**KARPAGAM ACADEMY OF HIGHER EDUCATION**
**(Deemed to be University)**

**(Established Under Section 3 of UGC Act, 1956)**

**Coimbatore-641021.**
**(For the candidates admitted from 2017 onwards)**
**Department of CS,CA & IT**

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**SUBJECT : MULTIMEDIA AND APPLICATIONS**
**SEMESTER : II**
**SUBJECT CODE : 17CSU203** **CLASS : I B.Sc.CS**

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## COURSE OBJECTIVE

Understand basic multimedia concepts, devices and the current trends in multimedia. Has the ability to build a multimedia project.

## COURSE OUTCOME

- Understand basic multimedia concepts.
- Acquire basic knowledge on Multimedia devices.
- Understand current trends in multimedia by experiencing a variety of applications and development packages.
- Be able to design different application in M.M and use different tools like adobe Photoshop and macromedia flash.

## UNIT-I

**Multimedia**: Introduction to multimedia, components, uses of multimedia, **6L** multimedia applications, virtual reality. **Text:** Fonts & Faces, Using Text in Multimedia, Font Editing & Design Tools, Hypermedia & Hypertext.

## UNIT-II

**Images:** Still Images – bitmaps, vector drawing, 3D drawing & rendering, natural light & colors, computerized colors, color palettes, image file formats.**Sound:** Digital Audio, MIDI Audio, MIDI vs Digital Audio, Audio File Formats.

## UNIT-III

**Video:** How video works, analog video, digital video, video file formats, video shooting and editing. **Animation:** Principle of animations, animation techniques,

**UNIT-IV**

**Animation:** animation file formats. **Internet and Multimedia**: www and HTML, multimedia on the web – web servers, **6L** web browsers, web page makers and site builders.

**UNIT-V**

**Making Multimedia**: Stages of a multimedia project, Requirements to make good multimedia, Multimedia Hardware - Macintosh and Windows production Platforms, Hardware peripherals - Connections, Memory and storage devices, Multimedia software and Authoring tools.

**Suggested Readings:**


1. Tay Vaughan. (2011). Multimedia: Making it work (8th ed.). New Delhi: TMH,
2. Ralf Steinmetz., & Klara Naharstedt. (2012).Multimedia: Computing, Communications Applications. New Delhi: Pearson.
3. Keyes. (2000). Multimedia Handbook. New Delhi: TMH.
4. Andleigh, K., & Thakkar, K. (2013).Multimedia System Design. New Delhi: PHI.


**WEB SITES**

1. en.wikipedia.org/wiki/Multimedia
2. www.arena-multimedia.com/ -
3. www.nextwavemultimedia.com/

**ESE MARKS ALLOCATION**

| | | |
|---|---|---|
| 1 | **Section A**<br>20 x 1 = 20 | 20 |
| 2 | **Section B**<br>5 x 2 = 10 | 10 |
| 3 | **Section A**<br>5 x 6 = 30 | 30 |
| | **TOTAL** | 60 |

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**SUBJECT NAME : MULTIMEDIA AND APPLICATIONS**
**SUB.CODE : 17CSU203**
**SEMESTER : II**
**CLASS : I B.SC CS**

**STAFF NAME: K.YUVARAJ, D.MANJULA**

## LECTURE PLAN

| Sl. No | Lecture Duration Period | Topics to be Covered | Support Material / Page No |
|---|---|---|---|
| | | **UNIT – I** | |
| 1 | 1 | Introduction to multimedia | T1: 1, W1 |
| 2 | 1 | Components of multimedia | T1: 2-4 |
| 3 | 1 | Uses of multimedia | T1: 5-8 |
| 4 | 1 | Cont… uses of multimedia | T1: 9-10 |
| 5 | 1 | multimedia applications | T1: 11-17, W4 |
| 6 | 1 | virtual reality | T1: 11-12 |
| 7 | 1 | **Text:** Fonts & Faces, | T1: 22-24, W1 |
| 8 | 1 | Using Text in Multimedia | T1: 25-39 |
| 9 | 1 | Font Editing & Design Tools -Fontographer | T1: 50-51, W3 |
| 10 | 1 | Font Editing & Design Tools -Making Pretty Text | T1: 52, W3 |
| 11 | 1 | Hypermedia & | T1: 53-57 |
| 12 | 1 | Hypertext | T1: 57-60 |
| 13. | 1 | Recapitulation and Discussion of Important Questions | |
| | | **Total number of Hours planned→13** | |
| | | **UNIT – II** | |
| 1 | 1 | **Images:** Still Images – bitmaps | T1: 70 -82, W1 |
| 2 | 1 | Vector drawing | T1: 80 |
| 3 | 1 | 3D drawing & rendering | T1: 81-83 |
| 4 | 1 | Cont….3D drawing & rendering | T1: 81-83 |
| 5 | 1 | Natural light & colors | T1: 88-91 |
| 6 | 1 | Computerized colors | T1: 91-93 |
| 7 | 1 | Color palettes | T1: 94-96 |
| 8 | 1 | Image file formats | T1: 96-99 |
| 9 | 1 | **Sound:** Digital Audio | T1: 106-108, W1 |
| 10 | 1 | MIDI Audio, | T1: 113-116 |
| 11 | 1 | MIDI vs Digital Audio | T1: 116-119 |
| 12 | 1 | Audio File Formats. | T1: 121-122, W3 |
| 13. | 1 | Recapitulation and Discussion of Important Questions | |
| | | **Total number of Hours planned→13** | |
| | | **UNIT – III** | |
| 1 | 1 | **Video:** How video works | T1: 165, W1 |
| 2 | 1 | Analog video, | T1: 166-167 |

| | | | |
|---|---|---|---|
| 3 | 1 | Digital video | T1: 168-169 |
| 4 | 1 | Video file formats | T1: 178 |
| 5 | 1 | Shooting | T1:181-183 |
| 6 | 1 | Video editing | T1:184-186 |
| 7 | 1 | (Cont….) Video shooting and editing | T1: 187-188 |
| 8 | 1 | **Animation:** Principle of animations | T1: 141,W1 |
| 9 | 1 | (Cont….) Animation techniques | T1: 142-148 |
| 10 | 1 | Animation techniques | T1:142-148, W3 |
| 11 | 1 | Recapitulation and Discussion of Important Questions | |
| **Total number of Hours planned→11** | | | |
| **UNIT – IV** | | | |
| 1 | 1 | **Animation:** animation file formats | T1:149 |
| 2 | 1 | **Internet and Multimedia**: www | T1: 372 |
| 3 | 1 | HTML | T1: 373, W1 |
| 4 | 1 | Multimedia on the web | T1: 374 |
| 5 | 1 | Web servers | T1: 375 |
| 6 | 1 | **6L** web browsers, | T1: 376 |
| 7 | 1 | Webpage makers and site builders. | T1: 377 |
| 8 | 1 | (Cont….) web page makers and site builders. | T1: 377 |
| 9 | 1 | Recapitulation and Discussion of Important Questions | |
| **Total number of Hours planned→09** | | | |
| **UNIT – V** | | | |
| 1 | 1 | **Making Multimedia**: Introduction | T1: 196, W1 |
| 2 | | Stages of a multimedia project | T1: 196, W1 |
| 3 | 1 | Requirements to make good multimedia | T1: 197 |
| 4 | 1 | Multimedia Hardware | T1: 200 |
| 5 | 1 | Macintosh and Windows production Platforms | T1: 201 |
| 6 | 1 | Hardware peripherals | T1: 211 |
| 7 | 1 | Connections, Memory and storage devices | T1:201-210, W3 |
| 8 | 1 | (Cont….) Connections, Memory and storage devices | T1:201-210 |
| 9 | 1 | Multimedia software and Authoring tools. | T1:212-232 |
| 10 | 1 | (Cont….) Multimedia software and Authoring tools. | T1:212-232 |
| 11 | 1 | Recapitulation and Discussion of Important Questions | |
| 12 | 1 | End semester previous question paper | |
| 13 | 1 | End semester previous question paper | |

| | | | |
|---|---|---|---|
| 14 | 1 | End semester previous question paper | |
| **Total Number of Hours planned →14** | | | |
| **Total Number Of Hours Planned for this Course→60** | | | |

**Support Materials (TEXT BOOKS)**

1. Tay Vaughan, 2015, *Multimedia: Making it work*, TMH, Eighth Edition.
2. RalfSteinmetz and KlaraNaharstedt,2012—*Multimedia:Computing, Communications Applications*, Pearson.
3. Keyes, —*Multimedia Handbook*, TMH,2013.
4. K. Andleigh and K. Thakkar, —*Multimedia System Design, PHI*.2016

**WEBSITES**

1. en.wikipedia.org/wiki/Multimedia
2. www.arena-multimedia.com/ -
3. www.nextwavemultimedia.com/
4. http://cpham.perso.univ-pau.fr/ENSEIGNEMENT/PAU-UPPA/RHD/04b-Multimedia.pdf

**UNIT-I**

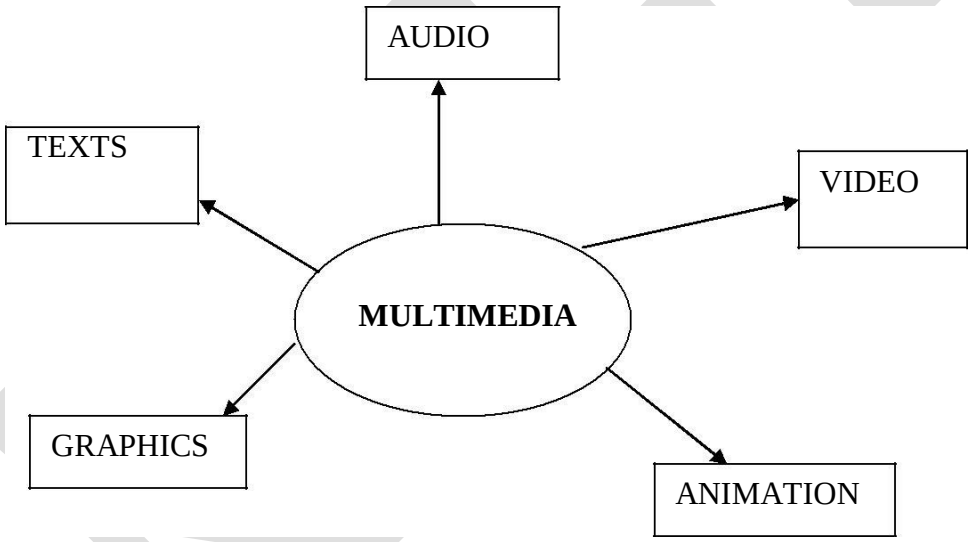
## SYLLABUS

**Multimedia**: Introduction to multimedia, components, uses of multimedia, **6L** multimedia applications, virtual reality. **Text:** Fonts & Faces, Using Text in Multimedia, Font Editing & Design Tools, Hypermedia & Hypertext.

## Multimedia

### Definition of multimedia:

"Multimedia can be defined as the technology engaging a variety of media, including text, audio, video, graphics, and animation, either separately or in combination, using computers, to communicate ideas."




### Components of Multimedia:

**AUDIO:** Speeches, music and other types of sounds. Audio element is generally used to enhance the usual multimedia environment, but in some cases may become more effective than all other media put together.

**TEXT:** The usual text with some difference as compared to the print media. Since computer can display a variety of fonts, beautiful color combinations, and background features in almost all of the multimedia titles, which is far better then the printed text.

**GRAPHICS:** pictures, photographic images and other art works.

**ANIMATION:** the artificial movements of texts or objects, created in visual environments, using specialized software packages. There are 2D and 3D animations. Animation is the most interesting part of multimedia.

**VIDEO:** the actual video clips that could be embedded right over the application and can be played back without a hitch. But the sizes of the clippings are usually much smaller than that from video cassette players.

**Multimedia Definition:**

The use of multiple formats for the presentation of information, including, text, sound, video, images, and animation. Computer-based interactive multimedia includes Hypermedia and hypertext. Multimedia means more than one media.

- Text
- Sound
- Images
- Animation
- Video

**Hypermedia:**

Computer-based system that allows interactive linking of multiple format information including text, sound, video, images, and animation. Allow non-linear traversal.

**Hypertext:**

Non-linear organized and accessed screens of text and static diagrams, images, and tables.

**Multimedia hardware**

- Selection of the proper platform for developing your multimedia project may be based on:
  - Personal preference
  - PC or Macintosh
  - Budget constraints
  - Delivery requirements
  - Type of material and content in the project

**Where to use multimedia**

**Multimedia** is **media** and **content** that uses a combination of different **content forms**. The term can be used as a noun (a medium with multiple content forms) or as an adjective describing a medium as having multiple content forms. The term is used in contrast to media which only use traditional forms of printed or hand-produced material. Multimedia includes a combination of **text**, **audio**, **still images**, **animation**, **video**, and **interactivity** content forms.

## Categorization of multimedia

Multimedia may be broadly divided into **linear** and **non-linear** categories. Linear active content progresses without any navigational control for the viewer such as a **cinema presentation**. Non-linear content offers user **interactivity** to control progress as used with a **computer game** or used in self-paced **computer based training**. **Hypermedia** is an example of non-linear content

Multimedia **presentations** can be live or recorded. A recorded presentation may allow interactivity via a **navigation system**. A live multimedia presentation may allow interactivity via an interaction with the presenter or performer.

## Usage

A presentation using **PowerPoint**. Corporate presentations may combine all forms of media content. **Virtual reality** uses multimedia content. Applications and **delivery platforms** of multimedia are virtually limitless.VVO Multimedia-Terminal in **Dresden** WTC (Germany)Multimedia finds its application in various areas including, but not limited to, **advertisements**, **art**, **education**, **entertainment**, **engineering**, **medicine**, **mathematics**, **business**, scientific research and **spatial temporal applications**. Several Examples are as follows:

## Creative industries

Creative industries use multimedia for a variety of purposes ranging from fine arts, to entertainment, to commercial art, to journalism, to media and software services provided for any of the industries listed below. An individual multimedia designer may cover the spectrum throughout their career. Request for their skills range from technical, to analytical, to creative.

## Commercial

Much of the electronic **old** and **new media** used by commercial artists is multimedia. Exciting presentations are used to grab and keep attention in **advertising**. Business to business, and interoffice communications are often developed by **creative services** firms for advanced multimedia presentations beyond simple slide shows to sell ideas or liven-up training. Commercial multimedia developers may be hired to design for governmental services and nonprofit services applications as well.

## Entertainment and fine arts

In addition, multimedia is heavily used in the entertainment industry, especially to develop special effects in movies and animations. Multimedia games are a popular pastime and are software programs available either as CD-ROMs or online. Some **video games** also use multimedia features. Multimedia applications that allow users to actively participate instead of just sitting by as passive recipients of information are called *Interactive Multimedia*.

## Education

In **Education**, multimedia is used to produce **computer-based training** courses (popularly called CBTs) and reference books like encyclopedia and almanacs. A CBT lets

the user go through a series of presentations, text about a particular topic, and associated illustrations in various information formats. **Edutainment** is an informal term used to describe combining education with entertainment, especially multimedia entertainment.

**Journalism**

Newspaper companies all over are also trying to embrace the new phenomenon by implementing its practices in their work. While some have been slow to come around, other major newspapers like **The New York Times**, **USA Today** and **The Washington Post** are setting the precedent for the positioning of the newspaper industry in a globalized world.

News reporting is not limited to traditional media outlets. Freelance journalists can make use of different new media to produce multimedia pieces for their news stories. It engages global audiences and tells stories with technology, which develops new communication techniques for both media producers and consumers. **Common Language Project** is an example of this type of multimedia journalism production.

**Engineering**

**Software engineers** may use multimedia in **Computer Simulations** for anything from entertainment to **training** such as military or industrial training. Multimedia for **software Interfaces** are often done as collaboration between **creative professionals** and software engineers.

**Industry**

In the **Industrial sector**, multimedia is used as a way to help present information to shareholders, superiors and coworkers. Multimedia is also helpful for providing employee training, advertising and selling products all over the world via virtually unlimited web-based technology

**Mathematical and scientific research**

In **mathematical** and **scientific research**, multimedia is mainly used for modeling and simulation. For example, a **scientist** can look at a **molecular model** of a particular substance and manipulate it to arrive at a new substance. Representative research can be found in journals such as the **Journal of Multimedia**.

**Medicine**

In **Medicine**, **doctors** can get trained by looking at a virtual **surgery** or they can simulate how the **human body** is affected by **diseases** spread by **viruses** and **bacteria** and then develop techniques to prevent it.

**Virtual reality**

- Virtual reality is an artificial environment that is created with software and presented to the user in such a way that the user suspends belief and accepts it as a real environment.
- On a computer, virtual reality is primarily experienced through two of the five senses: **sight and sound.**
- The simplest form of virtual reality is a 3-Dimage that can be explored interactively at a personal computer, usually by manipulating keys or the mouse so that the content of the image moves in some direction or zooms in or out.
- More sophisticated efforts involve such approaches as wrap-around display screens, actual rooms augmented with wearable computers, and hepatics devices that let you feel the display images.

**Virtual reality can be divided into:**

- The simulation of a real environment for training and education.
- The development of an imagined environment for a game or interactive story.

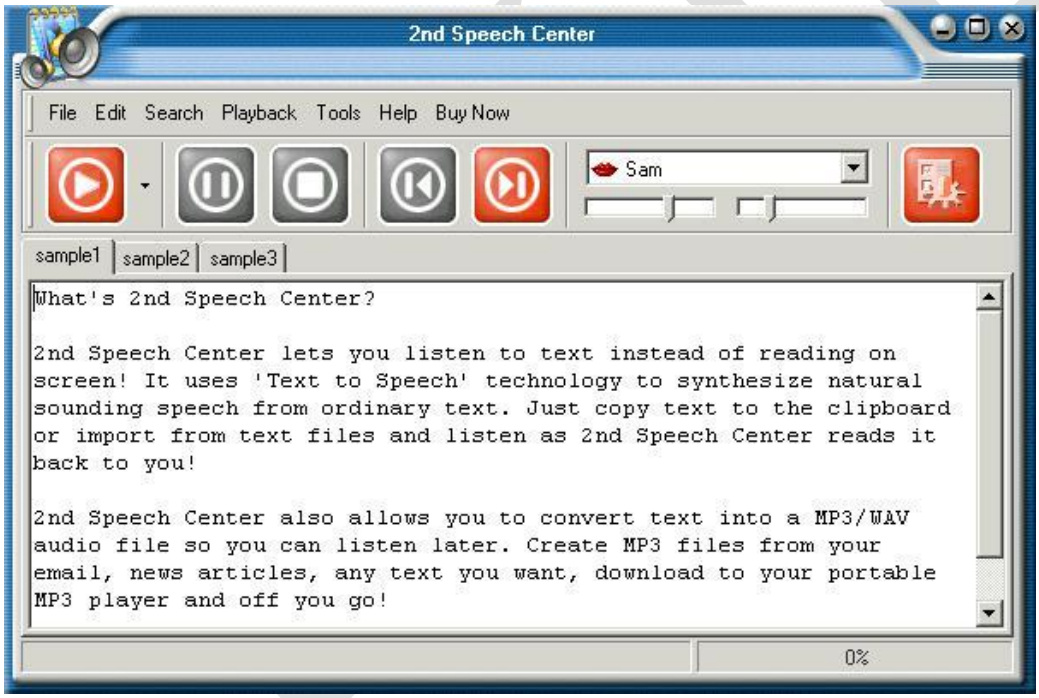
The **Virtual Reality Modeling Language (VRML)** allows the creator to specify images and the rules for their display and interaction using textual language statements.

**Using Text Elements in a Multimedia Presentation**

- The text elements used in multimedia are:
  - Menus for navigation.
  - Interactive buttons.
  - Fields for reading.
  - Portrait vs. Landscape

- HTML documents.
- Symbols and icons.
- Fonts and Faces
- Animating Text

**Menus for Navigation**




**Interactive Buttons**

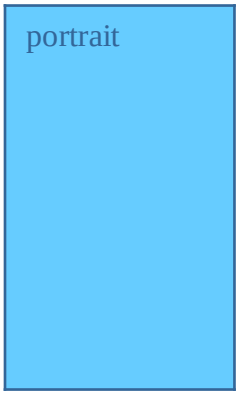
- A button is a clickable object that executes a /command when activated.
- Users can create their own buttons from bitmaps and graphics.
- The design and labeling of the buttons should be treated as an industrial art project.

**Fields for Reading**

- Reading a hard copy is easier and faster than reading from the computer screen.
- A document can be printed in one of two orientations - portrait or landscape.
- The taller-than-wide orientation used for printing documents is called **portrait**.
- The wider-than-tall orientation that is normal to monitors is called **landscape**.

**Portrait vs. Landscape**

- Monitor use wider-than-tall aspect ratios called landscape
- Most books use taller-than- wide orientation, called portrait
- Don‟t try to shrink a full page onto a monitor



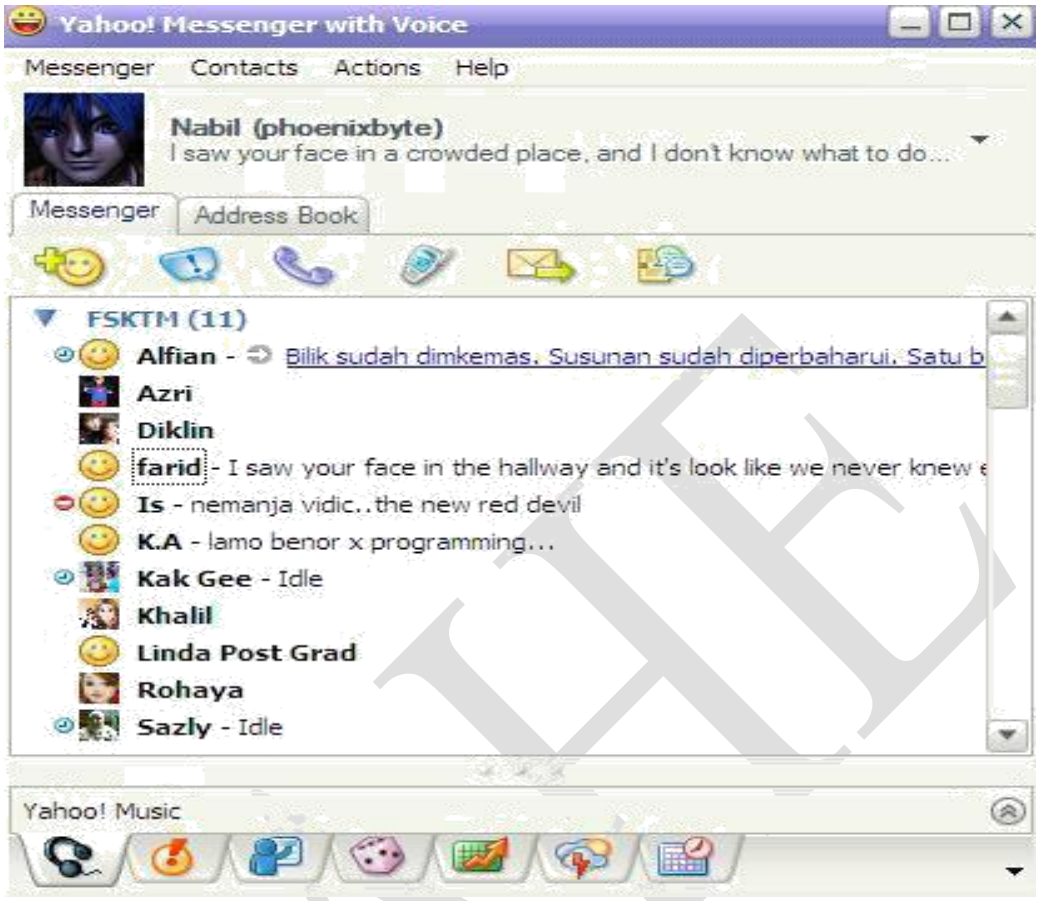


## HTML Documents

- HTML Documents HTML stands for Hypertext Markup Language.
- It is the standard document format used for Web pages.
- HTML documents are marked using tags.
- An advanced form of HTML is DHTML.
- DHTML stands for Dynamic Hypertext Markup Language.
- DHTML uses Cascading Style Sheets (CSS).
- **Some of the commonly used tags are:**
  - The <B> tag for making text bold faced.
  - The <OL> tag for creating an ordered list.
  - The <IMG> tag for inserting images.

## Symbols and Icons

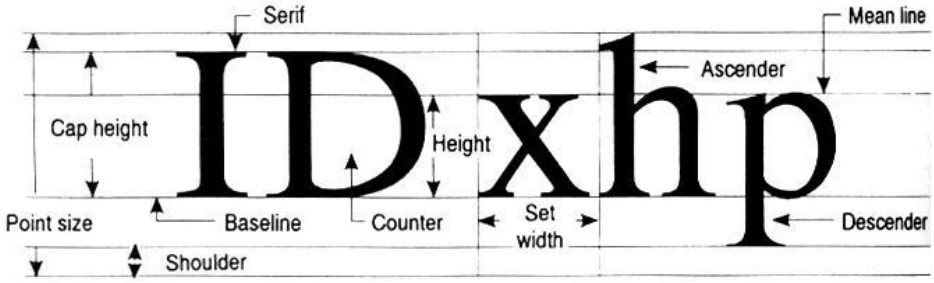
- Symbols are concentrated text in the form of stand-alone graphic constructs.
- They are used to convey meaningful messages.
- Symbols used to convey human emotions are called emoticons.
- Icons are symbolic representations of objects and processes.




## Fonts and Faces

- A typeface is a family of graphic characters that includes many type sizes and styles (such as Times, Arial, Helvetica)
- A font is a collection of characters of a single size and style belonging to a typeface family (such as bold, italic)
- Font sizes are in points 1 point = 1/72 inch
  (measured from top to bottom of descenders in capital letter)
- X-height is the height of the lower case letter x

## Character Metrics



**Factors affecting legibility of text**

- Size.
- Background and foreground color.
- Style.
- Leading (pronounced "ledding").

**Styles**

- Examples of styles are boldface and italic

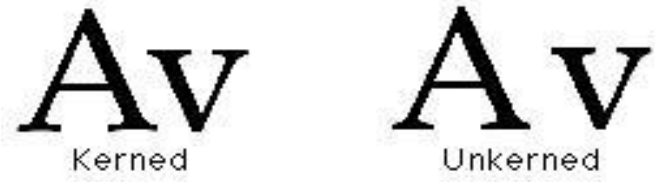
*Italic*
Bold
Underlined

**Leading and Kerning**

Computers can

- adjust the line spacing (called leading)

The space between pairs of letters,
Called kerning




**Fonts and Faces**

- PostScript, TrueType and Master fonts can be altered
- Bitmapped fonts cannot be altered
- The computer draws or rasterizes a letter on the screen with pixels or dots.

**Serif and Sans Serif**

- Type either has a little decoration at the end of the letter - called a serif
- or it doesn"t - sans serif ( "sans" from the French meaning without)
- Examples ( Times - serif "T" )
  ( Arial - sans serif "T")
- Use what is appropriate to convey your message

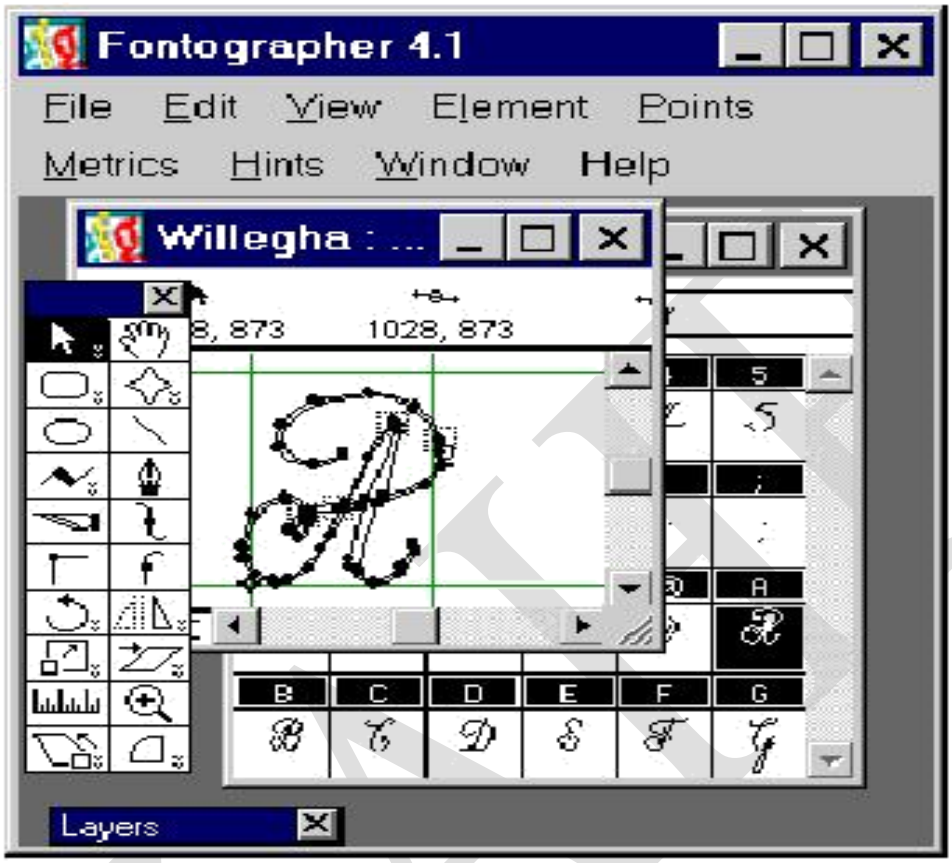
**Animating Text**

- To grab a viewer"s attention:
  - let text "fly" onto screen
  - rotate or spin text, etc.
- Use special effects sparingly or they become boring

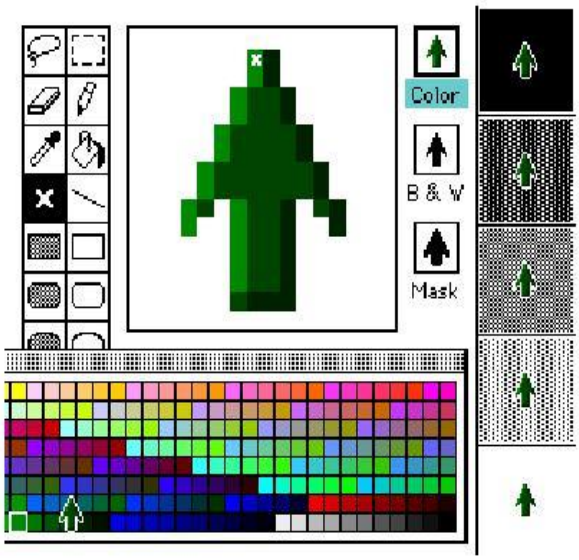
**Fonts Editing and Design Tools**

- Macromedia Fontographer
  - Fontographer is a specialized graphics editor.
  - It is compatible with both Macintosh and Windows platform.

