QUESTION BANK
IT6501 GRAPHICS AND MULTIMEDIA

UNIT I 2D PRIMITIVES

1. What is Output Primitive?

Basic geometric structures that describe a scene are referred to as Output Primitives. Points and straight lines segments are the simplest geometric components of pictures. Additional output primitives that can be used to construct a picture include circles and other conic sections, quadric surfaces, spline curves and surfaces, polygon colorareas, and character strings.

2. What is DDA?

The Digital Differential Analyzer is a scan-conversion line algorithm based on calculating either difference in y-coordinate (dy) or difference in x- coordinate. We sample the line at unit intervals in one coordinate and determine corresponding integer values nearest the line path for the other coordinate.

3. What are the disadvantages of DDA algorithm?

• Round-off error in successive additions of the floating-point increment can cause the calculated pixel positions to drift away from the true line path for long line segments.

• Rounding operations and floating-point arithmetic in procedure are still time consuming.

4. What is attribute parameter?

Any parameter that affects the way a primitive is to be displayed is referred to as an attribute parameter.

5. What are the basic line attributes?

Basic attributes of a straight line segment are its type, its width, and its color.

6. What is pixel mask?

Pixel mask is a string containing the digits 1 and 0 to indicate which positions to plot along the line path. The mask 1111000,could be used to display a dashed line with a dash length of 4 and inter dot spacing of three.

7. What are line caps?

The shape of the line ends are adjusted to give a better appearance by adding line caps. Butt cap: obtained by adjusting the end positions of the component parallel lines so that the thick line is displayed with square ends that is perpendicular to the line path.

Round cap: obtained by adding a filled semicircle to each

butt cap. Butt cap round cap, projecting square cap.

8.List out the methods used for smoothly joining two line segments?

⎪ Mitter join-by extending the outer boundaries of each of the two lines until they meet.

⎪ Round join– by capping the connection between the two segments with a circular boundary whose diameter is equal to the linewidth.

⎪ Bevel join– by displaying the line segments with butt caps and filling in thetriangular gap where the segmentmeet.

9. Briefly explain about the characterattributes.

Text attributes: Font: set of characters with a particular design style. Eg.Times roman, courier.Underlining style: solid, dotted, double Boldface, italics ,shadow

10. Briefly explain about the unbundled and bundled attributes.

Unbundled attributes: how exactly the primitive is to be displayed is determined by its attribute setting. These attributes are meant to be used with an o/p device capable of displaying primitives the way specified. Bundled attributes: when several kinds of o/p devices are available at a graphics installation, it is convenient for a user to be able to say how attributes are to be interpreted on different o/p devices. This is accomplished by setting up tables for each o/p device that lists sets of attribute value that are to be used on that device to display each primitive type. A particular set of attribute values for a primitive on each o/p device is then chosen by specifying the appropriate table index. Attributes specified in this manner is called as bundled attribute.

11. Define aliasing.

Displayed primitives generated by the raster algorithms have a jagged, stair step appearance because the sampling process digitizes coordinate points on an object to discrete integer pixel positions. This distortion of information due to low frequency sampling is called aliasing.

12. What is antialiasing?

Appearance of displayed raster lines by applying antialiasing methods that compensate for the under sampling process. Nyquist sampling frequency: to avoid losing information, the sampling frequency to at least twice that of the highest frequency occurring in the object. Fs=2*fmax.

13. What is antialiasing by super sampling or postfiltering?

This is a technique of sampling object characteristics at a high resolution and displaying results at a lower resolution.

14. What is antialiasing by area sampling or prefiltering?

An alternative to super sampling is to determine pixel intensity by calculating areas of overlap of each pixel with theobjects to be displayed .antialiasing by computing overlaps areas is referred to as area sampling orprefiltering.

15. What is antialiasing by pixelphasing?

Raster objects can be antialiased by shifting the display location of pixel areas. This is applied by "micro positioning" the electron beam in relation to object geometry.

