R09

Code No: C8904

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.TECH I SEMESTER EXAMINATIONS, APRIL/MAY-2012
GEOMETRIC MODELING
(ENGINEERING DESIGN)

Time: 3hours **Max.Marks:60**

Answer any five questions
All questions carry equal marks

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1.a) Write down the parametric form of circle and explain with the efficient algorithm to generate it

b) Generate an ellipse with semi major axis of 6 units and semi minor axis of 2 units inclined at an angle of 45^0 to the horizontal with center at (3,4) by using efficient algorithm and represent quarter part of ellipse graphically .

2.a) A Cubic Bezier curve is defined by the control points as P0(1,1), P1(2,3), P2(4,3),P3(5,1).Find the equation of curve and its mid point.

b) What is the need of curve manipulation? Explain various curve manipulation techniques.

3. What are the characteristics of B Spline curve and its advantages and disadvantages? Derive the parametric form equation for B spline curve.

4.a) The homogeneous coordinate system is the most preferred way to be used in geometric modeling. Why?

b) Prove the following:
i. Scaling and mirroring about Z axis is commutative
ii. Two successive translations are commutative.

c) A rectangle with coordinate A (2,3), B (2,5), C(6,5) and D (6,3) is reflected along line whose equation is y=2x+4, and sheared by 2 units in the x direction and 3 units in y direction . Find the new coordinates of the object.

5. Derive the parametric form of following
a) Bezier surface b) B-Spline surface c) Coon's surface

6.a) What are surface manipulation techniques used in surface modeling?

b) A circle with radius of 5 units having center located at point (20,10,0) is rotated about the x axis by an angle 2π to obtain a surface revolution. Calculate the surface point at $\theta = \pi$ and $\Phi = \pi$.

7. Explain the following:
a) Spatial occupancy enumeration
b) Octree Encoding
c) Constructive modeling
c) Boundary representation

8. Write a short notes on any **THREE** of the following:
a. Hermite cubic curve
b. Tabulated cylinder
c. Reflection transformation
d. Gaussain curvature

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