



Name : .....  
Roll No. : .....  
Invigilator's Signature : .....

**CS/MCA/SEM-4/MCA-402/2013**

**2013**

**GRAPHICS AND MULTIMEDIA**

*Time Allotted : 3 Hours*

*Full Marks : 70*

*The figures in the margin indicate full marks.*

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

**GROUP - A**

**( Multiple Choice Type Questions )**

1. Choose the correct alternatives for the following :  $10 \times 1 = 10$ 
  - i) The resolution (in pixels per inch) of a 4 inch  $\times$  3 inch image that covers  $640 \times 480$  pixels is
    - a) 640
    - b) 480
    - c) 12
    - d) 160.
  - ii) In direct coding of RGB values with 4-bits per primary colour, how many colours are possible for each pixel ?
    - a) 1024
    - b) 2048
    - c) 4096
    - d) 256.



- iii) On compressing a string using Run Length Encoding, it becomes 432462. What is the original (uncompressed) string ?
  - a) 333344222222                      b) 444222266
  - c) 432462                                d) either (a) or (b).
- iv) If  $P_0, P_1, P_2$  be the control points (in sequential ordering) then the Bezier curve must pass through
  - a)  $P_0$  and  $P_1$
  - b)  $P_1$  and  $P_2$
  - c)  $P_2$  and  $P_0$
  - d) points close to  $P_0, P_1$  and  $P_2$ .
- v) The maximum numbers of colours supported by GIF and JPEG (in that order only) are
  - a) 256 and 4096
  - b) 256 and "True Colours (16 million)"
  - c) "True Colours (16 million)" and 256
  - d) it depends.
- vi) Which one of the following is true about Huffman coding ?
  - a) The length of all the coded characters in it is the same.
  - b) It does not need information about the frequency of occurrence of the characters.
  - c) It assigns the shortest code to the most frequently occurring character.
  - d) None is true.





- x) The second derivatives of the Bezier curve at the initial and final points depend on
- a) the nearest two polygon vertices
  - b) the nearest three polygon vertices
  - c) the nearest four polygon vertices
  - d) none of these.

**GROUP – B**

**( Short Answer Type Questions )**

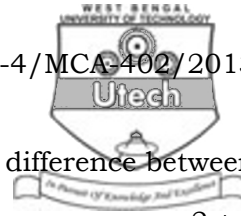
Answer any *three* of the following.  $3 \times 5 = 15$

2. Consider two raster systems with the resolutions of  $640 \times 480$  and  $1280 \times 1024$ .

How many pixels could be accessed per second in each of these systems by a display controller that refreshes the screen at a rate of 60 frames per second ?

What is the access time per pixel in each system ?

3. What do you mean by 'symmetry of points' in a circle ? How does it help in drawing a circle through an algorithm ?  $2 + 3$
4. Derive the 3-D transformation matrix for rotating an object by an angle in a direction of YZ plane.



5. What do you mean by spline ? What is the difference between Bezier curve and *b*-spline curve ? 2 + 3
6. Define Multimedia. Give the absolute minimum requirements of MPC level 3 specification. Differentiate lossy compression from lossless compression providing suitable examples. 3 + 2

**GROUP – C**

**( Long Answer Type Questions )**

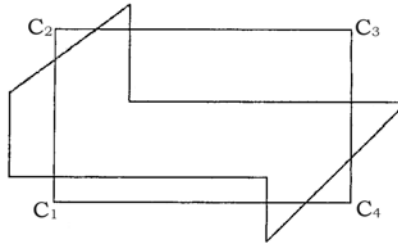
Answer any *three* of the following. 3 × 15 = 45

7. a) What is filling ?
- b) Find the normalization transformation for window to view port which uses the rectangle whose lower left corner (2, 2) and upper right corner (6, 10) as window and the view port that has lower left corner at (0,0) and upper right corner at (1,1).
- c) Find the vanishing point of parallel lines which are parallel with the line given  $P(-5,4,2)$ ,  $Q(5,-6,18)$ .

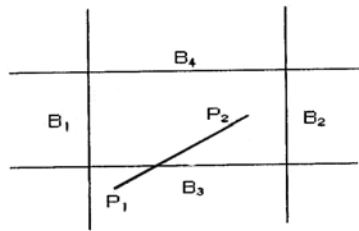
4 + 6 + 5



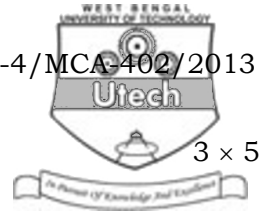
8. a) Define rotation and scaling.  
 b) Clip the polygon with respect to the rectangle  $C_1C_2C_3C_4$  step-by-step.



- c) Perform a  $45^\circ$  rotation of a triangle  $A(0,0)$ ,  $B(1,1)$ ,  $C(5,2)$  about the origin and about  $(-1, -1)$ . 4 + 6 + 5
9. a) Reflect the diamond shape polygon whose vertices are  $A(-1,0)$ ,  $B(0,-2)$ ,  $C(1,0)$ ,  $D(0,2)$  about (i)  $Y = 2$ , (ii)  $X = 2$ , (iii)  $Y = X + 2$ .  
 b) Clip  $P_1P_2$  line segment with respect to  $B_1B_2B_3B_4$ .



- c) Derive the equation of parallel projection onto the  $XY$  plane in the direction of projection  $v = ai + bj + ck$ . 5 + 6 + 4
10. a) What is projection ? Describe orthogonal projection.  
 b) Determine the parametric representation of the line segment between position vectors  $P_1 (2,4)$  and  $P_2 (6,4)$ .  
 c) Compare Gouraud shading and Phong shading. 2 + 5 + 4 + 4



11. Write short notes on any *three* :

- a) MPEG file format
  - b) K-d Tree in multimedia data structure
  - c) JPEG compression
  - d) Sutherland-Hodgeman polygon clipping algorithm.
  - e) GKS.
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