16. What are the basictransformations?

Translation : translation is applied to an object by repositioning it along a straight line path from one coordinate location to another.

   x1=x+Tx   y1=y+Ty(Tx,Ty) – translation vector or shiftvector

   Rotation: a two dimensional rotation is applied to an object by repositioning it along a circular path in the xyplane.

        P1=R.P

     R= cosθ -

        sinθsinθ

        cosθ

θ- rotation angle

   Scaling:a scaling transformation alters the size of an

   object . x1=x.Sx y1=y.SySx and Sy are

   scalingfactors.

17. What is uniform and differentialscaling?

   Uniform scaling: Sx and Sy are assigned the same

value. Differential scaling: unequal values for Sx
andSy.

18.Define reflection.

A Reflection is a transformation that produces a mirror image of an object. The mirror image for a 2D reflection is generated relative to an axis of reflection by rotating the object 180 degree about the reflection axis.

By line y =0(x-axis)

$$\text{transformation matrix} = \begin{bmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

by the x axis

$$\text{transformation matrix} = \begin{bmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

19.Define shearing.

A transformation that distorts the shape of an object such that the transformed shape appears as if the object is composed of internal layers that had been caused to slide over each other is called shear.

x-direction shear relative to x axis

$$\text{shear matrix} = \begin{bmatrix} 1 & shx & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

x-direction shear relative to other
reference lines Shearmatrix =

$$\begin{bmatrix} 1 & shx & -shx.yref \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

20.What is a window and a viewport?

A world coordinate area selected for display is called a window. An area on a display device to which a window is mapped is called a viewport.

21.   What is viewing transformation?

The mapping of a part of a world-coordinate scene to device coordinates is referred to as viewing transformation.

22.   Define Clipping.

Any procedure that identifies those portions of a picture that are either inside or outside of a specified region of space is referred to as a clipping algorithm or simply clipping. The region against which an object is clipped is called a clip window.

23.What are the types of Clipping?

  • Point clipping
  • Line clipping
  • Area clipping
  • Curve clipping
  • Text clipping

PART B

1. Explain in detail about Bresenham's line generating algorithm. Give example.
2. Explain in detail about Midpoint ellipse generating algorithm. Give example.
3. Explain in detail about Midpoint Circle generating algorithm. Give example. Algorithm
4. Explain in detail about window to viewport coordinate transformation.
5. Write a detailed note on the basic two dimensional transformations.
6. Explain with an example the Cohen-Sutherland line clipping algorithm.
7. Explain in detail about 2Dattributes

UNIT II
3D CONCEPTS

1. What are the representation schemes for solidobjects?

Boundary representations: they describe a 3D object as a set of surfaces that separate the object interior from environment. Example: polygon facets Space partitioning epresentations: they are used to describe interior properties, by partitioning the spatial region containing an object into a set of small, non overlapping, contiguous solids. Example: octree

2. What is parallelprojection?

One method for generating a view of a solid object is to project points on the object surface along parallel lines onto the display plane. By selecting different viewing positions, can project visible pointson the object onto the display plane.

3. What is perspectiveprojection?

Project points to the display plane along converging points. Object realism is acheived. Smaller as their distance from the observer increases. For a perspective projection object positions are transformed to the view plane along lines that converge to a point called the projection reference point.

4. What are blobby objects?

Some objects do not maintain a fixed shape, but change their surface characteristics in certain motions or when in proximity to other objects. Examples in this class of objects include molecular structures, water droplets and other liquid effects, melting objects and muscle shapes in the human body. These objects can be described as exhibiting "blobbiness" and are often simply referred to as blobby objects, since their shapes show a certain degree offluidity.

5. What is depthcueing?

Depth information is important so that easily identify for a particular viewing direction, which is the front and which is the back of displayed objects.

6. What is anellipsoid?

An ellipsoid surface can be described as an extension of a spherical surface, where the radii in three mutually perpendicular directions can have different values.

7. Describe about spline curve.

The term spline is a flexible strip used to produce a smooth curve through a designated set of points. In computer graphics,the term spline curve refers to any composite curve formed

with polynomial sections satisfying specified continuity conditions at the boundary of the pieces.

