01
CHAPTER

K9QN28

Multimedia and Desktop Publishing

LEARNING OBJECTIVES

Students will be able to learn about the concepts, techniques, and processes used throughout the multimedia environment

- **Gain an ability to understand multimedia tools.**
- **Import graphics, create objects using various tools, add effects to objects**
- **To know various multimedia file formats for sound and video**
- **To understand the Multimedia production method and their team activities.**

1.1 Introduction to Multimedia

Multimedia allows the users to combine and change data from various sources like image, text, graphics, video, audio and video to a single platform. Multimedia has become the latest enriching experience in the field of information sector. The fast growing of multimedia technology over the last decade has brought a lot of changes to computing, entertainment and education.

The phenomenal growth of multimedia technologies and applications has presented the computerized field with great challenges and opportunities. Multimedia is becoming more popular among the user in the terms of its uses and applications. Multimedia application plays vital role in terms of presenting information to the users.

Figure: 1.1 Introduction to Multimedia

1.2 Multimedia Definition

The word multimedia consists of two words “multi” and “media” which means that multiple forms of media are combined to gather and provide services like storage,

communication, presentation and Input/ output interactions of text, video, image, graphics and audio.

The term multimedia comprises of two words, "multi" and "medium". Multi refers to many i.e. at least two. Media is the plural of medium. Therefore multimedia is an integration of many types of media like text, graphics, images, audio, animation, video etc on a single medium in the same information unit.

1.3 Components of Multimedia

Multimedia has five major components like text, images, sound, video and animation. They are explained in detail below:

Figure: 1.2 Components of Multimedia

1.3.1 Text

Text is the basic component of multimedia and is the most common way of communicating information to other person. Even though multimedia includes images, video, audio and graphics, Text is the basic component used in multimedia.

Figure: 1.3 Text

Static Text

Static text, the text which will remain static as a heading or in a line, or in a paragraph. The words are given along with the images to explain about the images. In static text the words will either give information or support an image or an video.

Figure: 1.4 Static Text

Hypertext

A hypertext is a system which consists of nodes, the text and the links between the nodes, which defines the path the user need to follow for the text access in non-sequential ways. The author of the working system created this structure. The user is permitted to define their own paths in more sophisticated hypertext systems. The user is provided with the flexibility and choice to navigate in hypertext. In a multimedia product, text is used to convey the information and must be placed at appropriate position in order to obtain the well-formatted sentences and paragraphs. The readability of the text depends on the spacing and punctuation. The message communication is more appropriate with improved Fonts and styles.

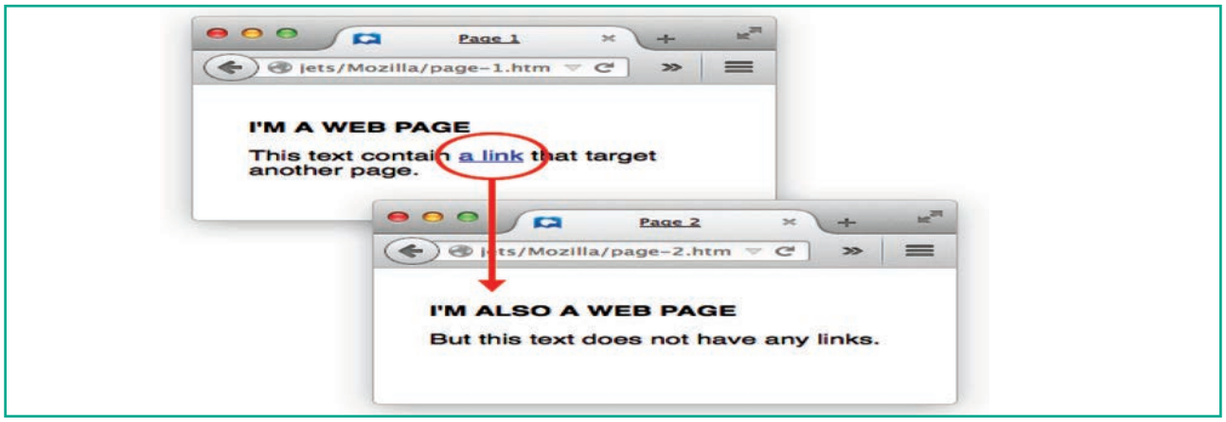

Figure: 1.5 Hyper Text

1.3.2 Image

Images acts as an vital component in multimedia. These images are generated by the computer in two ways, as bitmap or raster images and as vector images.

