ROLL NO. _____

Code: AT14 Subject: IMAGE PROCESSING & COMPUTER GRAPHICS

AMIETE – IT (OLD SCHEME)

Time: 3 Hours **OCTOBER 2012** **Max. Marks: 100**

PLEASE WRITE YOUR ROLL NO. AT THE SPACE PROVIDED ON EACH PAGE IMMEDIATELY AFTER RECEIVING THE QUESTION PAPER.

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 45 minutes 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. A shadow-mask CRT has _____ phosphor color dots at each pixel position.

(A) three **(B)** two
(C) one **(D)** four

b. Removing elements that lie outside the viewing window is called _____.

(A) Transformation **(B)** Scaling
(C) Texturing **(D)** Coloring

c. Each pixel in a color image is a _____element vector.

(A) one **(B)** two
(C) three **(D)** none of these

d. The Fourier Transform of a product equals the _____ of the Fourier Transforms.

(A) convolution **(B)** revolution
(C) transformation **(D)** compression

e. Which of the following statement is not correct with reference to spatial filtering?

(A) It is the process of dividing the image into its constituent spatial frequencies, and selectively altering certain spatial frequencies to emphasize some image features.
(B) This technique increases the analyst's ability to discriminate detail.
(C) Low pass filters, Band pass filters and High pass filters are three types of spatial filters used in remote sensor data processing.
(D) None of these

f. _____ is concerned with the process of dividing an image into meaningful regions.

(A) Clipping **(B)** Toning
(C) Segmentation **(D)** Aliasing

g. $S = \begin{pmatrix} S_x & 0 \\ 0 & S_y \end{pmatrix}$ defines a _____

(A) scaling **(B)** revolution
(C) rotation **(D)** reflection

h. Segmentation can be used for _____

(A) object recognition
(B) occlusion boundary estimation within motion
(C) image compression
(D) all of these

i. Conformal transformation preserves _____.

(A) lines **(B)** distance
(C) angles **(D)** parallelism

j. When the projected lines intersect, the intersection is called a _____, since it corresponds to a point infinitely far away.

(A) vanishing point **(B)** intersection point
(C) infinite point **(D)** none of these

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

Q.2 a. Write brief note on:
(i) Digitizers
(ii) Touch Panels
(iii) Light Pens **(6)**

b. Illustrate simple DDA algorithm on the line joining points (0, 0) to (–8,–4) **(10)**

Q.3 a. Find the matrix that represents rotation of an object by 30° about the origin. What are the new coordinates of the point P (2,–4) after the rotation? **(6)**

b. Discuss Cohen Sutherland line clipping algorithm giving suitable example. **(10)**

Q.4 a. The pyramid defined by the coordinates A(0,0,0), B(1,0,0), C(0,1,0), and D(0,0,1) is rotated 45° about the line L that has the direction V=J+K and passing through point C(0,1,0). Find the coordinates of the rotated figure. **(10)**

b. Define three basic classes of 3D transformation. Give two examples in each category. **(6)**

Q.5 a. Differentiate between parallel and perspective projection. Discuss common subcategories of orthographic projections. **(6)**

b. Discuss Z-buffer algorithm. How does the Z-buffer algorithm determine which surface are hidden? **(10)**

Q.6 a. What is Digital Image Processing? Discuss in brief four fields that use Digital Image Processing. **(9)**

b. How can we determine grey scale transformation function that creates an output image with a uniform histogram? If we transform the input image to get s=T(r), what is probability distribution of $P_s(s)$? **(7)**

Q.7 a. Write a brief note on spatial filtering. **(5)**

b. Discuss a general concept of frequency domain techniques in image enhancement. **(5)**

c. Differentiate between low-pass and High-pass filter. Discuss two low-pass filters. **(6)**

Q.8 a. What is goal of segmentation? Discuss Region oriented segmentation and basic formulation used there. **(8)**

b. How to detect an edge in an image? Discuss. **(8)**

Q.9 a. Discuss a general image compression model. **(5)**

b. What do you mean by error free compression and lossy compression? Briefly describe. **(6)**

c. Discuss LZW coding using a suitable example. **(5)**