

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. 5

(Turn Over)

(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. 5
2. (a) Define frame buffer and loop-up table. Also mention the working principle of look-up table. 2 + 3
- (b) Write the difference between raster scan and random scan display. 5
3. (a) What is shear transformation? Mention the two standards of shear? 1 + (2 + 2)
- (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° is known as pure rotation). 5
4. (a) What is projection? Define the term "Projection plane" and "Centre of Projection". 1 + 1 + 1

(3)

- (b) Compare (any two): $3\frac{1}{2} \times 2$
- (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. 5

3. (a) Write the $H(u, v)$ of any two high-pass filter and low-pass filter. 2 + 2

(b) Write the effect of low-pass filter and high-pass filter when applied to the image. 1

4. Show that the Fourier transform the 2 D sine function-

$f(x, y) = A \sin(v_0x + v_0y)$ is the pair of conjugate impulses-

$$F(u, v) = -j \frac{A}{2} \left[\delta \left(u - \frac{u_0}{2\pi}, v - \frac{v_0}{2\pi} \right) - \delta \left(u + \frac{u_0}{2\pi}, v + \frac{v_0}{2\pi} \right) \right]. \quad 5$$

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

(a) $f(x, y) + g(x, y)$.

(5)

(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* : $2\frac{1}{2} \times 2$

(i) Edge detector

(ii) Neighbor of pixel

(iii) Adaptive thresholding

(iv) Bit-plane slicing.

[*Internal Assessment* – 5 Marks]