8. How to generate a spline curve?

A spline curve is specified by giving a set of coordinate positions called as control points. These control points are then fitted with piece wise continuous parametric polynomial functions in one of the two ways. When polynomial sections are fitted so that the curve passes through each control point, the resulting curve is said to interpolate the set of control points. When the polynomials are fitted to the general control point path without necessarily passing through any control point the resulting curve is said to approximate the set controlpoints.

9. Explain about Bezier curves.

This is a spline approximation method. A beizer curve section can be fitted to any number of control points. The number of control points to be approximated and their relative position determine the degree of the Beizer polynomial. As with the interpolation splines , a beizer curve can be specified with boundary conditions, with a characterization matrix , or with blending functions

10. Explain about sweep representations.

Sweep representations are useful for constructing three- dimensional objects that possess translational, rotational or other symmetries. One can represent such objects by specifying a 2D shape and a sweep that moves the shape through a region of space to produce other objects(3D). A set of 2D primitives, such as circle and rectangles, can be provided for sweep representations as menu options.

11. What is ray casting?

Ray casting methods are commonly used to implement constructive solid geometry operations when objects are described with boundary representations. Ray casting is applied by constructing composite objects in world coordinates with the xy plane corresponding to the pixel

plane of a video monitor. This plane is referred to as "firing plane", since each pixel emits a ray through the objects that are combined. Then the surface intersections along each ray path, and they are sorted according to the distance from the firing plane. The surface limits for the composite objects are determined by specified set operations.

12. Define Octree.

Hierarchical tree structures called octrees are used to represent solid objects in some graphics system. The tree structure is organized so that each node corresponds to a region of 3D space. This representation for solids takes advantage of spatial coherence to reduce storage requirements for 3Dobjects.

13. What are the two types of projections?

Parallel projection: coordinate positions are transformed to the view plane along parallel lines. Perspective projection: object positions are transformed to the view plane along lines that converge to a point called projection reference point.

14. What are the two types of parallel projection?

Orthographic parallel projection: projection is perpendicular to the view plane. Oblique parallel projection: projection is not perpendicular to the view plane.

15. Explain about axonometric projection.

Orthogonal projections that display more than one face of an object are axonometric projection.

16. Explain about isometric projection.
Isometric projection is obtained by aligning the projection plane so that it intersects each coordinate axis in which the object is defined at the same distance from the origin.

17. State the use of exploded views.
Exploded and cutaway views of such objects can then be used to show the internal structure and relationship of the object parts.

18. What are called control points?
The spline curve is specified by giving a set of coordinate positions, called control points, which indicates the general shape of the curve.

19. What is called a convex hull?
In Spline Curves The convex polygon boundary that encloses a set of control points is called the convex hull.

20. Mention some surface detection methods.
Back-face detection, depth-buffer method, A-buffer method, scan-line method, depth-sorting method, BSP-tree method, area subdivision, octree method, ray casting.

21. What are super qadric surfaces.?
The super quadrics or super-quadrics (also superquadratics) are a family of geometric shapes defined by formulas that resemble those of elipsoids and other quadrics, except that the squaring operations are replaced by arbitrary powers. Additional parameters are added the equation of quadrics to produce different shapes

22. What is a color model?
A color model is a method for explaining the properties or behavior of color within some particular context. Example: XYZ model, RGB model.

23. Define intensity of light.
Intensity is the radiant energy emitted per unit time, per unit solid angle, and per unit projected area of source.

24. What is hue?
The perceived light has a dominant frequency (or dominant wavelength). The dominant frequency is also called as hue or simply ascolor.

25. What is purity of light?
Purity describes how washed out or how "pure" the color of the light appears. pastels and pale colors are described as lesspure.

26. Explain about CMY model.
A color model defined with the primary colors cyan, magenta and yellow is useful for describing color output to hard copy devices.

