

# Sardar Vallabhbhai Patel Institute of Technology

BE- Semester V-Remedial Exam 2017

Subject Name: Computer Graphics (2151603)

Date: 3/10/17

Time: 2:30 pm to 4.00 pm

Total Marks: 40

Instructions:

1. Attempt all questions.
2. Make suitable assumptions whenever necessary.
3. Figures to the right indicate full marks.

- Q-1 A Write a short note on Cathode Ray Tube. 04
- Q-1 B Attempt any Two 06
1. Flat panel Display
  2. Software Standard
  3. Bit map method of character generation
- Q-1 C Derive all necessary formulas for Mid point circle algorithm. 04
- Q-1 D Attempt any two. 06
1. Draw line from (18,20) to (22,23) using Bresenham line drawing algorithm.
  2. Boundary fill algorithm using pixel span
  3. What is aliasing? Enlist anti-aliasing methods. And explain any one in detail.
- Q-2 A What are the basic 2D transformations? Describe each with their matrix representation. 04
- OR
- A Find the matrix that represents rotation of an object by 90 degree (a) about the origin. (b) What are the new co-ordinates of the point P(-2,4) after the rotation? 04
- Q-2 B Explain 2D rotation about a pivot point with diagram and matrix representation. 06
- OR
- B Explain 2D scaling about a fixed point with diagram and matrix representation. 06
- Q-2 C What do you mean by projection? Also explain various types of projection and compare between parallel and perspective projection? 04
- OR
- C Translate the square ABCD whose co-ordinate are A(0,0), B(3,0), C(3,3) and D(0,3) by 2 units in both directions and then scale it by 1.5 units in x direction and 0.5 units in y-direction. 04
- Q-2 D Find the instance transformation which places a half -size copy of square A(0,0), B(2,0), C(2,2) and D(0,2) defined in a master co-ordinate system into a world co-ordinate system in such a way that the center of the square is at (-3,-3) in the world co-ordinate system. 06
- OR
- D Prove that the multiplication of composite transformation matrices (Any Two) 06
- (a) Two successive rotations.
  - (b) Two successive translations.
  - (c) Two successive scaling

\*\*\*\*\*;\*\*\* Best of luck \*\*\*\*\*

Q=2

Ans

$$\begin{bmatrix} \cos 90^\circ & -\sin 90^\circ \\ \sin 90^\circ & \cos 90^\circ \end{bmatrix} = \begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}$$

(a)

$$\begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix} \begin{bmatrix} -2 \\ 4 \end{bmatrix} = \begin{bmatrix} -4 \\ -2 \end{bmatrix}$$

(b)

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 0 & 0 & 1 \\ 3 & 0 & 1 \\ 0 & 3 & 1 \end{bmatrix} = \begin{bmatrix} 2 & 2 & 1 \\ 3 & 2 & 1 \\ 0 & 5 & 2 \end{bmatrix}$$
$$\begin{bmatrix} 2 & 2 & 1 \\ 3 & 2 & 1 \\ 0 & 5 & 2 \end{bmatrix} \begin{bmatrix} 0.5 & 0 & 0 \\ 0 & 0.5 & 0 \\ 0 & 0 & 1 \end{bmatrix} = \begin{bmatrix} 1 & 1 & 0.5 \\ 1.5 & 1 & 0.5 \\ 0 & 2.5 & 2 \end{bmatrix}$$

1, 1>  
1, 3>  
3, 3>  
3, 1>

center is at (2,2) is reduced to half of its size, with centre still remaining at (2,2). The coordinate of square ABCD are A(0,0), B(0,4), C(4,4) and D(4,0). Find the co-ordinate of new square.

OR

① (-2, 2) ② (-2, 2)  
(-2, 4) 05 (-4, 2)  
(-4, 4) (-4, 4)

B A triangle is define by 2 4 4  
2 2 4

Find the transformed co-ordinates after the following transformation

(1)  $90^\circ$  rotation about origin. (2) reflection about line  $y = -x$ .

Q-2

C Show that the composition of two rotations is additive by concatenating the matrix representations for  $R(\theta_1)$  and  $R(\theta_2)$  to obtain  $R(\theta_1) R(\theta_2) = R(\theta_1 + \theta_2)$ .

05

OR

C What do you mean by projection? Also explain various types of projection and compare between parallel and perspective projection?

