COMPUTER GRAPHICS

(Short Answer type Questions)

Q 1. Can you give some basic features of computer graphics?

Ans. The salient feature of computer graphics is the creation and manipulation of graphics (artificial images) by computer.

Q 2. Can you tell which major components (hardware and software) are needed for computer graphics?

Ans. Besides the basic computer, some special devices and software may be required especially for computer graphics. For hardware, a special high-resolution, color monitor is often demanded and some input tools, e.g. mouse and joy-sticker, and hard-copy devices, e.g. high-resolution color printer, may be required. For software, some special purpose utilities (device-dependent and device-independent) are needed for handling processing in computer graphics.

Q 3. Can you list at least three important applications of computer graphics?

Ans. There are many interesting applications of computer graphics. Three common applications are graphic user interface (GUI), computer-aided design (CAD), and computer games.

Q 4. Define Computer Graphics.

Ans. Computer graphics remains one of the most existing and rapidly growing computer fields. Computer graphics may be defined as a pictorial representation or graphical representation of objects in a computer.

Q 5. What is meant by scan code?

Ans. When a key is pressed on the keyboard, the keyboard controller places a code carry to the key pressed into a part of the memory called as the keyboard buffer. This code is called as the scan code.

Q 6. What does refreshing of the screen mean?

Ans. Some method is needed for maintaining the picture on the screen. Refreshing of screen is done by keeping the phosphorus glowing to redraw the picture repeatedly. i.e. by quickly directing the electronic beam back to the same points.

Q 7. Define Random Scan/Raster Scan displays.

Ans. Random scan is a method in which the display is made by the electronic beam, which is directed, only to the points or part of the screen where the picture is to be drawn.

The Raster scan system is a scanning technique in which the electrons sweep from top to bottom and from left to right. The intensity is turned on or off to light and unlight the pixel.

Q 8. Explain the merits and demerits of Penetration techniques.

Ans. The merits and demerits of the Penetration techniques are as follows:

1. It is an inexpensive technique.

2. It has only four colors.

3. The quality of the picture is not good when it is compared to other techniques.

4. It can display color scans in monitors.

Q 9. Explain the merits and demerits of DVST.

Ans. The merits and demerits of direct view storage tubes (DVST) are as follows:

1. It has a flat screen.

2. Refreshing of screen is not required.

3. Selective or part erasing of screen is not possible.

4. It has poor contrast.

5. Performance is inferior to the refresh CRT.

Q 10. What do you mean by emissive and non-emissive displays?

Ans. EMISSIVE:

The emissive display converts electrical energy into light energy. The plasma panels, thin film electro-luminescent displays are the examples.

NON-EMISSIVE:

They are optical effects to convert the sunlight or light from any other source to graphic form. Liquid crystal display is an example.

Q 11. Explain the merits and demerits of Plasma panel display.

Ans. ADVANTAGES:

1. Refreshing is not required.

2. Produce a very steady image free of Flicker.

3. Less bulky than a CRT.

DISADVANTAGES:

1. Poor resolution of up to 60 d.p.i.

2. It requires complex addressing and wiring.

3. It is costlier than CRT.

Q 12. What is persistence?

Ans. The time it takes the emitted light from the screen to decay one tenth of its original intensity is called as persistence.

Q 13. What is resolution?

Ans. The maximum number of points that can be displayed without an overlap on a CRT is called as resolution.

Q 14. What is Aspect Ratio?

Ans. The ratio of vertical points to the horizontal points necessary to produce length of lines in both directions of the screen is called Aspect Ratio. Usually the aspect ratio is ¾.

Q 15. What is meant by Addressability?

Ans. Addressability is the number of individual dots per inch (d.p.i.) that can be created. If the address of the current dot is (x, y) then the next dot will be (x + y), (x + y + 1) etc.

Q 16. What is a dot size?

Ans. Dot size may be defined as the diameter of a single dot on the devices output. Dot size is also called as the Spot size.

Q 17. What is interdot distance?

Ans. Interdot distance is the reciprocal of addressability. If the addressability is large, the interdot distance will be less. The interdot distance should be less to get smooth shapes.

