MCA-301

June - Examination 2026
MCA 1st/3rd Year Examination
Computer Graphics
Paper : MCA-301

[*Time: **3** Hours*] [*Maximum Marks: **80***]

Note :- The question paper is divided into three Sections A, B and C. Write answers as per the given instructions in each section.

Section-A 8×2=16
(Very Short Answer Type Questions)

Note :- Answer **all** questions. As per the nature of the question delimit your answer in one word, one sentence or maximum up to **30** words. Each question carries **2** marks.

1. (i) List any four standard graphical input devices used in modern computer graphics.
   (ii) What is meant by a Composite Transformation? When is it specifically used?
   (iii) Briefly discuss the core differences between TIFF and JPEG image file formats.
   (iv) Explain screen and world coordinates with examples.
   (v) List any two image Compression Techniques.
   (vi) State the concept of Interpolation.
   (vii) What is Pixel?
   (viii) Briefly distinguish between a 'Window' and a 'Viewport' in a 2D viewing pipeline.

Section-B 4×8=32
(Short Answer Type Questions)

Note :- Answer **any four** questions. You have to delimit your each answer maximum up to **200** words. Each question carries **8** marks.

2. Explain the Bresenham's line generation algorithm. Compare its computational efficiency with the DDA (Digital Differential Analyzer) line generation algorithm.
3. Detail the working of the scan-line polygon fill algorithm. Distinguish its approach from the traditional flood-fill algorithm.
4. Differentiate between Parallel Projection and Perspective Projection. Support your comparison with a suitable conceptual diagram.
5. Derive the 4×4 homogeneous transformation matrix for scaling an object in 3D space relative to a fixed point $P(x_f, y_f, z_f)$ rather than the origin.

6. Explain the Beam Penetration and Shadow Mask strategies in CRT monitors.
7. Explain the YIQ color model. Discuss its primary components and why it was historically utilized in standard broadcast television.
8. Write a midpoint circle drawing algorithm. Apply this algorithm to find pixel coordinates of the circular boundary only for the first quadrant, whose radius is 4 units.
9. Differentiate between Forward Kinematics and Inverse Kinematics in the context of computer animation and articulated figures.

Section-C

2×16=32

(Long Answer Type Questions)

Note :- Answer **any two** questions. You have to delimit your each answer maximum up to **500** words. Each question carries **16** marks.

10. What is the use of Animation? Explain different types of animations and also explain the different applications of multimedia.
11. Solve the following two transformation problems -
    (a) Find the final coordinates of a triangle ABC defined by A(0,0), B(1,1) and C(5,2), when subjected to an anticlockwise rotation of 45º strictly about the origin.
    (b) Outline the mathematical matrix steps required to find the reflection of a point P(5,9) about the arbitrary linear equation $y = x + 5$.
12. Explain depth buffer algorithm to display visible surfaces of a given polyhedron. Also explain the relation in object and storage requirement of the depth buffer.
13. Detail the Ray Casting algorithm used for hidden surface removal. Mathematically explain how this algorithm determines which plane or surface is visible from the view plane along the line of sight?
