PDPM
Indian Institute of Information Technology
Design & Manufacturing Jabalpur

November 25, 2017 2:30-5:30

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 developbale 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

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