- It can be used to develop PostScript, TrueType, and bitmapped fonts.
- It can also modify existing typefaces and incorporate PostScript artwork.




- ResEdit
  - Introduced by Apple Text to design text as a bitmap image.

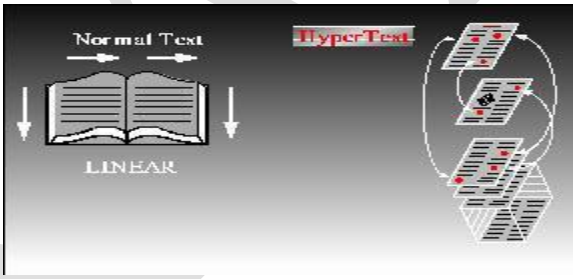


**Creating attractive texts.**

- Applications that are used to enhance texts and images include:
  - Adobe Photoshop
  - Typestyle
  - COOL 3D
  - Hot TEXT
  - Type Caster

**Hypermedia and Hypertext**

- Multimedia - combines text, graphics and audio
- Interactive multimedia - gives user control over what and when content is viewed (non-linear)
- Hypermedia -provides a structure of linked elements through which user navigates and interacts
- Hyper media provides a structure of links
- Hypertext words are linked to other elements
- Hypertext is usually searchable by software robots




**Hypermedia Structures**

- Hypermedia elements are called *nodes*
- Nodes are connected using *links*
- A linked point is called an *anchor*
- Link - connections between conceptual elements (navigation pathways and menus)
- Node - contains text, graphics sounds

- Anchor - the reference from one document to another document, image, sound or file on the web
- Link anchor - where you came from




**Multimedia and Hypertext**

- Hypertext system.
- Using hypertext systems.
- Searching for words.
- Hypermedia structures.
- Hypertext tools.
- Hypertext System
- Hypertext is defined as the organized cross-linking of words, images, and other Web elements.
- A system in which words are keyed or indexed to other words is referred to as a hypertext system.
- A hypertext system enables the user to navigate through text in a non-linear way.

**Using Hypertext Systems**

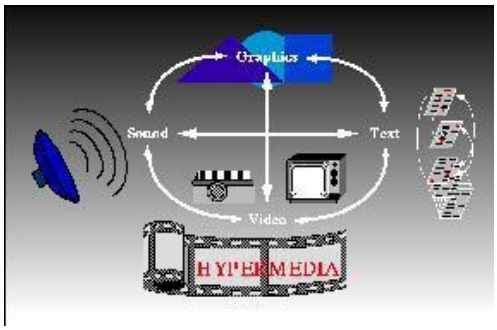
- Information management and hypertext programs present electronic text, images, and other elements in a database fashion.
- Software robots visit Web pages and index entire Web sites.
- Hypertext databases make use of proprietary indexing systems.
- Server-based hypertext and database engines are widely available.

**Searching for Words**

- Typical methods for word searching in hypermedia systems are (cont):
  - Adjacency
    - Words occurring next to one another, usually in phrases or proper names
  - Alternates
    - Applying OR
  - Association
    - Applying AND
- Typical methods for word searching in hypermedia systems are (continued):
  - Negation
    - Applying NOT
  - Truncation
    - Words with its possible suffixes
  - Intermediate words
  - Frequency

**Hypermedia Structures**

- **Anchors.**
  - Anchor is defined as the reference from one document to another document, image, sound, or file on the Web.
  - The source node linked to the anchor is referred to as a link anchor.
  - The destination node linked to the anchor is referred to as a link end.




- **Navigating hypermedia structures.**
  - The simplest way to navigate hypermedia structures is via buttons.
  - Location markers must be provided to make navigation user-friendly.

**Hypertext Tools**

- Two functions common to most hypermedia text management systems are building (authoring) and reading.
- The functions of „builder" are:
  - Creating links.
  - Identifying nodes.
  - Generating an index of words.

## POSSIBLE QUESTIONS

**PART-B(2Marks)**

1. Define multimedia.
2. List out the different types uses in multimedia.
3. List out any four applications of multimedia.
4. Define Hypermedia
5. Define Hypertext

**PART-C (6 Marks)**

1. Discuss about the uses of multimedia with suitable examples.
2. Write in detail about using Text in Multimedia.
3. Write about Font Editing & Design Tools.
4. Explain briefly about the five components of multimedia
5. Explain the following

   i) Hypermedia ii) Hypertext

6. Discuss about the fonts and faces in detail

**KARPAGAM ACADEMY OF HIGHER EDUCATION**

**DEPARTMENT OF COMPUTER SCIENCE, CA & IT**

**I B.Sc CS (Batch 2017-2020)**

**MULTIMEDIA AND ITS APPLICATIONS**

**PART - A OBJECTIVE TYPE/MULTIPLE CHOICE QUESTIONS**

**ONLINE EXAMINATIONS**

**UNIT-1**

| S.No | Questions | Opt 1 | Opt 2 | Opt 3 | Opt 4 | Answer |
|---|---|---|---|---|---|---|
| 1 | ---------- multimedia allows an end user to control what and when the elements are delivered | Hyper media | Interactive Multimedia | Non interactive Multimedia | Non Hypermedia | **Interactive Multimedia** |
| 2 | ---------- is a structure of linked elements through which the user can navigate. | Hyper media | Multimedia | linked list | circular list | **Hyper media** |
| 3 | HTML and DHTML Web pages or sites are generally viewed using a ------ | MS Office | Paint | Browser | Notepad. | **Browser** |
| 4 | Multimedia elements are typically seen together into a project using -------- | Editing Tools | Unauthoring tools | Integrated Tools | Authoring tools | **Authoring tools** |
| 5 | The sum of what gets played back and how it is presented to viewer on a monitor is the ---------- | UML | URL | GUI | GPRS | **GUI** |
| 6 | The hardware and software that govern the limit of what can happen are the multimedia ---------- | Platform | bandwidth | content | storyboard | **Platform** |
| 7 | A browser is used to view -------- - | program code | story boards | fonts | web-based pages & documents | **web-based pages & documents** |
| 8 | CD & DVD ---------- are used for reading and making discs. | Banners | video discs | pictures | authoring tool | **Banners** |
| 9 | PDA stands for ---------- | personal data agency | personal data assistants | principle data agency | principle data assistants | **personal data assistants** |
| 10 | Cell phones and PDA utilize ----- ----- communication technology | GPRS | Internet | Bluetooth | Intranet | **Bluetooth** |

| | | | | | | |
|---|---|---|---|---|---|---|
| 11 | VR stands for ---------- | Virtual reality | visual random | Video raster | video response | **Virtual reality** |
| 12 | VRML stands for ---------- | virtual reality modeling language | visual response modeling language | video raster mode language | video raster modeling language | **virtual reality modeling language** |
| 13 | DVD stands for ---------- | digital versatile disk | digital video disk | digital virtual disk | dynamic versatile disk | **digital versatile disk** |
| 14 | Macintosh is an operating systems developed by ---------- | Windows | Apple | Microsoft | IBM | **Apple** |
| 15 | ---------- file requires no cross platform conversion | Digital | Apple | hexadecimal | decimal | **Apple** |
| 16 | Which of the following is not a stage of multimedia production? | Planning and costing | designing and producing | Marketing | Delivering | **Marketing** |
| 17 | A family of graphic characters that usually include many type sizes and styles is called a ---------- | type face | font | point | link | **type face** |
| 18 | A ---------- is a collection of characters of a single size | Attribute | font | group | link | **font** |
| 19 | Type sizes are usually expressed in ---------- | Font | inches | no of characters | points | **points** |
| 20 | One point is ---------- inch | 0.0138 | 0 .1038 | 0 .0318 | 0 .0381 | **0.0138** |
| 21 | ---------- are general measurements applied to individual characters | Kerning | tracking | character metrics | type face | **character metrics** |
| 22 | ---------- is the spacing between character pairs | leading | kerning | tracking | points | **kerning** |
| 23 | Which of the following term represent the spacing between characters of the text? | Leading | gothic | tracking | trimming | **tracking** |
| 24 | The ---------- is the little decoration at the end of the letter stroke | Serif | sans serif | gothic | arial | **Serif** |
| 25 | Designers call roomy blank areas as ---------- | Blending | white space | gothic | kerning | **white space** |
| 26 | ---------- blends the colors along the edges of the letters to create a soft transition between the letter and its back ground | anti – aliasing | aliasing | anti – aligning | alignment | **anti – aliasing** |

| | | | | | | |
|---|---|---|---|---|---|---|
| 27 | The pages are coded using | HTTP | ASCII | HTML | FTP | **HTML** |
| 28 | The taller-than-wide orientation used for printed document is called ---------- | Portrait | newsscape | netscape | Unicode | **Portrait** |
| 29 | The wider – than –tall orientation normal to monitors is called---------- | Landscape | newsscape | flat file | portrait | **Landscape** |
| 30 | CSS stands for ---------- | cascading sheet styles | cascading style sheets | cascading spread styles | cascading spread sheets | **cascading style sheets** |
| 31 | Which of the following is displayed on a web page after installation of a browser plug-in? | Windows 98 | Macromedia Flash | Photo shop | Power builder | **Macromedia Flash** |
| 32 | WYSIWYG stands for ---------- | what you see is what you get | Where you see is where you go | when you see is when you get | what you see is where you go | **what you see is what you get** |
| 33 | What is ESQ? | enhanced system quality | enhanced screen quality | enhanced software quality | enhanced screen quantity | **enhanced screen quality** |
| 34 | -------- are connections between conceptual elements | Point | node | link | tag | **link** |
| 35 | ---------- text can be link and can navigate through text in non linear way | hyper text | linked text | navigate text | document text | **hyper text** |
| 36 | ---------- is a specialized graphics editor for both Macintosh and Windows platform | texto-grapher | fontographer | post script | true script | **fontographer** |
| 37 | Fontographer is supplied by ---------- | Apple | IBM | Macro media | Microsoft | **Macro media** |
| 38 | Translating or designing multimedia is called ---------- | Specialization | globalization | localization | serilization | **localization** |
| 39 | In Macro media's director, font mapping can be controlled by altering the ----- file. | FONT MAP .BMP | FONT MAP.JPG | FONT MAP . DOC | FONT MAP.TXT | **FONT MAP.TXT** |
| 40 | Substituting a font that is not existed on the target is called ---------- | font replacement | font substitution | font exchange | font – editing | **font substitution** |
| 41 | What is ANSI ? | American national standard institute | American nation standard institute | Advanced national standard institute | Advanced nation standard institute | **American national standard institute** |

| | | | | | | |
|---|---|---|---|---|---|---|
| 42 | Which of the following is not part of multimedia specification | Text | Odors | Sound | Video | **Odors** |
| 43 | ---------- is required to display type 1 post script font at all sizes without jaggies | Adobe tool manager | Adobe type manager | Adobe state manager | Adobe data manger | **Adobe type manager** |
| 44 | Jaggies can be avoided by ------- -- edges of the text characteristics | anti – aliasing | editing | aliasing | filtering | **anti – aliasing** |
| 45 | Hypercard was first introduced in -------- | 1989 | 2000 | 1979 | 1987 | **1987** |
| 46 | DHTML uses ---------- to define choices ranging from line height to margin width to font face. | CCS | CSC | CSS | CCS | **CSS** |
| 47 | Placing an upper case letter in the middle of a word called---------- | midle cap | center cap | inter cap | joint cap | **inter cap** |
| 48 | A file in Macintosh AIF format we get ---------- sound. | Analog | digitized | hyper media | hyperlink | **digitized** |
| 49 | Web sites with rich media require large amount of ---------- | Bandwidth | memory | software tools | software packages | **Bandwidth** |
| 50 | _____is a Animation tool. | Sound forge | Premiere | Flash | Photoshop | **Flash** |
| 51 | _____is a Graphics tool. | Sound forge | Premiere | Flash | Photoshop | **Photoshop** |
| 52 | Nodes are ____ for links to other pages | Anchors | Viewpoint | Images | Transition effect | **Anchors** |
| 53 | _____is an area of memory where data such as text and images is temporarily stored when you cut or copy them within an application | file | directory | clipboard | desktop | **clipboard** |
| 54 | QoS means _____ | Quality of server | Quantity of Service | Quality of Service | Quantity of Server | **Quality of Service** |
| 55 | _____ is a text which contains links to other texts | Hyperimage | Hypermedia | Image | Hypertext | **Hypertext** |
| 56 | _____ fonts work better for visual communication | Sans serif | Serif | Technic | TW | **Sans serif** |

## UNIT- II
## SYLLABUS

**Images:** Still Images – bitmaps, vector drawing, 3D drawing & rendering, natural light & colors, computerized colors, color palettes, image file formats.
**Sound:** Digital Audio, MIDI Audio, MIDI vs Digital Audio, Audio File Formats.

### Still Images

Still images may be small or large, or even full screen. They may be colored, placed at random on the screen, evenly geometric, or oddly shaped.

***Examples:***

A single tree on a wintry hillside; stacked boxes of text against a gray, tartan, or Italian marble background; an engineering drawing; a snapshot of your new car.

Still images are generated by the computer in two ways:

- **bitmaps** (or paint graphics) also be called "raster" images are used for photo-realistic images and for complex drawings requiring fine detail. Bitmap editors are sometimes called "painting" programs.
- **vector-drawn** (or just plain "drawn") graphics are used for lines, boxes, circles, polygons, and other graphic shapes that can be mathematically expressed in angles, coordinates, and distances. Vector editors are sometimes called "drawing" programs.

A drawn object can be filled with color and patterns, can be selected as a single object.

The appearance of both types of images depends on the display resolution and capabilities of computer's graphics hardware and monitor. Both types of images are stored in various file formats and can be translated from one application to another or from one computer platform to another.

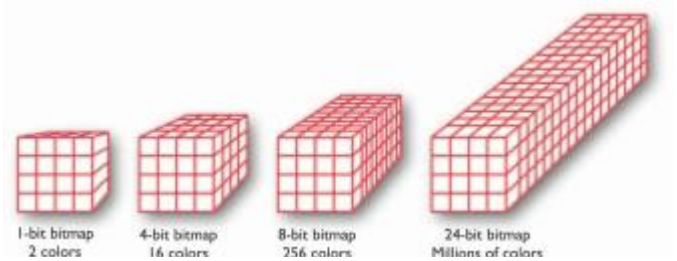
Image files are compressed to save memory and disk space; many bitmap image file formats already use compression within the file itself—for example, **GIF**, **JPEG**, and **PNG**.

Still images may be the most important element of multimedia project or web site.

***Bitmaps***

- A **bit** is the simplest element in the digital world, an electronic digit that is either on or off, black or white, or true (1) or false (0). This is referred to as **binary**, since only two states (on or off) are available.
- A map is a two dimensional matrix of these bits. A bitmap, then, is a simple matrix of the tiny dots that form an image and are displayed on a computer screen or printed.

A one-dimensional matrix (1-bit depth) is used to display monochrome images—a bitmap where each bit is most commonly set to black or white. Depending upon the software, any two colors that represent the on and off (1 or 0) states may be used. More information is required to describe shades of gray or the more than 16 million colors that each picture element might have in a color image, as illustrated in Figure.




These picture elements (known as **pels** or, more commonly, **pixels**) can be either on or off, as in the 1-bit bitmap, or, by using more bits to describe them, can represent varying shades of color

| Bit Depth | Number of Colors Possible | Available Binary Combinations for Describing a Color |
|---|---|---|
| 1-bit | 2 | 0, 1 |
| 2-bit | 4 | 00, 01, 10, 11 |
| 4-bit | 16 | 0000, 0001, 0011, 0111, 1111, 0010, 0100, 1000, 0110, 1100, 1010, 0101, 1110, 1101, 1001, 1011 |

Together, the state of all the pixels on a computer screen make up the image seen by the viewer, whether in combinations of black and white or colored pixels in a line of text, a photograph-like picture, or a simple background pattern.

***Bitmap Sources***

Bitmaps can be created as follows:

- Make a bitmap from scratch with a paint or drawing program.
- Grab a bitmap from an active computer screen with a screen capture program, and then paste it into a paint program or your application.
- Capture a bitmap from a photo or other artwork using a scanner to digitize the image.
- Once made, a bitmap can be copied, altered, e-mailed, and otherwise used in many creative ways.

Bitmaps can also be received from

- Suppliers of clip art,
- Photograph suppliers who already have digitized images.
- Libraries of clip art are available on CD-ROMs and downloadable through online services.
- Many graphics applications are shipped with clip art and useful graphics. A clip art collection may contain a random assortment of images, or it may contain a series of graphics, photographs, sound, and video related to a single topic.

- Some 3-D modeling programs incorporate libraries of pre-made 3-D models into the application, allowing the user to drag and drop common objects into a scene.
- The image bitmap can also download from a web site as : in most browsers right-click over the image to see a menu of options. Choose "Download image to disk," "Copy Image," or "Save picture as…."

Regardless of the source of the image, the user should be aware of the legal issues such as copyright to the image. Legal rights protecting use of images from clip libraries fall into three basic groupings.

- ***Public domain images*** were either never protected by a copyright or their copyright protection has ended. Generally these can be freely used without obtaining permission or paying a license fee, though there still may be an ownership issue for a particular work of art (such as a painting owned by an art gallery).
- ***Royalty-free images*** are purchased and then used without paying additional license fees.
- ***Rights-managed images*** require that user negotiate with the rights holder regarding terms for using the image and how much user will pay for that use.

Regardless of the source, a bitmap, can be manipulated and adjust many of its properties (such as brightness, contrast, color depth, hue, and size). Bitmaps can also be edited using an image-editing program.

***Bitmap Software***

The abilities and features of painting and image-editing programs range from simple to complex. The best programs are available in versions that work the same on both Windows and Mac platforms, and the graphics files you make can be saved in many formats, readable across platforms. Macintosh computers do not ship with a painting tool, and Windows provides only a rudimentary Paint program, so you will need to acquire this very important software separately. Many multimedia authoring tools offer built-in bitmap editing features.
Eg: Director, Adobe's Photoshop,

Many designers also use a vector-based drawing program such as Adobe's Illustrator, CorelDRAW, or InDesign to create curvy and complicated looks that they then convert to a bitmap.

Image editing software can be used to create original images, such as cartoons, symbols, buttons, bitmapped text, and abstract images that have a refined "graphic" look, but it is virtually impossible to create a realistic-looking photo from scratch using an image-editing program.

The artistic painting tools offered by Corel's Painter include hundreds of brushes, sprays, watercolors, inks, and textures to mimic the output of natural media in a bitmap. There are also many open source and free bitmap editors available—just type "graphics editors" in a search engine.

*Capturing and Editing Images*

- The image you see on your monitor is a digital bitmap stored in video memory, updated about every 1/60 of a second.
- The simplest way to capture what you see on the screen at any given moment is to press the proper keys on your computer keyboard. This causes a conversion from the screen buffer to a format that you can use.

- Both the Macintosh and Windows environments have a **clipboard**— an area of memory where data such as text and images is temporarily stored when you cut or copy them within an application. In Windows, when you press print screen, a copy of your screen's image goes to the clipboard. From the clipboard, you can then paste the captured bitmap into an application (such as Paint, which comes with Windows).
- On the Macintosh, the keystroke combination command-shift-3 creates a readable PNG-format file named Picture and places it on your desktop. You can then import this file's image into your multimedia authoring system or paint program. You can also press command control- shift-4 to drag a rectangle on your screen and capture what is inside the rectangle onto the clipboard, ready for pasting.

- The way to get more creative power when manipulating bitmaps is to use an image-editing program.
- In addition to letting you enhance and make composite images, image-editing tools allow you to alter and distort images.
- A color photograph of a red rose can be changed into a purple rose, or blue if you prefer. A small child standing next to her older brother can be "stretched" to tower over him.
- **Morphing** is another effect that can be used to manipulate still images or to create interesting and often bizarre animated transformations. Morphing allows you to smoothly blend two images so that one image seems to melt into the next, often producing some amusing results.

**Scanning Images**

- Everyday objects can be scanned and manipulated using image-editing tools, such as those described in the preceding section, to create unusual, attention-getting effects.

*Eg:* enliven a screen with a gardening motif, scan a mixture of seeds, some fall foliage, or grass-stained garden gloves

- Open the scan in an image-editing program and experiment with different filters, the contrast, and various special effects.
- Another alternative to computer-generated graphics is to create artwork using traditional methods: watercolors, pastels, and even crayons. You can then scan the image, make necessary alterations, and tweak pixels on the computer.
- Powerful filters and plug-ins are offered by most image-editing programs to manipulate bitmaps in many different ways.

**Vector Drawing**

Most multimedia authoring systems provide for use of vector-drawn objects such as lines, rectangles, ovals, polygons, complex drawings created from those objects, and text.

- Computer-aided design (CAD) programs have traditionally used vector-drawn object systems for creating the highly complex and geometric renderings needed by architects and engineers.
- Graphic artists designing for print media use vector-drawn objects because the same mathematics that put a rectangle on your screen can also place that rectangle (or the fancy curves of a good line-art illustration) on paper without jaggies. This requires the higher resolution of the printer, using a page description format such as Portable Document Format (PDF).

- Programs for 3-D animation also use vector-drawn graphics. For example, the various changes of position, rotation, and shading of light required to spin an extruded corporate logo must be calculated mathematically.

*How Vector Drawing Works*

- A **vector** is a line that is described by the location of its two endpoints. Vector drawing uses **Cartesian coordinates** where a pair of numbers describes a point in two-dimensional space as the intersection of horizontal and vertical lines (the x and y axes). The numbers are always listed in the order x,y. In three-dimensional space, a third dimension—depth— is described by a z axis (x,y,z). This coordinate system is named for the French philosopher and mathematician, René Descartes. So a line might be simply

  <line x1="0" y1="0" x2="200" y2="100">

  where x1 and y1 define the starting point (in the upper-left corner of the viewing box) and x2 and y2 define the end point.
- A simple rectangle is computed from starting point and size: software will draw a rectangle (rect) starting at the upper-left corner of viewing area (0,0) and going 200 pixels horizontally to the right and 100 pixels downward to mark the opposite corner. Add color information Like

  <rect x="0" y="0" width="200" height="100" fill="#FFFFFF" stroke="#FF0000"/>

  and the software will draw the rectangle with a red boundary line and fill it with the color white.
- Other parameters can be added to describe a fill pattern or the width of the boundary line. Circles are defined by a location and a radius:

  <circle cx="50" cy="50" r="10" fill="none" stroke="#000000" />

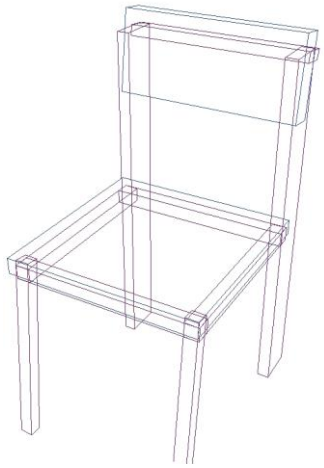
- Type the following code into a text editor and save it as plain text with a .svg extension. This is a **Scalable Vector Graphics** file. Open it in an HTML5-capable browser (File:Open File…):

```
<svg xmlns="http://www.w3.org/2000/svg"
        xmlns:xlink="http://www.w3.org/1999/xlink"
        width="200"
        height="200"
        viewBox="-100 -100 300 300">
        <rect x="0" y="0" fill="yellow" stroke="red" width="200" height="100"/>
        <text transform="matrix(1 0 0 1 60 60)" font-family="'TimesNewRomanPS-
        BoldMT'" font-size="36">SVG</text>
</svg>
```

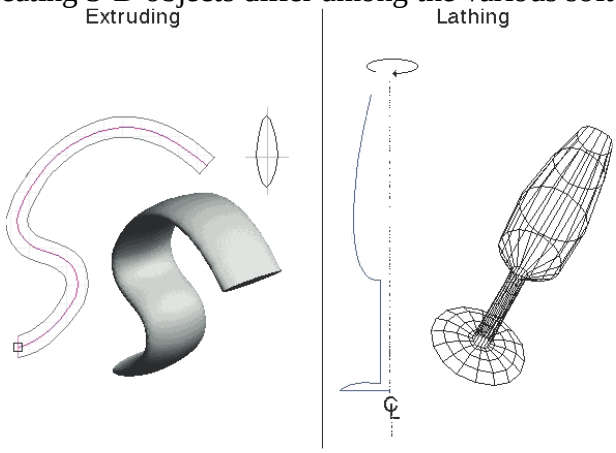
- Because these SVG files can be saved in a small amount of memory and because they are scalable without distortion, SVG (Tiny) is supported by browsers on most mobile phones and PDAs.
- The SVG specification also includes time based changes or animations that can be embedded within the image code

**3-D Drawing and Rendering**

- Creating objects in three dimensions on a computer screen can be difficult for designers comfortable with squares, circles, and other x (width) and y (height) geometries on a two-dimensional screen.
- Dedicated software is available to help you render three-dimensional scenes, complete with directional lighting and special effects, but be prepared for late nights and steep learning curves as you become familiar with nurbs, deformations, mesh generations, and skinning!
- From making 3-D text to creating detailed walkthroughs of 3-D space, each application will demand study and practice before you are efficient and comfortable with its feature set and power.
- The production values of multimedia projects have increased dramatically, and as the production bar has risen, end users' expectations have also ratcheted upward.
- The multimedia production bar moves like a high jump or pole vault contest—as each new project improves on the last, competitors must jump to meet the new, higher standard.
- Flat and colorless 2-D screens are no longer sufficient for a successful commercial multimedia project.
- 3-D-rendered graphic art and animation has become commonplace since the late 1980s, providing more lifelike substance and feel to projects.
- In an arena where only high-powered workstations could supply the raw computing horsepower for effective 3-D designing, inexpensive desktop PCs and excellent software have made 3-D modeling attainable by most multimedia developers.
- To delve deeply into 3-D, the open-source Blender is a powerful tool—but its complex interface presents a steep learning curve.
- For 3-D, the depth (**z dimension**) of cubes and spheres must be calculated and displayed so that the perspective of the rendered object seems correct to the eye.
- A great deal of information is needed to display a 3-D scene. **Scenes** consist of **objects** that in turn contain many small elements such as blocks, cylinders, spheres, or cones (described using mathematical constructs or formulas).
- The more elements contained in an object, the more complicated its structure will be and, usually, the finer its resolution and smoothness.
- Objects and elements in 3-D space carry with them **properties** such as shape, color, texture, shading, and location.
- A scene contains many different objects. Imagine a scene with a table, chairs, and a background. Zoom into one of the objects—the chair, for example, in Figure.



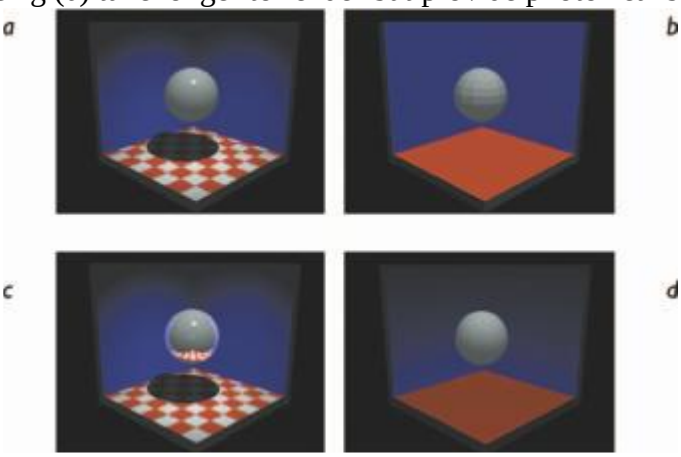
- It has 11 objects made up of various blocks and rectangles. Objects are created by **modeling** them using a 3-D application.
- To model an object that is necessary to place into the scene, at first we should start with a **shape**. A shape can be created from scratch, or can import a previously made shape from a library of geometric shapes called **primitives**, typically blocks, cylinders, spheres, and cones.
- In most 3-D applications, any 2-D shape is created with a drawing tool or place the outline of a letter, then extrude or lathe it into the third dimension along the z axis.
- When a plane surface is **extruded**, its shape extends some distance, either perpendicular to the shape's outline or along a defined path.
- When a shape is **lathed**, a profile of the shape is **rotated** around a defined axis (or set the direction) to create the 3-D object.
- Other methods for creating 3-D objects differ among the various software packages.




- Once a 3-D object can be created, **textures** and colors can be applied to it to make it seem more realistic, whether rough and coarse or shiny and smooth. A color or pattern, or even a bitmapped picture, to texture your object can be applied.

- To model a scene, place all of your objects into 3-D space. Some complex scenes may contain hundreds (if not thousands) of elements. In modeling your scene, can also set up one or more lights that will create diffuse or sharp shades and shadows on objects and will also reflect, or **flare**, where the light is most intense. A background and set a camera view, the location and angle to view the final rendered scene can be included.

**Shading** can usually be applied in several ways. As illustrated in Figure flat shading (*b*) is the fastest for the computer to render and is most often used in preview mode. Gouraud shading (*a*), Phong shading (*d*), and ray tracing (*c*) take longer to render but provide photo-realistic images.




**Rendering** is when the computer finally uses intricate algorithms to apply the effects specified on the objects that was created. Rendering an image requires great computing muscle and often takes many hours for a single image, and the strength (or weakness) of hardware will be felt. Indeed, some multimedia and animation companies dedicate certain computers solely for rendering.

**Color**

- Color is a vital component of multimedia.
- Management of color is both a subjective and a technical exercise.
- Selecting the right colors and combinations of colors for your project can involve many tries until you feel the result is right.
- But the technical description of a color may be expressed in known physical values (humans, for example, perceive colors with wavelengths ranging from 400 to 600 nanometers on the electromagnetic spectrum), and several methods and models describe color space using mathematics and values
- The next few sections explain where color comes from and how colors are displayed on a computer monitor.

**Understanding Natural Light and Color**

- Light comes from an atom when an electron passes from a higher to a lower energy level; thus each atom produces uniquely specific colors. This explanation of light, known as the **quantum theory**, was developed by physicist Max Planck in the late 19th century. Niels Bohr, another physicist, later showed that an excited atom that has absorbed energy and

whose electrons have moved into higher orbits will throw off that energy in the form of quanta, or photons, when it reverts to a stable state. This is where light comes from.

