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ANNA UNIVERSITY (UNIVERSITY DEPARTMENTS)

B.E. /B.Tech / B. Arch (Full Time) - END SEMESTER EXAMINATIONS, APR / MAY 2025

INFORMATION TECHNOLOGY
VI Semester
IT 5008- COMPUTER GRAPHICS
(Regulation2019)

Time:3hrs Max.Marks: 100

CO1	To know the mathematical basis of computer graphics.
CO2	To train the students to acquire knowledge in Computer Graphics modeling, animation, and rendering.
CO3	To create graphical applications.
CO4	To acquire knowledge about tools and technologies related to graphics.
CO5	To create visually realistic animations.

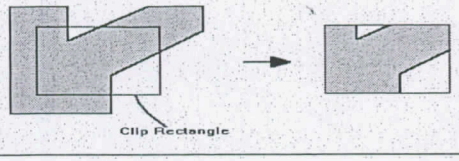
BL – Bloom's Taxonomy Levels
(L1-Remembering, L2-Understanding, L3-Applying, L4-Analysing, L5-Evaluating, L6-Creating)

PART- A(10x2=20Marks)
(Answer all Questions)

Q.No.	Questions	Marks	CO	BL
1	Digitize the line A(3,3)B(5,6) using DDA line drawing algorithm.	2	CO1	L3
2	An object is defined with respect to a coordinate system whose units are measured in metres. If an observers coordinate system uses centimeter as basic unit. what is the coordinate transformation used to describe object coordinate in the observers coordinate system?	2	CO1	L4
3	Show that uniform scaling and a rotation form a commutative pair of operations.	2	CO2	L3
4	Demonstrate local scaling taking scaling factors along x, y, z axes as 2, 3 and 1 for a unit cube with one vertex at origin.	2	CO2	L3
5	How is flat shading applied over objects?	2	CO5	L2
6	Compare Orthographic and oblique projection with an example for each.	2	CO5	L3
7	Draw the diagrammatic representation of HSV colour model	2	CO4	L1
8	Apply Decasteliau algorithm to find the Bezier curve for the given Bernstein polynomial functions $A(u)=(1-u)P_0+uP_1$ and $B(u)=(1-u)P_1+uP_2$	2	CO1	L3
9	Define tweening.	2	CO4	L1
10	Calculate the fractal dimension when the number of sub units = 4 and scaling factor=2/3	2	CO1	L3

PART- B(5x 13=65Marks)
(Restrict to a maximum of 2 subdivisions)

Q.No.	Questions	Marks	CO	BL
11 (a)(i)	Digitize an ellipse with centre (2,2) and $r_x=5$ and $r_y=2$ units.	6	CO1	L2
(ii)	Use Sutherland Hodgman polygon clipping algorithm to clip the polygon shown in the figure below against the rectangular window to obtain the result as shown in the figure.	7	CO2	L3

				
	OR			
11 (b) (i)	Derive the window to viewport transformation matrix.	**6**	CO1	L2
(ii)	Digitize a circle with centre (3,3) and radius 8 units using Mid point circle drawing algorithm.	**7**	CO2	L3
12 (a)(i)	Given a unit cube with one corner at (0,0,0) and other corner at (1,1,1). Calculate the new coordinates of the cube after applying translation of (3,3,3) and then rotating the cube at an angle of 45 degrees about z axis.	**6**	CO2	L3
(ii)	Show that $R_\alpha . R_\beta = R_\beta . R_\alpha = R_{\alpha+\beta}$ Where R_x represents rotation about an angle x	**7**	CO2	L3
	OR			
12 (b)(i)	Clip the line A(6,7) B(7,1) against a window P (2,2) Q(8,2) R(8,6) S(2,6) using any line clipping algorithm.	**6**	CO2	L3
(ii)	Given a Triangle ABC with points A(2,2), B(4,2) and C(3,3). Apply translation parameters of (2,2) and then rotation of 45 degrees. Calculate the final end points of the triangle.	**7**	CO2	L3
13 (a)(i)	Find out the perspective projection of a pint P(x,y,z) onto the view plane with Z_{vp} as the distance of the view plane in the Z axis and Z_{prp} as the projection reference point on the Z axis.	**6**	CO5	L3
(ii)	Discuss about the various shading models in detail and justify the best model.	**7**	CO4	L1
	OR			
13 (b)(i)	Given a triangular object. Derive the mappings needed to morph the given object into a rectangular object using edge equalization and vertex equalization techniques.	**6**	CO5	L3
(ii)	How will you find the hidden surfaces in three dimensional scenes? Explain in detail.	**7**	CO4	L1
14 (a)(i)	Write down the fundamental formula for the B spline function. Also generate the linear B spline curve for order=2 and k=0	**6**	CO4	L3
(ii)	Calculate the angle between two vectors (2,3) and(-3,1) and check whether the angle is acute, obtuse or right angle.	**7**	CO1	L3
	OR			
14 (b)(i)	How will you find the Complementary colours, Dominant frequency and Colour gamuts using CIE Chromaticity diagram. Discuss with an example for each.	**6**	CO4	L3
(ii)	How far is a point C=(6,4) from the line that passes through (1,1) and (4,9).	**7**	CO1	L3
15 (a)	Discuss on the different types of fractals in detail with their applications.	**13**	CO5	L2
	OR			
15 (b)	Discuss on the principles of animation in detail with an example for each	**13**	CO5	L2

PART- C(1x 15=15Marks)

(Q.No.16 is compulsory)

Q.No.	Questions	Marks	CO	BL
16.	You are a graphic designer and you are allocated the task of creating an educational AR/VR application.		CO3	L6
	(i) How will you design the three dimensional objects? Explain.	**4**		
	(ii) How will you add visual realism to the designed scenes? Explain.	**4**		
	(iii) How will you create augmented reality and virtual reality objects for the above scenes? Explain.	**4**		
	(iv) How will you author the above application? Explain.	**3**		