INSTITUTE OF AERONAUTICAL ENGINEERING
(AUTONOMOUS)

Code No: **BCC001**

M.Tech I Semester Regular Examinations, December 2016
ADVANCED CAD
(CAD/CAM)

Time: 3 hours   Max. Marks: 70

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

UNIT-I

1. (a) Summarize the following transformation in 2D & 3D concept of computer graphic with individual examples. i) Translation   ii) Scaling   iii) Rotation.   [7M]

    (b) Using the DDA algorithm describe in the text, sketch the pixels for the line drawn from (4, 4) to (12, 14).   [7M]

2. (a) Rotate a triangle with vertices (10, 20), (10, 10), (20, 10) about the origin by 30 degrees and then translate it by $t_x=5$, $t_y=10$.   [7M]

    (b) Discuss the window and view port features of the CAD software you use. Write down the different techniques for the hidden surface removal.   [7M]

UNIT-II

3. (a) Distinguish between synthetic and analytical curves and mention the characteristics of Bezier curve.   [7M]

    (b) A cubic Bezier curve is described by the four control points: (0,0), (2,1), (5,2), (6,1).Find the tangent to the curve at t = 0.25.   [7M]

4. (a) The non parametric implicit equation of a circle with center at the origin and Radius r is given by $x^2+y^2= r^2$. Generate the circle parametric equation.   [7M]

    (b) A cubic spline curve is defined by the equation, $P(u) = C_3u_3 + C_2u_2 + C_1u + C_0$, $0 \le u \le 1$, where C_0, C_1, C_2 and C_3 are the polynomial Coefficients. Assuming these coefficients are known, find the four control points that define an identical Bezier curve.   [7M]

UNIT-III

5. (a) Suggest the procedure that you will adopt to create the following surface geometries:
    i.   The surfaces of the vanes and inner projections of the shroud of a mixed flow impeller.
    ii. The surface of a propeller.   [7M]

    (b) Summarize briefly the following methods of surface modeling with a few application examples:
    i.   Lofted surface
    ii. Ruled surface and Tabulated cylinder   [7M]

6. (a) Create the surface model of a product of head lamp of a passenger car and analyze how the blending of surface is done.   [7M]

(b) Design the parametric representation of a hermite cubic surface with an example. Describe the importance of curve and surface modeling in computer aided design. [7M]

UNIT-IV

7. (a) Suggest the procedure that you adapt the surfaces of the vanes and inner projections of the shroud of a mixed shroud flow impeller.
[7M]

(b) Categorize the surface manipulation techniques with suitable parametric representations and case studies
[7M]

8. (a) Distinguish between interpolation and approximation approaches used in design of surfaces in detail with parametric representations.
[7M]

(b) Consider the Bezier curve defined by the control points $P_1 = (0, 5,0)$, $P_2 = (3,4,0)$, $P_3 = (2,0,0)$, and $P_4 = (5,0,0)$. Translate the curve five units along the z-axis to generate a swept surface. [7M]

UNIT-V

9. (a) Describe the considerations in selecting elements to model the following:
    i. Column of a machine tool
    ii. Connecting rod of an engine
    iii. Spindle of a lathe
    iv. Flywheel of a diesel engine
[7M]

(b) Categorize different types of data exchange formats used in CAD systems. Also Write a brief note on Mechanical tolerances and mass property calculations.
[7M]

10. (a) Summarize about B- representation in solid modeling and the importance in the construction of the B-rep solid models with examples.
[7M]

(b) Organize the structure of collaborative engineering and its applicability in industrial sectors. Explain how data exchange formats are useful in the collaborative engineering applications. [7M]