COMPUTER GRAPHICS AND MULTIMEDIA

1. Define Multimedia.

   Multimedia is the use of the computer to present and combine text, graphics, audio and video with links and tools that lets the user to navigate, interact, create and communicate.

2. List four Multimedia applications.

   • Document imaging
   • Image processing and Image recognition
   • Full-Motion Digital Video Applications
   • Electronic Messaging

3. What are the elements of multimedia?

   Text, Graphics, Animations, Audio and Video.

   E.g. Facsimile, Document images, Photographic images, Geographical information system maps, Voice commands and voice synthesis, Audio messages, Video messages, Full-motion stored and live video, Holographic images, Fractals.

4. Define Holography?

   It is defined as the technique that allows the light scattered from an object to be recorded and later reconstructed so that when an imaging system (a camera or an eye) is placed in the reconstructed beam, an image of the object will be seen even when the object is no longer present. The image changes as the position and orientation of the viewing system changes in exactly the same way as if the object were still present, thus making the image appear three-dimensional.

5. What is hologram?

   A hologram was a projected three-dimensional representation of a person or object, normally used in communication or entertainment.

   The photographic recoding of the image is called a hologram, which appears to be an unrecognizable pattern of stripes and whorls but which when illuminate by coherent light as by a laser beam, organizes the light in to 3D representation of the original object.

6. State the important processes in image processing?

   - Image recognition
   - image enhancement
   - image synthesis
   - image reconstruction.

7. Name the complex image enhancement capabilities?

   - Image calibration
   - Real-time alignment
   - Gray-scale normalization
   - RGB hue
   - intensity adjustment

- Color separation
- Frame averaging.

8. What is Hypertext?

   The linking of associated data for easy access is called Hypertext. It is an application of indexing text to provide a rapid search of specific text strings in one or more documents. It is an integral component of Hypermedia. Hypermedia document is the basic object and text is sub object. **(or)**

   Hyper text is an application of indexing text to provide a rapid search of specific text strings in one or more documents. Hypertext is an integral part of hypermedia documents. In multimedia applications, a hypermedia documents is the basic complex object of which text is a sub-object. Other sub-objects in the basic object include images, sound, and full-motion video.

9. What is a hypermedia document?

   The linking of media for easy access is called Hypermedia. The media may be of any type such as text, audio, video etc. A hypermedia document contains a text and any other sub objects such as images, sound, full-motion video etc. **(or)**

   A set of documents in which a given document can contain text, graphics video and audio clips as well as embedded references to other documents world wide web pages are hypermedia documents.

10. What are the types of images based on multimedia?

    Visible images, non-visible images, abstract images.

11. What does non-visible images refer?

    Non-visible images are those that are not stored as images but are displayed as images e.g. pressure gauges, temperature gauges.

12. What are abstract images?

    Abstract images are really not images that ever existed as real-world objects or representations. Rather they are computer-generated images based on some arithmetic calculations. e.g. fractals.

13. What is DVI?

    The Digital Video Interface (DVI) standard was defined to provide a processor independent specification for a video interface that could accommodate most compression algorithms for fast multimedia displays.

14. What is Apple\'s Quick time?

    The QuickTime standard, developed by Apple Computer, is designed to support multimedia applications. Apple\'s QuickTime is viewed as a multimedia interface that is evolving to become a standard part of the Apple as well as MS-Windows based systems.

15. What is JPEG?

    The Joint Photographic Experts Group, formed as a joint ISO and CCITT working committee, is focused exclusively on still-image compression.

16. What is called Asymmetrical compression based on Compression?

These are applications that need to be compressed once but are read many times.

17. What are the considerations in Multimedia storage?

Massive storage volumes, large object sizes, multiple related objects, temporal requirements for retrieval.

18. What are the components of Multimedia databases?

- Multimedia storage and retrieval
- DB management systems for multimedia system
- DB organization for multimedia applications,
- Transaction management for multimedia systems

19. How objects are defined for multimedia system?

The objects for a multimedia system are defined independently or combinations of the following elements

- Text
- Graphics / Images
- Animations
- Audio and video,
- Full-motion and live video

20. What are the Multimedia data interface standards?

- File formats for multimedia systems,
- Video processing standards,
- Microsoft's AVI.

