? **(Nov 08)**
11. Distinguish between interpolation and approximation approaches used in design of curves.
- 12 Explain the basic curve fitting techniques. **(Nov 08)**
13. Write on the importance of studying geometric modeling in CAD. **(Feb 08, Jun 09)**
- 14 What are entities?
- 15 Explain the methods of defining lines, arcs and Circles in wire frame modeling?
- 16 Describe with the help of neat sketches the major surface entities provided by CAD/CAM systems. **(Feb 08)**
17. How do you ensure convex hull property in Bezier surface? **(Feb 08)**
- 18 Describe the effect of characteristic polyhedron over the resulting Bezier surface. **(Feb 08)**
- 19.. What do you mean by blending function? Explain reparametrisation of a surface. **(Feb 08)**
20. What are the controlling points for generating curves.

Part B

1. Write a note on: **(Nov 07)**

i. NURBS

ii. B-splines. **(Nov 07)**

2 Discuss the modeling guidelines to be followed by the user while constructing a surface model as a CAD/CAM system. **(Nov 07)**

3. Differentiate between Bezier and B- spline surface with reference to number of control points, order of continuity and surface normal. **(Mar 06)**

4. Explain how a Bezier curve is defined.

5. What are the advantages of Bezier curves over cubic spline. **(Mar 06)**

6. Explain how the curves are represented in Generic form

7. Explain how the curves are represented in Parametric form. **(Nov 05, May 04)**

8. Describe the effect of characteristic polyhedron over the resulting Bezier surface.

9. What do you mean by blending function? Explain reparametrisation of a surface.

UNIT – IV

Part A

1. Derive the equation that converts HSL Coordinates into RGB coordinates

2. Apply the area oriented

3. Develop an algorithm that can enable the user to create and manipulate boundary model by using set operations.

4. Create the boundary model of the solid fillet. **(Nov 08)**

5. It is desired to develop bounded primitives for a two- dimensional solid modeler based on the CSG scheme. Plate (rectangular plate and triplate) and disc

6. Primitives are to be developed. Find the mathematical definitions of these primitives. **(Feb 08)**

7. Describe the various methods and operations required in each approach for the Connecting rod. **(Feb 08)**

8. What do you mean by geometric modeling?

9. Enumerate various solid-modeling techniques and compare them. **(Feb 07, ,Mar 06, Nov 06)**

10. How do you represent a bracket with various primitives and sweep operations.

11. Sketch with appropriate dimensions and explain the limitation. **(Nov 07)**

12. Find the length of the common perpendicular to two skew lines

13. Find the center and major and minor radii of an ellipse

14. Find the intersection of two tangent lines at two known points on an ellipse

15. Find the radius and centre of tangent to a line, passing through a point and with a given radius

16. Find the radius and centre of tangent to a given circle and a given line with a given radius

17. Find the radius and centre of tangent to two lines and passing through a point

18. Find the radius and centre of passing through two points and tangent to a line

19. Find tangent to an ellipse at any given point on its circumference

20. Find tangent to an ellipse from a point outside the ellipse

Part B

1. Derive decision parameters for the Bresenham's circle generating algorithm assuming the starting point as (0, 10) and generate the pixel positions for one fourth of a circle.

2 Explain the Cohen - Sutherland line-clipping approach with proper sketches.

3. A shaft is to transmit 10 kW power at 1500 rpm. The shaft is made of medium carbon steel material. Write a C program to select the material, design the shaft and create the CAD model.

4. A flange coupling is to transmit 5 kW power at 1500 rpm. The coupling is made of cast iron. Write a C/LISP/FORTRAN program to design the coupling and draw the production drawing of the coupling.

5. Find all the layer-related commands on your system, specifically how to select/deselect layers, assign entities to layers, assign layers to entities, assign colors to layers, modify layer colors and modify layers of existing entities.