27. Define computer animation.
Computer animation generally refers to any time sequence of visual changes in a scene.

28. Explain about frame-by-frame animation.
Frame-by-frame animation, each frame of the scene is separately generated and stored. Later the frames can be recorded on film or they can be consecutively displayed in "real time playback" mode.

29. Explain about storyboard.
The storyboard is an outline of the action. It defines the motion sequence as a set of basic events that are to take place. Depending on the type of animation to be produced, the storyboard could consist of a set of rough sketches or it could be a list of the basic ideas for the motion.

30. Explain about key frame.

A key frame is a detailed drawing of the scene at a certain time in the animation sequence. Within each key frame, each object is positioned according to the time for that frame. Some key frames are chosen at extreme positions in action; others are spaced so that the time interval between key frames is not too great.

31. Explain about morphing.

Transformation of object shape from one form to another is called morphing.

PART B

1. Explain various 3D object representations.
2. Briefly explain about the basic transformations performed on three dimensional objects.
3. Write short notes on parallel and perspective projections.
4. Explain in detail about 3D viewing.
5. Explain in detail about Visible surface detection methods
6. Explain about quadric surfaces
7. Explain in detail about the steps in computer animation.
8. Explain in detail about the approaches for object motion specifications.

UNIT III
PART A

1. Give some Multimedia applications.

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

2. What are the multimedia elements?

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.

3. What is Holography?

It is defined as the means of creating a unique photographic image without the use of a lens.

4. What is hologram?

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.

5. What are the important processes in image processing? Uses of MM in Image processing.

Image recognition, image enhancement, image synthesis, and image reconstruction.

6. What are complex image enhancement capabilities?

   Image calibration, Real-time alignment, Gray-scale normalization, RGB hue intensity adjustment, Color separation, Frame averaging.

7. What is VGA mixing?

   Here, the image acquisition memory also serves as the display source memory, thereby fixing its position and size on screen.

8. What is Dual-buffered VGA mixing /scaling?

   Double buffer schemes maintain the original images in a decompression buffer and the resized image in a display buffer.

9. What is hypermedia documents?

   In hypermedia documents in addition to text, embedded or linked multimedia objects such as image, audio, hologram, or full -motion video.

10. What are the sub-systems inDSP?

   Memory management, hardware-interrupt handling, Multitasking, Inter task synchronization and communication, Multiple timer services, Device-independent I/O.

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

   Visible images, non-visible images, abstract images.

12. 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.

13. 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.

14. What isDVI?

   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.

15. What is MIDI?

   This is the interface standard for file transfer between a computer and a musical instrument such as a digital piano.

16. 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.

17. What is JPEG?

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

18. What is called Asymmetrical compression based onCompression?

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

19. What are the considerations in Multimedia storage?

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

20. What are the strengths of object orienteds/w?

Encapsulation, Association, Classification.

21. What is multimedia?

Multimedia is an efficient combination of all the multimedia objects like text, image, and video, audio. It is a general term used for documents, applications, presentations and any information dissemination that uses the different multimedia objects.

22. Define HDTV and UDTV.

High Definition Television (HDTV) is a broadcasting standard introduced by US as a digital technology. A 1125 line digital HDTV has been developed and is being commercialized. NHK of Japan has developed Ultra Definition Television (UDTV) featuring approximately 3000 lines.

23. What are the data objects used in MultimediaSystems?

- ➢ Text
- ➢ Image
- ➢ Audio
- ➢ Holograms
- ➢ Full motionvideo

24.What are ways to perform ImageAnnotation?

Image annotation is performed in the following twoways
- • As a text file stored along with the image
- • As a small image stored with the original image

PART B

1. Give the multimedia applications and explain.

2. What are the multimedia elements? Explain.

3. Explain about Multimedia databases.

4. Explain about defining objects for multimedia system.

5. Explain about Multimedia data interface standards?

UNIT IV
PART A

1. Write about Compression Decompression and itstypes

       Compression and decompression techniques are utilized for a number of applications, such as facsimile systems, printer systems, document storage and retrieval systems. When information is compressed, the redundancies are removed. Easy storage and retrieval

Type of compression
       Lossless compression
       Lossy compression

2. Say some loss less compression standards?

   Pack bits encoding, CCITT Group3 1D, CCITT Group3 2D, CCITT Group4,Lembel-Ziv and Welch algorithm LZW.