21. What is scan conversion?

A major task of the display processor is digitizing a picture definition given in an application program into a set of pixel-intensity values for storage in the frame buffer. This digitization process is called scan conversion.

22. What is meant by refreshing of the screen?

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.

23. State the properties of video display devices?

Properties of video display devices are persistence, resolution, and aspect ratio.

24. Define Random scan/Raster scan displays?

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.

25. What is rasterization?

The process of determining the appropriate pixels for representing picture or graphics object is known as rasterization.

26. Define Computer graphics.

Computer graphics may be defined as a pictorial representation or graphical representation of objects in a computer.

27. Name any four input devices.

Four input devices are keyboard, mouse, image scanners, and trackball.

28. State the two techniques for producing colour displays with a CRT?

Beam penetration technique and shadow mask technique are the techniques for producing colour displays with a CRT.

29. What is vertical retrace of the electron beam?

In raster scan display, at the end of one frame, the electron beam returns to the left top corner of the screen to start the next frame. This is called vertical retrace of the electron beam.

30. Short notes on video controller?

Video controller is used to control the operation of the display device. A fixed area of the system is reserved for the frame buffer, and the video controller is given direct access to the frame buffer memory.

31. What is bitmap?

A bitmap is a graphical representation of an image stored as a two dimensional map of bits. Originally, bitmaps were one bit is equal to one pixel without color information but nowadays multi-color images are stored as bitmaps. Some system has only one bit per pixel; the frame buffer is often referred to as bitmap.

32. What is resolution?

The maximum number of points that can be displayed without overlap on a CRT is referred to as the resolution.

33. What is horizontal retrace of the electron beam?

In raster scan display, the electron beam return to the left of the screen after refreshing each scan line. This is called horizontal retrace of the electron beam.

34. What is filament?

In the CRT, heat is applied to the cathode by directing a current through a coil of wire, is called filament.

35. What is a dot size?

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.

36. What is pixmap?

A three dimensional array of bits corresponding to a 2 dimensional array of pixels. It is used, for example, in the X Window System to describe a memory region where graphics can be drawn without affecting the screen. Typically this is used for the efficient handling of expose events, icon images or for animation. Some system has multiple bits per pixel, the frame buffer is often referred to as pixmap.

37. Define clipping?

Clipping is the method of cutting a graphics display to neatly fit a predefined graphics region or the view port.

38. What is covering (exterior clipping)?

This is just opposite to clipping. This removes the lines coming inside the windows and displays the remaining. Covering is mainly used to make labels on the complex pictures.

39. What is the need of homogeneous coordinates?

To perform more than one transformation at a time, use homogeneous coordinates or matrixes. They reduce unwanted calculations intermediate steps saves time and memory and produce a sequence of transformations.

40. State the types of clipping?

Point clipping, line clipping, area clipping, text clipping and curve clipping.

41. What is meant by scan code?

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.

42. What is persistence?

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

43. What is Aspect ratio?

The ratio of horizontal points to the vertical points necessary to produce length of lines in both directions of the screen is called the Aspect ratio. Usually the aspect ratio is 4:3.

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

Impact printer 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.

45. Define pixel?

Pixel is shortened forms of picture element. Each screen point is referred to as pixel.

46. What is frame buffer?

Picture definition is stored in a memory area called frame buffer or refresh buffer.

47. What is purpose of the video controller?

A special purpose processor, which is used to control the operation of the display device, is known as video controller or display controller.

48. What is run length encoding?

Run length encoding is a compression technique used to store the intensity values in the frame buffer. This stores each scan line as a set of integer pairs. First number in each pair indicates an intensity value, and second number specifies the number of adjacent pixels on the scan line that are to have that intensity value.

49. What is an output primitive?

Graphics programming packages provide function to describe a scene in terms of these basic geometric structures, referred to as output primitives.

50. What is point in the computer graphics system?

The point is a most basic graphical element & is completely defined by a pair of user coordinates (x, y).

51. How lines can be represented?

A line is of infinite extent can be defined by an angle of slope and one point on the line P = P(x,y). This can also be defined as y = mx+c where c is the y intercept.

52. Define Circle?

Circle is defined by its center x_c, y_c and its radius in user coordinate units. The equation of the circle is $(x-x_c)^2 + (y-y_c)^2 = r^2$.

53. What are the various attributes of a line?

The various attributes of a line are (i) line type, (ii) width and (iii) color. The line type includes solid line, dashed lines, and dotted lines.

54. What is aliasing?

In the line drawing algorithms, all rasterized locations do not match with the true line and have to represent a straight line. This problem is severe in low resolution screens. In such screens line appears like a stair-step. This effect is known as aliasing.

55. What is antialiasing?

The process of adjusting intensities of the pixels along the line to minimize the effect of aliasing is called ant aliasing.

56. Define Ellipse?

An ellipse can use the same parameters x_c, y_c ,r as a circle, in addition to the eccentricity ‘e’. The equation of an ellipse is: $(x-x_c)^2/a^2 + (y-y_c)^2/b^2 = 1$

57. Define polygon?

A polygon is any closed continues sequence of line segments i.e., a polyline whose last node point is same as that of its first node point. The line segments form the sides of the polygon and their intersecting points form the vertices of the polygon.

58. Distinguish between convex and concave polygons?

If the line joining any two points in the polygon lies completely inside the polygon then, they are known as convex polygons. If the line joining any two points in the polygon lies outside the polygon then, they are known as concave polygons.

59. What is seed fill?

One way to fill a polygon is to start from a given point (seed) known to be inside the polygon and highlight outward from this point i.e neighboring pixels until encounter the boundary pixels, this approach is called seed fill.

60. What is Transformation?

Transformation is the process of introducing changes in the shape size and orientation of the object using scaling rotation reflection shearing & translation etc.

61. What do you mean by active and passive transformations?

In active transformation the points x and x' represent different coordinates of the same coordinate system. Here all the points are acted upon by the same transformation and hence the shape of the object is not distorted.

In passive transformation the points x and x' represent same points in the space but in a different coordinate system. Here the change in the coordinates is merely due to the change in the type of the user coordinate system.

62. What is translation?

Translation is the process of changing the position of an object in a straight-line path from one coordinate location to another. Every point (x, y) in the object must undergo a displacement to (x',y'). the transformation is: x' = x + tx ; y'= y+ty

63. What is rotation?

A 2-D rotation is done by repositioning the coordinates along a circular path, in the x-y plane by making an angle with the axes. The transformation is given by: X' = r cos (q + f) and Y' = r sin (q + f).

64. What is scaling?

A 2-D rotation is done by repositioning the coordinates along a circular path, in the x-y plane by making an angle with the axes. The transformation is given by: X| = r cos (q + f) and Y| = r sin (q + f).

65. What is shearing?

The shearing transformation actually slants the object along the X direction or the Y direction as required. That is, this transformation slants the shape of an object along a required plane.

66. What is reflection?

The reflection is actually the transformation that produces a mirror image of an object. For this use some angles and lines of reflection.

67. What are the two classifications of shear transformation?

The two classifications of shear transformation X shear, y shear.

68. Differentiate serif and sans serif fonts. Give one example

Serif fonts have a little decoration at the end of the letter, but san serif font has not. Times, new century schoolbook is the examples of serif fonts. Arial, potima are examples for sans serif fonts.

69. Distinguish between window port & view port?

A portion of a picture that is to be displayed by a window is known as window port. The display area of the part selected or the form in which the selected part is viewed is known as view port.

70. Distinguish between uniform scaling and differential scaling?

When the scaling factors (sx and sy) are assigned to the same value, a uniform scaling is produced that maintains relative object proportions. Unequal values for sx and sy result in a differential scaling that is often used in design application

71. What is fixed point scaling?

The location of a scaled object can be controlled by a position called the fixed point that is to remain unchanged after the scaling transformation.