(May/June 09)

7. What are the basic Geometric commands in AutoCAD? **(May/June 09)**

8. Give an example of how the centralized integrated database concept can help with the what-if situations that arise during the design process. **(Nov 08, Jun 09)**

9. Describe various commonly used primitives for solid modeling and explain the Boolean operations.

10. Describe the properties that a solid model should capture mathematically. **(Nov 08)**

UNIT – V

Part A

1. Give the requirements of product data exchange between dissimilar cad/cam systems

2. compare IGES, PDES

3. Illustrate the Scan-conversion process of a straight line in terms of pixel position.

4. Write the mathematical expression to scale a straight line about a fixed point.

5. Write any 2 properties of Bezier Curves.

6. Define 3D Translation.

7. What is Composite Transformation?

7. What are the types of parallel projection?

8. What is color model?

9. What is color Gamut?

10. Differentiate Shades, Tints and Tones.

11. What is Morphing?

12. Write the parametric equation of a plane surface defined by three points P_0 , P_1 and P_2 .

13. Illustrate the difference between geometry and topology.

15. Sketch the four Boolean operations of a block and a cylinder B.
16. Illustrate translational and rotational sweep models.
17. Distinguish between hidden line removal and hidden surface removal models.
18. State the salient features of RGB color space.
19. Briefly explain the top-down assembly approach.
20. What is the importance of WCS method in the assembly model?

Part B

1 Explain the following polyhedral object using B-rep elements and verify the Euler equation for the same

- (i) Simple Polyhedra.
- (ii) Polyhedral object a face may have loops.

(iii) Objects with holes that do not go through the entire object.

(iv) Objects have holes that go through entire objects.

2. Sketch the following feature operations using CSG.

- (i) Extruded
- (ii) Revolved feature
- (iii) Chamber
- (iv) Loft feature
- (v) Pocket
- (vi) Shell
- (vii) Fillet
- (viii) Draft
- (ix) Rib and
- (x) Dimple.

3. Explain briefly with sketches any six tests used for hidden line identification.

- 4 List the differences and the similarities between nonlinear sweeps and lofts.
- 5 Describe how the variable radius fillet works. When is such one used?
6. Fig. 1 shows a pin and a block with their MCSs. The pin and the instances to be assembled into the hole in the block. Use WCS and write the transformation matrices to merge the three instances of B into A.

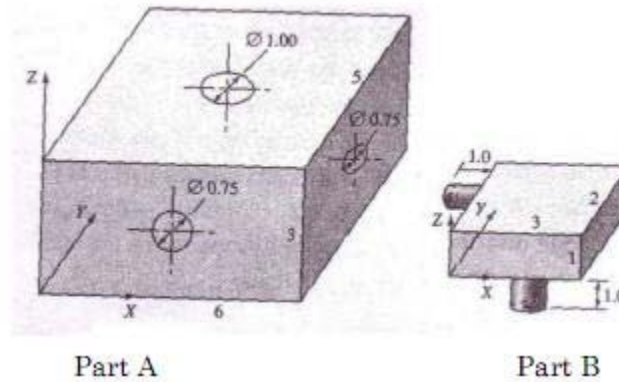


Fig. 1

- 7 Use the bottom-up approach to create the model of the universal joint shown in Fig. 2

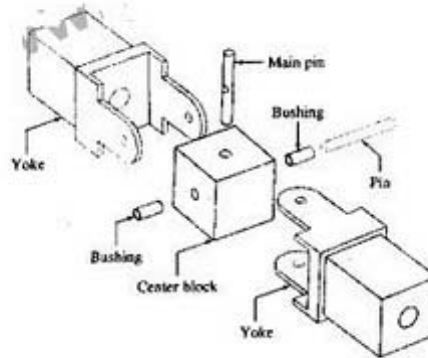


Fig. 15 (b)

Fig. 2

8. Describe the IGES Methodology
9. Describe the PDES Methodology
10. Compare various testing methods of IGES processors.