Q 18. What is the difference between impact and non-impact printers?

Ans. Impact printers press formed character faces against an inked ribbon on to the paper. A line printer and dot-matrix printer are examples.

Non-impact printer and plotters use Laser techniques, inkjet sprays, Xerographic process, electrostatic methods and electro thermal methods to get images onto the papers. Examples are: Inkjet/Laser printers.

Q 19. What is the features of Inkjet printers?

Ans. Features of inkjet printers:

1. They can print 2 to 4 pages/minutes.
2. Resolution is about 360d.p.i. Therefore better print quality is achieved.
3. The operating cost is very low. The only part that requires replacement is ink cartridge.
4. Four colors cyan, yellow, magenta, black are available.

Q 20. What are the advantages of laser printers?

Ans. Advantages of laser printer:

1. High speed, precision and economy.
2. Cheap to maintain.
3. Quality printers.
4. Lasts for longer time.
5. Toner power is very cheap.

Q 21. What is the advantages of electrostatic plotters?

Ans. Advantages of electrostatic plotters:

1. They are faster than pen plotters and very high quality printers.
2. Recent electrostatic plotters include a scan-conversion capability.
3. Color electrostatic plotters are available. They make multiple passes over the paper to plot color pictures.

Q 22. Explain the differences between a general graphics system designed for a programmer and one designed for a specific application, such as architectural design?

Ans. Basically, packages designed for graphics programming contain functions for setting primitives, attributes, and parameters for various graphics operations such as viewing and transformations. Packages designed for applications allow a user to create scenes in terms of the particular application, rather than in terms of graphics functions.

Q 23. Consider three different raster systems with resolutions of 640 x 480, 1280 x 1024 and 2560 x 2048.

- a) **What size is frame buffer (in bytes) for each of these systems to store 12 bits per pixel?**
- b) **How much storage (in bytes) is required for each system if 24 bits per pixel are to be stored?**

Ans. a) Because eight bits constitute a byte, frame-buffer sizes of the systems are as follows:

640 x 480 x 12 bits π 8 = 450KB

1280 x 1024 x 12 bits π 8 = 1920KB

2560 x 2048 x 12 bits π 8 = 7680KB

- b) Similarly, each of the above results is just doubled for 24 (12x2) bits of storage per pixel.

Q 24. Consider two raster systems with the resolutions of 640 x 480 and 1280 x 1024.

- a) **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?**
- b) **What is the access time per pixel in each system?**

Ans. a) Since 60 frames are refreshed per second and each frame consists of 640 x 480 pixels, the access rate of such a system is:

$$(640 \times 480) * 60 = 1.8432 \times 10^7 \text{ pixels/second.}$$

Likewise, for the 1280 x 1024 system, the access rate is:

$$(1280 \times 1024) * 60 = 7.86432 \times 10^7 \text{ pixels/second.}$$

b) According to the definition of access rate, we know that the access time per pixel should be 1/(access rate). Therefore, the access time is around 54 nanoseconds/pixel for the 640 x 480 system, and the access time is around 12.7 nanoseconds/pixel for the 1280 x 1024 system.

Q 25. Consider a raster system with the resolution of 1024 x 768 pixels and the color palette calls for 65,536 colors. What is the minimum amount of video RAM that the computer must have to support the above-mentioned resolution and number of colors?

Ans. Recall that the color of each pixel on a display is represented with some number of bits. Hence, a display capable of showing up to 256 colors is using 8 bits per pixels (i.e., "8-bit color").

Notice, first that the color palette calls for 65,536 colors. This number is but 216, which implies that 16 bits are being used to represent the color of each pixel on the display. The display's resolution is 1024 by 768 pixels, which implies that there is a total of 786,432 (1024 $\times$ 768) pixels on the display. Hence, the total number of bits required to display any of 65,536 colors on each of the screen's 786,432 pixels is 12,582,912 (786,432 $\times$ 16). Dividing this value by 8 yields an answer of 1,572,864 bytes. Dividing that value by 1,024 yields an answer of 1,536 KB. Dividing that value by 1,024 yields an answer of 1.5 MB.