

Reg. No.

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B.E. / B.TECH. DEGREE EXAMINATIONS, MAY 2023

Sixth Semester

ME18601 – COMPUTER AIDED DESIGN AND MANUFACTURING

(Regulation 2018)

TIME: 3 HOURS

MAX. MARKS: 100

COURSE OUTCOMES	STATEMENT	RBT LEVEL
CO 1	Students will be able to differentiate between conventional design & CAD; Perform 2D & 3D transformations. Also, can write algorithms for lines.	3
CO 2	Students will be able to understand and select different curves and surfaces for applications.	3
CO 3	Students will be able to understand hidden line, surface, solid removal algorithms and various techniques of colouring and shading.	2
CO 4	Students will be able to understand different graphic and data exchange standards.	2
CO 5	Students will be able to understand the principles of operations of CNC machines and develop CNC manual part programming using G-codes and M-codes for a given component.	3

PART- A (10 x 2 = 20 Marks)

(Answer all Questions)

	CO	RBT LEVEL
1. What are the drawbacks of sequential engineering in handling design change requests?	1	2
2. A line (2,6) and (4,12) is rotated 45° about the origin. Find the final co-ordinate points.	1	3
3. Draw the Bezier spline for the following control points (0,0), (4,3), (8,4) and (12, 0).	2	3
4. Compare the effect of change in control points with respect to Bezier curves and B-Spline curves.	2	3
5. What is meant by silhouette and sketch a silhouette.	3	2
6. Define rendering.	3	2
7. Draw the flow of organization of a typical CAD/CAM structure with graphics standard.	4	2
8. List out various file section in IGES.	4	2
9. What will happen to the tool motion if we write the block as "N15 G92 X-100.00 Y86.00 Z95.0"?	5	3
10. Whether slides and spindle speed of the CNC machine are driven by stepper motors? Justify.	5	3

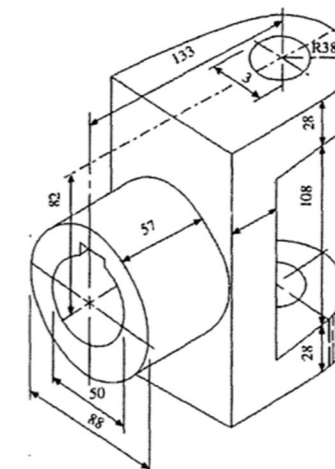
PART- B (5 x 14 = 70 Marks)

	Marks	CO	RBT LEVEL
11. (a) (i) Discuss the stages in the product life cycle and the importance of each stage.	(7)	1	3
(ii) Using the line drawing algorithm sketch the pixels for the line drawn from (4,4) to (12, 14).	(7)	1	3

(OR)

(b) For the points P ₁ (1, 1), P ₂ (3, 1), P ₃ (4, 2), P ₄ (2, 3), that defines 2D polygon, develop a single transformation matrix that	(14)	1	2
1) Reflects about the line x = 0,			
2) Translates by -1 in both x and y directions and			
3) Rotates about the z-axis by 180°			

12. (a) A mechanical component is shown below along with dimensions. A CSG representation is to be made. Define the minimum basic primitives to be used for constructing the component. Give details of the CSG tree for the given component. Include details of primitives, transformation involved (scaling, translation, rotation), and the Boolean operations.	(14)	2	2
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(OR)

(b) (i) Briefly write about the representation of surfaces by tabulated cylinder, ruled surface, surface of revolution, swept surface and sculptured or curved mesh, with simple sketches.	(9)	2	2
(ii) Write about Coons patch & Bicubic patch.	(5)	2	2

13. (a) Describe the hidden line removal technique and hidden surface removal technique using depth buffer or Z – buffer algorithms used in visual realism.	(14)	3	2
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(OR)

(b) Design a colour model of RGB and CMY.	(14)	3	2
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14. (a) Explain IGES and its sub categories, structure & testing.	(14)	4	2
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(OR)

- (b) Write short notes on:
- (i) OpenGL. (7) 4 2
 - (ii) Layers of GKS. (7) 4 2

15. (a) Illustrate with sketches, about drives and controllers, involved in CNC machine. (14) 5 3

(OR)

- (b) Write a manual part programme to mill the outer contour of the part shown in figure – 1 in one pass and also write the manual part programme to drill the four holes using standard drilling cycle code. Assume suitably the machine data and list the assumptions. Brief about each block in the programme. (14) 5 3

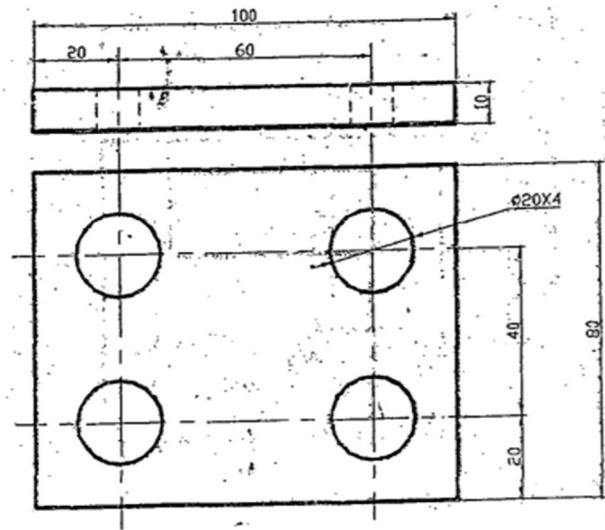


Figure - 1

PART- C (1 x 10 = 10 Marks)

(Q.No.16 is compulsory)

- | | Marks | C O | RBT
LEVEL |
|--|-------|-----|--------------|
| 16. Given the triangle, described by the homogenous points matrix below, scale it by a factor $\frac{3}{4}$, keeping the centroid in the same location. Use (1) separate matrix operation and (2) condensed matrix for transformation. (10) 1 3 | (10) | 1 | 3 |

$$[P] = \begin{bmatrix} 2 & 2 & 0 & 1 \\ 2 & 5 & 0 & 1 \\ 5 & 5 & 0 & 1 \end{bmatrix}$$