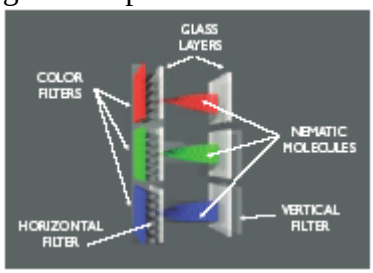
- Color is the frequency of a light wave within the narrow band of the electromagnetic spectrum to which the human eye responds. The letters of the mnemonic **ROY G. BIV**, learned by many of us to remember the colors of the rainbow, are the ascending frequencies of the visible light spectrum: red, orange, yellow, green, blue, indigo, and violet.
- Light that is infrared, or below the frequency of red light and not perceivable by the human eye, can be created and viewed by electronic diodes and sensors, and it is used for TV and VCR remote controls, for wireless communications among computers, and for night goggles used in the military.
- Infrared light is radiated heat. Ultraviolet light, on the other hand, is beyond the higher end of the visible spectrum and can be damaging to humans.
- The color white is a noisy mixture of all the color frequencies in the visible spectrum. Sunlight and fluorescent tubes produce white light; tungsten lamp filaments produce light with a yellowish cast; sodium vapor lamps, typically used for low-cost outdoor street lighting, produce an orange light characteristic of the sodium atom.
- These are the most common sources of light in the everyday (or every night) world.
- The light these sources produce typically reaches eye as a reflection of that light into the lens of human eye.
- The cornea of the eye acts as a lens to focus light rays onto the retina.
- The light rays stimulate many thousands of specialized nerves, called rods, which cover the surface of the retina.
- Receptors in the cones are sensitive to red, green, and blue light, and all the nerves together transmit the pattern of color information to the brain.
- The eye can differentiate among about 80,000 colors, or **hues**, consisting of combinations of red, green, and blue.
- As color information is sent to the brain, other parts of the mind massage the data en route to its point of cognitive recognition.
- Human response to color is complicated by cultural and experiential filters that cause otherwise straightforward color frequencies to carry pleasant, unpleasant, soothing, depressing, and many other special meanings.

**Computerized Color**

- Because the eye's receptors are sensitive to red, green, and blue light, by adjusting combinations of these three colors, the eye and brain will interpolate the combinations of colors in between.
- This is the psychology, not the physics, of color: what you perceive as orange on a computer monitor is a combination of two frequencies of green and red light, not the actual spectral frequency you see when you look at that namesake fruit, an orange, in sunlight.
- Although the eye perceives colors based upon red, green, and blue, there are actually two basic methods of making color:
  - Additive
  - Subtractive

*Additive Color*

- In the **additive color** method, a color is created by combining colored light sources in three primary colors: red, green, and blue (**RGB**).
- This is the process used for cathode ray tube (CRT), liquid crystal (LCD), and plasma displays.
- On the back of the glass face of a CRT are thousands of phosphorescing chemical dots.
- These dots are each about 0.30mm or less in diameter (the **dot pitch**), and are positioned very carefully and very close together, arranged in triads of red, green, and blue. These dots are bombarded by electrons that "paint" the screen at high speeds (about 60 times a second).
- The red, green, and blue dots light up when hit by the electron beam.
- Human eye sees the combination of red, green, and blue light and interpolates it to create all other colors.
- Like CRTs, LCD and plasma screens utilize tiny red, green, and blue elements energized through tiny transparent conductors and organized in a Cartesian grid as illustrated by Marvin Raaijmakers and Angelo La Spina:




*Subtractive Color*

- In the **subtractive color** method, color is created by combining colored media such as paints or ink that absorb (or subtract) some parts of the color spectrum of light and reflect the others back to the eye.
- Subtractive color is the process used to create color in printing.
- The printed page is made up of tiny halftone dots of three primary colors: cyan, magenta, and yellow (designated as CMY).
- Four-color printing includes black (which is technically not a color but, rather, the absence of color).
- Since the letter B is already used for blue, black is designated with a K (so four-color printing is designated as **CMYK**).
- The color remaining in the reflected part of the light that reaches your eye from the printed page is the color you perceive.
- All these factors make computerized color pretty tricky to manage.
- The fact that a paint program uses RGB to create the colors on your monitor, while your printer uses CMYK to print out your image, explains the problem of matching what you see on the screen with printout.
- High end image-editing programs such as Photoshop deal with this problem by allowing user to calibrate monitor with printer.
- The following chart shows the three primary additive colors and how, when one of the primary colors is subtracted from this RGB mix, the subtractive primary color is perceived.

The numbers in parentheses indicate the amount of red, green, and blue (in that order) used to create each of the colors in 24-bit color.

- A zero indicates a lack of that primary color, while 255 is the maximum amount of that color.

| RGB Combination (R,G,B) | Perceived Color |
|---|---|
| Red only (255,0,0) | Red |
| Green only (0,255,0) | Green |
| Blue only (0,0,255) | Blue |
| Red and green (blue subtracted) (255,255,0) | Yellow |
| Red and blue (green subtracted) (255,0,255) | Magenta |
| Green and blue (red subtracted) (0,255,255) | Cyan |
| Red, green, and blue (255,255,255) | White |
| None (0,0,0) | Black |

*Computer Color Models*

- Models or methodologies used to specify colors in computer terms are RGB, **HSB**, **HSL**, CMYK, **CIE**, and others.
- Using the 24-bit RGB (red, green, blue) model, you specify a color by setting each amount of red, green, and blue to a value in a range of 256 choices, from 0 to 255.
- Eight bits of memory are required to define those 256 possible choices, and that has to be done for each of the three primary colors; a total of 24 bits of memory (8 + 8 + 8 = 24) are therefore needed to describe the exact color, which is one of "millions" (256 □□256 □□256 = 16,777,216).
- Rather than using one number between 0 and 255, two **hexadecimal** numbers, written in a scale of 16 numbers and letters in the range "0123456789ABCDEF" represent the required 8 bits (16 □□16 = 256) needed to specify the intensity of red, green, and blue.
- Thus, in HTML, you can specify pure green as #00FF00. The number sign (#) specifies the value as hexadecimal.

| Red | Green | Blue | Color |
|---|---|---|---|
| 255 (#FF) | 255 (#FF) | 255 (#FF) | White (#FFFFFF) |
| 255 (#FF) | 255 (#FF) | 0 (#00) | Yellow (#FFFF00) |
| 255 (#FF) | 0 (#00) | 255 (#FF) | Magenta (#FF00FF) |
| 0 (#00) | 255 (#FF) | 255 (#FF) | Cyan (#00FFFF) |
| 255 (#FF) | 0 (#00) | 0 (#00) | Red (#FF0000) |
| 0 (#00) | 255 (#FF) | 0 (#00) | Green (#00FF00) |
| 0 (#00) | 0 (#00) | 255 (#FF) | Blue (#0000FF) |
| 0 (#00) | 0 (#00) | 0 (#00) | Black (#000000) |

- In the HSB (hue, saturation, brightness) and HSL (hue, saturation, lightness) models, you specify hue or color as an angle from 0 to 360 degrees on a color wheel, and saturation, brightness, and lightness as percentages.
- Saturation is the intensity of a color.

- At 100 percent saturation a color is pure; at 0 percent saturation, the color is white, black, or gray.
- Lightness or brightness is the percentage of black or white that is mixed with a color. A lightness of 100 percent will yield a white color; 0 percent is black; the pure color has a 50 percent lightness.
- The CMYK color model is less applicable to multimedia production. It is used primarily in the printing trade where cyan, magenta, yellow, and black are used to print process color separations.

| Color | Degrees |
|---|---|
| Red | 0° |
| Yellow | 60° |
| Green | 120° |
| Cyan | 180° |
| Blue | 240° |
| Magenta | 300° |

- Other color models include CIE, **YIQ**, **YUV**, and **YCC**. CIE describes color values in terms of zrequency, saturation, and illuminance. CIE more closely resembles how human beings perceive color, but certain devices such as scanners are unable to replicate the process.
- YIQ and YUV were developed for broadcast TV. They are based on luminance and chrominance expressed as the amplitude of a wave and the phase of the wave relative to some reference.
- Detail is carried by luminance (black and white), so reduction in color does not result in the loss of image definition detail.
- This analog process can be translated to a number value so that the computer can use a palette to assign a color to a pixel.
- The Photo YCC model has been developed by Kodak to provide a definition that enables consistent representation of digital color images from negatives, slides, and other high-quality input. YCC is used for PhotoCD images.

**Color Palettes**

**Palettes** are mathematical tables that define the color of a pixel displayed on the screen. The most common palettes are 1, 4, 8, 16, and 24 bits deep:

| Color Depth | Colors Available |
|---|---|
| 1-bit | Black and white (or any two colors) |
| 4-bit | 16 colors |
| 8-bit | 256 colors (good enough for color images) |
| 16-bit | Thousands of colors (65,536; excellent for color images) |
| 24-bit | More than 16 million colors (16,777,216; totally photo-realistic) |

When color monitors became available for computers, managing the computations for displaying colors severely taxed the hardware and memory available at the time. 256-color, 8-bit images using a color lookup table or palette were the best a computer could do. 256 default system

colors were statistically selected by Apple and Microsoft engineers (working independently) to be the colors and shades that are most "popular" in photographic images; their two system palettes are, of course, different.

Web authorities also decided on a palette of 216 "web-safe" colors that would allow browsers to display images properly on both Macintosh and Windows computers.
GIF files using 256-color palettes are saved in a lossless format. The PNG format also uses palettes (24-bits or 32 bits if an "alpha" mask is included for transparency), and is lossless. It was developed for the Internet (it supports only the RGB color space) to expand GIF's limited 256 colors to millions of colors.

In 24-bit color systems, your computer works with three channels of 256 discrete shades of each color (red, green, and blue) represented as the three axes of a cube. This allows a total of 16,777,216 colors (256 *256 *□256).

*Dithering*

- Dithering is a process whereby the color value of each pixel is changed to the closest matching color value in the target palette, using a mathematical algorithm.
- Dithering concepts are important to understand when working with bitmaps derived from RGB information or based upon different palettes.
- Software's use a dithering algorithm to find the 256 color shades that best represent both images, generating a new palette in the process.
- Dithering software is usually built into image-editing programs and is also available in many multimedia authoring systems as part of the application's palette management suite of tools.

**Image File Formats**

- Most applications on any operating system can manage JPEG, GIF, PNG, and TIFF image formats.
- An older format used on the Macintosh, **PICT**, is a complicated but versatile format developed by Apple where both bitmaps and vector-drawn objects can live side by side.
- The **device-independent bitmap (DIB)**, also known as a **BMP**, is a common Windows palette–based image file format similar to PNG.
- **PCX** files were originally developed for use in Z-Soft MS-DOS paint packages; these files can be opened and saved by almost all MS-DOS paint software and desktop publishing software.
- **TIFF**, or Tagged Interchange File Format, was designed to be a universal bitmapped image format and is also used extensively in desktop publishing packages.
- Often, applications use a proprietary file format to store their images.
- Adobe creates a PSD file for Photoshop and an AI file for Illustrator; Corel creates a CDR file.
- **DXF** was developed by AutoDesk as an ASCII-based drawing interchange file for AutoCAD, but the format is used today by many computer-aided design applications.
- **IGS** (or **IGES**, for **Initial Graphics Exchange Standard**) was developed by an industry committee as a broader standard for transferring CAD drawings.

- These formats are also used in 3-D rendering and animation programs. JPEG, PNG, and GIF images are the most common bitmap formats used on the Web and may be considered cross-platform, as all browsers will display them.
- Adobe's popular PDF (Portable Document File) file manages both bitmaps and drawn art, and is commonly used to deliver a "finished product" that contains multiple assets.

**SOUND**

- Sound perhaps the most sensuous element of multimedia.
- It is meaningful "speech" in any language, from a whisper to a scream.
- It can provide the listening pleasure of music, the startling accent of special effects, or the ambience of a mood-setting background.

*The Power of Sound*

When something vibrates in the air by moving back and forth (such as the cone of a loudspeaker), it creates waves of pressure. These waves spread like the ripples from a pebble tossed into a still pool, and when they reach your eardrums, you experience the changes of pressure, or vibrations, as sound. In air, the ripples propagate at about 750 miles per hour, or Mach 1 at sea level.

Sound waves vary in sound pressure level (amplitude) and in frequency or pitch. Many sound waves mixed together form an audio sea of symphonic music, speech, or just plain noise.

**Acoustics** is the branch of physics that studies sound. Sound pressure levels (loudness or volume) are measured in **decibels (dB)**; a decibel measurement is actually the ratio between a chosen reference point on a logarithmic scale and the level that is actually experienced. A logarithmic scale (seen below) makes sense because humans perceive sound pressure levels over an extraordinarily broad dynamic range.

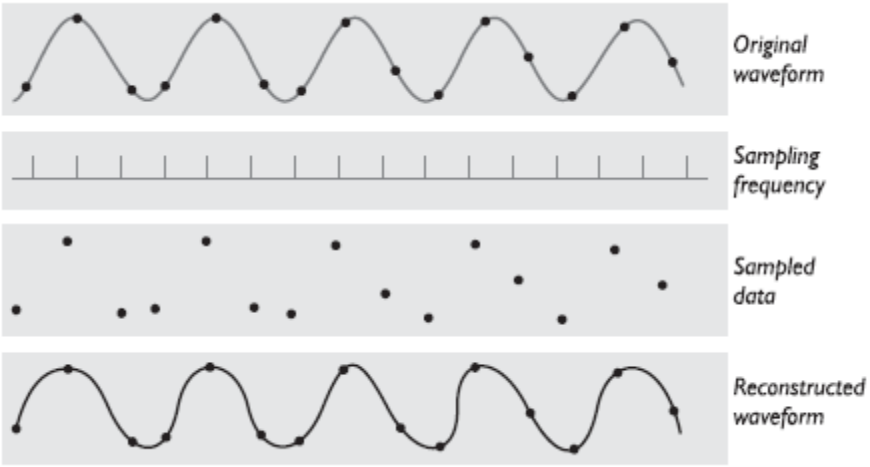
| dB | Watts | Example |
|---|---|---|
| 195 | 25–40 million | Saturn rocket |
| 170 | 100,000 | Jet engine with afterburner |
| 160 | 10,000 | Turbojet engine at 7,000-pounds thrust |
| 150 | 1,000 | ALSETEX splinterless stun grenade |
| 140 | 100 | 2 JBL2226 speakers pulling 2,400 watts inside an automobile |
| 130 | 10 | 75-piece orchestra, at fortissimo |
| 120 | 1 | Large chipping hammer |
| 110 | 0.1 | Riveting machine |
| 100 | 0.01 | Automobile on highway |
| 90 | 0.001 | Subway train; a shouting voice |
| 80 | 0.0001 | Inside a 1952 Corvette at 60 mph |
| 70 | 0.00001 | Voice conversation; freight train 100 feet away |
| 60 | 0.000001 | Large department store |
| 50 | 0.0000001 | Average residence or small business office |
| 40 | 0.00000001 | Residential areas of Chicago at night |
| 30 | 0.000000001 | Very soft whisper |
| 20 | 0.0000000001 | Sound studio |

- Sound is energy, just like the waves breaking on a sandy beach, and too much volume can permanently damage the delicate receiving mechanisms behind users eardrums, typically dulling users hearing in the 6 kHz range.
- In terms of volume, what you hear subjectively is not what you hear objectively. The perception of loudness is dependent upon the frequency or pitch of the sound: at low frequencies, more power is required to deliver the same perceived loudness as for a sound at the middle or higher frequency ranges. User may feel the sound more than hear it.
- Human hearing is less able to identify the location from which lower frequencies are generated. In surround sound systems, subwoofers can be placed wherever their energy is most efficiently radiated (often in a corner), but midrange speakers should be carefully placed.
- There is a great deal more to acoustics than just volume and pitch.

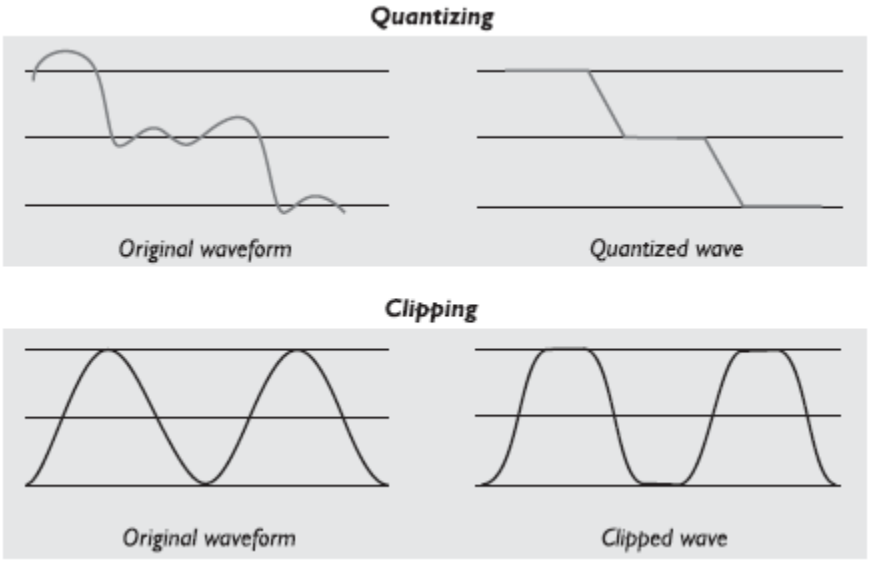
**Digital Audio**

- **Digital audio** is created when you represent the characteristics of a sound wave using numbers—a process referred to as digitizing.
- Sound from a microphone, a synthesizer, existing recordings, live radio and television broadcasts, and popular CD and DVDs can be digitized.
- In fact, sounds can be digitized from any natural or prerecorded source. Digitized sound is sampled sound.

- E very *n*th fraction of a second, a **sample** of sound is taken and stored as digital information in bits and bytes.
- The quality of this digital recording depends upon how often the samples are taken (**sampling rate** or frequency, measured in kilohertz, or thousands of samples per second) and how many numbers are used to represent the value of each sample (**bit depth**, **sample size**, resolution, or dynamic range).
- The more often user take a sample and the more data stored about that sample, the finer the resolution and quality of the captured sound when it is played back.
- Since the quality of audio is based on the quality of r recording and not the device on which end user will play the audio, digital audio is said to be **device independent**.
- The three sampling rates most often used in multimedia are 44.1 kHz (**CD-quality**), 22.05 kHz, and 11.025 kHz.
- Sample sizes are either 8 bits or 16 bits. The larger the sample size, the more accurately the data will describe the recorded sound. An 8-bit sample size provides 256 equal measurement units to describe the level and frequency of the sound in that slice of time. A 16-bit sample size, on the other hand, provides a staggering 65,536 equal units to describe the sound in that same slice of time.
- As shown in Figure, slices of analog waveforms are sampled at various frequencies, and each discrete sample is then stored either as 8 bits or 16 bits (or more) of data.




- The value of each sample is rounded off to the nearest integer (quantization), and if the amplitude is greater than the intervals available, clipping of the top and bottom of the wave occurs.
- Quantization can produce an unwanted background hissing noise, and clipping may severely distort the sound.




**Making Digital Audio Files**

Making digital audio files is fairly straightforward on most computers. Two crucial aspects of preparing digital audio files should be focused:

- Balancing the need for sound quality against file size. Higher quality usually means larger files, requiring longer download times on the Internet and more storage space on a CD or DVD.
- Setting proper recording levels to get a good, clean recording.

*Setting Proper Recording Levels*

- A distorted recording sounds terrible. If the signal fed into computer is too "hot" to handle, the result will be an unpleasant crackling or background ripping noise. Conversely, recordings that are made at too low a level are often unusable because the amount of sound recorded does not sufficiently exceed the residual noise levels of the recording process itself.
- The trick is to set the right levels during recording.
- Any good piece of digital audio recording and editing software will display digital meters to let users know how loud the sound is.
- Watch the meters closely during recording, and user will never have a problem.
- Unlike analog meters that usually have a 0 setting somewhere in the middle and extend up into ranges like +5, +8, or even higher, digital meters peak out.
- To avoid distortion, do not cross over this limit. If this happens, lower the volume and try again.
- Try to keep peak levels between –3 and –10. Any time the sound goes over the peak, whether user can hear it or not, distortion into the recording is introduced.
- In digital meter displays, if red color is seen, the sound is over the peak.

*Editing Digital Recordings*

Once a recording has been made, it will almost certainly need to be edited. With sound editing tool user can create sound tracks and digital mixes. The basic sound editing operations that most multimedia producers need are described as follows.

- ✓ **Trimming** Removing "dead air" or blank space from the front of a recording and any unnecessary extra time off the end is first sound editing task. Trimming even a few seconds here and there might make a big difference in file size. Trimming is typically accomplished by dragging the mouse cursor over a graphic representation of recording and choosing a menu command such as Cut, Clear, Erase, or Silence.

- ✓ **Splicing and Assembly** Using the same tools mentioned for trimming, user will probably want to remove the extraneous noises that inevitably creep into a recording. Even the most controlled studio voice-overs require touch-up. Also, user may need to assemble longer recordings by cutting and pasting together many shorter ones. In the old days, this was done by splicing and assembling actual pieces of magnetic tape.
- ✓ **Volume Adjustments** When trying to assemble ten different recordings into a single sound track, there is little chance that all the segments will have the same volume. To provide a consistent volume level, select all the data in the file, and raise or lower the overall volume by a certain amount. Don't increase the volume too much, or the file might be distorted. It is best to use a sound editor to **normalize** the assembled audio file to a particular level, say 80 percent to 90 percent of maximum (without clipping), or about –16 dB. Without normalizing to this rule-of-thumb level, final sound track might play too softly or too loudly. Even pros can leave out this important step. Sometimes an audio CD just doesn't seem to have the same loudness as the last one you played, or it is too loud and you can hear clipping.
- ✓ **Format Conversion** In some cases, digital audio editing software might read a format different from the one read by the presentation or authoring program. Most sound editing software will save files in choice of many formats, most of which can be read and imported by multimedia authoring systems. Data may be lost when converting formats. For example, a Digital Rights Management (DRM)–protected M4P file downloaded from the iTunes store and burn that file to an Audio CD track, the DRM data will be lost because the Audio CD format does not provide for DRM data. The now-unprotected tune on the CD can then be ripped into a playable **MP3** format.
- ✓ **Resampling or Downsampling** If the sounds are recorded and edited at 16-bit sampling rates but are using lower rates and resolutions in the project, **resample** or **downsample** the file should be done. The software will examine the existing digital recording and work through it to reduce the number of samples. This process may save considerable disk space.
- ✓ **Fade-ins and Fade-outs** Most programs offer enveloping capability, useful for long sections that fade in or fade out gradually. This enveloping helps to smooth out the very beginning and the very end of a sound file.
- ✓ **Equalization** Some programs offer **digital equalization (EQ)** capabilities that allow to modify a recording's frequency content so that it sounds brighter (more high frequencies) or darker (low, ominous rumbles).
- ✓ **Time Stretching** Advanced programs let to alter the length (in time) of a sound file without changing its pitch. This feature can be very useful, but watch out: most **time-stretching** algorithms will severely degrade the audio quality of the file if the length is altered more than a few percent in either direction.
- ✓ **Digital Signal Processing (DSP)** Some programs allow to process the signal with reverberation, multitap delay, chorus, flange, and other special effects using **digital signal processing (DSP)** routines. Being able to process a sound source with effects can greatly add

to a project. To create an environment by placing the sound inside a room, a hall, or even a cathedral can bring depth and dimension to a project. But a little can go a long way—do not overdo the sound effects!

- ✓ **Reversing Sounds** Another simple manipulation is to reverse all or a portion of a digital audio recording. Sounds, particularly spoken dialog, can produce a surreal, otherworldly effect when played backward.
- ✓ **Multiple Tracks** Being able to edit and combine multiple tracks (for sound effects, voice-overs, music, etc.) and then merge the tracks and export them in a "final mix" to a single audio file is important.

***File Size vs. Quality***

- The sampling rate determines the frequency at which samples will be taken for the recording. Sampling at higher rates (such as 44.1 kHz or 22.05 kHz) more accurately captures the high-frequency content of sound. Audio resolution (such as 8- or 16-bit) determines the accuracy with which a sound can be digitized. Using more bits for the sample size yields a recording that sounds more like its original.
- Stereo recordings are more lifelike and realistic because human beings have two ears. Mono recordings are fine but tend to sound a bit "flat" and uninteresting when compared with stereo recordings. Logically, to record stereo you need two microphones (left and right), and the sound file generated will require twice as much storage space as the mono file for the same length of play time.
- Audiophiles (listeners seriously interested in perfect sound reproduction) have driven a small market for very high-end equipment that can play back SACD (Super Audio CD) or DVD-Audio formats written on special audio-only DVDs that require dedicated players and a system with as many as five full-frequency speakers and a subwoofer.
- This sound is typically sampled at a depth of 24 bits and frequency of 96 kHz.
- Here are the formulas for determining the size (in bytes) of a digital recording. For a monophonic recording:

  sampling rate* duration of recording in seconds * (bit resolution / 8) * 1
- For a stereo recording:

  sampling rate * duration of recording in seconds * (bit resolution / 8) * 2

**MIDI Audio**

- **MIDI** (Musical Instrument Digital Interface) is a communications standard developed in the early 1980s for electronic musical instruments and manufacturers to communicate with each other by sending messages along cables connected to the devices.
- MIDI provides a protocol for passing detailed descriptions of a musical score, such as the notes, the sequences of notes, and the instrument that will play these notes.
- But MIDI data is not digitized sound; it is a shorthand representation of music stored in numeric form.
- Digital audio is a recording, MIDI is a score—the first depends on the capabilities of your sound system, the other on the quality of your musical instruments *and* the capabilities of your sound system.
- A MIDI file is a list of time-stamped commands that are recordings of musical actions (the pressing down of a piano key or a sustain pedal, for example, or the movement of a control wheel or slider).

- When sent to a MIDI playback device, this results in sound.
- A concise MIDI message can cause a complex sound or sequence of sounds to play on an instrument or synthesizer; so MIDI files tend to be significantly smaller (per second of sound delivered to the user) than equivalent digitized waveform files.
- Composing own original score can be one of the most creative and rewarding aspects of building a multimedia project, and MIDI is the quickest, easiest, and most flexible tool for this task. Yet creating an original MIDI score is hard work.
- The process of creating MIDI music is quite different from digitizing existing recorded audio. If you think of digitized audio as analogous to a bitmapped graphic image, then MIDI is analogous to structured or vector graphics.
- For digitized audio you simply play the audio through a computer or device that can digitally record the sound.
- To make MIDI scores, however, you will need **notation software**, **sequencer software**, and a **sound synthesizer**.
- A **MIDI keyboard** is also useful for simplifying the creation of musical scores.
- Rather than recording the sound of a note, MIDI software creates data about each note as it is played on a MIDI keyboard (or another MIDI device)—which note it is, how much pressure was used on the keyboard to play the note, how long it was sustained, and how long it takes for the note to decay or fade away, for example.
- This information, when played back through a MIDI device, allows the note to be reproduced exactly.
- Because the quality of the playback depends upon the end user's MIDI device rather than the recording, MIDI is **device dependent**.
- The sequencer software quantizes your score to adjust for timing inconsistencies (a great feature for those who can't keep the beat), and it may also print a neatly penned copy of your score to paper.
- ***Advantage*** of structured data such as MIDI is the ease with to edit the data. Eg: Let's say you have a piece of music being played on a honky-tonk piano, but your client decides he wants the sound of a soprano saxophone instead. If you had the music in digitized audio, you would have to re-record and redigitize the music. When it is in MIDI data, however, there is a value that designates the instrument to be used for playing back the music.
- To change instruments, just change that value.
- Instruments that you can synthesize are identified by a **General MIDI** numbering system that ranges from 0 to 127.
- Until this system came along, there was always a risk that a MIDI file originally composed with, say, piano, electric guitar, and bass, might be played back with piccolo, tambourine, and glockenspiel if the ID numbers were not precisely mapped to match the original hardware setup. This was usually the case when you played a MIDI file on a MIDI configuration different from the one that recorded the file.

| ID | Sound | ID | Sound |
|---|---|---|---|
| 0 | Acoustic grand piano | 16 | Hammond organ |
| 1 | Bright acoustic piano | 17 | Percussive organ |
| 2 | Electric grand piano | 18 | Rock organ |
| 3 | Honky-tonk piano | 19 | Church organ |
| 4 | Rhodes piano | 20 | Reed organ |
| 5 | Chorused piano | 21 | Accordion |
| 6 | Harpsichord | 22 | Harmonica |
| 7 | Clarinet | 23 | Tango accordion |
| 8 | Celesta | 24 | Acoustic guitar (nylon) |
| 9 | Glockenspiel | 25 | Acoustic guitar (steel) |
| 10 | Music box | 26 | Electric guitar (jazz) |
| 11 | Vibraphone | 27 | Electric guitar (clean) |
| 12 | Marimba | 28 | Electric guitar (muted) |
| 13 | Xylophone | 29 | Overdriven guitar |
| 14 | Tubular bells | 30 | Distortion guitar |
| 15 | Dulcimer | 31 | Guitar harmonics |

- MIDI data can also describe the **envelope** of the sound: the **attack** (how quickly a sound's volume increases), the **sustain** (how long the sound continues), and the **decay** (how quickly the sound fades away).

**MIDI vs. Digital Audio**

- In contrast to MIDI data, digital audio data is the actual representation of a sound, stored in the form of thousands of individual numbers *(samples).*
- The digital data represents the instantaneous amplitude (or loudness) of a sound at discrete slices of time. MIDI data is to digital audio data what vector or drawn graphics are to bitmapped graphics. That is, MIDI data is device dependent; digital data is not. Just as the appearance of vector graphics differs depending on the printer device or display screen, the sounds produced by MIDI music files depend on the particular MIDI device used for playback. Similarly, a roll of perforated player-piano score played on a concert grand would sound different than if played on a honky-tonk piano.
- Digital data, on the other hand, produces sounds that are more or less identical regardless of the playback system. The MIDI standard lets instruments communicate in a well-understood language.

***Advantages over Digital Sound***:

- MIDI files are much more compact than digital audio files, and the size of a MIDI file is completely independent of playback quality. In general, MIDI files will be 200 to 1,000 times smaller than CD-quality digital audio files. Because MIDI files are small, they don't take up as much memory, disk space, or bandwidth.
- Because they are small, MIDI files embedded in web pages load and play more quickly than their digital equivalents.
- In some cases, if the MIDI sound source you are using is of high quality, MIDI files may sound better than digital audio files.

- You can change the length of a MIDI file (by varying its tempo) without changing the pitch of the music or degrading the audio quality.
- MIDI data is completely editable—right down to the level of an individual note. You can manipulate the smallest detail of a MIDI composition (often with sub millisecond accuracy) in ways that are impossible with digital audio.
- Because they represent the pitch and length of notes, MIDI files can generally be converted to musical notation, and vice versa. This is useful when you need a printed score; in reverse, you can scan a printed score and convert it to MIDI for tweaking and editing.