05

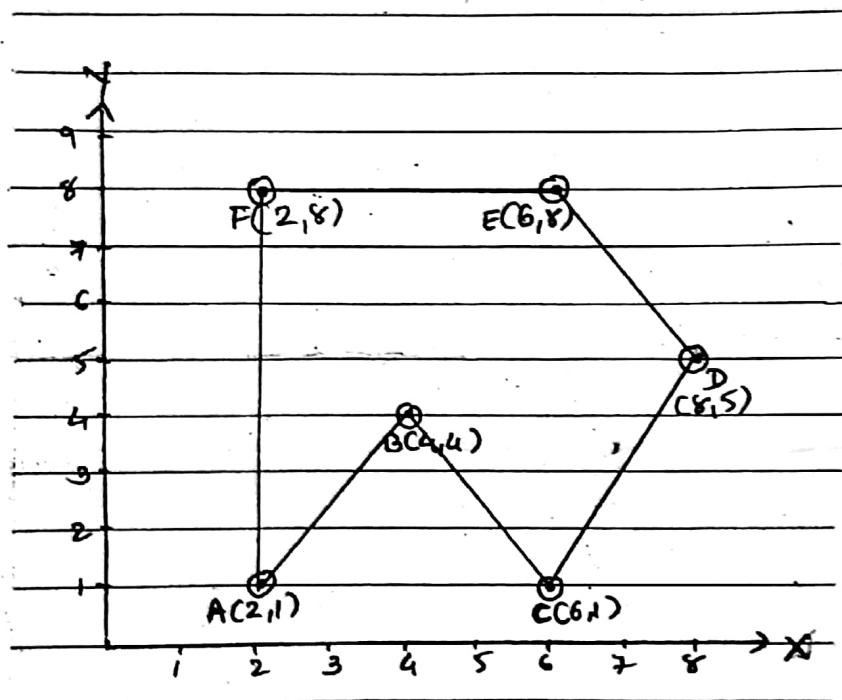


Fig. 1-A

\*\*\*\*\* Best of luck \*\*\*\*\*

# Sardar Vallabhbhai Patel Institute of Technology

BE- Semester V-Mid Semester Exam 2017

Subject Name: Computer Graphics (2151603)

Date: 7/09/17

Time: 12:30 pm to 2.00 pm

Total Marks:

40

Instructions:

1. Attempt all questions.
2. Make suitable assumptions whenever necessary.
3. Figures to the right indicate full marks.

Q-1 A Answer the following.

07

1. \_\_\_\_\_ is the ratio of horizontal points to vertical points necessary to produce equal length lines in both directions.
2. Define horizontal retrace and vertical retrace
3. Match the following

Part A

Part B

A. Plasma panel

i) Polarizer

B. DVST

ii) Zinc sulfide

C. LCD

iii) Dielectric mesh

D. Thin film electroluminescent

iv) Neon gas

4. The transformation in which the dimension of an object are changed relative to a specified fixed point is called \_\_\_\_\_
5. Reflection of a point about x-axis, followed by a counter-clockwise rotation of  $90^\circ$ , is equivalent to reflection about which line?
6. Which of the following allow for 8 mirror images?  
a) Parabola b) Ellipse c) Hyperbola d) Circle
7. The amount of light emitted by the phosphor coating depends on the?  
a) Number of electrons striking the screen  
b) Speed of electrons striking the screen  
c) Distance from the cathode to the screen  
d) Type of phosphor

Q-1 B Attempt any three.

09

1. Starburst method of character generation.
2. Merit and demerit of DVST
3. Inside outside test
4. 8-connected flood fill algorithm

Q-1 C Derive all necessary formulas for Bresenham line drawing algorithm and determine all the pixels to draw a line from (0,0) to (10,6).

04

D Briefly explain scan line polygon filling algorithm. Using the algorithm fill polygon given in fig 1\_A.

05

OR

D Derive formulas for Midpoint ellipse generation algorithm.

05

Q-2 A Find the matrix that represents rotation of an object by  $45^\circ$  (a) about the origin.

05

(b) What are the new co-ordinates of the point P(2,-4) after the rotation?

OR

A The pyramid defined by the co-ordinates A(0,0,0), B(1,0,0), C(0,1,0) and D(0,0,1) is rotated  $90^\circ$  about the L that has direction vector  $V=i+j+k$  and passing through the origin. Find the co-ordinates of the rotated figure.

05

Q-2 B Find the transformation matrix that transforms the square ABCD whose

05

$$\textcircled{a} \begin{bmatrix} \cos 45^\circ & -\sin 45^\circ \\ \sin 45^\circ & \cos 45^\circ \end{bmatrix} \quad \textcircled{b} \begin{bmatrix} \sqrt{2} + 2\sqrt{2} & \sqrt{2} - 2\sqrt{2} \\ \sqrt{2} - 2\sqrt{2} & \sqrt{2} + 2\sqrt{2} \end{bmatrix}$$

$$A' = (0, 0, 0) \quad B' = \left(\frac{2}{3}, \frac{1+\sqrt{3}}{3}, \frac{1-\sqrt{3}}{3}\right) \quad C' = \left(\frac{1-\sqrt{3}}{3}, \frac{1}{3}, \frac{1+\sqrt{3}}{3}\right) \quad D' = \left(\frac{1+\sqrt{3}}{3}, \frac{1-\sqrt{3}}{3}, \frac{1}{3}\right)$$