3. Say some lossy compression standards?

   JPEG(Joint photographic Experts Group),MPEG(Moving Picture Experts Group),Intel DVI,CCITTH.261 video coding algorithm, Fractals.

4. What are the advantages of CCITT Group 31D?

• It is simple to implement in both h/w and s/w.

• It is a worldwide standard for facsimile, which is accepted for document imaging application. This allows document-imaging applications to incorporate fax documents easily.

5. What is the disadvantage of CCITT Group 3 2DScheme?

   It is complex and relatively difficult to implement in software.

6. What isLuminance?

   Luminance refers to brightness. This is a measure of the brightness of the light emitted or reflected by an object.

7. What are the levels of definition in JPEGstandards?

   Baseline system, Extended system, special loss less function.

8. DefineQuantization.

   It is a process of reducing the precision of an integer, thereby reducing the number of bits required to store the integer. Vector quantization is an efficient pattern matching algorithm in which animage is decomposed into two or more vectors each representing particular features of the image such as pixels, transform coefficients,color luminance, that are matched to a code book ofvectors.

9. What are the controls in VCRparadigm?

play, fast, forward, rewind, search forward, and rewind search.

10. What are types of moving picture?

Intra picture, Unidirectional predicted pictures, Bi-directional predicted pictures.

11. What are the factors that affect video performance?
Microprocessor speed, Play back window size, Frame rate.

12. What is fractal?
     A fractal is a multidimensional object with an irregular shape or body that has approximately the same shape or body irrespective of size. i.e., irrespective of whether it gets smaller or bigger in size.

13. What are multimedia fileformats?
Rich-Text Format(RTF), Taggedimage file format(TIFF), Resource image file format(RIFF), Musical instrument digital interface(MIDI), Joint Photographic Experts
Group, Audio Video Interchanged Indeo file Format(AVI), TWAIN.

14. What is digitalpen?
A digital pen is a powerful input device that allows the user to write, draw, point and gesture.

15. What are the components ofPEN?
Electronic pen and digitizer, Pen driver, Recognition context manager, Recognizer, Dictionary, Display driver.

16. What are the display performance issues?
N/w b/w, Decompression or decoding, Display technology.

17. What is roping?
Roping causes straight lines to appear twisted or helical. This is caused by poor convergence as successive pixels in the line show different edge colors.

18. Write the four basic technologies used for flat paneldisplays.
Passive-matrix monochrome, Active-matrix monochrome, Passive-matrix color, Active-matrix color.

19. What are the components of Laser printer?
Paper feed mechanism, Laser assembly, Corona assembly, Fuser, Toner artridge.

20. What are the main characteristics of voice recognition system?
Separation b/w words, Speaker dependency and speaker-independent recognition, Use of phonemes, Vocabulary size.

21. List the types of Chunks used in RIFF.
- RIFF Chunk-defines the contents of the RIFFfile.

- List Chunk-allows embedding additional file information such as archival location, copyright
   information, creation date, and so on.

   3. Subchunk- allows adding more information to a primary chunk when the primary

chunk is not
sufficient.

22. Write about Disk Spanning.

Disk spanning is a method of attaching multiple drives to a single host adapter, all drives appear as a single continuous logical unit. It is a good way of increasing storage capacity.The data is written to the first drive and when the first drive is full the controller switches to the second drive and so on.

23.What is Runlengthen coding

It is one of the simplest data compression scheme to compress black and white(Binary) images. A consecutive repeated string of characters is replaced by two bytes. The first byte contains a number representing the number of times the character is repeated , the second byte contains the character itself.

24. What is the purpose ofMPEG?

MPEG(Moving Picture Expert Group) is a standardization of compression algorithms for video. This was initiated by CCITT for teleconferencing and video telephony. The compression rate is about 64,128 or 192 kbits/sec for a specificresolution.