***Disadvantages over Digital Sound***

- Because MIDI data does not represent sound but musical instruments, you can be certain that playback will be accurate only if the MIDI playback device is identical to the device used for production. Imagine the emotional humming chorus from *Madame Butterfly* sung by a chorus of Budweiser frogs—same score, wrong instrument. Even with the General MIDI standard, the sound of a MIDI instrument varies according to the electronics of the playback device and the sound generation method it uses.
- Also, MIDI cannot easily be used to play back spoken dialog, although expensive and technically tricky digital samplers are available.

In general, use MIDI in the following circumstances:

- Digital audio won't work because you don't have enough memory or bandwidth.
- You have a high-quality MIDI sound source.
- You have complete control over the machines on which your program will be delivered, so you know that your users will have high-quality MIDI playback hardware.
- You don't need spoken dialog.

The most important advantage of digital audio is its consistent playback quality, but this is where MIDI is the least reliable! With digital audio you can be more confident that the audio track for your multimedia project will sound as good in the end as it did in the beginning when you created it. For this reason, it's no surprise that digital audio is used far more frequently than MIDI data for multimedia sound delivery. There are two additional and often more compelling reasons to work with digital audio:

A wider selection of application software and system support for digital audio is available for both the Macintosh and Windows platforms.

The preparation and programming required for creating digital audio do not demand knowledge of music theory, while working with MIDI data usually does require a modicum of familiarity with musical scores, keyboards, and notation, as well as audio production.

In general, use digital audio in the following circumstances:

- You don't have control over the playback hardware.
- You have the computing resources and bandwidth to handle digital files.
- You need spoken dialog.

**Audio File Formats**

- When the user create multimedia, it is likely that user will deal with file formats and translators for text, sounds, images, animations, or digital video clips.
- A sound file's format is simply a recognized methodology for organizing and (usually) compressing the digitized sound's data bits and bytes into a data file.

- The structure of the file must be known, of course, before the data can be saved or later loaded into a computer to be edited and/or played as sound.
- The file name extension identifies which method of storage is used.
- There are many ways to store the bits and bytes that describe a sampled waveform sound.
- The method used for consumer-grade music CDs is **Linear Pulse Code Modulation (LPCM)**, often shortened to PCM.
- An audio CD provides up to 80 minutes of playing time, which is enough for a slow-tempo rendition of Beethoven's Ninth Symphony.
- Incidentally, being able to contain Beethoven's Ninth is reported to have been Philips's and Sony's actual size criterion during early research and development for determining the length of the sectors and ultimately the physical size of the compact disc format itself.
- The **CD-ROM/XA (extended architecture)** format for reading and writing CDs was developed later so you could put several recording sessions of music or data onto a single CD-R (recordable) disc.
- LPCM tracks from an audio CD are usually converted and stored on a computer in uncompressed **AIFF** (Audio Interchange File Format) or **wave format (WAV)** files when copied from the CD.
- AIFF is historically used for Macintosh sound files.
- The WAV format was introduced by Microsoft when Windows was first released. Both formats contain uncompressed sound data. But there are huge numbers of sound file formats and "multimedia containers" that store sound data, and often a converter is required to read or write sound files in the format you need.
- Hoo Technologies offers MP3 to SWF, SWF/FLV to MP3, AIFF to MP3, MIDI to MP3, WMA to MP3, WAV to MP3, and OGG to MP3 converters.
- Their AIFF to MP3 converter will read the following formats: 3G2, 3GP, 3GP2, 3GPP, 4XM, AAC, AC3, ADX, AFC, AIF, AIFC, AIFF, ALAW, AMR, AMV, APE, ASF, AU, AVI, AWB, CAF, CDA, CDATA, DIF, DIVX, DTS, DV, DVD, DVR-MS, DXA, FLAC, FLC, FLI, FLIC, FLV, FLX, GSM, GXF, H261, H263,
- And it will output to MP3, WAV, WMA, AAC, MP4, M4A (MPEG-4 Audio), M4B (MPEG-4 AudioBook), OGG, AMR, and AWB formats. But rest easy—user will likely only work with a handful of sound file types.
- The MP3 format was developed by the Moving Picture Experts Group (**MPEG**) and evolved during the 1990s into the most common method for storing consumer audio. It incorporates a "**lossy**" compression algorithm to save space.
- An audio CD, for example, may hold an hour or so of uncompressed LPCM sound. That same CD, using MP3 compression, can store almost seven hours of the same music, but with a slight loss of quality. WMA (Windows Media Audio) is a proprietary Microsoft format developed to improve MP3. OGG was developed as an open-source and royalty-free "container" for sound compressed using Vorbis algorithms similar to MP3—because the Vorbis sound data resides within an Ogg container, these audio files are normally called "Ogg Vorbis."
- MP4 is a format based on Apple's **QuickTime movie (.mov)** "container" model and is similar to the MOV format, which stores various types of media, particularly time-based streams such as audio and video.

- The mp4 extension is used when the file streams audio and video together. The m4a extension is used when the file contains only audio data. M4p files contain only audio, but are encrypted for Digital Rights Management (DRM).
- M4r files are used for ringtones on Apple's iPhone. Other GSM (Global System for Mobile Communications) mobile phones use 3gp files for their ringtones, a format also based on the MPG container model.
- The AAC (Advanced Audio Coding) format, which is part of the MP4 model, was adopted by Apple's iTunes store, and many music files are commercially available in this format.
- ACC is the default format for iPod, iPhone, PlayStation, Wii, Dsi, and many mobile phones including Motorola, Nokia, Philips, Samsung, Siemens, and Sony Ericsson.
- The SWF format is a container for vector-based graphics and animations, text, video, and sound delivered over the Internet.
- Typically created using Adobe's Flash, SWF files require a plug-in or player be installed in the user's browser.
- Adobe claims that the Flash Player is installed in more than 98 percent of Web users' browsers and in more than 800 million handsets and mobile devices.
- Flash video files (FLV) contain both a video stream and an audio stream, and the FLV format has been adopted by YouTube, Google, Yahoo, Reuters.com, BBC.com, CNN.com, and other news providers for Internet delivery of content.
- A **codec** (compressor-decompressor) is software that compresses a stream of audio or video data for storage or transmission, then decompresses it for playback.
- There are many codecs that do this with special attention to the quality of music or voice after decompression.
- Some are "lossy" and trade quality for significantly reduced file size and transmission speed; some are "lossless," so original data is never altered.
- While editing your audio files, be sure to save your files using a lossless format or codec—with repetitive saves in a lossy format, you will notice a quality degradation each time.
- A container format such as MP4, MOV, or OGG may encapsulate data streams that use one of many codecs available in that container.

## POSSIBLE QUESTIONS

**PART-B(2Marks)**

1. Define bitmap

2. Define still images

3. Define vector drawn images

4. .List out any four image file formats

5. What is Digital audio?

6. Define MIDI audio.

**PART-C (6 Marks)**

1. Discuss in detail about bitmap with neat example.

2 Discuss in detail about vector drawn images with neat example.

3. Explain briefly about computerized color model in detail.

4. Explain about the Digital audio in detail

5. Differenitate between MIDI vs. Digital Audio

6. Discuss about color palettes in detail.

7. Explain briefly about image file formats in detail.

8. What is MIDI? How it works in sound system.

**KARPAGAM ACADEMY OF HIGHER EDUCATION**

**DEPARTMENT OF COMPUTER SCIENCE, CA & IT**

**I B.Sc CS (Batch 2017-2020)**

**MULTIMEDIA AND ITS APPLICATIONS**

**PART - A OBJECTIVE TYPE/MULTIPLE CHOICE QUESTIONS**

**UNIT-2**

**ONLINE EXAMINATIONS**

| S.No | Questions | Opt 1 | Opt 2 | Opt 3 | Opt 4 | Answer |
|---|---|---|---|---|---|---|
| 1 | Still images can be generated by _____ | bitmaps | text documents | linear | jpeg | **bitmaps** |
| 2 | _____ are used for photo realistic images | documents | bitmaps | linear | jpeg | **bitmaps** |
| 3 | _____ are used for lines, boxes, circles, polygons | bitmaps | vector drawn | linear | jpeg | **vector drawn** |
| 4 | A bit is referred to a _____ | decimal | octal | hexa | binary | **binary** |
| 5 | A _____ is a two dimensional matrix of the bits. | map | pixels | decimal | pels | **map** |
| 6 | A _____ is a simple matrix of the tiny dots that form an image | vector drawn | bitmaps | linear | pixels | **bitmaps** |
| 7 | A _____ dimensional matrix is used to display monochrome images | two | three | one | four | **one** |
| 8 | The pixels are also called as _____ | pels | dels | cels | pix | **pels** |
| 9 | A _____ contains a collection of images,graphics or photographs. | image map | bitmaps | clip art | image library | **clip art** |
| 10 | TIFF means _____ | Tagged Interchanged files form | Tagged Interleaved file formats | Tagged Inter File format | Tagged Interchanged File Format | **Tagged Interchanged File Format** |
| 11 | _____ is extensively used in desktop publishing packages | TIFF | PICT | PCX | IMG | **TIFF** |

| | | | | | | |
|---|---|---|---|---|---|---|
| 12 | JPEG and GIF images are the most common bitmap formats used on the _____ | documents | slides | web | Excelsheets | **web** |
| 13 | ____ is the RGB code for black color | 0 0 0 | 0 1 0 | 0 0 1 | 0 1 1 | **0 0 0** |
| 14 | ____ is the RGB code for white color | 0 0 0 | 0 1 0 | 0 0 1 | 1 1 1 | **1 1 1** |
| 15 | AVI stands for | Audio visual Interval | Audio visual Interleave | Audio video Interval | Audio video Interleave | **Audio video Interleave** |
| 16 | MIDI stands for_____ | Multimedia Instrument Digital Interface | Musical Instrument Digital Interface | Media Instrument Digital Interface | Movie Instrument Digital Interface | **Musical Instrument Digital Interface** |
| 17 | The size of the original Image divided by the size of the compressed image is called_____ | Image Quality | Lossy schemes | Compression ratio | Lossless | **Compression ratio** |
| 18 | _____ is the branch of physics that studies sound | Acoustics | Device independent | AIF format | None | **Acoustics** |
| 19 | PNG stands for _____ | portable network graphics | portable net graphics | portable network gegabyte | All the above | **portable network graphics** |
| 20 | In Windows, system sounds are _____files | DOC | WAV | DBS | PPT | **WAV** |
| 21 | _____ is created when you convert a sound wave into numbers | digital video | recording | digital audio | digital visual | **digital audio** |
| 22 | Sampling rate is measured in _____ | kilohertz | hertz | watts | ohms | **kilohertz** |
| 23 | Sample sizes are either 8bits or ____ bits | 32 | 64 | 16 | 12 | **16** |
| 24 | _____ determines the accuracy with which a sound can be digitized | Audio files | Audio frequency | Audio resolution | Audio equalization | **Audio resolution** |

| | | | | | | |
|---|---|---|---|---|---|---|
| 25 | _____ allows to modify a recording's frequency content so that it sounds brighter or darker | digital waves | digital resolution | digital finalization | digital equalization | **digital equalization** |
| 26 | A _____ keyboard is also useful to simplify the creation of musical scores | MACE | MIDI | MIDS | AIFF | **MIDI** |
| 27 | _____ is a device dependent | MACE | MIDS | MIDI | AIFF | **MIDI** |
| 28 | MIDI files will be _____ times smaller than CD-quality digital audio files | 1000-10000 | 1000-7000 | 200-1000 | 500-1000 | **200-1000** |
| 29 | Removing blank space or dead air at the beginning or end of a recording is sometimes called _____ | quieting | quantizing | trimming | pre rolling | **trimming** |
| 30 | _____ software allows you to record, edit and save music generated from a MIDI keyboard or instrument | Sound | Sequence | synthesizer | Samples | **Sequence** |
| 31 | An 8 bit sample size provides ____equal units to describe the dynamic range or amplitude | 16 | 12 | 256 | 324 | **256** |
| 32 | General MIDI numbering system ranges from_____ | 0 to 127 | 0 to 125 | 0 to 126 | 0 to 124 | **0 to 127** |
| 33 | MIDI sounds are typically stored in files with the _____ extension | .sou | .midi | .mid | .mdi | **.mid** |
| 34 | Digital audio data is the actual representation of a sound, stored in the form of thousands of individual numbers called _____ | orders | datas | codes | samples | **samples** |
| 35 | A music compression scheme to reduce file size was enveloped by the _____ | MPEG | MPES | MPPS | MPDS | **MPEG** |

| | | | | | | |
|---|---|---|---|---|---|---|
| 36 | CAD stands for _____ | Computer aided design | common aided design | computer art design | commmon art design | **Compute r aided design** |
| 37 | HSB stands for _____ | Hue,saturation,b rightness | Hue,saturation ,black | Hue,saturat ion,lightnes s | None | **Hue,satu ration,br ightness** |
| 38 | If red and green colors are 255 than the color will get___ | cyan | magenta | yellow | black | **yellow** |
| 39 | If red and blue colors are 255 than the color will get___ | cyan | magenta | yellow | black | **magenta** |
| 40 | If green and blue colors are 255 than the color will get___ | cyan | magenta | yellow | black | **cyan** |
| 41 | In macintosh the color palettes are called _____ | color palettes | color lookup | color table | presets | **color lookup** |
| 42 | In macintosh OS you can change only _____sound type format | AIF | Wav | Mp3 | none | **AIF** |
| 43 | An 16 bit sample size provides ____equal units to describe the dynamic range or amplitude | 65536 | 32123 | 65537 | 32768 | **65536** |
| 44 | DAT stands for _____ | Digital audio tap | Digital audio ta | Digital audi | None | **Digital au** |
| 45 | If the first four bits are all ones in MIDI, the message is interpreted as a ____ | System message | Channel message | Voice message | Mode message | **System message** |
| 46 | The four color printing is designated as _____ | CMYB | CMYG | CMYK | CMKY | **CMYK** |
| 47 | _____ is a process whereby the color value of each pixel is changed to the closet matching color value in the target palette | Anthering | dithering | ordering | linear | **dithering** |
| 48 | Default foreground and background colors are | Black & White | Grey & white | Black & grey | Grey & Black | **Black & White** |
| 49 | A _____ file is a windows bitmap file | PCX | PICT | BMP | IMG | **BMP** |

| | | | | | | |
|---|---|---|---|---|---|---|
| 50 | ___ is the shortcut to select the entire content of an image | Ctrl +T | Ctrl + A | Ctrl + S | Ctrl + V | **Ctrl + A** |
| 51 | _____ is the shortcut to deselect the selected portion of the image | Ctrl +T | Ctrl + A | Ctrl + S | Ctrl + I | **Ctrl + I** |
| 52 | _____ icon is used to make the layer visible | Eye | Lock | Insert | Delete | **Eye** |
| 53 | Which of the following is not a standard color format? | RGB | CMYK | HSB | RBG | **RBG** |
| 54 | ___ is the intensity of a particular hue | Hue | Saturation | Brightness | Contrast | **Saturation** |
| 55 | ___ is the position of the color on a color wheel. | Hue | Saturation | Brightness | Contrast | **Hue** |
| 56 | _____ tool uis used to sample colors directly from image | Brush | Lasso | Magic wand | Eye dropper | **Eye dropper** |

**dio tape**

## UNIT-3
## SYLLABUS

**Video:** How video works, analog video, digital video, video file formats, video shooting and editing.
**Animation:** Principle of animations, animation techniques.

VIDEO

### How Video Works and Is Displayed

When light reflected from an object passes through a video camera lens, that light is converted into an electronic signal by a special sensor called a **charge-coupled device (CCD)**. Top-quality broadcast cameras and even camcorders may have as many as three CCDs (one for each color of red, green, and blue) to enhance the resolution of the camera and the quality of the image.

It's important to understand the difference between analog and digital video. Analog video has a resolution measured in the number of horizontal scan lines (due to the nature of early cathode-tube cameras), but each of those lines represents continuous measurements of the color and brightness along the horizontal axis, in a linear signal that is analogous to an audio signal. Digital video signals consist of a discrete color and brightness (RGB) value for each pixel. Digitizing analog video involves reading the analog signal and breaking it into separate data packets. This process is similar to digitizing audio, except that with video the vertical resolution is limited to the number of horizontal scan lines.

For some multimedia projects you may need to digitize legacy analog video. The following discussion will help you understand the differences between analog and digital video and the old and new standards for horizontal lines, aspect ratios, and interlacing.

**Analog Video**

In an analog system, the output of the CCD is processed by the camera into three channels of color information and synchronization pulses (sync) and the signals are recorded onto magnetic tape. There are several video standards for managing analog CCD output, each dealing with the

amount of separation between the components—the more separation of the color information, the higher the quality of the image (and the more expensive the equipment). If each channel of color information is transmitted as a separate signal on its own conductor, the signal output is called **component** (separate red, green, and blue channels), which is the preferred method for higher-quality and professional video work. Lower in quality is the signal that makes up **Separate Video (S-Video)**, using two channels that carry luminance and chrominance information. The least separation (and thus the lowest quality for a video signal) is **composite**, when all the signals are mixed together and carried on a single cable as a composite of the three color channels and the sync signal. The composite signal yields less-precise color definition, which cannot be manipulated or color-corrected as much as S-Video or component signals.

The analog video and audio signals are written to tape by a spinning recording head that changes the local magnetic properties of the tape's surface in a series of long diagonal stripes. Because the head is canted or tilted at a slight angle compared with the path of the tape, it follows a helical (spiral) path, which is called **helical scan** recording. As illustrated in Figure 6-1, each stripe represents information for one field of a video frame. A single video frame is made up of two fields that are **interlaced** (described in detail later in the chapter). Audio is recorded on a separate straight-line track at the top of the videotape, although with some recording systems (notably for ¾-inch tape and for ½-inch tape with high fidelity audio), sound is recorded helically between the video tracks. At the bottom of the tape is a control track containing the pulses used to regulate speed. **Tracking** is the fine adjustment of the tape during playback so that the tracks are properly aligned as the tape moves across the playback head. These are the signals your grandmother's VCR reads when you rent *Singing in the Rain* (on video cassette) for the weekend.

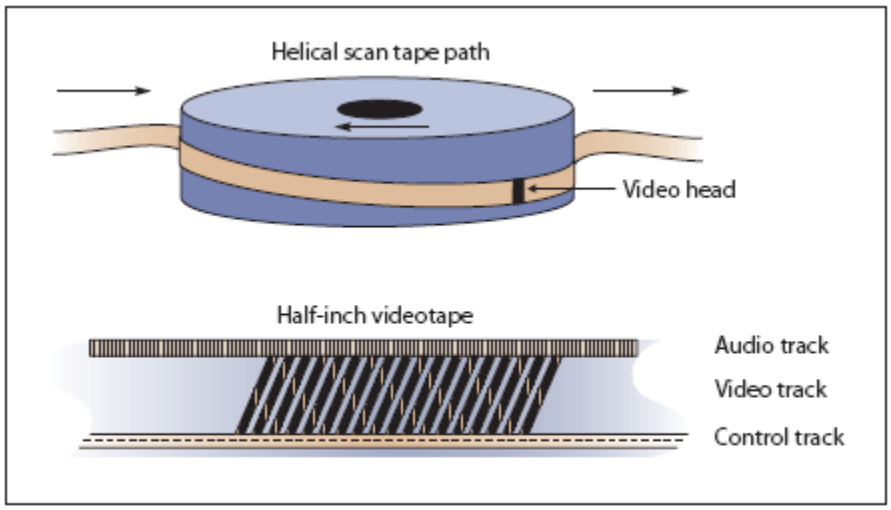



**Figure 6-1** Diagram of tape path across the video head for analog recording

Many consumer set-top devices like **video cassette recorders (VCRs)** and satellite receivers add the video and sound signals to a subcarrier and modulate them into a radio frequency (RF) in the FM broadcast band. This is the NTSC, PAL, or SECAM signal available at the Antenna Out connector of a VCR. Usually the signal is modulated on either Channel 3 or Channel 4, and the resulting signal is demodulated by the TV receiver and displayed on the selected channel. Many television sets today also provide a composite signal connector, a S-Video connector, and a **High-Definition Multimedia Interface (HDMI)** connector for purely digital input. Video displays for computers typically provide analog component (red, green, blue) input through a 15-pin **VGA connector** and also a purely digital **Digital Visual Interface (DVI)** and/or an HDMI connection.

Three analog broadcast video standards are commonly in use around the world: NTSC, PAL, and SECAM. In the United States, the NTSC standard has been phased out, replaced by the **ATSC Digital Television Standard**. Because these standards and formats are not easily interchangeable, it is important to know where your multimedia project will be used. A video cassette recorded in the United States (which uses NTSC) will not play on a television set in any European country (which uses either PAL or SECAM), even though the recording method and

style of the cassette is "VHS." Likewise, tapes recorded in European PAL or SECAM formats will not play back on an NTSC video cassette recorder. Each system is based on a different standard that defines the way information is encoded to produce the electronic signal that ultimately creates a television picture.

Multiformat VCRs can play back all three standards but typically cannot dub from one standard to another. **Dubbing** between standards still requires high-end, specialized equipment.

***NTSC***

The United States, Canada, Mexico, Japan, and many other countries used a system for broadcasting and displaying video that is based upon the specifications set forth by the 1952 **National Television Standards Committee (NTSC)**. These standards defined a method for encoding information into the electronic signal that ultimately created a television picture. As specified by the NTSC standard, a single frame of video was made up of 525 horizontal scan lines drawn onto the inside face of a phosphor-coated picture tube every 1/30th of a second by a fast-moving electron beam. The drawing occurred so fast that your eye would perceive the image as stable. The electron beam actually made two passes as it drew a single video frame—first it laid down all the odd-numbered lines, and then all the even-numbered lines. Each of these passes (which happen at a rate of 60 per second, or 60 Hz) painted a field, and the two fields were then combined to create a single frame at a rate of 30 frames per second (fps). (Technically, the speed is actually 29.97 Hz.)

***PAL***

The **Phase Alternate Line (PAL)** system was used in the United Kingdom, Western Europe, Australia, South Africa, China, and South America. PAL increased the screen resolution to 625 horizontal lines, but slowed the scan rate to 25 frames per second. As with NTSC, the even and odd lines were interlaced, each field taking 1/50 of a second to draw (50 Hz).

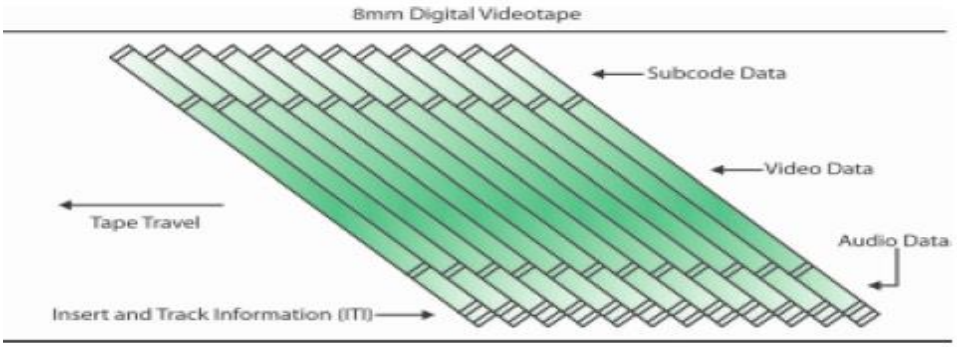
***SECAM***

The **Sequential Color and Memory (SECAM)** (taken from the French name, reported variously as System Electronic pour Couleur Avec Mémoire or Séquentiel Couleur Avec Mémoire) system

was used in France, Eastern Europe, the former USSR, and a few other countries. Although SECAM is a 625-line, 50 Hz system, it differed greatly from both the NTSC and the PAL color systems in its basic technology and broadcast method. Often, however, TV sets sold in Europe utilized dual components and could handle both PAL and SECAM systems.

**DIGITAL VIDEO**

In digital systems, the output of the CCD is digitized by the camera into a sequence of single frames, and the video and audio data are compressed before being written to a tape (see Figure 6-2) or digitally stored to disc or flash memory in one of several proprietary and competing formats. Digital video data formats, especially the codec used for compressing and decompressing video (and audio) data, are important; more about them later in this chapter.




**igure 6-2** Diagram of tape path across the video head for digital recording

In 1995, Apple's FireWire technology was standardized as IEEE 1394, and Sony quickly adopted it for much of its digital camera line under the name i.Link. FireWire and i.Link (and USB 2) cable connections allow a completely digital process, from the camera's CCD to the hard disk of a computer; and camcorders store the video and sound data on an onboard digital tape, writable mini-DVD, mini–hard disk, or flash memory.

***HDTV***

What started as the **High Definition Television (HDTV)** initiative of the Federal Communications Commission in the 1980s changed first to the Advanced Television (ATV)

initiative and then finished as the **Digital Television (DTV)** initiative by the time the FCC announced the change in 1996. This standard, which was slightly modified from both the Digital Television Standard (ATSC Doc. A/53) and the Digital Audio Compression Standard (ATSC Doc. A/52), moved U.S. television from an analog to a digital standard. It also provided TV stations with sufficient bandwidth to present four or five Standard Television (STV, providing the NTSC's resolution of 525 lines with a 3:4 aspect ratio, but in a digital signal) signals or one HDTV signal (providing 1,080 lines of resolution with a movie screen's 16:9 aspect ratio). HDTV provides high resolution in a **16:9** aspect ratio (see Figure6-3). This aspect ratio allows the viewing of Cinemascope and Panavision movies. There was contention between the broadcast and computer industries about whether to use interlacing or progressive-scan technologies. The broadcast industry promulgated an ultra-high-resolution, 1920 □□1080 interlaced format (1080i) to become the cornerstone of the new generation of high-end entertainment centers, but the computer industry wanted a 1280 □□720 progressive-scan system (720p) for HDTV. While the 1920 □□1080 format provides more pixels than the 1280 □□720 standard, the refresh rates are quite different. The higherresolution interlaced format delivers only half the picture every 1/60 of a second, and because of the interlacing, on highly detailed images there is a great deal of screen flicker at 30 Hz. The computer people argue that the picture quality at 1280 □□720 is superior and steady. Both formats have been included in the HDTV standard by the **Advanced Television Systems Committee (ATSC)**, found at www.atsc.org.

**Displays**

Colored phosphors on a **cathode ray tube (CRT)** screen glow red, green, or blue when they are energized by an electron beam. Because the intensity of the beam varies as it moves across the screen, some colors glow brighter than others. Finely tuned magnets around the picture tube aim the electrons precisely onto the phosphor screen, while the intensity of the beam is varied according to the video signal. This is why you needed to keep speakers (which have strong magnets in them) away from a CRT screen. A strong external magnetic field can skew the electron beam to one area of the screen and sometimes caused a permanent blotch that cannot be fixed by **degaussing**—an electronic process that readjusts the magnets that guide the electrons. If you had the misfortune to forget and wear a watch, the degausser might stop it permanently and then, if you are particularly unlucky, erase the magnetic strips on the credit cards in your wallet as well.

If a computer displays a still image or words onto a CRT for a long time without changing, the phosphors will permanently change, and the image or words can become visible, even when the CRT is powered down. Screen savers were invented to prevent this from happening. Flat screen displays are all-digital, using either **liquid crystal display (LCD)** or **plasma** technologies, and have supplanted CRTs for computer use. Some professional video producers and studios, however, prefer CRTs to flat screen displays, claiming colors are brighter and more accurately reproduced. Full integration of digital video in cameras and on computers eliminates the analog television form of video, from both the multimedia production and the delivery platform. If your video camera generates a digital output signal, you can record your video direct-to-disk, where it is ready for editing. If a video clip is stored as data on a hard disk, CD-ROM, DVD, or other mass-storage device, that clip can be played back on a computer's monitor without special hardware.

***Interlacing and Progressive Scan***

The process of building a single frame from two fields is called interlacing, a technique that helps to prevent flicker on CRT screens. Computer monitors use a different **progressive-scan**

technology, and draw the lines of an entire frame in a single pass, without interlacing them and without flicker. In television, the electron beam actually makes two passes on the screen as it draws a single video frame, first laying down all the odd-numbered lines, then all the even-numbered lines, as they are interlaced. On a computer monitor, lines are painted one-pixel thick and are not interlaced. Singlepixel lines displayed on a computer monitor look fine; on a television, these thin lines flicker brightly because they only appear in every other field. To prevent this flicker on CRTs, make sure your lines are greater than two pixels thick and that you avoid typefaces that are very thin or have elaborate serifs. If you are capturing images from a video signal, you can filter them through a de-interlacing filter provided by image-editing applications such as Photoshop and Fireworks. With typefaces, interlacing flicker can often be avoided by anti-aliasing the type to slightly blur the edges of the characters. The term "interlacing" has a different meaning on the Web, where it describes the progressive display of lines of pixels as image data is downloaded, giving the impression that the image is coming from blurry into focus as increasingly more data arrives (see Chapter 13).

Most computers today provide video outputs to CRT, LCD, or plasma monitors at greater than 1024 × 768 resolution. Table 6-1 describes the various aspect ratios and width/heights in pixels used by computer displays since IBM's VGA standard was adopted in 1987. The VGA's once ubiquitous 640 × 480 screen resolution is again becoming common for handheld and mobile device displays.

| Acronym | Name | Aspect Ratio | Width (pixels) | Height (pixels) |
|---|---|---|---|---|
| VGA | Video Graphics Array | 4:3 | 640 | 480 |
| SVGA | Super Video Graphics Array | 4:3 | 800 | 600 |
| XGA | eXtended Graphics Array | 4:3 | 1024 | 768 |
| XGA+ | eXtended Graphics Array Plus | 4:3 | 1152 | 864 |
| WXGA | Widescreen eXtended Graphics Array | 5:3 | 1280 | 768 |
| WXGA | Widescreen eXtended Graphics Array | 8:5 (16:10) | 1280 | 800 |
| SXGA | Super eXtended Graphics Array | 4:3 | 1280 | 960 |
| SXGA | Super eXtended Graphics Array | 5:4 | 1280 | 1024 |
| HD | High Definition (Basic) | 16:9 | 1366 | 768 |
| WSXGA | Widescreen Super eXtended Graphics Array | 8:5 (16:10) | 1440 | 900 |
| HD+ | High Definiton (Plus) | 16:9 | 1600 | 900 |
| UXGA | Ultra eXtended Graphics Array | 4:3 | 1600 | 1200 |
| WSXGA+ | Widescreen Super eXtended Graphics Array Plus | 8:5 (16:10) | 1680 | 1050 |
| HD-1080 | Full High Definition | 16:9 | 1920 | 1080 |
| WUXGA | Widescreen Ultra eXtended Graphics Array | 8:5 (16:10) | 1920 | 1200 |

**Table 6-1** Screen Resolutions for Computer Monitors

| Scan Lines from Top to Bottom | Pixels from Left to Right | Aspect Ratio | Display Rate in Frames per Second |
|---|---|---|---|
| 1080p (progressive) | 1920 | 16:9 | 30, 24 |
| 1080i (interlaced) | 1920 | 16:9 | 30 |
| 720p (progressive) | 1280 | 16:9 | 60, 30, 24 |
| 480p (progressive) | 704 or 640 | 16:9 or 4:3 | 60, 30, 24 |
| 480i (interlaced) | 704 or 640 | 16:9 or 4:3 | 30 |

**Table 6-2** Common Digital Television Resolutions

***Over scan and the Safe Title Area***

As illustrated earlier in Figure 6-3, it is common practice in the television industry to broadcast an image larger than will fit on a standard TV screen so that the "edge" of the image seen by a viewer is always bounded by the TV's physical frame, or bezel. This is called **overscan**. In contrast, computer monitors display a smaller image on the monitor's picture tube (**underscan**), leaving a black border inside the bezel. Consequently, when a digitized video image is displayed on a CRT, there is a border around the image; and, when a computer screen is converted to video, the outer edges of the image will not fit on a TV screen. Only about 360 of the 480 lines of the computer screen will be visible. Video editing software often will show you the safe areas while you are editing.

