

## AMIETE – IT (OLD SCHEME)

Code: AT14  
Time: 3 Hours

Subject: IMAGE PROCESSING & COMPUTER GRAPHICS  
Max. Marks: 100

**DECEMBER 2010**

**NOTE:** There are 9 Questions in all.

- Question 1 is compulsory and carries 20 marks. Answer to Q.1 must be written in the space provided for it in the answer book supplied and nowhere else.
- The answer sheet for the Q.1 will be collected by the invigilator after half an hour of the commencement of the examination.
- Out of the remaining EIGHT Questions answer any FIVE Questions. Each question carries 16 marks.
- Any required data not explicitly given, may be suitably assumed and stated.

**Q.1 Choose the correct or the best alternative in the following: (2×10)**

- a. Shadow masking is used in CRT to
- (A) Absorb misdirected electrons      (B) Illuminate only correct dot  
(C) None of the above                      (D) Both (A) & (B)
- b. Mid-point circle algorithm
- (A) Computes points upto first  $45^\circ$       (B) Also called Bresenham algorithm  
(C) Only A                                      (D) Both A and B
- c. A window with diagonal points at (1, 2) and (9, 8) clips a line between points (2, 3) and (12, 15) at
- (A) (3.45, 8)                                      (B) (3.645, 8)  
(C) (3.525, 9)                                      (D) (.6451, 9)
- d. While showing 3D scenes on 2D planes, the technique used in computer graphics is called
- (A) Projection                                      (B) Transformation  
(C) Animation                                      (D) Equalization
- e. After translating by unit 1, 0, 3 respectively along x-axis, y axis and z-axis a point (2, 3, -1) becomes
- (A) (3, -1, 2)                                      (B) (3, 3, 4)  
(C) (3, 3, 2)                                      (D) (2, 3, -1)
- f. Image acquisition refers to
- (A) Capturing of image in digital format.  
(B) Transforming one image format into native format.  
(C) A process of obtaining digital image from vision sensor.  
(D) To use device interface like camera.

- g. In histogram specification while image processing the following are/is true
- (A) It uses reference image and input image
  - (B) It compares the input image with reference image to produce some comparison study.
  - (C) It draws a bar chart only for mismatched pixel between input image and reference image.
  - (D) (A) and (B) only.
- h. Morphology refers to
- (A) Dilation and Erosion
  - (B) Erosion and Probe
  - (C) Probe and Dilation
  - (D) Erosion, Dilation and Probe
- i. JPEG is a compression technique that is
- (A) Always lossless
  - (B) Always lossy
  - (C) Only when converted from other format
  - (D) None of the above
- j. Which of the following is not used in image analysis?
- (A) Blob analysis
  - (B) Normalized Correlation
  - (C) Hough Transform
  - (D) Histogram

**Answer any FIVE Questions out of EIGHT Questions.  
Each question carries 16 marks.**

- Q.2** a. Describe the technical functionality of data gloves. Is it an input device? Justify your answer. (8)
- b. Outline the core points involved in drawing a line segment on computer display device to avoid jaggung and maintain smoothness of line. (8)
- Q.3** a. Determine the composite transformation matrix to rotate a point  $(x, y)$  around a point  $(2, 3)$  by an angle  $60^\circ$  in anticlockwise direction. (6)
- b. Derive a transformation matrix for perspective transformation for a point  $(x, y, z)$  where eye point is at  $(a, b, c)$ , centre point at  $(u, v, w)$  and assume any other missing parameters. (10)
- Q.4** a. Describe the Z-buffer algorithm for removal of hidden surface. (8)
- b. Derive a transformation matrix for first translating a point  $(x, y, z)$  to  $(3, -4, 6)$  and then rotating it about z axis by  $30^\circ$  in anticlockwise direction. (8)
- Q.5** a. Derive a matrix to transform a point  $(x, y, z)$  from world coordinate system to given viewing coordinate system. (8)
- b. Find points to colour while drawing a line segment between  $(2, 3)$  and  $(6, 8)$  using Bresenham line generation algorithm. (8)

- Q.6** a. Image compression is essentially required to optimize storage space. How does Huffman coding achieve this? Give an example to justify your answer. (8)
- b. What is frequency domain? Give mathematical formula involved in filtering image noises using DFT. (8)
- Q.7** a. Describe background symmetry algorithm for thresholding technique. (8)
- b. Image sharpening is used to highlight fine details in an image. Give the spatial filter that performs the task justifying that it performs the above task. (8)
- Q.8** a. What is CMYK colour model? Why is it called subtractive colour model instead of additive colour model? (8)
- b. Describe central difference edge detection method in image segmentation. (8)
- Q.9** Write short note on any **TWO** of the followings
- (i) Thresholding
  - (ii) Histogram matching
  - (iii) Homogeneous coordinate system
- (8, 8)