COMPUTER GRAPHICS & MULTIMEDIA
(CSEN 3131)

Time Allotted : 2½ hrs   **Full Marks : 60**

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and
any 4 (four) from Group B to E, taking one from each group.

Candidates are required to give answer in their own words as far as practicable.

Group – A

1.   Answer any twelve: **12 × 1 = 12**

Choose the correct alternative for the following

(i)   Two consecutive scaling transformation t1 and t2 are
        (a) Additive   (b) Subtractive
        (c) Multiplicative   (d) None of these.

(ii)   The animator creates the illusion of smooth motion by
        (a) onion skinning   (b) masking
        (c) tweening   (d) color cycling.

(iii)   Consider the point (2, 5) in the XY plane. Assume that the point is rotated counter-clockwise in the plane by 90 degrees about the origin. What are the coordinates of the resulting point?
        (a) (-2, 5)   (b) (2,-5)   (c) (-2,-5)   (d) (-5,-2).

(iv)   In Cohen-Sutherland line clipping, a line with end-point codes 0000 and 0100 is
        (a) partially visible   (b) completely visible
        (c) completely invisible   (d) cannot be determined.

(v)   The Bezier curve obtained from four control points is called a
        (a) Square Bezier curve   (b) Cubic Bezier curve
        (c) Hectare Bezier curve   (d) Rectangle Bezier curve.

(vi)   In which type of compression I-frame is used?
        (a) JPEG   (b) MPEG   (c) GIF   (d) None of these.

(vii)   The format for storing digital audio in multimedia application is
        (a) JPEG   (b) MPEG   (c) WAV   (d) BMP.

(viii) z buffer algorithm is used for
        (a) Frame buffer removal   (b) Rendering
        (c) Animation   (d) Hidden line removal.

(ix)   In MIDI standards, how many channels are specified?
        (a) 24   (b) 16   (c) 32   (d) None of these.

(x) Aliasing means
(a) Rendering effect (b) shading effect
(c) Staircase effect (d) cueing effect.

Fill in the blanks with the correct word

(xi) The full for of MPEG is _____.

(xii) If in CMY color model, blue is represented by 110, then green is represented by _____.

(xiii) LCD stands for _____.

(xiv) The 2D translation matrix is _____.

(xv) In RGB color model B stands for _____.

Group - B

2. (a) Derive mid point circle drawing algorithm. *[(CO1)(Analyse/IOCQ)]*
   (b) Using mid point circle drawing algorithm draw a circle with radius 8 units along the circle octant in the 1st quadrant from x=0 to x=y. *[(CO1)(Apply/IOCQ)]*
   6 + 6 = 12

3. (a) Explain the Scan-line polygon fill algorithm. *[(CO1)(Understand/LOCQ)]*
   (b) Describe how Scan line polygon fill algorithm is different from boundary fill algorithm. *[(CO1)(Apply/IOCQ)]*
   (c) How to check if a given point lies inside or outside of a polygon?
   [(CO1)(Understand/LOCQ)]
   4 + 4 + 4 = 12

Group - C

4. (a) Why homogeneous coordinates are used for transformations in computer graphics? *[(CO2)(Understand/LOCQ)]*
   (b) Derive the transformation matrix for rotation about any pivot point using homogeneous coordinates. *[(CO2)(Evaluate/HOCQ)]*
   (c) Prove or disprove that two successive translations are additive.
   [(CO2)(Understand/LOCQ)]
   3 + 6 + 3 = 12

5. (a) Discuss briefly about Cohen-Sutherland algorithm for line clipping.
   [(CO4)(Remember /LOCQ)]
   (b) Determine 3D transformation matrix to scale an object with respect to a fixed point. *[(CO3) (Understand/IOCQ)]*
   7 + 5 = 12

Group - D

6. (a) Compare between Bezier Curve and B-Spline Curve. *[(CO5)(Analyse/IOCQ)]*
   (b) Write the equation of quadratic Bezier curve. *[(CO5)(Analyse/IOCQ)]*

(c)   Explain the term control points. *[(CO5)(Remember/LOCQ)]*

(d)   What are the properties of a B-spline curve? *[(CO5)(Remember/LOCQ)]*

4 + 3 + 2 + 3 = 12

7.   (a)   What do you mean by hidden surface removal? *[(CO5)(Remember/LOCQ)]*

(b)   Write down the z buffer algorithm. *[(CO5)(Remember/LOCQ)]*

(c)   What is the difference between local and global illumination? *[(CO5)(Analyse/IOCQ)]*

(d)   How diffuse light is calculated? *[(CO5)(Analyse/IOCQ)]*

2 + 5 + 2 + 3 = 12

Group - E

8.   (a)   Compare analogue and digital video. *[(CO6)(Understand/LOCQ)]*

(b)   Explain basic steps of JPEG and MPEG. *[(CO6)(Remember/LOCQ)]*

(c)   What do you mean by key frame and tweening in case of animation?

[(CO6)(Understand /IOCQ)]

4 + (3 + 3) + 2 = 12

9.   Write a short note on any three of the following:

(i)   MIDI

(ii)   JPEG

(iii) Sampling and Quantization

(iv) 3D animation. *[(CO6)(Understand /LOCQ)]*

(4 + 4 + 4) = 12

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Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	57.29	36.46	6.25

Course Outcome (CO):

After completion of the course, students will be able to:

CSEN3131.1.   Compare and study effectiveness of different line and circle drawing algorithms on Raster scan display.

CSEN3131.2.   Design two-dimensional graphics and apply two dimensional transformations.

CSEN3131.3.   Design three-dimensional graphics and apply three dimensional transformations.

CSEN3131.4.   Apply Illumination and color models and apply clipping techniques to graphics.

CSEN3131.5.   Demonstrate activities and applications of device dependent and independent color models, image representation techniques (raster and random graphics).

CSEN3131.6.   Understood Different types of Multimedia File Format and demonstrate image, video, text analysis tools and techniques.

LOCQ: Lower Order Cognitive Question; IOCQ: Intermediate Order Cognitive Question; HOCQ: Higher Order Cognitive Question.