## VIDEO FORMAT CONVERTERS

Be prepared to produce more than one version of your video (codecs in a container) to ensure that the video will play on all the devices and in all the browsers necessary for your project's distribution. DVD video uses MPEG-2 compression. Blu-ray video uses MPEG-4 AVC compression.

These are known standards and few choices are necessary: simply click "Save for DVD" or "Save for Blu-ray." But if you need to prepare a video file that will run on an iPod, a Droid, and

an Atom-based netbook, as well as in all web browsers, you will need to convert your material into multiple formats. There are many free, shareware, and inexpensive file format converters available for multiple platforms. Figure 6-4 shows a menu of video format selections and profiles available in the free converter Handbrake for Mac and Windows (http://handbrake.fr).

=

**Shooting and Editing Video**

Before you head out to the field with your camcorder in hand, it is important to understand at least the basics of video recording and editing, as well as the constraints of using video in a multimedia project. Setting up a production environment for making digital video requires hardware that meets minimum specifications for processing speed, data transfer, and storage. There are many considerations to keep in mind when setting up your production environment, depending on the capabilities of your camcorder:

■■ Fast processor(s)

■■ Plenty of RAM

■■ Computer with FireWire (IEEE 1394 or i.Link) or USB connection and cables

■■ Fast and big hard disk(s)

■■ A second display to allow for more real estate for your editing software

■■ External speakers

■■ Nonlinear editing (NLE) software Expensive professional video equipment and services may not yield proportionately greater benefits than if you used consumer-grade equipment and nonlinear editors. As with audio equipment, you need to make balancing decisions using Vaughan's Law of Multimedia Minimums (see Chapter 4). Most likely, your goal is to expend resources without diminishing returns—in other words, to produce multimedia that is adequate and does its job, but doesn't break your bank. If you can, experiment with your computer, and test the results using your multimedia-authoring platform.

You can do a great deal of satisfactory work with consumer-grade video cameras and recording equipment if you understand the limitations of the technology.

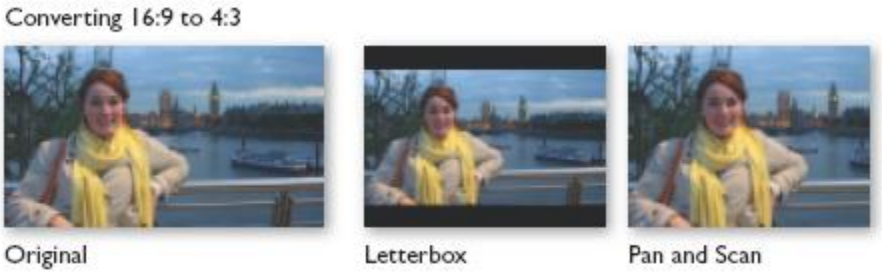
**The Shooting Platform**

Never underestimate the value of a steady shooting platform. A classic symbol of amateur home movies is shaky camera work. Using a tripod or even placing the camera on a stable platform, such as a rolled-up sweater on the hood of a car, can improve a shot. With a little care, and careful adjustment of the lockdown screws, a sturdy conventional tripod can do wonders. If you must shoot handheld, try to use a camera with an electronic image stabilization feature for static shots, use a "steady-cam" balancing attachment, or use camera moves and a moving subject to mask your lack of steadiness. Even using a rolling office chair and sitting facing the back with the camera balanced on the chair-back makes a convenient, stable dolly. If you must shoot handheld, set the camera's lens to the widest angle: at a wide angle, camera motion becomes smaller relative to the field of view and is thus less apparent. And invest in an external microphone, like a Lavaliere. It will give you better audio than the on-camera microphone during interviews, and you can easily hide it in the scene during general use. Or use a "shotgun" mic on a boom, with an operator who can "ride levels" by monitoring the recorded volume.

Most important, learn the features and controls of your camera—there are many tiny icons and menu selections! Study the manual. Experiment and practice. Stay organized—keep your extra batteries, spare memory cards and tapes, your charger and cables, and even your manual (in case

you haven't studied it hard enough) in a good camera bag. Learn how to connect the camera to your computer and how to access your video footage with nonlinear editing software. Learn how to use the editing software. If you are new to video, this is a steep learning curve with many small annoyances but it is forgiving: if you mess up your video, there is often *something* from it that can be recovered and used.

Many digital camcorders will allow you to choose 4:3 or 16:9 aspect ratios for your recording, one or the other. Unfortunately, there is no easy way to convert between these aspect ratios, so you should decide up front which to use in your multimedia project. As shown in Figure 6-5, there are three ways to convert from a 4:3 aspect ratio for display on a 16:9 aspect ratio screen: you can *stretch* the 4:3 image to fill the 16:9 frame (this distortion can make people look fat), you can zoom the width of the image to fit the 16:9 frame (you lose part of the top and bottom of the image), or you can place the image into the center of the 16:9 frame (leaving empty **pillars** right and left). There are two ways to convert from 16:9 to 4:3. The *Letterbox* or hard matte method produces blank bars at top and bottom, but leaves the original image untouched; *Pan and Scan*, on the other hand, loses both sides of the original image. When using the Pan and Scan method for conversion, editors will carefully pan across wide scenes to capture the best area to show. Videographers and widescreen moviemakers often consider a 4:3 "safe frame" area when setting up their wide shots, knowing that their work will be converted to 4:3 for the DVD aftermarket. Some DVDs use an **anamorphic widescreen** coding system to squeeze 16:9 widescreen image data into a DVD's standard 4:3 aspect ratio format; with a compatible player, these



"Enhanced for Widescreen Televisions" discs will play the original video properly on a 16:9 screen

**Storyboarding**

Preplanning a video project is a factor that cannot be ignored without costing time loss, lots of unnecessary aggravation, and money that would be better spent elsewhere. Successful video production, of any sort, deserves the time it takes to make a plan to carry it out. It may take a little time at first, but you'll find it to be very helpful in the long run. Storyboards are like any sequential comic you read daily. Every day there are three or four panels showing a progression of story or information. Take the time to structure your production by writing it down and then engineer a sequential group of drawings showing camera and scène, shooting angles, lighting, action, special effects, and how objects move through from start to finish. A storyboard can get everyone on one page quickly.

**Lighting**

Perhaps the greatest difference between professional camcorders and consumer camcorders is their ability to perform at low light levels. With proper lighting, however, it may be difficult for uninitiated viewers to differentiate between shots taken with an expensive studio-grade video camera and an inexpensive camcorder. Using a simple floodlight kit, or even just being sure that daylight illuminates the room, can improve your image. Onboard battery lights for camcorders can be useful, but only in conditions where the light acts as a "fill light" to illuminate the details of a subject's face. As in photography, good lighting techniques separate amateurs from professionals in video shoots. Illustrated in Figure 6-6 is a screen from The Lighting Lab. The standard lighting arrangement of a studio is displayed with fill, key, rim, and background lights. Changing any of these lights can make a dramatic difference in the shot. This project originally used a QuickTime container of several hundred single-frame images of the model as she is lighted by every permutation of lamp and intensity; clicking a light switch instantly shows the effect of that combination. If you are not convinced that lighting is critical to the success of a photo or video shoot, it will become immediately clear with this exercise! Try it at

www.tayvaughan.com/multimedia/ stuff/lightinglab.html. appear choppy or broken. Shooting in daylight, and letting the sun illuminate the screen, will mitigate this problem. Also be careful about color spill." If your actors stand too close to the screen, the colored light reflecting off the screen will spill onto them, and parts of their body will key out. While adjustments in most applications can compensate for this, the adjustments are limited. Beware of fine detail, such as hair or smoke, that wisps over the screen; this does not key well.

A video of an actor shot against blue screen on a commercial stage. The blue background was removed from each frame, and the actor himself was turned into a photo-realistic animation that walked, jumped, pointed, and ran from a dinosaur.

**Composition**

The general rules for shooting quality video for broadcast use also apply to multimedia. When shooting video for playback in a small window, it is best to avoid wide panoramic shots, as the sweeping majesty will be lost. Use close-ups and medium shots, head-and-shoulders or even tighter. Depending upon the compression algorithm used (see the discussion on video codecs earlier in the chapter), consider also the amount of motion in the shot: the more a scene changes from frame to frame, the more "delta" information needs to be transferred from the computer's memory to the screen. Keep the camera still instead of panning and zooming; let the subject add the motion to your shot, walking, turning, talking. Beware of excessive backlighting—shooting with a window or a bright sky in the background—is a common error in amateur video production. Many cameras can be set to automatically compensate for backlighting. If you adjust for this, the background may be "blown out" (so bright the video signal peaks), but at least the foreground image you're focusing on will be visible. Of course, the best choice in this situation is to light the foreground.

Non-professional cameras are set to always adjust the iris (the opening in the lens) to keep the image's overall exposure at a constant level. When you go from a dark to light setting the camera will adjust, and you can often see this shift. Pro cameras allow the iris setting to be locked down to avoid this. In different situations, white may not be white, depending on the color temperature

(warmth or coolness) of the light source. **White balance** corrects for bluish, orange, or greenish color casts resulting from an uneven distribution of colors in the spectrum your eye tells you is white, but your less forgiving digital camera says is not quite white. Many cameras automatically set white balance with best guesses, but they also offer adjustable settings for daylight, shady, cloudy, tungsten, and fluorescent lighting conditions.

Try to get the white balance correct when shooting; then you won't be spending time with your editing software to remove the greenish tinge from your client's white wedding dress.

**Titles and Text**

Titles and text are often used to introduce a video and its content. They may also finish off a project and provide credits accompanied by a sound track. Titles can be plain and simple, or they can be storyboarded and highly designed. For plain and simple, you can use templates in an image editor and then sequence those images into your video using your video editing software. Or you can create your own imagery or animations and sequence them. More elaborate titles, typical for feature films and commercial videos, can become multimedia projects in themselves.

Upasana Nattoji Roy's title design for Director Indrajit Nattoji's "Aagey Se Right," for example, began with creative ideas (see Chapter 10), transitioned into a detailed storyboard and animations (see Chapter 7), and was finally rendered using Aftereffects .

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(see Chapter 7), and was finally rendered using Aftereffects . If you make your own, here are some suggestions for creating good titles:

Fonts for titles should be plain, sans serif, and bold enough

■■ to be easily read.

■■ When you are laying text onto a dark background, use white or a light color for the text.

■■ Use a drop shadow to help separate the text from the background image.

■■ Do not kern your letters too tightly.

■■ If you use underlining or drawn graphics, always make your lines at least two pixels wide. If you use a one-pixel-wide line (or a width measured in an odd number of pixels), the line may flicker when transferred to video due to interlacing.

■■ Use parallel lines, boxes, and tight concentric circles sparingly. When you use them, draw them large and with thick lines.

■■ Avoid colors like bright reds and magenta that are too "hot"; they might twinkle and buzz.

■■ Neighboring colors should be markedly different in intensity. For example, use a light blue and a dark red, but not a medium blue and a medium red.

■■ Keep your graphics and titles within the safe area of the screen. Remember that CRT televisions over scan (see the earlier section "Over scan and the Safe Title Area").

■■ Bring titles on slowly, keep them on screen for a sufficient time, and then fade them out.

■■ Avoid making busy title screens; use more pages or a longer sequence instead.

**Nonlinear Editing (NLE)**

Top-of-the-line **nonlinear editing (NLE)** software includes Adobe's Premiere, Apple's Final Cut, and Avid's Media Composer, the "A Team" of professional video editors. These are feature-packed and expensive packages designed to work hand-in-hand with fast and powerful computers (six gigabytes of RAM recommended) and dedicated file servers. Many hours of training and many days of experience are needed before users become proficient.

If your project involves simple cutting and editing of footage, with a few transitions and titles thrown in, then you may be satisfied with simpler software such as Microsoft's Windows Live

| Name | Platform | Download Address |
|---|---|---|
| Avidemux | Windows/Mac/BSD/Linux | www.avidemux.org |
| Cinelerra | Linux/Mac | www.heroinewarrior.com/cinelerra.php |
| iMovie | Mac | www.apple.com/ilife/imovie |
| Kdenlive | Linux/BSD/Mac | www.kdenlive.org |
| Kino | Linux/BSD | http://kinodv.org |
| LiVES | Linux/BSD/Mac | http://lives.sourceforge.net |
| OpenShot | Linux | www.openshotvideo.com |
| Pinnacle Videospin | Windows | www.videospin.com/Redesign |
| PiTiVi | Linux | www.pitivi.org |
| VideoLab | Windows | www.mitov.com/html/videolab.html |
| VideoThang TM | Windows | www.videothang.com |
| VirtualDub | Windows | www.virtualdub.org |
| Windows Live Movie Maker | Windows | http://explore.live.com/windows-live-movie-maker |

**Table 6-4** Free Video Editing Software

Movie Maker or Apple's iMovie for Macs that come free with the operating system. Table 6-4 contains a list of free video editing software applications to choose from.

**ANIMATION**

**B**y definition, **animation** makes static presentations come alive. It is visual change over time and can add great power to your multimedia projects and web pages. Many multimedia applications for both Macintosh and Windows provide animation tools.

The Power of Motion

You can animate your whole project, or you can animate here and there, accenting and adding spice. For a brief product demonstration with little user interaction, it might make sense to design the entire project as a video and keep the presentation always in motion. For speaker support, you can animate bulleted text or fly it onto the screen, or you can use charts with quantities that grow or dwindle; then, give the speaker control of these eye-catchers. In a parts-assembly training manual, you might show components exploding into an expanded view.

Visual effects such as wipes, fades, zooms, and dissolves are available in most multimedia authoring packages, and some of these can be used for primitive animation. For example, you can slide images onto the screen with a wipe, or you can make an object implode with an iris/close effect. Figure 5-1 shows examples of many transition effects that may be available in your editing software (in this case, an early version of Adobe's Premiere).

But animation is more than wipes, fades, and zooms. Animation is an object actually moving across or *into* or *out of* the screen; a spinning globe of our earth; a car driving along a line-art


highway; a bug crawling out from under a stack of papers, with a screaming voice from the speaker telling you to "Shoot it, now!" Until video became more commonplace (see Chapter 6), animations were the primary source of dynamic action in multimedia presentations.

**Principles of Animation**

Animation is possible because of a biological phenomenon known as **persistence of vision** and a psychological phenomenon called **phi**. An object seen by the human eye remains chemically mapped on the eye's retina for a brief time after viewing. Combined with the human mind's need to conceptually complete a perceived action, this makes it possible for a series of images that are changed very slightly and very rapidly, one after the other, to seemingly blend together into a visual illusion of movement. The illustration shows a few cells, or frames, of a rotating logo. When the images are progressively and rapidly changed, the arrow of the compass is perceived to be spinning.

Digital television video builds 24, 30, or 60 entire frames or pictures every second, depending upon settings; the speed with which each frame is replaced by the next one makes the images

appear to blend smoothly into movement. Movies on film are typically shot at a shutter rate of 24 frames per second, but using projection tricks (the projector's shutter flashes light through each image twice), the flicker rate is increased to 48 times per second, and the human eye thus sees a motion picture. On some film projectors, each frame is shown three times before the pull-down claw moves to the next frame, for a total of 72 flickers per second, which helps to eliminate the flicker effect: the more interruptions per second, the more continuous the beam of light appears. Quickly changing the viewed image is the principle of an animatics, a flip-book, or a zoetrope. To make an object travel across the screen while it changes its shape, just change the shape and also move, or **translate**, it a few pixels for each frame. Then, when you play the frames back at a faster speed, the changes blend together and you have motion and animation. It's the same magic as when the hand is quicker than the eye, and you don't see the pea moving in the blur of the gypsy's cups.

Animation by Computer

Using appropriate software and techniques, you can animate visual images in many ways. The simplest animations occur in two-dimensional (2-D) space; more complicated animations occur in an intermediate "2½-D" space (where shadowing, highlights, and forced perspective provide an illusion of depth, the third dimension); and the most realistic animations occur in three-dimensional (3-D) space. In 2-D space, the visual changes that bring an image alive occur on the flat Cartesian x and y axes of the screen. A blinking word, a **color-cycling** logo (where the colors of an image are rapidly altered according to a formula), a cel animation (described more fully later on in this chapter), or a button or tab that changes state on mouse rollover to let a user know it is active are all examples of **2-D animations**. These are simple and static, not changing their position on the screen.

**Path animation** in 2-D space increases the complexity of an animation and provides motion, changing the location of an image along a predetermined path (position) during a specified amount of time (speed). Authoring and presentation software such as Flash or PowerPoint provide user-friendly tools to compute position changes and redraw an image in a new location,

allowing you to generate a bouncing ball or slide a corporate mascot onto the screen. Combining changes in an image with changes in its position allows you to "walk" your
corporate mascot onto the stage. Changing its size from small to large as it walks onstage will give you a 3-D perception of distance.

In **2½-D animation**, an illusion of depth (the z axis) is added to an image through shadowing and highlighting, but the image itself still rests on the flat x and y axes in two dimensions. Embossing, shadowing, beveling, and highlighting provide a sense of depth by raising an image or cutting it into a background. Zaxwerks' 3D Invigorator for example, provides 3-D effects for text and images and, while calling itself "3D," works within the 2-D space of image editors and drawing programs such as Adobe Illustrator, Photoshop, Fireworks, and After Effects.

In **3-D animation**, software creates a virtual realm in three dimensions, and changes (motion) are calculated along all three axes (x, y, and z), allowing an image or object that itself is created with a front, back, sides, top, and bottom to move toward or away from the viewer, or, in this virtual space of light sources and points of view, allowing the viewer to wander around and get a look at all the object's parts from all angles. Such animations are typically rendered frame by frame by high-end 3-D animation programs such as NewTek's Light wave or Autodesk's Maya.

Today, computers have taken the handwork out of the animation and rendering process, and commercial films such as *Shrek, Coralline, Toy Story,* and *Avatar* have utilized the power of computers. (See Chapter 3 for an account of the historic "computer wall" of 117 Sun SPARCstation's used to render the animated feature *Toy Story*.)

**Animation Techniques**

When you create an animation, organize its execution into a series of logical steps. First, gather up in your mind all the activities you wish to provide in the animation. If it is complicated, you may wish to create a written script with a list of activities and required objects and then create a storyboard to visualize the animation. Choose the animation tool best suited for the job, and then build and tweak your sequences. This may include creating objects, planning their movements,

texturing their surfaces, adding lights, experimenting with lighting effects, and positioning the camera or point of view. Allow plenty of time for this phase when you are experimenting and testing. Finally, post-process your animation, doing any special renderings and adding sound effects.

***Cell Animation***

The animation techniques made famous by Disney use a series of progressively different graphics or cells on each frame of movie film (which plays at 24 frames per second). A minute of animation may thus require as many as 1,440 separate frames, and each frame may be composed of many layers of cells. The term **cell** derives from the clear celluloid sheets that were used for drawing each frame, which have been replaced today by layers of digital imagery. Cells of famous animated cartoons have become sought-after, suitable-for-framing collector's items.

**Cell animation** artwork begins with **key frames** (the first and last frame of an action). For example, when an animated figure of a woman walks across the screen, she balances the weight of her entire body on one foot and then the other in a series of falls and recoveries, with the opposite foot and leg catching up to support the body. Thus the first key frame to portray a single step might be the woman pitching her body weight forward off the left foot and leg, while her center of gravity shifts forward; the feet are close together, and she appears to be falling. The last key frame might be the right foot and leg catching the body's fall, with the center of gravity now centered between the outstretched stride and the left and right feet positioned far apart.

The series of frames in between the key frames are drawn in a process called tweening. **Tweening** is an action that requires calculating the number of frames between key frames and the path the action takes, and then actually sketching with pencil the series of progressively different outlines. As twining progresses, the action sequence is checked by flipping through the frames. The penciled frames are assembled and then actually filmed as a **pencil test** to check smoothness, continuity, and timing. When the pencil frames are satisfactory, they are permanently inked, photocopied onto cells, and given to artists who use acrylic colors to paint the details for each cell. Women were often preferred for this painstaking inking and painting

work as they were deemed patient, neat, and had great eyes for detail. In the hands of a master, cell paint applied to the back of acetate can be simply flat and perfectly even, or it can produce beautiful and subtle effects, with feathered edges or smudges. The cells for each frame of our example of a walking woman—which may consist of a text title, a background, foreground, characters (with perhaps separate cells for a left arm, a right arm, legs, shoes, a body, and facial features)—are carefully registered and stacked. It is this composite that becomes the final photographed single frame in an animated movie. To replicate natural motion, traditional cell animators often utilized "motion capture" by photographing a woman walking, a horse trotting, or a cat jumping to help visualize timings and movements. Today, animators use reflective sensors applied to a person, animal, or other object whose motion is to be captured. Cameras and computers convert the precise locations of the sensors into x,y,z coordinates and the data is rendered into 3-D surfaces moving over time For 3-D animation, most of your effort may be spent in creating the models of individual objects and designing the characteristics of their shapes and surfaces. It is the software that then computes the movement of the objects within the 3-D space and renders each frame, in the end stitching them together in a digital output file or container such as an AVI or QuickTime movie.

On the computer, paint is most often filled or drawn with tools using features such as gradients and anti-aliasing. The word **inks**, in computer animation terminology, usually means special methods for computing color values, providing edge detection, and layering so that images can blend or otherwise mix their colors to produce special transparencies, inversions, and effects.

You can usually set your own frame rates on the computer. 2-D cell based animated GIFs, for example, allow you to specify how long each frame is to be displayed and how many times the animation should loop before stopping. 3-D animations output as digital video files can be set to run at 15 or 24 or 30 frames per second. However, the rate at which changes are computed and screens are actually refreshed will depend on the speed and power of your user's display platform and hardware, especially for animations such as path animations that are being generated by the computer on the fly. Although your animations will probably never push the

limits of a monitor's scan rate (about 60 to 70 frames per second), animation does put raw computing horsepower to task. If you cannot compute all your changes and display them as a new frame on your monitor within, say, 1/15th of a second, then the animation may appear jerky and slow. Luckily, when the files include audio, the software maintains the continuity of the audio at all cost, preferring to drop visual frames or hold a single frame for several seconds while the audio plays.

**Morphing**

Morphing is a popular (if not overused) effect in which one image transforms into another. Morphing applications and other modeling tools that offer this effect can transition not only between still images but often between moving images as well. Some products that offer morphing features are Black Belt's Easy Morph and Win Images (. com) and Human Software's Squizz www.humansoftware. Illustrates part of a morph in which 16 kindergarten children are dissolved one into the other in a continuous, compelling motion video.

The morphed images were built at a rate of eight frames per second, with each transition taking a total of four seconds (32 separate images for each transition), and the number of key points was held to a minimum to shorten rendering time. Setting key points is crucial for a smooth transition between two images. The point you set in the start image will move to the corresponding point in the end image—this is important for things like eyes and noses, which you want to end up in about the same place (even if they look different) after the transition. The more key points, the Smoother the morphing.

## POSSIBLE QUESTIONS

**PART-B (2Marks)**

1. Define analog video
2. Define digital video
3. What is meant by Pal?
4. What is meant by SECAM?
5. Define MPEG.
6. Explain Chroma keys.

**PART-C (6Marks)**

1. Explain in detail how video works with neat example.
2. List out various types of Analog video with example.
3. List out the various types of Digital video with example.
4. Explain different types of video file formats in detail.
5. Discuss in detail about animation technique in detail
6. List out the various techniques used in animation.

**KARPAGAM ACADEMY OF HIGHER EDUCATION**

**DEPARTMENT OF COMPUTER SCIENCE, CA & IT**

**I B.Sc CS (Batch 2017-2020)**

**MULTIMEDIA AND ITS APPLICATIONS**

**PART - A OBJECTIVE TYPE/MULTIPLE CHOICE QUESTIONS**

**ONLINE EXAMINATIONS**

| S.No | Questions | Opt 1 | Opt 2 | Opt 3 | Opt 4 | Answer |
|---|---|---|---|---|---|---|
| | **UNIT-III** | | | | | |
| 1 | MPEG stands for_____ | Moving picture Expert Group | Movie Picture Expert Group | Music Pic Expert Group | Media Picture Expert Group | **Moving picture Expert Group** |
| 2 | _____provides high resolution in a 16:9 aspect ratio | SECAM | PAL | ATSC DTV | HDTV | **HDTV** |
| 3 | Using MPEG-1 we can deliver _____ of video | 1.5Mbps | 2 Kbps | 1.2 Mbps | 3 Mbps | **1.2 Mbps** |
| 4 | ____ supports repeated recording without degradation of image quality | Analog video | Image | Digital video | Audio | **Digital video** |
| 5 | ____ uses 720 active lines or higher | TV | SDTV | EDTV | HDTV | **HDTV** |
| 6 | _____ movies being prepared for a CD or website should be processed together | All time | Quick time | sometime | none | **Quick time** |

| | | | | | | |
|---|---|---|---|---|---|---|
| 7 | _____ places the highest performance demand on any computer system | Audio | Video | sound | Text | **Video** |
| 8 | How many formats were developed in DVD recordable? | 2 | 3 | 4 | 5 | **3** |
| 9 | _____ means that you interleave the audio and video segments together | Flattening | seek time | Quick time | none | **Flattening** |
| 10 | A video consists of a sequence of | Frames. | B. Signals. | C. Packets. | D. Slots. | **Frames.** |
| 11 | Which of the following is NOT a video file extension: | MP4 | AVI | QT | JPG | **JPG** |
| 12 | With reference to multimedia elements, pick the odd one out of the following: | Graphics | Animation | Audio | Voice Script | **Voice Script** |
| 13 | _____ are primarily used to ilustrate or demonstrate an idea | Animation | Sound | Video | Text | **Animation** |
| 14 | DRM stands for _____ | Digital Right management | Digital Read Management | Digital right manner | Both A & B | **Digital Right management** |
| 15 | _____ lines displayed on an RGB mointor lookfine | Double pixel | Single pixel | Both a & b | None | **Single pixel** |
| 16 | NLE stands for _____ | Non linear editing | Non line editing | Non laser editing | Both B & C | **Non linear editing** |
| 17 | How many categories are there in 2D animation? | 2 | 3 | 4 | 5 | **2** |
| 18 | For creating a 3D animation how many steps are there? | 3 | 2 | 1 | 8 | **3** |
| 19 | Editing is also known as_____ | Morphing | Creating | Worphing | none | **Morphing** |
| 20 | ATSC stands for _____ | Advanced Television system committee | Advanced Telegraph system committee | Advanced Telecommunication | none | **Advanced Television system committee** |

| | | | | | | |
|---|---|---|---|---|---|---|
| 21 | ____ between standards still requires high-end specialized equipment | Dancing | Dubbing | Degqussing | Digitzing | **Dubbing** |
| 22 | A digital camcorder directly connected a computer workstation using _____ | Wire fire | Wifi | Firewire | Both a & b | **Firewire** |
| 23 | _____ files tend to be very heavy | Audio | Video | Sound | Text | **Video** |
| 24 | How many types of video compressions are there? | 2 | 3 | 1 | 4 | **2** |
| 25 | _____ retains the exact image throughout the compression | Lossless | Lossy | LossLow | Losshigh | **Lossless** |
| 26 | The extension for quicktime format _____ | .Mov | .Wav | .Qtf | none | **.Mov** |
| 27 | Extension for wave format _____ | .WMV | .WAV | .MOV | .Qtf | **.WMV** |
| 28 | Shockwave format is _____ | .WMV | .SMV | .SMF | .SMA | **.SMF** |
| 29 | Sounds and video in multimedia applications can be played inline by using | sound | helper | text | none | **helper** |
| 30 | What are the formats in DVD recordable? | CD-rom,GIF | CD-Rom,DDT | CD-Rom,GUI | Digitzing | **CD-rom,GIF** |
| 31 | _____ recordables are used for consumer audio and video recording | DVD | DTV | DIA | DMA | **DVD** |
| 32 | DVD recordables contain how many formats? | 3 | 2 | 4 | 5 | **3** |
| 33 | A classic symbol of amateur home movies is _____ camera work | shaky | sharky | shark | sharp | **shaky** |
| 34 | Betamax is also called as _____ | Betacom | Betacam | Bettacom | none | **Betacam** |

| | | | | | | |
|---|---|---|---|---|---|---|
| 35 | Animation is possible because of biological phenomenon known | Product of vision | phenomenon of vision | persistance of vision | Persistance of video | **persistance of vision** |
| 36 | Psychological phenomenon called _____ | pha | phe | phi | phd | **phi** |
| 37 | _____ artwork begins with keyframes | cell | cel | stored | object | **cel** |
| 38 | 3D animations programs such as _____ | Newteks lightware or Autodesks maya | Newtake liner or audio desk | Newtake liner or audio drive | none | **Newteks lightware or Autodesks maya** |
| 39 | The penciled frames are assembled and then actually filmed as _____ to check | Toolbox | Pencil | Ink | Colors | **Pencil** |
| 40 | The human mind needs to conceptually complete a _____ | Perceived action | Persistance action | None | Both A & B | **Perceived action** |
| 41 | _____ is an object actually moving across into or out of the screen | Video | Animation | sound | None | **Animation** |
| 42 | _____ is an effect in which one image transforms into another | Morphing | Editing | Both a & b | Fonts | **Morphing** |
| 43 | _____ programs typically employ the same logic and producedural | Computer animation | object animation | Persistance action | stored | **Computer animation** |

## UNIT-IV
## SYLLABUS

**Animation:** animation file formats. **Internet and Multimedia**: www and HTML, multimedia on the web – web servers, **6L** web browsers, web page makers and site builders

## Animation

### Animation File Formats

Some file formats are designed specifically to contain animations, so they can be ported among applications and platforms with the proper translators. Those formats include Director (.dir and .dcr), AnimatorPro (.fli and .flc), 3D Studio Max (.max), GIF89a (.gif), and Flash (.fla and .swf). Because file size is a critical factor when downloading animations to play on web pages, file compression is an essential part of preparing animation files for the Web. A Director's native movie file (.dir), for example, must be preprocessed and compressed into a proprietary Shockwave animation file (.dcr) for the Web. Compression for Director movies is as much as 75 percent or more with this tool, turning 100K files into 25K files and significantly speeding up download/display times on the Internet.

