EX/IT/T/215/2019

B.E. INFORMATION TECHNOLOGY SECOND YEAR FIRST SEMESTER – 2019

(2nd Year; 1st Semester)

Subject: Computer Graphics

Time: Three hours **Full Marks: 100**

CO1 [20]	A) What is raster representation? (5) B) Briefly describe how a pixel is generated in (1) CRT (2) LED (3) LCD (3+3+3) C) Write mechanisms by which an image of the face of a person can be made (i) distorted (ii) looking slender (iii) looking sharper? Give reasons for your answer. (2+2+2)
CO2 [20]	A) Describe Bresenham Line Drawing Algorithm for drawing $5x + 3y + 6 = 0$. Discuss aliasing effect on this (10 +5) OR Derive the transformation matrix for rotation about $2x+3y = 0$. (15) B) Write a parametric representation of a curve. (5)
CO3 [25]	A. a) Prove that reflection about an axis (X or Y) can be done with only translation. Hence write the required transformation matrix. (7) b) Define Homogeneous Coordinate system? Why this is important in Computer Graphics? (4 + 4) c) Write a line clipping algorithm when the view port is a rectangle. (10) OR B. a) Show that scaling and rotation by angle θ, about origin, are commutative, when, $\theta = n\pi$ or $Sy = Sx$.(7) b) What are convex and concave polygons? Maximum how many points a straight line can cut a (i) convex polygon and (ii) concave polygon. (Justify. Do not consider the case when the line coincides with some edge.) (4+4+5+5)
CO4 [25]	A) a) Derive the transformation matrix for perspective projection w.r.t center of projection (-5,8). (15) b) Prove with mathematical argument that "you cannot see your own ears'' (do not consider mirror image). (5) c) Which projection is better to locate hidden surface: i. parallel projection, ii. perspective projection. Justify. (5) OR B) a) How does the basic scan-line method determine which surfaces are hidden. (10) b) What are the limitations of Painter's Algorithm? (5) c) How subdivision algorithm helps to reduce computations. (5) d) What is the maximum number of objects that can be presented by using the Z-buffer algorithm? Justify. (2) e) Describe an real life example (with mathematical elastration) where you find a vanishing point. (3)
CO5 [10]	A. Derive CMY color model from RGB color model. (10)

CO1: Explain the applications of Computer Graphics and Describe the display mechanism and input-output devices of Computer Graphics. (K3)

CO2: Illustrate various curve representation and drawing algorithms. (K2)

CO3: Compute 2D transformation and apply viewing algorithms in typical cases. (K3)

CO4: Explain viewing and representation of 3D images. (K2)

CO5: Describe color representation and rendering mechanisms of images. (K2)