Raster or Bitmap Images

The common and comprehensive form of storing images in a computer is raster or bitmap image. Bitmap is a simple matrix of the tiny dots called pixel that forms a raster or bitmap image. Each pixel consists of two or more colors. Based on how much data, in bits is used to determine the number of colors, the color depth is determined. Eg. one bit is two colors, four bits means sixteen colors, eight bits indicates 256 colors, and so on.

Vector Images

Drawing elements or objects such as lines, rectangles, circles and so on to create an images are based on Vector images. The advantage of vector image is relatively small amount of data is required to represent the image and thereby only less memory is needed to store. Compression techniques are used to reduce the file size of images that is useful for storing large number of images and speeding transmission for networked application. various Compression formats used for this purpose are GIF, TIFF and JPEG.

Figure: 1.6 Images

1.3.3 Animation

Animation is the process of displaying still images so quickly so that they give the impression of continuous movement. In animation the screen object is a vector image. Using numerical transformations the movement of that image along its paths is calculated for their defining coordinates. The least frame rate of at least 16 frames per second gives the impression of smoothness and for natural looking it should be at least 25 frames per second. Animations may be in two or three dimensional. A two dimensional animation, brings an image alive, that occur on the flat X and Y axis

of the screen. while in three dimensional animation it occurs along the three axis X, Y and Z. Animation tools are very powerful and effective. The two basic types of animations are Path animation and Frame animation.

Path Animation

Path animation involves moving an object on a screen that has a constant background e.g. a cartoon character may move across the screen regardless of any change in the background or the character.

Figure: 1.7 Animation

Frame Animation

In frame animations, multiple objects are allowed to travel simultaneously and the background or the objects also changes.

1.3.4 Sound

Sound is a meaningful speech in any language and is the most serious element in multimedia, providing the pleasure of music, special effects and so on. Decibels is the measurement of volume, the pressure level of sound.

Figure: 1.8 Sound

Musical Instrument Digital Identifier (MIDI)

Musical Instrument Digital Identifier (MIDI) is a standard communication tool developed for computers and electronic instruments. This tool is flexible and easy for composing the projects in multimedia. Tools for synthesizing the sound and software for sequencing are necessary for MIDI.

Digital Audio

Sampled sound is a Digitized sound. A sample of sound is taken and stored every n^{th} fraction of a second as digital information in bits and bytes. The quality of this recording depends on the sampling rate. sampling rate is defined as how often the samples are taken and how many numbers are used to represent the value of each sample (bit depth, resolution and sample size). The finer the quality of the captured sound and the resolution is achieved while played back, when more often the sample is taken and the more data is stored about that sample.

1.3.5 Video

Video is defined as the display of recorded event, scene etc. The powerful way to convey information in multimedia applications are embedding of video. The video can be categorized in two types as Analog video and Digital video.

Analog Video

In Analog video, the video data's are stored in any non-computer media like video tape, laser disc, film etc. It is divided further in two types as Composite and Component Analog Video. Composite Analog Video has all the video components

like brightness, color, and synchronization combined into one signal. Thus the quality of the composite video resulted in color blending, low clarity and high generational loss.

Digital Video

Digital video is an electronic representation of moving visual images in the form of encoded digital data. This is in contrast to analog video where images are displayed in rapid succession.

1.4 File Formats for Multimedia

The following is an outline of current file formats used for the production and delivery of multimedia data.

1.4.1 Text Formats

RTF

Rich Text Format is the primary file format introduced in 1987 by Microsoft with the specification of their published products and for cross-platform documents interchange.

Plain text

Plain text files can be opened, read, and edited with most text editors. commonly used are Notepad (Windows), Gedit or nano (Unix, Linux), TextEdit (Mac OS X) and so on. Plain text is the original and popular way of conveying an e-mail.

1.4.2 Image Formats

TIFF (Tagged Image File Format)

This format is common in desktop publishing world (high quality output), and is supported by almost all software packages. Recent versions of TIFF allows image compression, and the format is comfortable for moving large files between computers.

BMP (Bitmap)

Initially this format is in use with Windows 3.1. It is quite large and uncompressed and hence BMP is used for the high-resolution or large images.

DIB (Device Independent Bitmap)

A device independent bitmap contains a colour table. The colour describes how pixel values corresponds to RGB colour values, which describes colors that are produced by emitting light.