Flash, widely used for web-based animation, makes extensive use of vector graphics (see Chapter 3) to keep the post-compression file size at absolute minimums. As with Director, its native .fla files must be converted to Shockwave Flash files (.swf) in order to play on the Web. To view these animations within a web page, special plug-ins or players are required (see Chapter 6).

In some cases, especially with 3-D animations, the individual rendered frames of an animation are put together into one of the standard digital video file containers, such as the Windows Audio Video Interleaved format (.avi), QuickTime (.qt, .mov), or Motion Picture Experts Group video (.mpeg or .mpg). These can be played using the media players shipped with computer operating systems. New with HTML5 is animation built within a .svg (scalable vector graphics) file, where graphic elements can be programmed to change over time (www.w3.org/TR/SVG11/animate.html). In the following simple code, a patch of red expands within a rectangle, filling it in three seconds. Type this code into a text processor and save it as plain text with a .svg extension. Open the file with "File Open…" from a HTML5-compliant web browser to see it work. Change some parameters (duration, colors, location) and reload or refresh the file to see the effects of your changes.

### The Internet and Multimedia

The material covered in this chapter is designed to give you an overview of the Internet while describing particular features that may be useful to you as a developer of multimedia for the World Wide Web. URLs and other pointers are also included here to lead you to information for

obtaining, installing, and using these applications and utilities. This chapter does *not* provide details about technology for connecting and using the Internet, about setting up servers and hosts, about installing and using applications, or what to do when you discover that you pressed the wrong key and have broadcast the intimate details of last night's hot date to 532 friends.

**Internet History**

The Internet began as a research network funded by the Advanced Research Projects Agency (ARPA) of the U.S. Defense Department, when the first node of the ARPANET was installed at the University of California at Los Angeles in September 1969. By the mid-1970s, the ARPANET "inter-network" embraced more than 30 universities, military sites, and government contractors, and its user base expanded to include the larger computer science research community. By 1983, the network still consisted of merely several hundred computers on only a few local area networks.

In 1985, the National Science Foundation (NSF) aligned with ARPA to support a collaboration of supercomputing centers and computer science researchers across the ARPANET. The NSF also funded a program for improving the backbone of the ARPANET, by increasing its bandwidth from 56 Kbps to T1 and then T3 (see "Connections" a little later in the chapter for more information) and branching out with links to international sites in Europe and the Far East.

In 1989, responsibility and management for the ARPANET was officially passed from military interests to the academically oriented NSF, and research organizations and universities (professors and students alike) became increasingly heavy users of this ever-growing "Internet."

Much of the Internet's etiquette and rules for behavior (such as for sending e-mail and posting to newsgroups) was established during this time. More and more private companies and organizations linked up to the Internet, and by the mid-1990s, the Internet included connections to more than 60 countries and more than 2 million host computers with more than 15 million users worldwide. Commercial and business use of the Internet was not permitted until 1992, but businesses have since become its driving force. By 2001 there were 109,574,429 domain hosts and 407.1 million users of the Internet, representing 6.71 percent of the world's population. By the beginning of 2010 (see Table 12-1), about one out of every four people around the world (26.6 percent) had access to the Internet, and more than 51 million domain names had been registered as "dot-coms."

**Internetworking**

In its simplest form, a network is a cluster of computers, with one computer acting as a server to provide network services such as file transfer, e-mail, and document printing to the client computers or users of that network. Using gateways and routers, a local area network (LAN) can be connected to other LANs to form a wide area network (WAN). These LANs and WANs can also be connected to the Internet through a server that provides both the necessary software for the Internet and the physical data connection (usually a high-bandwidth telephone line, coaxial cable TV line, or wireless). Individual computers not permanently part ofa network (such as a home computer or a laptop) can connect to one of these Internet servers and, with proper identification and onboard client software, obtain an IP address on the Internet (see "IP Addresses and Data Packets" later in the chapter).

**Internet Addresses**

Let's say you get into a taxi at the train station in Trento, Italy, explain in English or Spanish or German or French that you wish to go to the Mozzi Hotel, and half an hour later you are let out of the car in a suburban wood—you have an address problem. You will quickly discover, as you return to the city in the back of a bricklayer's lorry to report your missing luggage and the cab driver, Mauro, who sped away in the rain, that you also have a serious language problem.

If you know how addresses work and understand the syntax or language of the Internet, you will likely not get lost and will save much time and expense during your adventures. You will also be able to employ shortcuts and workarounds.

***Top-Level Domains***

When the original ARPANET protocols for communicating among computers were remade into the current scheme of TCP/IP (Transmission Control Protocol/Internet Protocol) in 1983, the Domain Name System (DNS) was developed to rationally assign names and addresses to computers linked to the Internet. Top-level domains (TLDs) were established as categories to accommodate all users of the Internet:

| | |
|---|---|
| com | Commercial entities |
| edu | Degree-granting colleges and universities (other schools register in the country domain) |
| gov | U.S. federal government agencies (state and local agencies register in the country domain) |
| int | Organizations established by international treaties and international databases |
| mil | U.S. military |
| net | Computers belonging to network providers |
| org | Miscellaneous and non-government organizations |
| Two-letter country codes | More than 240 countries and territories |

In late 1998, the Internet Corporation for Assigned Names and Numbers (ICANN) was set up to oversee the technical coordination of the Domain Name System, which allows Internet addresses to be found by easy-to-remember names instead of one of 4.3 billion individual IP numbers. In late 2000, ICANN approved seven additional TLDs:

As a particular domain name is built up from the top-level domain, it consists of different levels separated by a period (spoken as "dot"). Since we read left to right, we tend to think first.second.third, left to right, but domain name levels are numbered right to left. Companies such as Microsoft, Apple, and IBM have second-level domain addresses that read microsoft.com, apple.com, and ibm.com—they are commercial (.com) operations with their second-level domain to the left of the top-level "com" domain. Government (.gov) agencies such as the Federal

Bureau of Investigation, the Internal Revenue Service (a branch of the U.S. Treasury Department), and the White House have addresses that read fbi.gov, irs.ustreas.gov (note that the irs constitutes a third-level address), and whitehouse.gov.

***Second-Level Domains***

Many second-level domains contain huge numbers of computers and user accounts representing local, regional, and even international branches as well as various internal business and management functions. So the Internet addressing scheme provides for subdomains that can contain even more subdomains. Like a finely carved Russian matryoshka doll, individual workstations live at the epicenter of a cluster of domains. Within the education (.edu) domain containing hundreds of universities and colleges, for example, is a second-level domain for Yale University called yale. At that university are many schools and departments (medicine, engineering, law, business, computer science, and so on), and each of these entities in turn has departments and possibly sub departments and many users. These departments operate one or even several servers for managing traffic to and from the many computers in their group and to the outside world. At Yale, the server for the Computing and Information Systems Department is named cis. It manages about 11,000 departmental accounts—so many accounts that a cluster of three subsidiary servers was installed to deal efficiently with the demand. These subsidiary servers are named minerva, morpheus, and mercury. Thus, minerva lives in the cis domain, which lives in the yale domain, which lives in the edu domain. Real people's computers are networked to minerva. Other real people are connected to the morpheus and mercury servers. To make things easy (exactly what computers are for), the mail system database at Yale maintains a master list of all of its people. So, as far as the outside world is concerned, a professor's e-mail address can be simply firstname.lastname@yale.edu; the database knows he or she is really connected to Minerva so the mail is forwarded to that correct final address. In detailed e-mail headers, you may see the complete destination address listed as well as names of the computers through which your mail message may have been routed.

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There are never any blank spaces in an Internet e-mail address, and while addresses on the Internet are normally case insensitive, conventional use dictates using all lowercase: the Internet will find tay@timestream.com, TAY@TIMESTREAM.COM, and Tay@Timestream.Com to be the same address.

***The US Domain and Country Codes***

The two-letter top-level US domain is based on political boundaries and is used by federal, state, and local government agencies, high schools, technical/ vocational schools, private schools, elementary schools, libraries, fire and police departments, and regular citizens. Any computer in the United States can be in the US domain. Some fictitious examples are as follows:

| | |
|---|---|
| fs.fed.us | Federal |
| senate.state.pa.us | State |
| assembly.state.ny.us | State |
| mwra.state.ma.us | State |
| ci.wayland.mi.us | City |
| co.alameda.ca.us | County |
| ccsf.cc.ca.us | Public community college |
| appleton.lib.me.us | Public library |
| pps.k12.or.us | Public school |
| perkins.pvt.k12.ma.us | Private school |

***IP Addresses and Data Packets***

When a stream of data is sent over the Internet by your computer, it is first broken down into packets by the Transmission Control Protocol (TCP). Each packet includes the address of the receiving computer, a sequence number ("this is packet #5"), error correction information, and a small piece of your data. After a packet is created by TCP, the Internet Protocol (IP) then takes over and actually sends the packet to its destination along a route that may include many other computers acting as forwarders. TCP/IP is two important Internet protocols working in concert. The 32-bit address included in a data packet, the IP address, is the "real" Internet address. It is made up of four numbers separated by periods, for example, 140.174.162.10. Some of these numbers are assigned by Internet authorities, and some may be dynamically assigned by an

Internet service provider (ISP) when a computer logs on using a subscriber's account. There are domain name servers throughout the Internet whose sole job is to quickly look up text-based domain name addresses in large distributed databases, convert them into real IP addresses, and then return them to you for insertion into your data packets. Every time you connect to http://www.google.com or send mail to president@whitehouse.gov, the domain name server is consulted and the destination address is converted to numbers.

**Connections**

If your computer is connected to an existing network at an office or school, it is likely you are already connected to the Internet. If you are an individual working from home, you will need a telephone dial-up account or broadband cable, Digital Subscriber Line (DSL), or wireless equipment to connect to the backbone (the ultra-high-bandwidth underlying network operated by MCI, AT&T, Sprint, and other telecommunications companies) of the Internet through an Internet service provider (ISP).

**The Bandwidth Bottleneck**

Bandwidth is how much data, expressed in bits per second (bps), you can send from one computer to another in a given amount of time. The faster your transmissions (or the greater the bandwidth of your connection), the less time you will spend waiting for text, images, sounds, and animated illustrations to upload or download from computer to computer, and the more

satisfaction you will have with your Internet experience. To think in bytes per second, divide the rate by eight. Table 12-2 lists the bandwidth of some common data transfer methods.

| Type of Connection | Bandwidth (in bits per second) Without Compression | Comment |
|---|---|---|
| 56K modem | 56,000 | Maximum analog modem speed for copper wires, (Dial-Up) data compressed using V91 standard. Actual is about 48 Kbps. |
| ISDN | 56,000 to 128,000 | Integrated Services Digital Network basic services (128,000 bps if no voice mixed in). |
| Frame relay | 56,000 to 45,000,000 | Dedicated service offered by long-distance phone companies. |
| Ethernet-10 | 10,000,000 | Networking hardware and protocol, commonly uses two twisted pairs of copper wire. |
| T-1 (DS-1 in North America) | 1,544,000 | Equal to 24 leased lines at 56 Kbps. |
| E-1 (DS-1 in Europe) | 2,000,000 | European equivalent of a T-1 connection. |
| DSL | 1,500,000 to 9,000,000 | Digital Subscriber Line service available in various technologies (HDSL, SDSL, ADSL, VDSL, and RDSL) with differing data rates, operating distances, and ratios between downstream and upstream speeds. |
| Cable Modem | 3,000,000 upload; 7,000,000 download | Even though copper coaxial TV cable can be used in a bidirectional fashion, it was originally designed to carry limited signals in one direction. |
| Wireless (802.11) | 3,000,000 to 54,000,000 | Radio connection in the radio frequency (RF) bands of 2.4 GHz (WiFi) or 5.8 GHz. |
| T-3 (D-3 in North America) | 45,000,000 | Typical backbone speed of major ISPs in the United States (1996). |
| Fast Ethernet-100 | 100,000,000 | Networking hardware and protocol, commonly uses two twisted pairs of copper wire. |
| OC-3 | 155,000,000 | Upgrade for ISPs in the United States (1997). |
| Gigabit Ethernet | 1,000,000,000 | Used for local network backbones; standard in many computers. |
| OC-48 | 2,400,000,000 (2.4 gigabits per second) | Typical speed for intercity fiber-optic lines (called SONET or Synchronous Optical Network). |
| 10 Gigabit Ethernet | 10,000,000,000 (10 gigabits per second) | Used for local network backbones. |
| OC-255 | 13,210,000,000 (13.21 gigabits per second) | Really fast fiber-optic lines using SONET. |

To work within the constraints of bandwidth bottlenecks, multimedia developers on the Internet have but a few options: Compress data as tightly as possible (into ZIP or SIT or TAR files) Before transmitting.

■■ Require users to download data only once; then store the data in a local hard disk cache (this is automatically managed by most browsers).

■■ Design each multimedia element to be efficiently compact—don't use a greater color depth than is absolutely necessary or leave extra space around the edges.

■■ Design alternate low-bandwidth and high-bandwidth navigation paths to accommodate all users.
■■ Implement streaming methods that allow data to be transferred and displayed incrementally as it comes in (without waiting for the entire data file to arrive).

Internet Services

To many users, the Internet means the World Wide Web. But the Web is only the latest and most popular of services available today on the Internet. E-mail; file transfer; discussion groups and newsgroups; real-time chatting by text, voice, and video; and the ability to log into remote computers are common as well. Internet services are shown here.

| Service | Purpose |
|---|---|
| ftp | For transferring files between computers; can be anonymous or password protected (from File Transfer Protocol) |
| gopher | For menus of material available on the Internet (seldom used) |
| http | For posting and reading documents (from the Hypertext Transfer Protocol used by the World Wide Web) |
| https | For posting and reading encrypted (secure) documents |
| imap | For receiving electronic mail (from Internet Message Access Protocol) |
| irc | For real-time text messaging (from Internet Relay Chat) |
| mud | For real-time game playing (from MultiUser Dimension) |
| pop | For receiving electronic mail (from Post Office Protocol) |
| rtsp | For streaming media control (from Real Time Streaming Protocol) |
| telnet | For logging on and working from remote computers |
| smtp | For sending mail (Simple Mail Transport Protocol) |
| usenet | For participating in discussion groups (from USErs NETwork) |

Each Internet service is implemented on an Internet server by dedicated software known as a daemon. (Actually, daemons only exist on Unix/Linux systems—on other systems, such as Windows, the services may run as regular applications or background processes.) Daemons are agent programs that run in the background, waiting to act on requests from the outside. In the case of the Internet, daemons support protocols such as the Hypertext Transfer Protocol (HTTP) for the World Wide Web, the Post Office Protocol (POP) for e-mail, or the File Transfer Protocol (FTP) for exchanging files. You have probably noticed that the first few letters of a Uniform Resource Locator (URL)—for example, http://www .timestream.com/index.html—notify a server as to which daemon to bring into play to satisfy a request. In many cases, the daemons for the Web, mail, news, and FTP may run on completely different servers, each isolated by a security firewall from other servers on a network.

**MIME-Types**

To work with multimedia on the Internet, you must work within the requirements of the appropriate protocol, using recognizable documents and formats. A voice attachment to an e-mail message, for example, must be identified by the Post Office daemon for what it is, and then be transmitted with the correct coding to the receiving computer. The receiver must have the proper software (and hardware) for decoding the information and playing it back. To identify the nature of the data transmitted and, by inference, the purpose of that data, the Internet uses a standard list of filename extensions called Multipurpose Internet Mail Extensions (MIME-types). Most browsers allow you to define MIME-types and map "helper apps" to the type for decoding and playing. For example, with Netscape Navigator you can define Adobe's Acrobat files (PDF files) as a MIME-type and select the Acrobat Reader as the player application.

These are not just used by the e-mail daemon but, by convention, by other Internet daemons, including the Web's HTTP daemon. Perhaps the most widely installed HTTP software for managing web pages is the open-source application called Apache (www.apache.org). Table 12-3 shows a list of common MIME-types and their uses. (Note that many come from the Unix world, where the Internet was born.) You can also visit www.file-ext.com for more information.

| Extension | Type | Use |
|---|---|---|
| ai | application/postscript | PostScript program |
| aif | audio/x-aiff | Audio |
| aifc | audio/x-aiff | Audio |
| AIFF | audio/x-aiff | Audio |
| aiff | audio/x-aiff | Audio |
| au | audio/basic | ULAW audio data |
| avi | video/x-msvideo | Microsoft video |
| bin | application/octet-stream | Binary executable |
| cpio | application/x-cpio | Unix CPIO archive |
| csh | application/x-csh | C shell program |
| dcr | application/director | Shockwave animation |
| dvi | application/x-dvi | TeX DVI data |
| eps | application/postscript | PostScript program |
| exe | application/octet-stream | Binary executable |

**The World Wide Web and HTML**

The World Wide Web (www.w3.org/) started in 1989 at the European Particle Physics Laboratory (CERN) as a "distributed collaborative hypermedia information system." It was

designed by Tim Berners-Lee as a protocol for linking a multiplicity of documents located on computers anywhere within the Internet. This new Hypertext Transfer Protocol (HTTP) provided rules for a simple transaction between two computers on the Internet consisting of (1) establishing a connection, (2) requesting that a document be sent, (3) sending the document, and (4) closing the connection. It also required a simple document format called Hypertext Markup Language (HTML) for presenting structured text mixed with inline images. An HTML document could contain hyperlinks or anchors that referred to other similar documents. With browser software, users could then click on designated areas of hot text in one document and jump to another, which itself might have more hot text pointing to yet other documents. Users could surf from document to document across the Web, with HTML as the underlying buoyant framework. Berners-Lee is currently developing the next evolution, the Semantic Web, which "provides a common framework that allows data to be shared and reused across application, enterprise, and community boundaries." Visit www.w3.org/2001/sw/ for more.

***Dynamic Web Pages and XML***

HTML is fine for building and delivering uncomplicated *static* web pages. But you will need other tools and programming know-how to deliver *dynamic* pages that are built on the fly from text, graphics, animations, and information contained in databases or documents. JavaScript and programs written in Java may be inserted into HTML pages to perform special functions and tasks that go beyond the vanilla abilities of HTML—for mouse rollovers, window control, and custom animations.

**XML** (Extensible Markup Language) goes beyond HTML—it is the next evolutionary step in the development of the Internet for formatting and delivering web pages using styles. Unlike HTML, you can create your own tags in XML to describe exactly what the data means, and you can get that data from anywhere on the Web. In XML, you can build a set of tags like

```
<fruit>
<type>Tomato</type>
<source>California</source>
<price>$.64</price>
</fruit>
```

and your XML document, according to your instructions, will find the information to put into the proper place on the web page in the formatting style you assign. For example, with XML styles, you can declare that all items within the <price> tag will be displayed in boldface Helvetica type.

**Multimedia on the Web**

During the coming years, most multimedia experiences on the Internet will occur on the World Wide Web, programmed within the constraints of HTML, then stretched by the enhanced capabilities provided by XML, Java, JavaScript, AJAX, and special plug-ins like Flash and QuickTime to enable browsers to exceed their limits. These tools are used to build "Web 2.0" sites where there is collaboration and information sharing such as seen in blogs, on wikis, and at social networking sites such as Facebook and Twitter.

To design and make effective multimedia for this environment, developers need to understand not only how to create and edit the elements of multimedia, but also how to deliver it for HTML browsers and plug-in/ player vehicles. Well-crafted, professionally rendered sites on the Web include text, images, audio, and animation presented in a user-friendly interface that balances the bandwidth deficit against user patience. Inside the event horizon of the amazing World Wide Web explosion are many uncertainties and unsolved challenges. The bandwidth deficit will certainly be met with technology solutions that will reach the last mile into homes and businesses. There is a terrific need for high-quality, compelling content; multimedia developers and entrepreneurs will fill this creative void.

**Tools for the World Wide Web**

In the late 1990s, multimedia plug-ins and commercial tools aimed at the Web entered the marketplace at a furious pace, each competing for visibility and developer/user mind share in an increasingly noisy venue. In the few years since the birth of the first line-driven HTTP daemon in Switzerland, millions of web surfers had become hungry for "cool" enhancements to entertaining sites. Web site and page developers needed creative tools to feed the surfers, while surfers needed browsers and the plug-ins and players to make these cool multimedia enhancements work. A combination of the explosion of these tools and user demand for performance stresses the orderly development of the core HTML standard. Unable to evolve fast enough to satisfy the demand for features (there are committees, international meetings, rational debates, comment periods, and votes in the standards process), the HTML language is constantly being extended de facto by commercial interests. These companies regularly release new versions of web browsers containing tags (HTML formatting elements) and features not yet formally approved. By the time (measured in weeks!) millions of users have become dependent upon the features of the new browser versions, the more carefully considered official specification has no choice but to incorporate them. By the time features are "official," of course—after more meetings, votes, and understated demonstrations of power—still newer browser versions have been released with yet newer, unofficial features. What keeps this cycle from being chaotic are the natural selection forces of the marketplace: developers strive toward a successful product that works better and satisfies more users without mutating so far from the core standard that there are no sales and the company collapses. Developers also complain about the contention among browser vendors because they must program workarounds that compensate for the performance differences among them, and they must test the performance of their site on all or as many as possible.

Browsers provide a method for third-party developers to "plug in" special tools that take over certain computational and display activities. They also support the Java and JavaScript languages by which programmers can create bits of programming script and Java applets to extend and customize a browser's basic HTML capabilities, especially into the multimedia real. Java and JavaScript are only related by name. Java is a programming language much like C++ that must be compiled into machine code to be executed by a computer's operating system. JavaScript is a "scripting language" whose commands are executed at runtime by the browser itself.

JavaScript code can be placed directly into HTML using <script> tags or referenced from a file with the ".js" extension. Thus, while browsers provide the orchestrated foundation of HTML,

third-party players and even nonprogrammers can create their own cadenzas to enhance browser performance or perform special tasks. It is often through these plug-ins and applets that multimedia reaches end users. Many of these tools are available as freeware and shareware while others, particularly server software packages, are expensive, though most any tool can be downloaded from the Internet in a trial version. Try it. If you like it or use it, buy it. The stunning growth of the Internet as well as expansion of wireless mobile phone connectivity to the Internet has caused many multimedia developers to redirect their creative efforts toward providing software solutions for these arenas. This remains a new and lucrative frontier, and no developer wishes to be left behind.

**Web Servers**

The workings of the Web involve communication between two computers: a server and a client. The server delivers a file when a client asks for it. Because the playback or display performance of your multimedia content— particularly when it is a streaming MIME-type such as RealAudio or Shockwave/Flash or a QuickTime video—depends upon the speed and capabilities of the computer and software serving it (as well as the bandwidth and load factors of the Internet), you should know some basics. A growing number of software vendors provide web servers of varying strength and capacity and for a variety of platforms, all of which meet the requirements of the Hypertext Transfer Protocol. A server is technically not the hardware, but the software—you should invest in server software that will stand up to your intended use and be supported by the vendor.

Most vendors will also recommend hardware configurations. This combination of software and hardware is critical to your success and happiness if you wish to optimize response time (less than a second), your connections per second (as many as possible), and your throughput (plenty of room before your Internet connection is overwhelmed by traveling packets).

**Web Browsers**

Your computer's performance is as important as the bandwidth of your connection to the Web. Web browsers are applications that run on a user's personal computer (on the client side on the Internet) to provide the interactive graphical interface for searching, finding, and viewing text documents, sounds, animations, and other multimedia resources on the Web. In 1996, as many as 50 browsers competed for market share, each boasting special or unique features, performance, and cost. Rich Santalesa, editor of *NetGuide* magazine, predicted even then that "the browser wars are over—it's a battle between Microsoft and Netscape, and everyone else is going to dry up and blow away." Indeed, by mid-2001, only two serious competitors remained: Netscape and Microsoft, and Netscape, despite more than 40 million registered users, was beginning a chameleon act. Purchased by AOL, then alloyed by a merger with Time Warner, Netscape was repositioned as a "media hub," not a software company, giving the new Netscape a chance to sell advertising across its many media properties and experiment with subscriptions rather than just free services within the AOL-Time Warner media empire (which includes properties such as *Fortune* and *Time* magazines and the 24-hour cable news network CNN).

By 2006, Netscape was dead. From Netscape's ashes arose Mozilla Firefox as an open-source competitor to Microsoft Internet Explorer.

**Search Engines**

You should become familiar with the operation of one or more search engines. They will ferret out information for you in seconds, information that would take months to find searching in a traditional library. Individualized personal search engines are available that can search the entire public Web, while enterprise search engines can search intranets, and mobile search engines can search PDAs and even cell phones.

**Web Page Makers and Site Builders**

To deliver multimedia on the Web today, you should know some HTML, meaning that you must place the proper tags and references into your documents to launch and control your multimedia. Many HTML editors and web page–making applications offer to shortcut your HTML learning curve and working effort. If you use one of these editors, enjoy its easing your work effort, but do not shy away from learning the syntax and tags of the language. Often these "helpers" generate extremely complicated HTML code (described by some programmers as "garbage") with the idea that if this code is hidden "under the hood," who cares? As you yourself become more informed and better at HTML coding, you might discover that you are the person who cares! HTML documents are simple ASCII text files saved to disk without any formatting at all—no bolding, underlining, special fonts, margins, or tabs. Professional web page developers often use only a word processor like BBEdit for the Mac (see Figure 12-1) or WordPad in Windows rather than a sopped-up, drag-and-drop, HTML page builder, and they insert text and tags into their documents manually or with personalized shortcut keys and helper scripts. HTML currently includes about 50 tags, and once you understand their properties and uses, coding, or marking up, a document and saving it to your web site can be a straightforward process. Plain HTML may not be enough to create dynamic sites on the fly, sites based upon user preferences or that display "live" information pulled from databases or spreadsheets. To build these kinds of pages, you should be familiar with programming environments such as Microsoft's Active Server Pages (.asp); Adobe's ColdFusion (.cfm), which uses ColdFusion Markup Language (CFML); or the open-source and readily available PHP. For other powerful options beyond plain HTML, knowledge of Dynamic HTML (DHTML), Extensible Markup Language (XML), and Cascading Style Sheets (CSS) will enhance your skill set.

Most web browsers allow you to read the HTML code behind the page you are viewing. In Firefox, click View: Page Source The Sea Monkey browser, based on the Mozilla engine, includes a basic visual page editor, with several different modes, including a "Tag" mode, which visually shows the tags related to various elements on the page. HTML translators are built into many word processing programs, so you can export a word-processed document with its text styles and layout converted to HTML tags for headers, bolding, underlining, indenting, and so on. Some are more powerful than others. These work well for simple text documents but tend to choke on powerful HTML features such as tables, forms, frames, and other extensions. Dedicated editors are usually WYSIWYG (What You See Is What You Get) word processors, and they provide more power and more features specifically geared to exploiting HTML. Microsoft Word, for example, automatically opens web pages in a WYSIWYG view. On the downside, these "helpful" features may cause a page with many embedded graphics to load into

the word processor very slowly while it interprets and lays out the page as a browser would, instead of just loading the text of the page's HTML code and letting you change a few tags or lines. Among the many tools in this emerging marketplace, SharePoint Designer from Microsoft links to Microsoft Office and provides not only WYSIWYG support for many of the latest HTML formatting extensions, but also extensive web site management support through its extensions. In Design from Adobe saves pages as HTML documents and as Adobe Acrobat PDF files. Corel's XMetal imports and converts files created in Word, WordPerfect, Ami PRO, and other word processors. It has a point and- click interface for inserting valid HTML tags and elements and provides an enhanced URL editor to manage references and calls to other documents and files. Adobe Dreamweaver is a WYSIWYG editor that lets you create and edit text pages, import images, and link to other documents, and offers enhanced integration with Acrobat PDF files. Dreamweaver has become the most popular WYSIWYG HTML editor today.
Managing and maintaining a web site is a serious undertaking when the site contains many thousands of text documents, images, and other resources. Software and expert system tools for automated web page development, document management, and site activity analysis are becoming widely available. Combined with page builders and multimedia editors, these applications will evolve into the ubiquitous "word processors" of the new information age, essential to every home and office with outreach to the Web, and able to integrate and present all the elements of multimedia.
Content Management Systems (CMSs) combine the power and flexibility of a database with the dynamic capabilities of a programming language. Most CMSs are built on a combination of mySQL, an open-source database, and PHP, a programming language designed to be included directly in web pages. Here's how it works: when a server receives a request for a web page, it looks through that page's code to see if there are any PHP directives to retrieve data from a database. If it finds such a request, it opens the proper database, grabs the data, and inserts it into the web page as programmed.
CMSs offer prepackaged templates of pages with PHP code built in. Open-source Joomla, one of the most popular CMSs, is used in thousands of web sites, large and small. Drupal is another popular, powerful CMS. Concrete5 combines powerful AJAX technology to allow a more interactive experience. CMSs let non-technical computer users add and edit the content of the pages and manage the presentation and ordering of pages at a web site.

## POSSIBLE QUESTIONS

**PART-B (2Marks)**

1. List out the any four animations file formats.
2. Define WWW
3. Define HTML
4. Explain web browser.
5. Explain web server.

**PART-C (6Marks)**

1. Explain in detail about in WWW and HTML in detail
2. Explain in detail about multimedia on web
3. Discuss briefly about the web server in detail
4. Discuss briefly about the web browser in detail.
5. Explain about web page makers and site builders in detail.

