Solution	Marks
Q.2 a. List out the devices available for data input on graphics workstations. Describe three of the input devices in detail.	**10**

Answer: Page No. 57-62
Award two marks for listing at least six input devices. Award a total of eight marks for detailed description of the devices with three marks for each description (of the device).

b. Draw the architecture of a simple random scan system and explain its working.   **6**

 Answer: Page No. 41, 42
 Award two marks for the block diagram and four marks for detailed explanation of the block diagram.

**Q.3   a. Distinguish between Bresenham's line drawing algorithm and DDA
          algorithm.**   **4**

 Answer: Page No. 94-96
Give one marks for each item of comparison for a total of (maximum) 4 marks.

**b.   Find out all the intermediate points of a line connecting the end points (1,2) and
(15,10) using Bresenham's line drawing algorithm.**   **12**

 Answer: Page No.97- 98
        dx=14 ,   dy= 8,   Po= 2 x 8 -14 = 2
        2 dy= 16, 2 dy – 2 dx = -12
 The initial point is (1,2). The other points are obtained from the table below.

K	Pk	next point
0	2	2,3
1	-10	3,3
2	6	4,4
3	-6	5,4
4	10	6,5
5	-2	7,5
6	14	8,6
7	2	9,7
8	-10	10,7
9	6	11,8
10	-6	12,8
11	10	13,9
12	-2	14,10
13	14	15,10

 Award four marks for initial calculations. Award eight marks for correct tabulation.
 Reduce marks based on the errors ,if any.

Q.4   a. Briefly discuss the following line attributes   **8**
          (i) line width   (ii) line style

Answer: Page No. 214-125 *Explanation of different line types like dashed line, dotted line and dotted dashed line award four marks. Explanation of different line widths including closing the ends termination of lines crossing at an angle –award four marks.* **b.Briefly explain antialiasing. Also discuss the various antialiasing networks.** **Answer:** Page No. 183-186 *Area fill attributes with colours award four marks. Explanation of different pattern fills awards four marks.*	**8**
Q.5 Derive the equation for two dimensional rotation by an angle theta, with a reference point (xr,yr). If a straight line connecting two points (2,3) and (6,7) is rotated by an angle of 30 degrees with (5,5) as a reference point, find the end points of the rotated line.	**16**

Answer: Page No. 242
Award two marks for specifying general pivot point rotation. Awards 6 marks for obtaining the matrix of transformation.

$$\begin{pmatrix} Xn \\ yn \\ 1 \end{pmatrix} = \begin{pmatrix} \cos\theta & -\sin\theta & xr(1-\cos\theta)+yr\sin\theta \\ \sin\theta & \cos\theta & xr(1-\cos\theta)+yr\sin\theta \\ 0 & 1 & 1 \end{pmatrix} * \begin{pmatrix} x \\ y \\ 1 \end{pmatrix}$$

The solution to numerical problem is obtained from:
Xn= x cos θ - y sin θ + xr (1-cos θ) + yr sin θ
Yn=x sin θ +y cos θ + yr (1- cos θ) – yr sin θ
The calculated values are obtained for the two end points separately using
    x,y=2,3   and   xr,yr= 5,5   and   θ =30 degrees
    x,y= 6,7   and   xr,yr=5,5   and   θ =30 degrees
After simplification the end points of the line are (3.402,1.768) and (4.866,7.232). For correct calculations award 8 marks.

Q.6a. Explain in detail Cohen Sutherland algorithm for clipping lines against window	**10**

Answer: Page No. 317-321
Award three marks for identifying the region codes for the eight regions outside the window. Award two marks for explaining swap codes function, awards two marks for explaining swap point function and awards three marks for explaining clip line function.

b.Without using any algorithm , find the clipped part of the straight line joining points (2, -1) and (8,2) against a window with the diagonal points (0,0) and (6,3).	**6**

Answer :
The equation of the straight line joining the points (2,-1) and (8,2) is y=0.5 x - 2
Find the intersection of this line with x axis and x=6 line. The values will be line is
         intersecting x axis at x=4 and x=6 line at y=1.   For correct calculation
         award 6 marks. Deduct marks if there are any errors.

Q.7   a. Describe briefly the back face detection algorithm, which is one of the visible surface detection algorithms.   **8**

Answer: Page No. 530
Award marks based on the description

b.Write brief notes on surface lighting effects.   **8**

Answer: Page No. 564,567-8
Award full marks if the details of calculation of light intensity by vector methods is explained. Otherwise awards marks based on the shortcomings.

Q.8   a. Explain the six logical classifications used for input devices. Explain the functions to provide input to graphic devices and the modes in which they are operated.   **10**

Answer: Page No. 670-2/673-4
Award three marks for specifying locator, string, valuator, choice and pick devices. Awards 7 marks for explaining request mode, sample mode, and event mode.

b. Briefly explain what do you understand by virtual reality.   **6**

Answer : Page No. 679
Based on the quality of description of virtual reality awards not exceeding six.

Q.9   a. Explain the terms computer animation languages, key frame systems and motion specifications.   **8**

Answer: Page No. 738,739,745
Awards marks based on the details of calculation of in between frames and other details.

b.Write brief note on following:
         (i) Diffuse refection   (ii) Specular reflection

Answer: Page No. 762-63   **8**
Based on the description of hierarchical modeling award marks not exceeding 8.

TEXT BOOK

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