Q.P. Code : **5627**

it 5 sem computer graphics and virtual reality dec 2015

(3 Hours) [Total Marks :80

N.B. : (1) Questions No 1. is **compulsory.**
(2) Attempt **any three** questions from the remaining questions.
(3) Assume suitable data wherever possible.

1. (a) Explain various image representation techniques. 5
(b) Explain haptic rendering pipeline. 5
(c) Explain different types of virtual reality systems. 5
(d) Differentiate between Raster scan and Random scan display. 5

2. (a) Explain any computing architecture for virtual reality. 10
(b) Explain sutherland Hodgeman polygon clipping algorithm. Clip polygon ABCDE against window PQRS. The coordinates of the polygon are A (80, 200), B (220,120), C (150,100), D (100, 30) and E (10,120). The coordinates of the window are P (200,50), Q (50,150), R (200,150) and S (200, 50). 10

3. (a) What is marphing and warping? Explain techniques used in morphine? Warping 10
(b) With respect to 3D transformations, describe the steps to be carried out when an object is to be rotated about an arbitrary axis. Specify all the required matrices. State your assumptions clearly. 10

4. (a) Consider a triangle ABC whose coordinates are A (10, 20) B (30, 40) and C (50, 20). Perform the following transformations : (Specify the matrices that are used) 8
(i) Translate the given triangle by 3 units in X direction and -2 units in Y direction.
(ii) Rotate the given triangle by 30.
(iii) Reflect the given triangle about X = Y
(iv) Scale the given triangle uniformly by 2 units.
(b) Write a function to fill a region whose boundaries are specified by different colours. Explain the algorithm. 8
(c) Explain the test (s) to determine whether the point is inside or outside of polygon. 4

5. (a) State mathematical equation for Bezier curve. Find the Bezier curve which starts at (x0, y0) = (20, 20) and ends at (x_3, y_3) = (40,10) and has control points given as (x_1, y_1) = (0, 10) and (x_2, y_2) = (30, -30) 10
(b) What is the significance of modeling in virtual reality? Explain any modeling technique used in virtual reality. 10

6. Write short note on (any **four**) 20
(a) Fractals
(b) Projections
(c) Aliasing and anti- aliasing techniques
(d) B- spline curve
(e) Application of Virtual reality