GIF (Graphics Interchange Format)

GIF is a compressed image format. Most of the computer color images and backgrounds are GIF files. This file format is best suitable for graphics that uses only limited colors, and it is the most popular format used for online color photos. 13-bit Color look up table is used by the GIF format to identify its color values. This format is supported widely.

JPEG (Joint Photographic Experts Group)

JPEG is a commonly used method of lossy compression for digital images. The degree of compression can be adjusted and it works good with photographs, naturalistic artwork, and similar material but functions less on lettering, live drawings or simple cartoons.

TGA (Tagra)

It is the first popular format for high-resolution images. TGA files are common in animation video industry.

PNG (Portable Network Graphics)

An extensible file format for the less loss, portable and well compressed storage of raster images. PNG acts as replacement for GIF and also replaces multiple common uses of TIFF. PNG works good with online viewing applications like worldwide web. so it is fully streameable with a best display option.

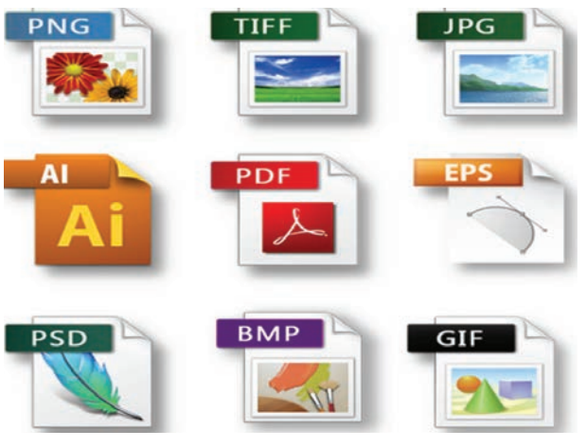

Figure: 1.9 Image file Formats

1.4.3 Digital Audio File Formats

WAV (Waveform Audio File Format)

It is the most popular audio file format in windows for storing uncompressed sound files. In order to attain the reduced file size it can also be converted to other file formats like MP3.

MP3 (MPEG Layer-3 Format)

MPEG Layer-3 format is the most popular format for storing and downloading music. The MP3 files are roughly compressed to one-tenth the size of an equivalent WAV file.

OGG

A free, open source container format that is designed for obtaining better streaming and evolving at high end quality digital multimedia. It can be compared to MP3 files in terms of quality.

AIFF (Audio Interchange File Format)

It is an audio file format developed by Apple Inc. used for storing sound data for personal computers and other electronic audio devices.

WMA (Windows Media Audio)

It is a popular windows media audio format owned by Microsoft. WMA is a file extension used with windows media player.

RA (Real Audio Format)

Real Audio format is designed for streaming audio over the Internet. The digital audio resources are usually stored as a computer file in computer's hard drive or CD/DVD. Besides the variety of audio file formats available, the most common formats are wave files (.WAV) and MPEG Layer-3 files (.MP3), WMA and RA.

Figure: 1.10 Digital Audio File Formats

1.4.4 Digital Video File Formats

AVI (Audio/Video Interleave)

AVI is the video file format for Windows. Here sound and picture elements are stored in alternate interleaved chunks in the file.

MPEG (Moving Picture Experts Group)

MPEG is a standard for generating digital video and audio compression under the International Standards Organization (ISO) by the group of people. The group has developed MPEG-1, the standard on which Video CD and MP3 are based, MPEG-2, the standard that supports products as Digital Television set top boxes and DVD, MPEG-4, the standard for multimedia and mobile web.MPEG-7, the standard for search of audio and visual content. Research on MPEG-21 "Multimedia Framework" has started in 2000. Simply MPEG is the standards for digital video and audio compression.

Figure: 1.11 Digital Video File Formats

1.5 Multimedia Production

1.5.1 Steps in Multimedia Production

Adequate time and efficient planning is required for multimedia production. This assures that the project will proceed smoothly and ensures that the information reaches the target audience. Following are the phases for development of complex multimedia projects.

1. **Conceptual Analysis and Planning**

   The process of multimedia making begins with a conceptual ignition point. Conceptual analysis identifies a appropriate theme, budget and content availability on that selected theme. Additional criteria like copyright issues also are considered in this phase.

2. **Project design**

   Once the theme is finalized objectives, goals, and activities are drawn for the multimedia project. General statements are termed as goals. The specific statements in the project is known as the objectives. Activities are series of actions performed to implement an objective. These activities contribute to the Project design phase.

3. **Pre-production**

   Based on the planning and design, it is necessary to develop the project. The following are the steps involved in pre-production:

4. **Budgeting**

   Budgeting for each phases like consultants, hardware, software, travel, communication and publishing is estimated for all the multimedia projects.

5. **Multimedia Production Team**

   The production team for a high-end multimedia project requires a team effort. The team comprises of members playing various roles and responsibilities like Script

writer, Production manager, Editor, Graphics Architect, Multimedia Architect and Web Master.

6. **Hardware/Software Selection**

   All multimedia Application requires appropriate tools to develop and playback the application. Hardware includes the selection of fastest CPU, RAM and huge monitors, sufficient disc for storing the records. Selection of the suitable software and file formats depends on the funds available for the project being developed.

7. **Defining the Content**

   Content is the "stuff" provided by content specialist to the multimedia architect with which the application is developed, who prepares the narration, bullets, charts and tables etc.

8. **Preparing the structure**

   A detailed structure must have information about all the steps along with the timeline of the future action. This structure defines the activities, responsible person for each activity and the start/end time for each activity.

9. **Production**

   In the multimedia application, after the pre-production activities, the production phase starts. This phase includes the activities like background music selection, sound recording and so on. Text is incorporated using OCR software, Pictures shot by digital camera, Video clips are shot, edited and compressed. A pilot project is ready by this time.

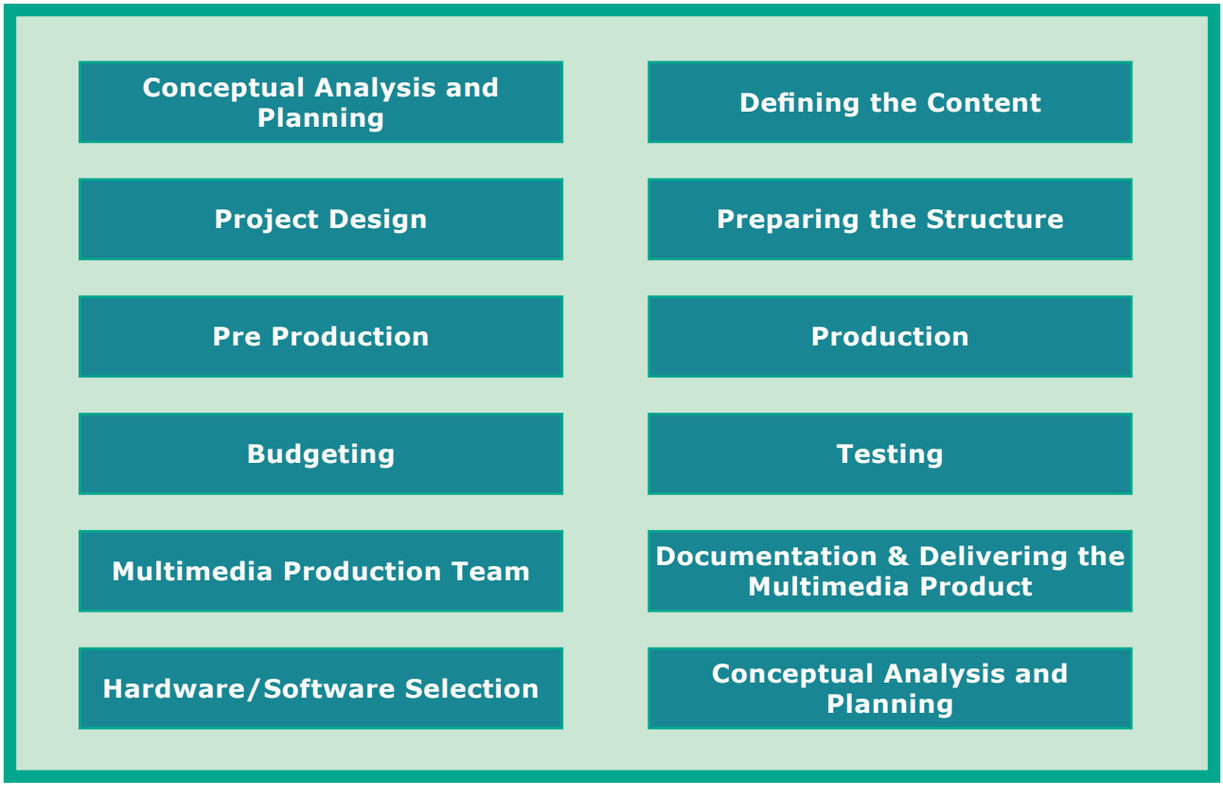

Figure 1.12 Steps in Multimedia Production

10. **Testing**

The complete testing of the pilot product is done before the mass production to ensure that everything is in place, thereby avoiding the failure after launch. If it's an web based product, its functioning is tested with different browsers like Internet Explorer, Chrome, Mozilla and Netscape Navigator. After the testing process is over, the product is incorporated with valid suggested changes.

11. **Documentation**

User documentation is a mandatory feature of all multimedia projects. The documentation has all the valuable information's starting from the system requirement till the completion of testing. Contact details, e-mail address and phone numbers are provided for technical support and sending suggestions and comments.

12. **Delivering the Multimedia Product**

Multimedia applications are best delivered on CD/DVD or in the website . In reality various challenges are faced while delivering through internet, like bandwidth problems, huge number of plug-ins required to play audio and video and long downloading time. Finally, a multimedia application is delivered in a more effective way by the integration of two mediums CD-ROM/DVD and Internet.

1.5.2 Multimedia Production Team

Managing team members in a way to get maximum outcome with high degree of efficiency is mandatory in multimedia production. The fine quality high-end multimedia production application requires a specialized team comprising of the following members:

1. **Production Manager**

In a multimedia production, the role of production manager is to define, and coordinate, the production of the multimedia project in time and with full quality. The production manager should be an expertise in the technology, good at proposal writing, good communication skills and budget management skills. Also must have experience in human resource management and act as an efficient team leader.

2. **Content Specialist**

Content specialist is responsible for performing all research activities concerned with the proposed application's content. Program content refers to projects information, graphics, data or facts presented through the multimedia production.

3. **Script Writer**

Video and film scripts represents a linear sequence of events. The script writer visualizes the concepts in three dimensional environment and if needed uses the virtual reality integration into the program.

4. **Text Editor**

The content of a multimedia production always must flow logically and the text should always be structured and correct

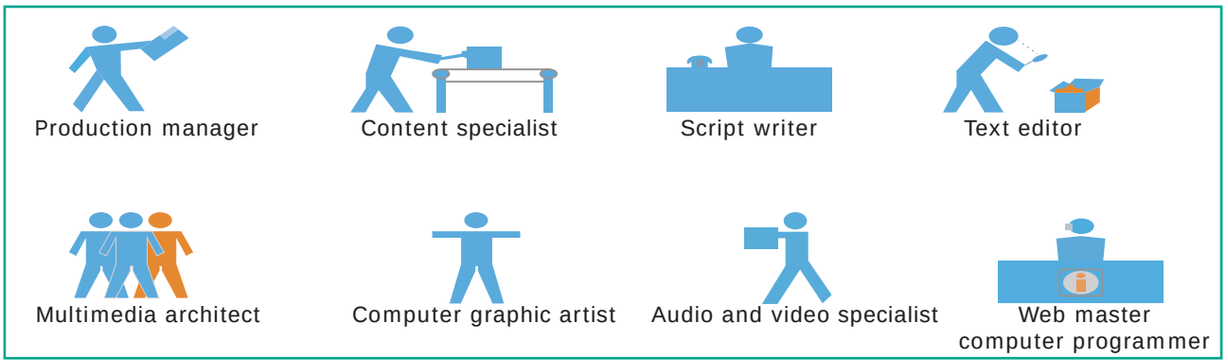

Figure: 1.13 **Multimedia Production Team**

grammatically. Text and narration is an integrated part of the application.

5. **Multimedia Architect**

   The multimedia architect integrates all the multimedia building blocks like graphics, text, audio, music, video, photos and animation by using an authoring software.

6. **Computer Graphic Artist**

   The role of Computer Graphic Artist is to deal with the graphic elements of the programs like backgrounds, bullets, buttons, pictures editing, 3-D objects, animation, and logos etc.

7. **Audio and Video Specialist**

   The roles of these specialists are needed for dealing with narration and digitized videos to be added in a multimedia presentation. They are responsible for recording, editing sound effects and digitizing.

8. **Computer Programmer**

   The computer programmer writes the lines of code or scripts in the appropriate language. These scripts usually develops special functions like developing the software to give the size and shape of video windows, controlling peripherals and so on.

9. **Web Master**

   The responsibility of the web master is to create and maintain an Internet web page. They convert a multimedia presentation into a web page. Final multimedia product is a joint effort of the entire team. Initially, the production manager identifies the project content, while the web master provides access to a wide range of community through web-services.

1.6 Multimedia on Internet

Major applications have been developed with the integration of internet and multimedia like maps, media rich blogs etc. A comprehensive study on use of internet and multimedia in USA says that an estimated 55 million consumers use Internet radio and video services each month. Image is the most widely used multimedia resource on internet. Social networking sites like Facebook, Whatsapp, Twitter etc. also enables multimedia rich contents to be exchanged online.

Figure: 1.14 Multimedia on Internet

1.7 Applications of Multimedia

Multimedia is the most fast growing area in the field of information technology. A Multimedia is an application which is a collection of multiple media sources like text, images, sound/audio, animation and video on a single platform. Predominantly, Entertainment and Education are the fields where multimedia is used in majority.

1. **Education**

   Multimedia plays an vital role in offering an excellent alternative method to traditional teaching by allowing the students to explore and learn various concepts through animation. Students, teachers and the parents enjoy this multimedia mode of learning and multimedia learning materials. Multimedia based teaching and learning system named as MODULO at GMU in Germany developed is a web-based environment that aims to provide students with flexible and decentralized learning environment based on their educational background.

   In India, multimedia is used in different ways for teaching and learning like e-learning, distance learning, virtual learning and so on. EDUSAT (Education Satellite) is launched in India for serving the educational sector of the country for emulating virtual classroom in an effective manner.

2. **Entertainment**

   The remarkable advancement in the entertainment industry is due to the Multimedia Technology mainly. This technology is needed in all mode of entertainment like radio, TV, online gaming, video on demand etc.

   Video on demand or movies on demand is a service that provides movies to television sets on an individual basis at homes. Movies are stored in a central server and transmitted through a communication network. A set-top box connected to the communication network converts

the digital information to analog signals and inputs it to the television set.

3. **Business Systems**

   Business applications for multimedia include presentations, training, internet protocols and so on. The marketing and advertising agencies are using animation techniques for sales promotion. High resolution projectors are common for multimedia presentations on the road. Cell phones and personal digital assistants with Bluetooth and Wi-Fi communication technology makes multimedia communication for business more efficiently.

4. **Medical Services**

   Medical services are grown drastically with the development of multimedia. Medical Students practices surgery methods via simulation prior to actual surgery. Tiny digital cameras are inserted in human body and it displays the inner site of the body through which the medical practitioners can see the internal parts without actually dissecting it.

5. **Public Places**

   Multimedia is available in many public places like trade shows, libraries, railway stations, museums, malls, airports, banks, hotels and exhibitions in the form of kiosks. It helps the customers by providing information to them. The information presented in kiosk are enriched with animation, video, still pictures, graphics, diagrams, maps, audio and text. Banks uses kiosks in the form of ATM machines.

6. **Multimedia Conferencing**

   Multimedia conferencing or video-conferencing is a system that performs face-to-face interactions among participating users, located far from each other, as if they were sitting and discussing in a single room.

1.8 Libraries, Information Centers and Archives

The primary function of library is to organize, collect, preserve, and disseminate information to users. Several techniques and technologies are in use for handling the information more effectively. Multimedia technology is adopted by the libraries in various functions like multimedia kiosks, user orientation programs etc. Following is the brief account of multimedia technology applications in libraries.

1. **Multimedia Kiosk**

   Kiosk is a free-standing furnished equipped multimedia computer that allow users to retrieve information via a touch screen. It is commonly used in airports and other public locations to provide directions and few mandatory information's. In an library, Kiosk is usually located near the entrance of the library, used for displaying announcements, reading lists, comments and suggestions from library users and other information's about operations and programs of the library.

2. **Webcasting and Video Conferencing**

The live telecast of real time programs through internet is known as Webcasting. Video conferencing is the process of conducting conference between more than two participants at different sites by using computer networks to transmit audio and video data.

3. **User Orientation Program**

The role of multimedia plays an vital role in training the librarians in schools, colleges and universities due to its interactivity. Hence, it is used in depth subject training to their faculties.

4. **In-house Production of Multimedia Resources and E-publishing**

Many libraries produce multimedia resources in-house, to serve the parent organization. Introduction of CD/DVD and their writers has solved few of the problems of libraries in storing or achieving the materials. Multimedia tools along with CD-writers is made possible to publish information from different sources in a most easy to use and acceptable form to library users.

5. **Digital Multimedia Libraries**

Information's are available in digital formats that include digital books, scanned images, graphics and digitized audio-visual clips etc. Initially digital library projects were based only on textual data but now it is an integration of various media elements like images, audio and video recordings.

POINTS TO REMEMBER

- Multimedia allows the users to combine and change data from various sources like image, text, graphics, video, audio and video to a single platform.
- Multimedia has five major components like text, images, sound, video and animation.
- Static text, the text or the words will remain static as a heading or in a line, or in a paragraph.
- A hypertext is a system which consists of nodes, the text and the links between the nodes, which defines the paths the user need to follow for the text access in non-sequential ways.
- Images acts as an vital component in multimedia. These images are generated by the computer in two ways, as bitmap or raster images and as vector images.
- Animation is the process displaying still images so quickly so that they give the impression of continuous movement. In animation the screen object is a vector image in animation.
- Sound is a meaningful speech in any language and is the most serious element in multimedia, providing the pleasure of music, special effects and so on.
- Musical Instrument Digital Identifier (MIDI) is a standard communication tool developed for computers and electronic instruments.
- Video can be categorized in two types as Analog video and Digital video.

GLOSSARY

Multimedia	Multimedia allows the users to combine and change data from various sources like image, text, graphics, video, audio and video to a single platform.
Raster or Bitmap Images	The common and comprehensive form of storing images in a computer is raster or bitmap image.
Vector Images	It relatively requires small amount of data to represent the image and thereby only less memory is needed to store.
Animation	Animation is the process of displaying still images quickly so that they give the impression of continuous movement. In animation the screen object is a vector image.
Path Animation	Path animation involves moving an object on a screen that has a constant background e.g. a cartoon character may move across the screen regardless of any change in the background or the character.
Musical Instrument Digital Identifier (MIDI)	Musical Instrument Digital Identifier (MIDI) is a standard communication tool developed for computers and electronic instruments.

EVALUATION

DGMENA

Part - I

Choose the correct answer

1. _____ refers to any type of application that involves more than one type of media such as text, graphics video animation and sound.
   a) an executable file
   b) desktop publishing
   c) multimedia
   d) hypertext
2. One of the disadvantages of the multimedia is its __.
   a) cost
   b) adaptability
   c) usability
   d) relativity
3. Expand JPEG
   a) joint photo experts gross
   b) joint photographic experts group
   c) joint processor experts group
   d) joint photographic expression group
4. You need hardware, software and __ to make multimedia.
   a) network
   b) compact disk drive
   c) good idea
   d) programming knowledge
5. Match the following by choosing the right one.
   1. Text – TGA
   2. Image – MIDI
   3. Sound – MPEG
   4. Video – RTF
   a) 1, 2, 3, 4 b) 2, 3, 4, 1
   c) 4, 1, 2, 3 d) 3, 4, 1, 2
6. Find the odd one on the following which is not an image format.
   a) TIFF b) BMP
   c) RTF d) JPEG
7. ___ is the process of displaying still images with continuous movement.
   a) Text formats
   b) Sound
   c) MP3
   d) Animation
8. The live telecasting of real time program through Internet is known as ____.
   a) web casting
   b) web hosting
   c) data manipulation
   d) none of the above
9. GIF use _____ color look up table
   a) 8 bit
   b) 13 bit
   c) 8 MB
   d) 13 MB
10. RTF file format was introduced by _____.
    a) TCS
    b) Microsoft
    c) Apple
    d) IBM

Part - II

Short Answers

1. Define Multimedia and their features.
2. List out Multimedia Components.
3. Classify the TEXT component in multimedia.
4. Classify the IMAGE component in multimedia.
5. Define Animation and their features.
6. List out image file formats.
7. List out audio file formats.
8. List out video file formats.
9. Define Multimedia Production.
10. List out Multimedia Production team members.

Part - III

Explain in Brief Answer

1. Briefly explain about Multimedia Components.
2. Describe the features and techniques of animation.
3. Write roles and responsibilities of Production team members.
4. Describe the various file formats in multimedia .
5. Explain animation industry and their scope.

Part - IV

Explain in detail

1. Explain in detail Process of Multimedia.
2. Explain in detail Techniques of Animation.
3. Explore the opportunities Animation filed movie industry.
4. Explain in detail about production team Roles and Responsibilities.
5. Explain about different file formats in multimedia files.