**KARPAGAM ACADEMY OF HIGHER EDUCATION**

**DEPARTMENT OF COMPUTER SCIENCE, CA & IT**

**I B.Sc CS (Batch 2017-2020)**

**MULTIMEDIA AND ITS APPLICATIONS**

**PART - A OBJECTIVE TYPE/MULTIPLE CHOICE QUESTIONS**

**ONLINE EXAMINATIONS**

**UNIT-4**

| S.No | Questions | Opt 1 | Opt 2 | Opt 3 | Opt 4 | Answer |
|---|---|---|---|---|---|---|
| 1 | Animation is possible because of a biological phenomenon known as _____ | persistence of vision | eye retina | human mind | heart | **persistence of vision** |
| 2 | When the images are progressively & rapidly changed the arrow of the compass is perceived to be _____ | right | spinning | left | rolling | **spinning** |
| 3 | Television video builds _____ entire frames or pictures every second | 20 | 72 | 30 | 43 | **30** |
| 4 | Movies on film are typically short at a shutter rate of _____ frames per second | 24 | 72 | 48 | 65 | **24** |
| 5 | The series of frames in between the key frames are drawn in a process called_____ | sketching | flipping | tweening | drawing | **tweening** |
| 6 | _____ is the study of the movement and motion of structures that have joints | kinematics | animation | velocity | graphics | **kinematics** |
| 7 | _____ is a popular effect in which one image that transforms into another | animation | morphing | graphing | drawing | **morphing** |
| 8 | The morphed images shown were built at a rate of _____ | 2 | 8 | 4 | 10 | **8** |
| 9 | _____ catches the eye & make things noticeable | multimedia | frame | animations | images | **animations** |
| 10 | _____makes your bouncing ball accelerate on its downward course & declarate on its upward course | gravity | graphics | animation ss | multimedia | **gravity** |
| 11 | A_____ is a cluster of computers, with one computer with one computer acting as a server to provide network screen | internet | network | server | browser | **network** |

| | | | | | | |
|---|---|---|---|---|---|---|
| 12 | _____computers are not the permanent part of the network | special | individual | normal | difficult | **individual** |
| 13 | _____was setup to overseas the technical co-ordination of the domain name system | ICANN | TCP | DNS | BCR | **ICANN** |
| 14 | In late 2000, ICANN approved seven additional _____- | TCP | DNC | TLD | DNS | **TLD** |
| 15 | In a second level domain for vale university is called_____ | Yale | Business | domain | co-domain | **Yale** |
| 16 | At Yale, the server for the computing & Information System is named as _____ | Computer | C18 | ICS | information | **C18** |
| 17 | The level of domains are named separated by a _____ | rows | columns | periods | groups | **periods** |
| 18 | Internet address are normally_____ | sensitive | case sensitive | all the above | in-sensitive | **case sensitive** |
| 19 | The _____ describes the hierarchical rules for address in the domain | Internet RFC 1480 | Internet RFC 1380 | Internet RFC 1482 | Internet RFC 1228 | **Internet RFC 1480** |
| 20 | Two-letters country's code based on the _____ | ISC | ISO | ICS | ISR | **ISO** |
| 21 | When the stream of data is sent over the internet by your computer, it is first broken down into packets by the _____ | transaction control | transaction control protocol | transaction | transaction on patrol | **transaction control protocol** |
| 22 | _____ is two key internet protocol working in concert | TCP/IP | ISO | DNS | IDS | **TCP/IP** |
| 23 | The 32 bit address includes in a data packet, the IP address is the _____ internet address | periods | dynamic | real | groups | **real** |
| 24 | In domain, the destination address is converted into _____- | alphabets | numbers | computer language | romans | **numbers** |
| 25 | Internet means | web connectors | distributors | world wide web | window | **world wide web** |
| 26 | _____ service is used for posting & reading encrypted documents | HTTP | HTML | POP | explorer | **HTTP** |
| 27 | The service is used for menus of material available on the internet _____ | goper | pops | usenet | matnet | **goper** |

| | | | | | | |
|---|---|---|---|---|---|---|
| 28 | The _____ serviceis used for sending mail | irc | flop | SMTP | disk | **irc** |
| 29 | The _____ service | mud | telnet | floppy | webcam | **mud** |
| 30 | Each internet service is implemented on a internet server by dedicated software known as _____ | daemon | window | processor | Linux | **daemon** |
| 31 | _____ are agent programs that run in background waiting to act on request from the outside | webs | hypertext | processor | daemons | **daemons** |
| 32 | The internet uses a standard list of file name extensions called _____type | MIME | PDF | HTTP | FTP | **MIME** |
| 33 | Most of the browsers allow you to define MIME types & map helper apps to type for _____ | decooding | playing | netprocessor | decoding and playing | **decoding and playing** |
| 34 | The most widely installed HTTP software for managing webpages is the open source application is called_____ | netweb | decoding | apache | webpages | **apache** |
| 35 | Multimedia elements are typically saved & transmitted on the internet in the appropriate _____type format | MIME | FTP | PDF | HTTP | **MIME** |
| 36 | A HTML document contains _____ | Anchors | web | pointers | documents | **Anchors** |
| 37 | _____service is used for receiving electronic mail | FTP | HTTP | usenet | POP | **POP** |
| 38 | Most multimedia experiences on the internet will occur on the _____ | web pages | World wide web | internet pages | history pages | **World wide web** |
| 39 | A combination of the explosion of tools & user demand per performance is stressing the orderly development of the core_____ standard | HTML | web pages | web server | commercial tools | **HTML** |
| 40 | The working of the web involve communication between two computers: a server & a _____ | server | client | page | netweb | **client** |
| 41 | Multimedia content performance particularly when it is a streaming _____ type | HTML | MIME | WWW | PAGE | **MIME** |

| | | | | | | |
|---|---|---|---|---|---|---|
| 42 | Most vendors will also recommend _____ configuration | software | hardware | netpage | software & hardware | **hardware** |
| 43 | In 1996, ___ browsers competed for market share | 30 | 40 | 50 | 60 | **50** |
| 44 | HTML editors & making application offer to shortcut your HTML learning curves & working effect | web server | web pages | WWW | web | **web pages** |
| 45 | HTML documents are simple_____ text files saved to disk without any formatting | ASCII | BCPL | web | ASCII-I | **ASCII** |
| 46 | HTML currently includes about _____ tags | 20 | 30 | 40 | 50 | **50** |
| 47 | HTML translators are built into many _____ programs | word | word processing | powerpoint | headers | **word processing** |
| 48 | Web site management supportthrough its _____ application | Front page explorer | back page explorer | programs | pages | **Front page explorer** |
| 49 | _____ from macromedia is a popular website design tool with the companion sitesping application for managing entire projects | HTML | web processor | Dreamweaver | page explorer | **Dreamweaver** |
| 50 | The service that used for transferring files between computers can be anonyms or password protected is called _____ | HTTP | FTP | mud | POP | **FTP** |
| 51 | _____ server is used for participating in discussion groups | usenet | pops | telnet | internet | **usenet** |
| 52 | The _____ server is used for real-time text messaging | irc | SMTP | FTP | mud | **irc** |
| 53 | _____ is a service that used for logging on & working from remote computers | usenet | telnet | https | FTP | **telnet** |
| 54 | Only _____ of these documents had been indexed by the search engines | one thousand | hundred | one billion | one crore | **one billion** |

| | | | | | | |
|---|---|---|---|---|---|---|
| 55 | An 1983, the ____ was developed to rationally assign names & address to computers linked to the internet | TCP | LAN | WAN | DNS | **DNS** |
| 56 | _____ is the types of MIME used for postscriptnprogram | ai | aif | mov | mpe | **ai** |
| 57 | The stunning growth of the internet has caused by many _____ | hardware developer | HTML | software developer | web | **software developer** |
| 58 | A growing number of software vendors provides ____ servers of varying capacity & strength | hardware | software | web | web page | **web** |
| 59 | _____ & other pointers are included to lead the information | URL | HTTP | HTML | APN | **URL** |
| 60 | A server is technically not the _____ but the _____ | software, hardware | hardware , software | HTTP, HTML | APN, URL | **hardware, software** |
| 61 | The web page developers often use only a word processor like _____ | BBE dit | HTML | HTTP | LAN | **BBE dit** |
| 62 | Microsoft links to microsoft office & provides support for many of the latest | HTTP | HTML | LAN | DNS | **HTML** |
| 63 | Dedicated editors are usually _____ & they provide more power & feature | word processor | web processo r | web page | wordweb | **word processor** |
| 64 | Many embedded graphics to load into word processor very slowly while it interprets & lay out the page as a _____ | processor | browsers | web page | wordweb | **browsers** |
| 65 | The ____ navigator editor offers a one- click interface for intersecting images | Netscape | processo r | document s | page builder | **Netscape** |
| 66 | _____ add the power of multimedia to web browsers | delivery vehicle | processo r | plug-ins | web page | **plug-ins** |
| 67 | The two letter country code, base on the document _____ | ISO-3166 | ISO-3100 | ISO-2166 | ISO-3366 | **ISO-3166** |
| 68 | When a stream of data is sent over the internet by your computer, it is first broken out into _____ by the transmission control protocol | packets | divisions | address | data | **packets** |

| | | | | | | |
|---|---|---|---|---|---|---|
| 69 | The _____ address included in a data packet, the IP address is the real internet address | 20-bit | 32-bit | 10-bit | 8-bit | **32-bit** |
| 70 | The netscape's navigator is otherwise known as _____ | Microsoft's internet explorer | Microsoft office | web processor | image processor | **Microsoft's internet explorer** |
| 71 | The HTML saving website can be a _____ process | forward | straight | backward | straight forward | **straight forward** |
| 72 | Quickly changing the viewed image is the principle of an _____ | animatic | processor | flip-book | web page | **animatic** |

## UNIT-V
## SYLLABUS

**Making Multimedia**: Stages of a multimedia project, Requirements to make good multimedia, Multimedia Hardware - Macintosh and Windows production Platforms, Hardware peripherals - Connections, Memory and storage devices, Multimedia software and Authoring tools

### Making Multimedia

**Stages of a Multimedia Project:**

**(1) Planning**

• Planning involve:-

▫ Developing an idea

▫ Identifying Objectives and Users

▫ Identify Skills and Resources

▫ Developing a graphic template, the structure, and a navigational system.

▫ Estimating Time and Cost

▫ Develop a small prototype or proof of concept

**(2) Design and Production**

▫ The planned tasks are performed to create a finished product.

▫ Task include storyboarding, designing a detail navigation structure, GUI consideration and HCI consideration.

▫ The product is revised, based on the continuous feedback received from the client by doing an evaluation.

**(3) Testing**

• The program is tested to ensure that it:

• meets the objectives of the project

• works on the proposed delivery platforms

• meets the client requirements.

**(4) Deliver**

• The final project is packaged and delivered to the end user.

Requirements for a Multimedia Project

**Requirements for a Multimedia Project:**

**(1) Hardware**

1. Fast processor
    - e.g. Pentium
2. Large RAM (Random Access memory)
    - Memory space that the computer uses when performing work.
    - More RAMs means computer works quicker and more efficient.
3. Storage
    - Large Hard Disk

 Capable of supporting fast data transfer rate.

    - Removable large-capacity storage devices

 E.g. rewritable CD-Rom, Zip drive

4. A good CD-ROM burner & good CD-R software to complement it
    - Easy CD Creature Deluxe
5. High resolution and a large monitor Minimum 17 inch monitor
6. Good video display card preferable capable of displaying 24 bit colors
7. Good video capture cards
    - Allow you to capture video from a tape or camcorder
8. A good quality digital camera
    - At least support 640 x 480 pixels images
    - Has display panel
9. Input devices
    - Keyboard, mouse, track ball, touch screen, graphic tablet, data glove

10. A good flatbed scanner
    - 24-bit color depth and 300-dpi resolution
11. Color Printer
12. Color projector

**Software**

- **Graphic design photo editing application**
  - Adobe Photoshop, Corel‟s Photo-Paint
- **3D modeling and animation application**
  - Maya, 3D StudioMax
- **Digital sound editing application**
  - Sonic Foundry‟s Sound Forge
- **Digital video editing application**
  - Adobe‟s Premiere
- **Multimedia authoring application**
  - Adobe Director
- **Web page authoring/design tool**
  - Adobe Dreamweaver, Microsoft‟s FrontPage

**Enabling Technology**

Computing Power

- Increase in CPU processing power
- Increase in storage capacData Networking

Data Networking

- Better transmission media
- Fiber optic as compared to copper wire
- Better transmission technique
- Fast packet switching

- Better services offered
- ATM, ISDN, B-ISDN, Broadband

Compression Technology

- GIF (Graphical Interchange Format)
  - Mostly used with the internet
- JPEG (Joint Photographic Experts Group)
  - Still image compression
- PNG (Portable network Graphic)
  - Very popular nowadays especially for web-based application
- MPEG (Motion Picture Expert Group)
  - Full motion video compression

**Creativity and Organizational skills.**

• In a multimedia project, being creative implies knowledge of hardware and software.

• It is essential to develop an organized outline detailing the skills, time, budget, tools and resources needed for the project

• Assets such as graphics, sound and the like should be continuously monitored throughout the project‟s execution.

• A standardized file-naming procedure should be followed for precise organization and swift retrieval.

**Windows vs. Macintosh**

A Windows computer is not a computer per se, but rather a collection of parts that are tied together by the requirements of the Windows operating system. Power supplies, processors, hard disks, CD-ROM and DVD players and burners, video and audio components, monitors, keyboards, mice, WiFi, and Bluetooth transceivers—it doesn't matter where they come from or who makes them. Made in Texas, Taiwan, Indonesia, India, Ireland, Mexico, or Malaysia by widely known or little-known manufacturers,

these componentsthat run Windows. If you are handy with a Phillips screwdriver and can read instructions, you can even order the parts and assemble your own computer "clone" to run Windows—at a considerable cost savings! In the early days, Microsoft organized the major PC hardware manufacturers into the Multimedia PC Marketing Council, in order to develop a set of specifications that would allow Windows to deliver a dependable multimedia experience. Since then, the multimedia PC, or MPC, specification has evolved into "what a computer does." And it does it all.

Unlike Microsoft, primarily a software company, Apple is a hardware manufacturing company that developed its own proprietary software to run the hardware. In 2006, Apple adopted Intel's processor architecture, an engineering decision that allows Macintoshes to run natively with any x86 operating system, same as Windows. All recent models of Macintosh come with the latest Mac operating system, and using Boot Camp or Parallels software, Macs can also run the Windows operating system.

***Networking Macintosh and Windows Computers***

If you are working in a multimedia development environment consisting of a mixture of Macintosh and Windows computers, you will want them to communicate with each other. You will also wish to share other resources among them, such as printers.

**Local area networks (LANs)** and **wide area networks (WANs)** can connect the members of a workgroup. In a LAN, workstations are usually located within a short distance of one another, on the same floor of a building, for example. WANs are communication systems spanning greater distances, typically set up and managed by large corporations and institutions for their own use, or to share with other users.

LANs allow direct communication and sharing of peripheral resources such as file servers, printers, scanners, and network routers. They use a variety of proprietary technologies to perform the connections, most commonly Ethernet (using twisted-pair copper wires) and WiFi (using radio). If you are operating a cross-platform multimedia

development shop, you should install a local Ethernet system so that your PCs and Macintoshes can talk to each other and to your network printers as well. This is many times more efficient than carrying removable media among your machines.

Ethernet is only a *method* for wiring up computers, so you still will need client/server software to enable the computers to speak with each other and pass files back and forth. The Windows and Mac operating systems provide this networking software, but you may need expert help to set it up—it can be complicated!

Unless you are in a large business or part of government, your WAN is likely the Internet connected to you by an Internet service provider (ISP); the Internet is worldwide and connects tens of millions of computers (an artist in New York, a programmer in San Francisco, and a client in Singapore), all can communicate and share information with other locations at any time of day or night using the Internet network. Chapter 12 discusses the Internet in greater detail.

**Connections**

The equipment required for developing your multimedia project will depend on the content of the project as well as its design. You will certainly need as fast a computer as you can lay your hands on, with lots of RAM and disk storage space. Table 7-2 shows various device connection methodologies and their data transfer rates. If you can find content such as sound effects, music, graphic art, clip animations, and video to use in your project, you may not need extra tools for making your own. Typically, however, multimedia developers have separate equipment for digitizing sound from tapes or microphone, for scanning photographs or other printed matter, and for making digital still or movie images.

***SCSI***

The **Small Computer System Interface** (**SCSI**—pronounced "scuzzy") adds peripheral equipment such as disk drives, scanners, CD-ROM players, and other peripheral devices

that conform to the SCSI standard. SCSI connections may connect *internal* devices such as hard drives that are inside the chassis of your computer and use the computer's power supply, and *external* devices, which are outside the chassis, use their own power supply, and are plugged into the computer by cable.

The hardware and the drivers for SCSI have improved over the years to provide faster data transfers across wider buses. Unlike the less expensive IDE scheme described next, a SCSI controller does not demand CPU time, and because it can support many devices, it is often preferred for real-time video editing, network servers, and situations in which writing simultaneously to two or more disks (**mirroring**) is required.

***IDE, EIDE, Ultra IDE, ATA, and Ultra ATA***

**Integrated Drive Electronics (IDE)** connections, also known as **Advanced Technology Attachment (ATA)** connections, are typically only internal, and they connect hard disks, CD-ROM drives, and other peripherals mounted inside the PC. With IDE controllers, you can install a combination of hard disks CD-ROM drives, or other devices in your PC. The circuitry for IDE is typically much less expensive than for SCSI, but comes with some limitations. For example, IDE requires time from the main processor chip, so only one drive in a master/slave pair can be active at once.

*USB*

A consortium of industry players including Compaq, Digital Equipment, IBM, Intel, Microsoft, NEC, and Northern Telecom was formed in 1995to a computer. These devices are automatically recognized ("plug-andplay") and installed without users needing to install special cards or turn the computer off and on when making the connection (allowing "hotswapping").

USB technology has improved in performance since its introduction (see Table 7-2) and has become the connection method of choice for many peripheral devices, from cameras to keyboards to scanners and printers. USB uses a single cable to connect as many as 127 USB peripherals to a single personal computer. Hubs can be used to "daisychain"

many devices. USB connections are now common on video game consoles, cameras, GPS locators, cell phones, televisions, MP3 players, PDAs, and portable memory devices.

***FireWire and i.LINK (IEEE 1394)***

**FireWire** was introduced by Apple in the late 1980s, and in 1995 it became an industry standard (IEEE 1394) supporting high-bandwidth serial data transfer, particularly for digital video and mass storage. Like USB, the standard supports hot-swapping and plug-and-play, but it is faster, and while USB devices can only be attached to one computer at a time, FireWire can connect multiple computers and peripheral devices (peer-to-peer). Both the Mac OS and Windows offer IEEE 1394 support. Because the standard has been endorsed by the Electronics Industries Association and the Advanced Television Systems Committee (ATSC), it has become a common method for connecting and interconnecting professional digital video gear, from cameras to recorders and edit suites. Sony calls this standard i.LINK. FireWire has replaced Parallel SCSI in many applications because it's cheaper and because it has a simpler, adaptive cabling system.

**Memory and Storage Devices**

As you add more memory and storage space to your computer, you can expect your computing needs and habits to keep pace, filling the new capacity. So enjoy the weeks that follow a memory storage upgrade or the addition of a gigabyte hard disk; the honeymoon will eventually end. To estimate the memory requirements of a multimedia project—the space required on a hard disk, thumb drive, CD-ROM, or DVD, not the random access memory (RAM) used while your computer is running— you must have a sense of the project's content and scope. Color images, text, sound bites, video clips, and the programming code that glues it all together require memory; if there are many of these elements, you will need even more. If you are *making* multimedia, you will also need to allocate memory for storing and archiving working files used during production,

original audio and video clips, edited pieces, and final mixed pieces, production paperwork and correspondence, and at least one backup of your project files, with a second backup stored at another location. It is said that when John von Neumann, often called "the father of the computer," was designing the ENIAC computer in 1945, there was an argument about how much memory this first computer should have. His colleagues appealed for more than the 2K Dr. von Neumann felt was sufficient.

In the end, he capitulated and agreed to install 4K in the ENIAC, commenting "...but this is more memory than you will ever need."

***Random Access Memory (RAM)***

If you are faced with budget constraints, you can certainly produce a multimedia project on a slower or limited-memory computer. On the other hand, it is profoundly frustrating to face memory (RAM) shortages time after time, when you're attempting to keep multiple applications and files open simultaneously. It is also frustrating to wait the extra seconds required of each editing step when working with multimedia material on a slow processor.

In spite of all the marketing hype about processor speed, this speed is ineffective if not accompanied by sufficient RAM. A fast processor without enough RAM may waste processor cycles while it swaps needed portions of program code into and out of memory. In some cases, increasing available RAM may show more performance improvement on your system than upgrading the processor chip.

***Read-Only Memory (ROM)***

Unlike RAM, **read-only memory (ROM)** is not *volatile.* When you turn off the power to a ROM chip, it will not forget, or lose its memory. ROM is typically used in computers to hold the small BIOS program that initially boots up the computer, and it is used in printers to hold built-in fonts.

**Programmable ROMs** (called **EPROMs**) allow changes to be made that are not forgotten when power is turned off.

*Hard Disks*

Adequate storage space for your production environment can be provided by large-capacity hard disks, server-mounted on a network. As multimedia has reached consumer desktops, makers of hard disks have built smaller-profile, larger-capacity, faster, and less-expensive hard disks. As network and Internet servers drive the demand for centralized data storage requiring terabytes (one trillion bytes), hard disks are often configured into fail-proof redundant arrays offering built-in protection against crashes.

***Flash Memory or Thumb Drives***

These flash memory data storage devices are about the size of a thin cigarette lighter and can be integrated with USB or FireWire interfaces to store from eight megabytes to several GB of data. They are available in every color of the rainbow, are extremely portable, and, because they have fewer moving parts, are more reliable than disk drives. Consisting of a small printed circuit board encased in a sturdy metal or plastic casing with a USB connector covered with a cap, the flash drive is trendy as a status symbol, and convenient to use. This same solid-state storage is used in digital cameras, cell phones, and audio recording devices, and for solidstate hard drives (no spinning platters or moving parts) that are found in some netbooks and other handheld devices.

*CD-ROM Discs*

**Compact disc read-only memory (CD-ROM)** players have become an integral part of the multimedia development workstation and are an important delivery vehicle for mass-produced projects. A wide variety of developer utilities, graphic backgrounds, stock photography and sounds, applications, games, reference texts, and educational software are available on this medium. CD-ROM players have typically been very slow to access and transmit data (150 KBps, which is the speed required of consumer Audio CDs), but developments have led to double-, triple-, quadruplespeed, 24x, 48x, and 56x drives designed specifically for computer (not Red Book Audio) use. These faster drives spool

up like washing machines on the spin cycle and can be somewhat noisy, especially if the inserted compact disc is not evenly balanced. With a compact disc recorder, you can make your own CDs, using CD-recordable (CD-R) blank discs to create a CD in most formats of CD-ROM and CD-Audio (see Chapter 4). Software, such as Roxio's Toast and Easy CD Creator, lets you organize files on your hard disk(s) into a "virtual" structure, and then writes them to the CD in that order. CD-R discs are manufactured differently than normal CDs but can play in any CD-Audio or CD-ROM player. These writeonce, enhanced CDs make excellent high-capacity file archives and are used extensively by multimedia developers for pre-mastering and testing CD-ROM projects and titles. Because they have become very inexpensive, they are also used for short-run distribution of finished multimedia projects and data backup. A CD-RW (read and write) recorder can rewrite 700MB of data to a CD-RW disc about 1,000 times.

***Digital Versatile Discs (DVD)***

In December 1995, nine major electronics companies (Toshiba, Matsushita, Sony, Philips, Time Warner, Pioneer, JVC, Hitachi, and MitsubishiElectric) agreed to promote a new optical disc technology for distribution of multimedia and feature-length movies called Digital Versatile Disc (DVD) (see Table 7-3).With a DVD capable not only of gigabyte storage capacity but also full-motion video (MPEG2) and high-quality audio in surround sound, this is an excellent medium for delivery of multimedia projects. Commercial multimedia projects will become more expensive to produce, however, as consumers' performance expectations rise. There are three types of DVD, including DVD-Read Write, DVD-Video, and DVD-ROM. These types reflect marketing channels, not the technology.

***Blu-ray Discs***

Driven by the implementation of High Definition TV (HDTV) and by the motion picture industry, a new technology was needed to increase storage capacity and throughput beyond DVD. Two competing and incompatible solutions were promoted and a war was

fought in the marketplace between HD-DVD, backed by Toshiba, and **Blu-ray**, backed by Sony. By 2008, Toshiba had sold about one million HD-DVD players, but Sony had sold close to ten million Blu-ray players, which were also included in popular PlayStation game machines. Toshiba announced it was quitting.

Blu-ray is promoted not only for high definition television recording and high definition video distribution, but also for high definition camcorder archiving, mass data storage, and digital asset management and professional storage when used as a recording medium in BD-R format.

**Authoring Systems**

Multimedia authoring tools provide the important framework you need for organizing and editing the elements of your multimedia project, including graphics, sounds, animations, and video clips. Authoring tools are used for designing interactivity and the user interface, for presenting your project on screen, and for assembling diverse multimedia elements into a single, cohesive product. Authoring software provides an integrated environment for binding together the content and functions of your project, and typically includes everything you need to create, edit, and import specific types of data; assemble raw data into a playback sequence or cue sheet; and provide a structured method or language for responding to user input. With multimedia authoring software, you can make

■■ Video productions

■■ Animations

■■ Games

■■ Interactive web sites

■■ Demo disks and guided tours

■■ Presentations

■■ Kiosk applications

■■ Interactive training

■■ Simulations, prototypes, and technical visualizations

**Making Instant Multimedia**

While this section discusses dedicated multimedia authoring systems, there is no reason to invest in such a package if your current software (or an inexpensive upgrade) can do the job. Indeed, not only can you save money by doing multimedia with tools that are familiar and already at hand, but you also save the time spent on the arduous and sometimes lengthy learning curves involved in mastering many of the dedicated authoring systems.

Common desktop tools have become multimedia-powerful. Some multimedia projects may be so simple that you can cram all the organizing, planning, rendering, and testing stages into a single effort, and make "instant" multimedia. Here is an example: The topic at your weekly sales meeting is sales force performance. You want to display your usual spreadsheet so that the group can see real names and numbers for each member of the team, but then you want to add an animated, multicolored 3-D bar graph for visual impact. Preparing for your meeting, you annotate the cell containing the name of the most productive salesperson for the week, using sounds of applause found on the Web or a recording of your CEO saying "Good job!" or a colleague's "Wait till next week, Pete!" At the appropriate time during the meeting, you click that cell and play the file. And that's it—you have just made and used instant multimediaYou can use a voice annotation, picture, or video clip in many word processing applications (see Figure 7-3). You can also click a cell in a spreadsheet to enhance its content with graphic images, sounds, and animations (see Figure 7-4). If you like, your database can include pictures, audio clips, and movies (see Figure 7-5), and your presentation software can generate

interesting titles, visual effects, and animated illustrations for your product demo (see Figure 7-6). With these multimedia-enhanced software packages,you get many more ways to effectively convey your message than just a slide show.

**Types of Authoring Tools**

Each multimedia project you undertake will have its own underlying structure and purpose and will require different features and functions. E-learning modules such as those seen on PDAs, MP3 players, and intra-college networks may include web-based teaching materials, multimedia CD-ROMs or web sites, discussion boards, collaborative software, wikis, simulations, games, electric voting systems, blogs, computer-aided assessment, simulations, animation, blogs, learning management software, and e-mail. This is also referred to as distance learning or blended learning, where online learning is mixed with face-to-face learning. The various multimedia authoring tools can be categorized into three groups, based on the method used for sequencing or organizing multimedia elements and events:

■■ Card- or page-based tools

■■ Icon-based, event-driven multimedia and game-authoring tools

■■ Time-based tools

*Card- and Page-Based Authoring Tools*

**Card-based** or **page-based** tools are authoring systems, wherein the elements are organized as pages of a book or a stack of cards. Thousands of pages or cards may be available in the book or stack. These tools are best used when the bulk of your content consists of elements that can be viewed individually, letting the authoring system link these pages or cards into organized sequences. You can jump, on command, to any page you wish in the structured navigation pattern.

Page-based authoring systems such as LiveCode from Runtime Revolution (www.runrev.com) and ToolBook (www.toolbook.org) contain media objects: buttons, text fields, graphic objects, backgrounds, pages or cards, and even the project itself. The

characteristics of objects are defined by properties (highlighted, bold, red, hidden, active, locked, and so on). Each object may contain a programming script, usually a property of that object, activated when an event (such as a mouse click) related to that object occurs. Events cause messages to pass along the hierarchy of objects in the project; for example, a mouse-clicked message could be sent from a button to the background, to the page, and then to the project itself. As the message traveled, it looks for handlers in the script of each object; if it finds a matching handler, the authoring system then executes the task specified by that handler.

Following are some typical messages that might pass along the object hierarchy of the LiveCode and ToolBook authoring systems: An example in ToolBook's OpenScript language would look like: to handle buttonUp go next page end buttonUp

The handler, if placed in the script of the card or page, executes its commands when it receives a "mouseUp" or "buttonUp" event message that occurs at any location on the card or page—not just while the cursor is within the bounds of a button. Card- and page-based systems typically provide two separate layers on each card: a background layer that can be shared among many cards, and a foreground layer that is specific to a single card.

***Icon- and Object-Based Authoring Tools***

**Icon- or object-based**, **event-driven** tools are authoring systems, wherein multimedia elements and interaction cues (events) are organized as objects in a structural framework or process. Icon- or object-based, event-driven tools simplify the organization of your project and typically display flow diagrams of activities along branching paths. In complicated navigational structures, this charting is particularly useful during development. Icon-based, event-driven tools provide a visual programming approach to organizing and presenting multimedia. First you build a structure or flowchart of events, tasks, and decisions, by dragging appropriate icons from a library. These icons can include menu choices, graphic images, sounds, and computations. The flowchart graphically depicts the project's logic. When the structure is built, you can add your

content: text, graphics, animation, sounds, and video movies. Then, to refine your project, you edit your logical structure by rearranging and fine-tuning the icons and their properties.

With icon-based authoring tools, non-technical multimedia authors can build sophisticated applications without scripting. In Authorware from Adobe, by placing icons on a flow line, you can quickly sequence events and activities, including decisions and user interactions. These tools are useful for storyboarding, as you can change sequences, add options, and restructure interactions by simply dragging and dropping icons. You can print out our navigation map or flowchart, an annotated project index with or without associated icons, design and presentation windows, and a cross-reference table of variables.

***Time-Based Authoring Tools***

**Time-based tools** are authoring systems, wherein element and events are organized along a timeline, with resolutions as high as or higher than 1/30 second. Time-based tools are best to use when you have a messagewith a beginning and an end. Sequentially organized graphic frames are played back at a speed that you can set. Other elements (such as audio events) are triggered at a given time or location in the sequence of events.

The more powerful time-based tools let you program jumps to any location in a sequence, thereby adding navigation and interactive control. Each tool uses its own distinctive approach and user interface for managing events over time. Many use a visual timeline for sequencing the events of a multimedia presentation, often displaying layers of various media elements or events alongside the scale in increments as precise as one second. Others arrange long sequences of graphic frames and add the time component by adjusting each frame's duration of play.

**Flash** Flash is a time-based development environment. Flash, however, is also particularly focused on delivery of rich multimedia content to the Web. With the Flash Player plug-in installed in more than 95 percent of the world's browsers, Flash delivers

far more than simple static HTML pages. ActionScript, the proprietary, under-the-hood scripting language of Flash, is based upon the international ECMAScript standard (www.ecmainternational. org) derived from Netscape's original JavaScript.

