M.Sc. 1st Semester Examination, 2013

COMPUTER SCIENCE

PAPER — COS-104(M-1 & M-2)

*Full Marks : 50*

*Time : 2 hours*

*The figures in the right hand margin indicate marks*

MODULE—1

*(Computer Graphics)*

*[Marks : 25]*

Answer any two questions

1. (a) Stepwise illustrate the Generalised Bresenham's line drawing algorithm. The illustration should contain code along with precise narrative description.
(2)

(b) If \( X_{\text{start}} = 0, Y_{\text{start}} = 0, X_{\text{end}} = -4 \) and \( Y_{\text{end}} = -8 \) then find out using generalized Bresenham's algorithm the pixel locations approximating a line between the given points.

2. (a) Define frame buffer and look-up table. Also mention the working principle of look-up table.

(b) Write the difference between raster scan and random scan display.

3. (a) What is shear transformation? Mention the two standards of shear?

(b) Show that a 2D reflection through \( X\)-axis followed by a 2D reflection through the line \( y = -x \) is equivalent to pure rotation about the origin. (The rotation about origin by an angle of \( 270^\circ \) is known as pure rotation).

4. (a) What is projection? Define the term "Projection plane" and "Centre of Projection".

PG/IS/COS-104/13 *(Continued)*
(3)

(b) Compare (any two):

(i) Shadow mask method and Beam penetration method.

(ii) Parallel projection and Perspective projection.

(iii) LCD and Plasma display system.

[Internal Assessment — 5 Marks]

MODULE—2

(Image Processing)

[Marks : 25]

Answer any four questions

1. (a) Define digital Image? How can you represent image by light intensity function. 1 + 2

(b) What is resolution? What do you mean by sampling? 1 + 1
2. Explain the Histogram equalization with suitable example.

3. (a) Write the $H(u, v)$ of any two high-pass filter and low-pass filter.
   
   (b) Write the effect of low-pass filter and high-pass filter when applied to the image.

4. Show that the Fourier transform the 2D sine function-
   
   $f(x, y) = A \sin (v_0 x + v_0 y)$ is the pair of conjugate impulses-
   
   $F(u, v) = -j \frac{A}{2} \left[ \delta \left( u - \frac{u_0}{2\pi}, v - \frac{v_0}{2\pi} \right) - \delta \left( u + \frac{u_0}{2\pi}, v + \frac{v_0}{2\pi} \right) \right]$. 

5. Two images $f(x, y)$ and $g(x, y)$, have histogram $h_f$ and $h_g$. Give the conditions under which you can determine the histogram of
   
   (a) $f(x, y) + g(x, y)$. 

   (Continued)
(b) \( f(x, y) - g(x, y) \).
(c) \( f(x, y) \times g(x, y) \).
(d) \( f(x, y) \div g(x, y) \).

—in each terms of \( hf \) and \( hg \). Explain how to obtain the histogram in each case. 5

6. Write short notes on any two:

(i) Edge detector
(ii) Neighbor of pixel
(iii) Adaptive thresholding
(iv) Bit-plane slicing.

[ Internal Assessment — 5 Marks ]