72. What is Bezier Basis Function?

Bezier Basis functions are a set of polynomials, which can be used instead of the primitive polynomial basis, and have some useful properties for interactive curve design.

73. Define B-Spline curve?

A B-Spline curve is a set of piecewise(usually cubic) polynomial segments that pass close to a set of control points. However the curve does not pass through these control points, it only passes close to them.

74. What is a spline?

To produce a smooth curve through a designed set of points, a flexible strip called spline is used. Such a spline curve can be mathematically described with a piecewise cubic polynomial function whose first and second derivatives are continuous across various curve section.

75. What are the different ways of specifying spline curve?

- Using a set of boundary conditions that are imposed on the spline.
- Using the state matrix that characteristics the spline
- Using a set of blending functions that calculate the positions along the curve path by specifying combination of geometric constraints on the curve

76. What are the important properties of Bezier Curve?

- It needs only four control points
- It always passes through the first and last control points
- The curve lies entirely within the convex half formed by four control points.

77. What are the steps involved in 3D transformation?

- Modeling Transformation
- Viewing Transformation
- Projection Transformation
- Workstation Transformation

78. What do you mean by view plane?

A view plane is the film plane in camera which is positioned and oriented for a particular shot of the scene.

79. Define Projection?

The process of displaying 3D into a 2D display unit is known as projection. The projection transforms 3D objects into a 2D projection plane. In other words, the process of converting the description of objects from world coordinates to viewing coordinates is known as projection.

80. What you mean by parallel projection?

Parallel projection is one in which z coordinates is discarded and parallel lines from each vertex on the object are extended until they intersect the view plane.

81. What do you mean by Perspective projection?

Perspective projection is one in which the lines of projection are not parallel. Instead, they all converge at a single point called the centre of projection.

82. What is Projection reference point?

In Perspective projection, the lines of projection are not parallel. Instead, they all converge at a single point called Projection reference point.

83. Define computer graphics animation?

Computer graphics animation is the use of computer graphics equipment where the graphics output presentation dynamically changes in real time. This is often also called real time animation.

84. What is tweening?

It is the process, which is applicable to animation objects defined by a sequence of points, and that change shape from frame to frame.

85. Define frame?

One of the shape photographs that a film or video is made of is known as frame. In other words, frame is one of the many still (or nearly so) images which compose the complete moving picture.

86. What is key frame?

One of the shape photographs that a film or video is made of the shape of an object is known initially and for a small no of other frames called key frame. A key frame in animation and filmmaking is a drawing that defines the starting and ending points of any smooth transition.

87. What is multimedia PC?

A multimedia PC is a computer that has a CD-ROM or DVD drive and supports 8-bit and 16-bit waveform audio recording and playback, MIDI sound synthesis, and MPEG movie watching, with a central processor fast enough and a RAM large enough to enable the user to play and interact with these media in real time, and with a hard disk large enough to store multimedia works that the user can create.

88. Where to use multimedia?

Multimedia improves information relation. Multimedia applications include the following:

- Business
- Schools
- Home
- Public place

89. List out the benefits of multimedia

Benefits of multimedia are

- Training
- Sales
- Communications
- Medicines

90. What are the main functions of a multimedia development system?

Multimedia development system must perform main three functions as follows:

- Input data
- Development
- Output Data

Data input from sources such as cameras or musical instruments, application development, and data output to some delivery medium such as a videodisk or CD-ROM.

91. What is Colour Look up table?

In colour displays, 24 bits per pixel are commonly used, where 8 bits represent 256 level for each color. It is necessary to read 24- bit for each pixel from frame buffer. This is very time consuming. To avoid this video controller uses look up table to store many entries to pixel values in RGB format. This look up table is commonly known as colour table.

92. What is tiling patterns?

The process of filling an area with rectangular pattern is called tiling and rectangular fill patterns are sometimes referred to as tiling patterns.

93. What is soft fill?

Soft fill is a filling method in which fill color is combined with the background colors.