Director Adobe's Director is a powerful and complex multimedia authoring tool with a broad set of features to create multimedia presentations, animations, and interactive multimedia applications. It requires a significant learning curve, but once mastered, it is among the most powerful of multimedia development tools. In Director, you assemble and sequence the elements of your project, called a "movie," using a Cast and a Score. The Cast is a multimedia database containing still images, sound files, text, palettes, QuickDraw shapes, programming scripts, QuickTime movies, Flash movies, and even other Director files. You tie these Cast members together using the Score facility, which is a sequencer for displaying, animating, and playing Cast members, and it is made up of frames that contain Cast members, tempo, a palette, timing, and sound information. Each frame is played back on a stage at a rate specified in the tempo channel. Director utilizes Lingo, a full-featured object-oriented scripting language, to enable interactivity and programmed control.

**Choosing an Authoring Tool**

In the best case, you must be prepared to choose the tool that best fits the job; in the worst case, you must know which tools will at least "get the job done." Authoring tools are constantly being improved by their makers, who add new features and increase performance with upgrade development cycles of six months to a year. It is important that you study the software product reviews in the blogs and computer trade journals, as well as talk with current users of these systems, before deciding on the best ones for your needs. Here's what to look for:

***Editing Features***

The elements of multimedia—images, animations, text, digital audio and MIDI music, and video clips—need to be created, edited, and converted to standard file formats, using

the specialized applications described in Chapters 2, 3, 4, 5, and 6, which provide these capabilities. Also, editingtools for these elements, particularly text and still images, are often included in your authoring system. The more editors your authoring system has, the fewer specialized tools you may need. In many cases, however, the editors that may come with an authoring system will offer only a subset of the substantial features found in dedicated tools. According to Vaughan's Law of Multimedia Minimums (see Chapter 4), these features may very well be sufficient for what you need to do; on the other hand, if editors you need are missing from your authoring system, or if you require more power, it's best to use one of the specialized, single-purpose tools.

***Organizing Features***

The organization, design, and production process for multimedia involvesstoryboarding and flowcharting. Some authoring tools provide a visual flowcharting system or overview facility for illustrating your project'shelp organize a projct and can help focus the overall project scope for all involved. Because designing the interactivity and navigation flow of your project often requires a great deal of planning and programming effort, your storyboard should describe not just the graphics of each screen, but the interactive elements as well. Features that help organize your material are a plus. Many web-authoring programs such as Dreamweaver include tools that create helpful diagrams and links among the pages of a web site. Planning ahead in an organized fashion may prevent countless moments of indecision, keep the client from changing her mind without periodic sign-offs on the materials included, and, in the long run, save you money.

## POSSIBLE QUESTIONS

**PART-B (2Marks)**

1. List out the different types stages used in multimedia.
2. Define Macintosh platform
3. Define window platform

4. Define SCSI
5. Explain USB

**PART-C (6Marks)**

1. Explain in detail about stages of project.
2. Explain the different types of authoring tools in detail
3. Discuss about the time based authoring tools in detail.
4. Explain about the memory and storage devices in detail.
5. Explain briefly about the SCSI in detail.

**KARPAGAM ACADEMY OF HIGHER EDUCATION**

**DEPARTMENT OF COMPUTER SCIENCE, CA & IT**

**I B.Sc CS (Batch 2017-2020)**

**MULTIMEDIA AND ITS APPLICATIONS**

**PART - A OBJECTIVE TYPE/MULTIPLE CHOICE QUESTIONS**

**ONLINE EXAMINATIONS**

**UNIT-5**

| S.No | Questions | Opt 1 | Opt 2 | Opt 3 | Opt 4 | Answer |
|---|---|---|---|---|---|---|
| 1 | To create a multimedia project a sense of _____ should be developed | scope | accuracy | speed | none | **scope** |
| 2 | Proper project _____is important as planning the layout and content | testing | estimate | planning | all of these | **planning** |
| 3 | The important thing to keep in mind when trying with _____ is balance | idea | cash | idea and cash | none of these | **idea** |
| 4 | Thr hardware capabilities of the end users_____ | software | software and platform | computer platform | idea | **computer platform** |
| 5 | The _____ capabilities of the end users computer platform | hardware | software and platform | operating system | memory | **hardware** |
| 6 | _____ depicts all the tasks along a timeline | graphic | Gantt charts | charts | software | **Gantt charts** |
| 7 | CPM stands for _____ | Computer Path Method | Critical Path Method | Computer Path Method | Critical Path Memory | **Critical Path Memory** |
| 8 | PERT stands for _____ | Program Evaluation Review Technique Charts | Program Education Review Technique Charts | Program Education Review Technology Charts | Program Evaluation Review Technique Charts | **Program Evaluation Review Technique Charts** |
| 9 | Protype- development is also called _____ | Proof- of-computer | Project-of--computer | Project-of-concept | Proof-of-concept | **Proof-of-concept** |
| 10 | The task of analysis need _____- of effort | 3% | 11% | 1% | 2% | **3%** |
| 11 | Scheduling includes _____ | time | amount | report | milestones | **milestones** |
| 12 | Any revisions of the previously approved materials would require a _____ | change order | computer order | change option | computer options | **change order** |
| 13 | In estimating the working for an outside client determine a _____ | payment schedule | process | payment system | process system | **payment schedule** |

| | | | | | | |
|---|---|---|---|---|---|---|
| 14 | GAG stands for ____ | Graphic Artist Guide | Graphic Audio Guide | Graphic Audio Guild | Graphic Artist Guild | **Graphic Artist Guild** |
| 15 | RFP stands for _____ | Receive for Purpose | Receive for Proposal | Request for Proposal | Request for Purpose | **Request for Proposal** |
| 16 | WWW stands for _____ | Way Wide Web | Worst Wide Web | World Wide Web | World Wide Way | **World Wide Web** |
| 17 | Navigation map is also called as _____ | site map | root map | road map | world map | **site map** |
| 18 | Hierarchy is also called as _____ | branching | linear | linear with branching | non-linear | **linear with branching** |
| 19 | In systems that allow to make any part of the screen, or any object into a _____ | hyperlink | hotspot | button | boxes | **hotspot** |
| 20 | Hotspot in web passes support_____ | PPT | Google | yahoo | HTML | **HTML** |
| 21 | GUI's stands for _____ | Graphic User Interface | Graphical User Interchange | Graphical Use Internet | Guide User Internet | **Graphic User Interface** |
| 22 | _____ is the phase when multimedia projects is actually rendered | estimate | schedule | production | time | **production** |
| 23 | In tracking method to develop a _____ specific to project structure | file-name conventions | data convention | name convention | disk convention | **file-name conventions** |
| 24 | Content can have low and high _____ | production value | project value | acquiring content | talent | **production value** |
| 25 | Among the rights most relevant to a multimedia producer are _____ | electronic rights | CD-ROM | Clipart Bitmap | acquiring content | **electronic rights** |
| 26 | Ability to use materials from the collection of _____ | clipart | bitmap | images | none of these | **clipart** |
| 27 | DRM stands for _____ | Digital Rights Management | Digital Rights Memory | Digital Review Management | Digital Review Memory | **Digital Rights Management** |
| 28 | WMRM stands for _____ | Microsoft Windows Media Right Manager | Microsoft Windows Memory Right Manager | Microsoft Windows Most Right Memory | Microsoft Windows Media Right Memory | **Microsoft Windows Media Right Manager** |
| 29 | ISMA stands for _____ | Internet Streaming Memory Alliance | Internet Streaming Memory Allocation | Internet Streaming Media Alliance | Internet Streaming Media Allocation | **Internet Streaming Media Alliance** |

| | | | | | | |
|---|---|---|---|---|---|---|
| 30 | DOI stands for _____ | Digital Object Internet | Digital Object Identifier | Digital Option Identifier | Digital Object Interchange | **Digital Object Identifier** |
| 31 | AFTRA stands for _____ | American Foundation of Television and Radio Artists | American Federation of Technology and Radio Artists | American Federation of Television and Radio Artists | American Federation Technique and Radio Artists | **American Foundation of Television and Radio Artists** |
| 32 | SAG stands for _____ Screen Actors Guide | Screen Artists Guide | Screen Actors Guild | Screen Artists Guide | Self-estimating Artists | **Screen Artists Guide** |
| 33 | Testing classifies _____ | 2type | 3type | 4type | 5type | **2type** |
| 34 | _____ are useful for delivering projects on disks compressed form | Self-extracting archives | Self-estimating archives | Self-extracting Artists | Self-estimating Artists | **Self-extracting archives** |
| 35 | Compact discs are made in what is generally referred to as a _____ | Compact disk technology | family process | single process | compact disk technique | **family process** |
| 36 | CD- R stands for _____ | Compact disk recordable | compact disc renewable | computer disk recordable | computer disc renewable | **Compact disk recordable** |
| 37 | _____ is the named for the color of the documents jacket | Red Book Standard | Red Book Supply | Red Book System | Red Board System | **Red Book Standard** |
| 38 | CDDAS stands for _____ | Computer Disc Digital Audio Standard | Computer Disc Digital Audio System | Compact Disc Digital Audio Standard | Compact Disc Digital Audio System | **Compact Disc Digital Audio Standard** |
| 39 | A CD contain one or more _____ | frames | tracks | periods | frames and tracks | **tracks** |
| 40 | The primary logical unit for data storage on a computer is a _____ | tracks | sectors | frames | period | **sectors** |
| 41 | WORM stands for _____ | Write-onceread-only | Write-only-read-once | Write-only-renew-once | Write-once-renew once | **Write-onceread-only** |
| 42 | DVD's stands for _____ | Digital Versatile Disc | Digital Video Disc | Digital Vestigial Disc | Different Versatile Disc | **Digital Versatile Disc** |
| 43 | DVD-R stands for _____- | Digital Versatile Discs-Recordable | Digital Versatile Disc-Renewable | Digital Versatile Disc-Receive | Digital Versatile Disc-Request | **Digital Versatile Discs-Recordable** |

| | | | | | | |
|---|---|---|---|---|---|---|
| 44 | Single-layered discs offers _____ of storage | 4.73GB | 4.37GB | 1.73GB | 1.37GB | **4.37GB** |
| 45 | Philips and Sony developed _____ | green book | yellow book | orange book | red book | **yellow book** |
| 46 | HFS stands for _____ | Hierarchical File System | Hybrid File System | Hybrid File Standard | Hierarchical File Standard | **Hierarchical File System** |
| 47 | Sound and Audio collaboration resulted in _____ | green book | orange book | yellow book | red book | **red book** |
| 48 | Green book is for _____ | CD-I | CD-ROM | Video CD | CDR | **CD-I** |
| 49 | Orange book is used by _____ | WORM | CD-ROM | CDR | CD-I | **WORM** |
| 50 | White book is for _____ | videoCD | WORM | CD-ROM | CD-I | **videoCD** |
| 51 | A CD-R can have several separate images or _____ on it each recorded at different times | sessions | tracks | frames | sectors | **sessions** |
| 52 | _____ represents the complete navigation map and describes all the links between components of project | depth structure | surface structure | plane structure | hierarchical structure | **depth structure** |
| 53 | _____ and description is particularly common in proposals that move through a company's executive hierarchy | needs analysis | cover | package | structure | **needs analysis** |
| 54 | Web designer range _____to _____ an hour | $60 to $160 | $50 to $150 | $90 to $150 | $60 to $150 | **$60 to $150** |

**CIA-1 ANSWER KEY (2017-2020 BATCH)**

**Register Number: _____**

**[17CSU203]**

# Karpagam Academy of Higher Education

**Eachanari, Coimbatore-641021.**

**(For the candidates admitted from 2017 onwards)**

**B.Sc COMPUTER SCIENCE**

**FIRST INTERNAL EXAMINATION – JAN 2018**

**Second Semester**

**Multimedia and Applications**

**Date & Session:** **Duration :** 2 Hours

**Class :I B.Sc(CS)** **Maximum :** 50 Marks

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**PART-A (20 X 1 = 20 Marks)**

**Answer ALL the Questions**

1. ---------- multimedia allows an end user to control what and when the elements are delivered

a. Hyper media **b. Interactive Multimedia**

c. Non interactive Multimedia d .Non Hypermedia

2. ---------- is a structure of linked elements through which the user can navigate.

**a. Hyper media** b. Multimedia c. linked list d. circular list

3. Multimedia elements are typically seen together into a project using -------

a. Editing Tools b. Unauthoring tools c. Integrated Tools **d. Authoring tools**

4. VR stands for ----------

**a. Virtual reality** b. visual random c. Video raster d. video response

5. Macintosh is an operating systems developed by ----------

a. Windows **b. Apple** c. Microsoft d.IBM

6. The taller-than-wide orientation used for printed document is called ----------

**a. Portrait** b. newsscape c. netscape d. Unicode

7. The wider – than –tall orientation normal to monitors is called----------

**a. Landscape** b. newsscape c. flat file d. portrait

8. CSS stands for ----------

a. cascading sheet styles **b. cascading style sheets**

c. cascading spread styles d. cascading spread sheets

9. DVD stands for ----------

**a. digital versatile disk** b. digital video disk c. digital virtual disk d. dynamic versatile disk

10. One point is ---------- inch

**a. 0.0138** b.0 .1038 c.0 .0318 d.0 .0381

11. Still images can be generated by _____

**a. bitmaps**b. text documents c. linear d.jpeg

12. _____ are used for photo realistic imagesLab2

a. documents **b. bitmaps** c. linear d.jpeg

13. _____ are used for lines, boxes, circles, polygons

a. bitmaps **b. vector drawn** c. linear d.jpeg

14. A bit is referred to a _____

a. decimal b.octal c.hexa **d.binary**

15.A _____ is a two dimensional matrix of the bits.

**a. map** b. pixels c. decimal d. pels

16.A _____ is a simple matrix of the tiny dots that form an image

a. vector drawn **b. bitmaps** c. linear d. pixels

17. The pixels are also called as _____

**a. pels** b. dels c. cels d.pix

18.A _____ contains a collection of images, graphics or photographs.

a. image map b. bitmaps **c. clip art** d. image library

19.TIFF means _____

a. Tagged Interchanged files form b. Tagged Interleaved file formats

c. Tagged Inter File format **d. Tagged Interchanged File Format**

20._____ is extensively used in desktop publishing packages

**a. TIFF** b. PICT c.PCX d.IMG

**PART –B [3*2=6 Marks]**

**Answer ALL the Questions**

**21. Define Multimedia.**

Multimedia can be defined as the technology engaging a variety of media, including text, audio, video, graphics, and animation, either separately or in combination, using computers, to communicate ideas.

**22. Write the categories of Multimedia**.

Multimedia may be broadly divided into **linear** and **non-linear** categories

**23. List out the different types of still images.**

Still images are generated by the computer in two ways

1. **bitmaps**
2. **vector-drawn**

**PART –C [3*8=24 Marks]**

**Answer ALL the Questions**

**24. a) Discuss about the Components and uses of multimedia with suitable examples.**

**Components of Multimedia**

**AUDIO:** Speeches, music and other types of sounds. Audio element is generally used to enhance the usual multimedia environment, but in some cases may become more effective than all other media put together.

**TEXT:** The usual text with some difference as compared to the print media. Since computer can display a variety of fonts, beautiful color combinations, and background features in almost all of the multimedia titles, which is far better then the printed text.

**GRAPHICS:** pictures, photographic images and other art works.

**ANIMATION:** the artificial movements of texts or objects, created in visual environments, using specialized software packages. There are 2D and 3D animations. Animation is the most interesting part of multimedia.

**VIDEO:** the actual video clips that could be embedded right over the application and can be played back without a hitch. But the sizes of the clippings are usually much smaller than that from video cassette players.

**Uses Of Multimedia**

A presentation using PowerPoint. Corporate presentations may combine all forms of media content. Virtual reality uses multimedia content. Applications and delivery platforms of multimedia are virtually limitless.VVO Multimedia-Terminal in Dresden WTC (Germany)Multimedia finds its application in various areas including, but not limited to, advertisements, art, education, entertainment, engineering, medicine, mathematics, business, scientific research and spatial temporal application. Several Examples are as follows:

1. **Creative industries**
2. **Commercial**
3. **Journalism**
4. **Entertainment and fine arts**
5. **Mathematical and scientific research**
6. **Industry**
7. **Engineering**

**(Or)**

b) Write in detail about using Text in Multimedia.

The text elements used in multimedia are:

- Menus for navigation.
- Interactive buttons.
- Fields for reading.

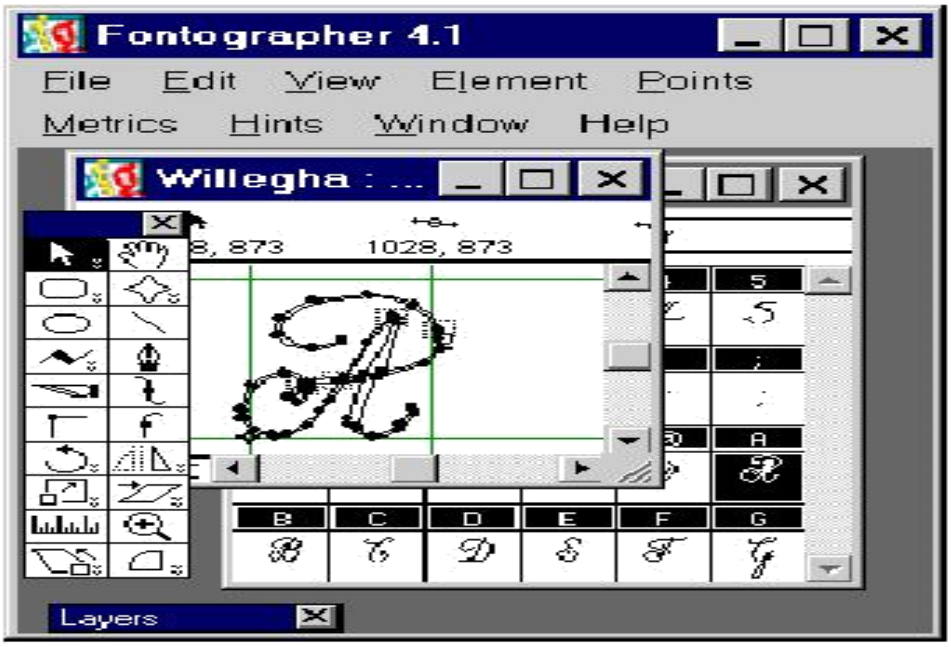
- Portrait vs. Landscape
- HTML documents.
- Symbols and icons.
- Fonts and Faces
- Animating Text

**25.a) Write a short note on (i)Font Editing & Design Tools (ii) Hypermedia and Hypertext**

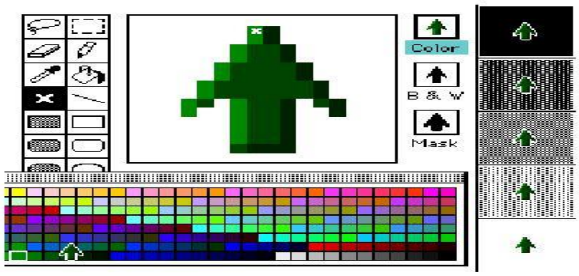
**(i)Font Editing & Design Tools**

**Macromedia Fontographer**

- Fontographer is a specialized graphics editor.
- It is compatible with both Macintosh and Windows platform.
- It can be used to develop PostScript, TrueType, and bitmapped fonts.
- It can also modify existing typefaces and incorporate PostScript artwork.




- ResEdit
- Introduced by Apple Text to design text as a bitmap image.

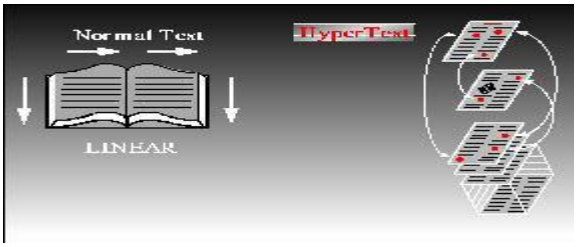


**Creating attractive texts.**

- Applications that are used to enhance texts and images include:
- Adobe Photoshop
- Typestyle
- COOL 3D
- Hot TEXT
- Type Caster

**(ii) Hypermedia and Hypertext**

- Multimedia - combines text, graphics and audio
- Interactive multimedia - gives user control over what and when content is viewed (non-linear)
- Hypermedia -provides a structure of linked elements through which user navigates and interacts
- Hyper media provides a structure of links
- Hypertext words are linked to other elements
- Hypertext is usually searchable by software robots




**Hypermedia Structures**

- Hypermedia elements are called *nodes*
- Nodes are connected using *links*
- A linked point is called an *anchor*
- Link - connections between conceptual elements (navigation pathways and menus)
- Node - contains text, graphics sounds
- Anchor - the reference from one document to another document, image, sound or file on the web
- Link anchor - where you came from

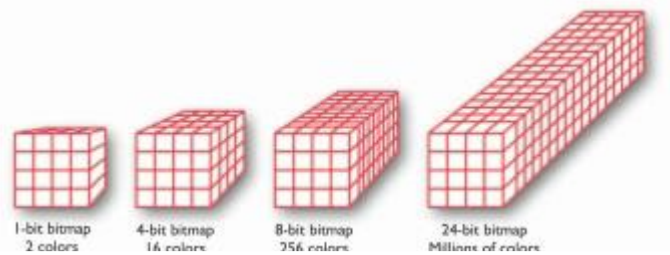
**(Or)**

**b) Discuss in detail about bitmap and vector drawing with neat example.**

**Bitmaps**

- A bit is the simplest element in the digital world, an electronic digit that is either on or off, black or white, or true (1) or false (0). This is referred to as binary, since only two states (on or off) are available.
- A map is a two dimensional matrix of these bits. A bitmap, then, is a simple matrix of the tiny dots that form an image and are displayed on a computer screen or printed.

A one-dimensional matrix (1-bit depth) is used to display monochrome images—a bitmap where each bit is most commonly set to black or white. Depending upon the software, any two colors that represent the on and off (1 or 0) states may be used. More information is required to describe shades of gray or the more than 16 million colors that each picture element might have in a color image, as illustrated in Figure.




These picture elements (known as pels or, more commonly, pixels) can be either on or off, as in the 1-bit bitmap, or, by using more bits to describe them, can represent varying shades of color

| Bit Depth | Number of Colors Possible | Available Binary Combinations for Describing a Color |
|---|---|---|
| 1-bit | 2 | 0, 1 |
| 2-bit | 4 | 00, 01, 10, 11 |
| 4-bit | 16 | 0000, 0001, 0011, 0111, 1111, 0010, 0100, 1000, 0110, 1100, 1010, 0101, 1110, 1101, 1001, 1011 |

Together, the state of all the pixels on a computer screen make up the image seen by the viewer, whether in combinations of black and white or colored pixels in a line of text, a photograph-like picture, or a simple background pattern.

**Vector Drawing**

Most multimedia authoring systems provide for use of vector-drawn objects such as lines, rectangles, ovals, polygons, complex drawings created from those objects, and text.

- Computer-aided design (CAD) programs have traditionally used vector-drawn object systems for creating the highly complex and geometric renderings needed by architects and engineers.

- Graphic artists designing for print media use vector-drawn objects because the same mathematics that put a rectangle on your screen can also place that rectangle (or the fancy curves of a good line-art illustration) on paper without jaggies. This requires the higher resolution of the printer, using a page description format such as Portable Document Format (PDF).
- Programs for 3-D animation also use vector-drawn graphics. For example, the various changes of position, rotation, and shading of light required to spin an extruded corporate logo must be calculated mathematically.

**26.a) Discuss in detail about color palettes and image file formats with neat example.**

**Color Palettes**

**Palettes** are mathematical tables that define the color of a pixel displayed on the screen. The most common palettes are 1, 4, 8, 16, and 24 bits deep:

| Color Depth | Colors Available |
|---|---|
| 1-bit | Black and white (or any two colors) |
| 4-bit | 16 colors |
| 8-bit | 256 colors (good enough for color images) |
| 16-bit | Thousands of colors (65,536; excellent for color images) |
| 24-bit | More than 16 million colors (16,777,216; totally photo-realistic) |

When color monitors became available for computers, managing the computations for displaying colors severely taxed the hardware and memory available at the time. 256-color, 8-bit images using a color lookup table or palette were the best a computer could do. 256 default system colors were statistically selected by Apple and Microsoft engineers (working independently) to be the colors and shades that are most "popular" in photographic images; their two system palettes are, of course, different.

Web authorities also decided on a palette of 216 "web-safe" colors that would allow browsers to display images properly on both Macintosh and Windows computers.

GIF files using 256-color palettes are saved in a lossless format. The PNG format also uses palettes (24-bits or 32 bits if an "alpha" mask is included for transparency), and is lossless. It was developed for the Internet (it supports only the RGB color space) to expand GIF's limited 256 colors to millions of colors.

In 24-bit color systems, your computer works with three channels of 256 discrete shades of each color (red, green, and blue) represented as the three axes of a cube. This allows a total of 16,777,216 colors (256 *256 *□256).

***Dithering***

- Dithering is a process whereby the color value of each pixel is changed to the closest matching color value in the target palette, using a mathematical algorithm.
- Dithering concepts are important to understand when working with bitmaps derived from RGB information or based upon different palettes.
- Software's use a dithering algorithm to find the 256 color shades that best represent both images, generating a new palette in the process.
- Dithering software is usually built into image-editing programs and is also available in many multimedia authoring systems as part of the application's palette management suite of tools.

**Image File Formats**

- Most applications on any operating system can manage JPEG, GIF, PNG, and TIFF image formats.
- An older format used on the Macintosh, **PICT**, is a complicated but versatile format developed by Apple where both bitmaps and vector-drawn objects can live side by side.
- The **device-independent bitmap (DIB)**, also known as a **BMP**, is a common Windows palette–based image file format similar to PNG.
- **PCX** files were originally developed for use in Z-Soft MS-DOS paint packages; these files can be opened and saved by almost all MS-DOS paint software and desktop publishing software.
- **TIFF**, or Tagged Interchange File Format, was designed to be a universal bitmapped image format and is also used extensively in desktop publishing packages.
- Often, applications use a proprietary file format to store their images.
- Adobe creates a PSD file for Photoshop and an AI file for Illustrator; Corel creates a CDR file.
- **DXF** was developed by AutoDesk as an ASCII-based drawing interchange file for AutoCAD, but the format is used today by many computer-aided design applications.
- **IGS** (or **IGES**, for **Initial Graphics Exchange Standard**) was developed by an industry committee as a broader standard for transferring CAD drawings.
- These formats are also used in 3-D rendering and animation programs. JPEG, PNG, and GIF images are the most common bitmap formats used on the Web and may be considered cross-platform, as all browsers will display them.
- Adobe's popular PDF (Portable Document File) file manages both bitmaps and drawn art, and is commonly used to deliver a "finished product" that contains multiple assets.

**(Or)**

**b) Explain about font and faces and computerized colors in detail.**

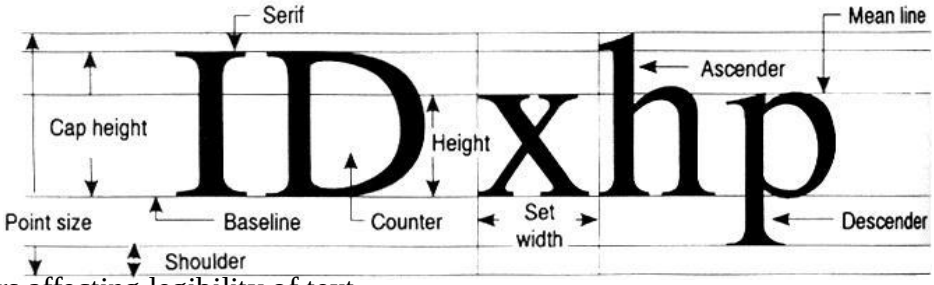
Fonts and Faces

- A typeface is a family of graphic characters that includes many type sizes and styles (such as Times, Arial, Helvetica)

- A font is a collection of characters of a single size and style belonging to a typeface family (such as bold, italic)

- Font sizes are in points 1 point = 1/72 inch
(measured from top to bottom of descenders in capital letter)
- X-height is the height of the lower case letter x

Character Metrics




Factors affecting legibility of text
– Size.

– Background and foreground color.
– Style.
– Leading (pronounced “ledding”).

Styles

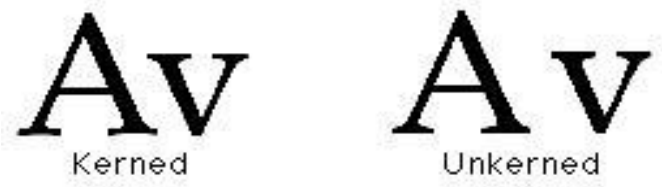
- Examples of styles are boldface and italic *Italic*

Bold Underlined

Leading and Kerning
Computers can

- adjust the line spacing (called leading) The space between pairs of letters,

Called kerning




Fonts and Faces

- PostScript, TrueType and Master fonts can be altered

- Bitmapped fonts cannot be altered
- The computer draws or rasterizes a letter on the screen with pixels or dots.

Serif and Sans Serif

- Type either has a little decoration at the end of the letter - called a serif
- or it doesn"t - sans serif ( “sans” from the French meaning without)
- Examples ( Times - serif “T” )

( Arial - sans serif “T”)

- Use what is appropriate to convey your message

Animating Text

- To grab a viewer"s attention:

– let text “fly” onto screen
– rotate or spin text, etc.

- Use special effects sparingly or they become boring

**Computerized Color**

- Because the eye’s receptors are sensitive to red, green, and blue light, by adjusting combinations of these three colors, the eye and brain will interpolate the combinations of colors in between.
- This is the psychology, not the physics, of color: what you perceive as orange on a computer monitor is a combination of two frequencies of green and red light, not the actual spectral frequency you see when you look at that namesake fruit, an orange, in sunlight.
- Although the eye perceives colors based upon red, green, and blue, there are actually two basic methods of making color:
  - Additive
  - Subtractive

*Additive Color*

- In the **additive color** method, a color is created by combining colored light sources in three primary colors: red, green, and blue (**RGB**).
- This is the process used for cathode ray tube (CRT), liquid crystal (LCD), and plasma displays.
- On the back of the glass face of a CRT are thousands of phosphorescing chemical dots.
- These dots are each about 0.30mm or less in diameter (the **dot pitch**), and are positioned very carefully and very close together, arranged in triads of red, green, and blue. These dots are bombarded by electrons that “paint” the screen at high speeds (about 60 times a second).
- The red, green, and blue dots light up when hit by the electron beam.
- Human eye sees the combination of red, green, and blue light and interpolates it to create all other colors.
- Like CRTs, LCD and plasma screens utilize tiny red, green, and blue elements energized through tiny transparent conductors and organized in a Cartesian grid as illustrated by Marvin Raaijmakers and Angelo La Spina: