MID-Semester Examination
ME-601: CAGD

Duration: 120 Min.   Maximum Marks: 60
All questions are compulsory.

1. Lamina ABCD with coordinates (4, 3), (3, 1), (8, 1) and (7, 4) respectively is first rotated through 60° about the origin and then translated by (5, 4). In another sequence, the lamina is first translated by (5, 4) and then rotated through 60° about the origin. Find the final positions and orientations of given lamina for the two sequences of transformations and show that lamina acquires different positions and orientations for the two sequences of transformations.   10

2. Explain merits and demerits of parametric representation of curves compared to implicit/explicit representation, you can give suitable examples. Explain use and need of the homogeneous coordinate system.   10

3. In case of axonometric projection derive the expression and find out the angle of rotation with respect to two principal axes to keep foreshortening ratio equal in all three directions. Also find out the foreshortening factor.   10

4. Discuss various properties and limitations of Bezier curves with suitable example/sketch.   10

5. Define a Bezier curve with four polygon vertices $B_0[5\ 4\ 4]$, $B_1[6\ 6\ 4]$, $B_2[8\ 4\ 4]$ and $B_3[7\ 4\ 4]$, calculate five point on this curve at equal parametric interval and plot these points on Bezier curve and control polygon.   10

6. Mathematically prove following with respect to a cubic Bezier curve: 10

    a. First and last point of the Bezier curve is same as the first and last point of the defining control polygon of the Bezier curve.

    b. Tangent vector for a Bezier curve at the start and end point has the same direction as the first and last polygon span.

    c. Second derivative or curvature of Bezier curve at start and end point depends on three nearest polygon points or two nearest polygon spans.

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