PART B

1. Explain binary image compression .

2. Explain color image and video compression and audio compression.

3. Explain about quantization

4. Explain data and file format standards.

5. Explain in detail about digital audio

6. Explain in detail about Full Motion Video

5. Explain about storage and retrieval mechanisms.

UNIT V
2 MARKS

1.   What are the key elements in object server architecture of multimedia applications?

Object name server, Object directory manager, Object server, Object manager, Network manager, Object data store.

2.   What are the types of database replication?

- ➢ Round-robinreplication
- ➢ manualreplication
- ➢ scheduledreplication
- ➢ immediatereplication,

- ➢ replication-on-demand
- ➢ predictivereplication
- ➢ replicatingreferences
- ➢ noreplication.

3. What are the primary n/w topologies used formultimedia?

- ➢ traditionalLANS
- ➢ extendedLANS
- ➢ High-speed LANS,WANS

4. What is the purpose ofMIME?

Multipurpose Internet Mail Extension specification defines mechanisms for generalizing the message content to include multiple body parts and multiple datatypes.

5. What are the characteristics of image and still videostores?

- ➢ Compressed information
- ➢ Multi- image documents
- ➢ Related annotations
- ➢ Large volumes
- ➢ Migration b/w high- volume media such as an optical disk library and high-speed media such as magnetic cache storage
- ➢ Shared access.

6. What are the services provided by a directory serviceagent?

Directory service, Object assignment, Object status management, Directory service domains, Directory service server elements, n/w access.

7. What are the services provided by User InterfaceAgent?

Services on workstations, Using display s/w

8. Give the primary goal of MAPI.

Message API, Separate client applications from the underlying messaging services, Make basic mail-enabling a standard feature for all applications, Support messaging- reliant workgroup applications.

9. List 3 Multimedia authoringtools.
* Icon based packages. eg) HSC interactive SE Icon Author fromAImtech.
* Script based packages. eg) Multimediaviewer.

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10.   DefinePremixing.
          Premixing combines a number of concurrent sound effect into a synchronized
     sound effect.

11.   What are common navigationmodes?

        * Directmode
        * Free formmode
        * Browsemode

12.   What is meant by mediacommunication?
          Media communication is a method to store and deliver information or data between
varies media such as advertising media, Electronic media, business media, print media and
Mass media.

13.   Differentiate hypertext andhypermedia.

Hypertext	Hypermedia
Hypertext allows the user to link information together,create information paths through a large volume of related text in documents,annotate existing text and append notes that direct readers to bibiliographic information or to other reference material	Hypermedia is an extension of hypertext in that the electronic documents will also include virtually any kind of information that can be stored in electronic storage such as audio,animatedvideo,graphics or full motion video.

14.   What are the types of Multimedia authoringSystems?

      ➢ Dedicated Authoringsystem
      ➢ Timeline-BasedAuthoring
      ➢ Structured Multimediasystems
      ➢ Telephone AuthoringSystem

15.   What is the purpose ofzooming?
     Zooming allows the user to see more detail for a specific area of the image.

16.   What is panning?
     Panning implies that the image window is unable to display the full image at the
selected resolution for display. In that case the image can be panned left to right or right to left
as well as top to bottom or bottom to top. Panning is useful for finding detail that is not visible
in the full image.

17.   What are the steps needed for Hypermedia reportgeneration?

    Planning
     Creating eachcomponent
    Integratingcomponents.

18.   What are the components of a distributed Multimediasystem?

    Application s/w,Container object store, Image and still video store, Audio and video component store, Object directory service agent, Component service agent, User interface service agent, Networks.

19.   What are the characteristics of Documentstore?
    Primary document storage, Linked object storage, Linked object management.

Part B

1. Explain different design issues for multimedia authoring.
2. Explain different types of multimedia authoring systems.
3. Explain Hypermedia messaging & Mobile Messaging
4. Explain Hypermedia messaging components
5. Explain the key design issues in user interface design.