

**I M.Tech - I Semester - Regular Examinations - February-2018****GEOMETRIC MODELLING  
(MACHINE DESIGN)**

Duration: 3 hours

Max. Marks: 60

Answer the following questions.

- 1.a) Show that a 2D reflection through the x-axis, followed by a 2D reflection through the line  $y = -x$ , is equivalent to a pure rotation about the origin. 9 M
- b) Justify the need of concatenated matrix. How the matrices are combined to generate a concatenated matrix? 6 M
- OR
- 2.a) Prove the following: 8 M
- (i) Scaling and Mirroring about Z-axis is cumulative.
- (ii) Two successive translations are commutative.
- b) A point is rotated about an axis by an angle ' $\theta$ ' first and then by an angle ' $\alpha$ '. Prove that the transformed coordinate is same if the point is transformed through rotation by angle  $(\theta+\alpha)$  in a single step. 7 M
- 3.a) Find the degree of Bezier curve controlled by three points (4,2), (0,0) and (2,8). Also find the equation of the Bezier curve in parametric format with parameter 'u'. 10 M

b) Explain the key characteristics of Bezier Curves? 5 M

OR

4.a) What do you understand by  $C_0$ ,  $C_1$  and  $C_2$  continuity conditions in curves? 7 M

b) Differentiate between Bezier and B-spline curves. 8 M

5.a) Derive parametric representation of the following surfaces:

(i) Surface of revolution

(ii) Tabulated cylinder 8 M

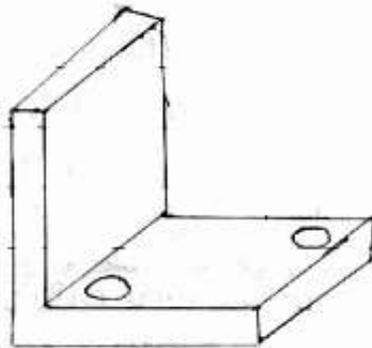
b) Derive the surface equation for 4x4 Bezier surface patch. 7 M

OR

6. What is the need of synthetic surfaces and explain about Bezier surface and B-spline surfaces? 15 M

7. a) Explain about Boundary representation (B-rep). 6 M

b) Create the boundary model of solid shown below. 9 M



OR

- 8.a) Describe the scheme of boundary representation to create solid models of physical objects. 7 M
- b) Write a note on Half space modeling. 8 M