

| Exam.       | New Back (2066 & Later Batch) |            |        |
|-------------|-------------------------------|------------|--------|
| Level       | BE                            | Full Marks | 80     |
| Programme   | BEX, BCT                      | Pass Marks | 32     |
| Year / Part | III / I                       | Time       | 3 hrs. |

**Subject: - Computer Graphics (EX603)**

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt All questions.
- ✓ The figures in the margin indicate Full Marks.
- ✓ Assume suitable data if necessary.

1. If we want to resize at  $1024 \times 768$  image to one that is 640 pixels wide with the same aspect ratio, what would be the height of the resized image? [4]
2. What is the advantage of Bresenham's algorithm over DDA algorithm for line drawing? Use Bresenham's algorithm to scan convert a straight line connecting the end points (20, 10) and (30, 18) [3+7]
3. Derive the 2D transformation matrix for rotating an object by angle  $\theta$  about a pivot point  $(x_r, y_r)$  [8]
4. Obtain perspective projection co-ordinates for the pyramid with vertices of base (15, 15, 10), (20, 20, 10), (25, 15, 10), (20, 10, 10) and apex (20, 15, 20); given that  $Z_{prp} = 20$  and  $Z_{vp} = 0$ . [8]
5. What is the difference between an interpolation spline and an approximate spline curve? Explain how to satisfy  $C^0$  and  $C^1$  continuity conditions when joining two Bezier curve sections together. [2+6]
6. Describe with illustrate how polygon tables may be used to organize geometric data for polygon surfaces boundary representation. [8]
7. How can you calculate depth of pixels and how it can be used to detect visible surface in depth buffer method? Explain. [8]
8. Derive the total diffuse reflection equation, including ambient light. [8]
9. Explain the Phong Shading model for polygon-rendering. [6]
10. Explain open GL with suitable examples. [6]
11. Write short notes on; [3×2]
  - a) 2D translation
  - b) Application of 3D transformation
  - c) Difference of image space and object space techniques