



**END-Semester Examination
ME-601: CAGD**

Duration: 180 Min.

Maximum Marks: 100

All questions are compulsory.

1. Write a procedure to truncate a parametric cubic curve segment at two specified values of u and subsequently reparametrize it. Test your formulation for a parametric cubic curve with a given set of end points $P_0(1,1,1)$ and $P_1(4,2,4)$ and the end tangents $p^u(0)=(1,1,0)$ and $p^u(1)=(1,1,1)$ truncated at :
 - a. $u = 0.25$ and $u = 0.75$,
 - b. $u = 0.333$ and $u = 0.667$ (15)
2. Show that a fourth order B Spline curve with four defining polygon vertices using open uniform knot vector yields a cubic Bezier curve. (15)
3. Write down the parametric equation of following.
 - a. A straight line joining points $(1, 1, 1)$ and $(10, 2, 3)$
 - b. A semi circular arc of radius 6 units lying in $y = 20$ plane. The arc has starting point at $(13, 20, 0)$ lies completely above x -axis with center at $(7, 20, 0)$.
 - c. Write down the parametric equation of ruled surface defined by joining above two curves.
 - d. Find out coordinates of point $(u = 0.5, w = 0.5)$ on the above surface. (15)
4. What is an average and Gaussian curvature with respect a parametric surface. Explain, How to decide whether given surface is developable or not. (15)
5. Define a Bezier curve with four polygon vertices $B_1[1 \ 1]$, $B_2[2 \ 3]$, $B_3[4 \ 3]$ and $B_4[3 \ 1]$, split this curve into two curves each one being a cubic Bezier curve and find out the control points of these two curves if the original curve is split at point corresponding to parametric value $u = 0.5$. (20)
6. Briefly explain following terms and phrases. (4x5)
 - a. Regularized Boolean Operation
 - b. Explain Conditions for C^0 and C^1 continuity between two Bezier patches along a common boundary.
 - c. Explain use and need of the homogeneous coordinates
 - d. Explain the advantage of Representing curves and surfaces as NURBS
