SLIATE
SRI LANKA INSTITUTE OF ADVANCED TECHNOLOGICAL EDUCATION
(Established in the Ministry of Higher Education, vide in Act No. 29 of 1995)

Higher National Diploma in Information Technology
First Year, Second Semester – 2017
IT 2002 /HNDIT1210 - Graphics and Multimedia

Answer Guide

Q1.

i. What it meant Multimedia? (02 Marks)

Multimedia means a (usually) interactive combination of two or more media elements (multimedia building block), such as text, graphics, audio, video and animation integrated using a computer

or

Multimedia is any combination of text, graphics, sound, animation and video that is delivered by computer

ii. Explain the following terms (02+02=04 Marks)

a. Hypertext

A **hypertext(links)** : meant to be read nonlinearly, by following links that point to other parts of the document, or to other documents. (text which contains links to other texts and is usually non-linear)

Invented by Ted Nelson around 1965

b. Hypermedia

HyperMedia is not constrained to be text-based.

It can include other media, e.g., graphics, images, and especially the continuous media - sound and video

The World Wide Web (WWW) is the best example of hypermedia applications.

iii. "Modalities are the sensory systems through which a multimedia activity occurs"

Mention two(02) types of modalities any two-(02*2=04 Marks)

a. tactile (touch)
b. gustatory (taste)
c. visual (sight)
d. auditory (hearing)
e. olfactory (smell)

iv. Write four (04) components of a multimedia system (01*4 =04 Marks)

Capture devices -- Video Camera, Video Recorder, Audio Microphone, Keyboards, mice, graphics tablets, 3D input devices, tactile sensors, VR devices. Digitising/Sampling Hardware

Storage Devices -- Hard disks, CD-ROMs, Jaz/Zip drives, DVD, *etc*

Communication Networks -- Ethernet, Token Ring, FDDI, ATM, Intranets, Internets.

Computer Systems -- Multimedia Desktop machines, Workstations, MPEG/VIDEO/DSP Hardware

Display Devices -- CD-quality speakers, HDTV,SVGA, Hi-Res monitors, Colour printers *etc.*

v. There are several features in multimedia systems. Mention and Briefly explain three of them (02*3=06 Marks)

Very High Processing Power

needed to deal with large data processing and real time delivery of media. Special hardware commonplace.

Multimedia Capable File System

needed to deliver real-time media -- *e.g.* Video/Audio Streaming. Special Hardware/Software needed *e.g* RAID technology.

Data Representations/File Formats that support multimedia

Data representations/file formats should be easy to handle yet allow for compression/decompression in real-time.

Efficient and High I/O

input and output to the file subsystem needs to be efficient and fast. Needs to allow for real-time recording as well as playback of data. *e.g.* Direct to Disk recording systems.

Special Operating System

to allow access to file system and process data efficiently and quickly. Needs to support direct transfers to disk, real-time scheduling, fast interrupt processing, I/O streaming *etc.*

Storage and Memory

large storage units (of the order of 50 -100 Gb or more) and large memory (50 -100 Mb or more). Large Caches also required and frequently of Level 2 and 3 hierarchy for efficient management.

Network Support

Client-server systems common as distributed systems common.

Software Tools

user friendly tools needed to handle media, design and develop applications, deliver media.

Give marks for three

(Total 20 Marks)

Q2.

i. What are the two types of multimedia applications? (02 Marks)

Linear

Non Linear

ii. What are computer graphics? Write two reasons for why we need study graphics? (02+02=04 Marks)

Computer Graphics is the technology for presenting information. Any image that produced by graphic computer application from simple image to complex (fractal), refers to any computer device or program that makes a computer capable of displaying and manipulating pictures.

The term also refers to the images themselves.

Why we study graphic

To make **pretty pictures** and **funny movies ?**

- Yes, in part. But in addition…

To improve:

- **Understanding**
- **Expression**
- **Communication**

Graphics is (or should be) essential to engineers and the practice of engineering

iii. Explain the purpose of graphic application programs mentioned below (02*2=04 Marks)

a. Paint program

Allow you to create rough freehand drawings. The images are stored as bitmaps and can easily be edited.

b. CAD software

Enables architects and engineers to draft designs.

iv. Briefly explains about raster graphics and vector graphics (02*03=06 Marks)

Raster Graphics

A raster graphics image or bitmap, is a data structure representing a generally rectangular grid of pixels, or points of color, viewable via a monitor, paper, or other display medium.

Raster graphics are technically characterized by the width and height of the image in pixels and by the number of bits per pixel (a color depth, which determines the number of colors it can represent).

Vector Graphics

- Draw type image or object oriented image
- Represented in geometric form (mathematical instruction) to create **straight line, oval, curve and sphere.**
- **E.g. instruction:**
  - **Line startcoord = "x.0 y.0"**
  - **endcoord = "x.20 y.20"**
  -

v. State three(03) advantages and three(03) disadvantages of raster graphics

Raster advantages

- A relatively simple data structure;
- The simple grid structure makes analysis easier.
- The computer platform can be "low tech" and inexpensive.
- Modification level is higher depend on the depth of an image
- Remote sensing imagery is typically obtained in raster format.

(any 3 give 3 marks)

Raster disadvantages

- Spatial inaccuracies
- Because each cell tends to generalize a landscape, the result is relatively low resolution compared to the vector format.
- Because of spatial inaccuracies caused by data generalization, a raster format cannot tell precisely what exists at a given location.
- Each cell must have a code, even where nothing exists.
- File size is bigger -High computer memory
- The process of resize make the image fuzzy and jaggies

(any 3 give 3 marks)

Q3.

i. What is "TYPEFACE" (02 Marks)

A typeface is the basic design of a character.

Each typeface has a design for each letter of the alphabet, numbers, punctuation symbols and may contain other symbols

ii. There are several types of Typeface Spacings. Write four (04) types of typeface spacing. (01*4=04 Marks)

Monospace
Proportional
Leading
Kerning
Tracking

iii. Multimedia project should be tested and review before delivering it to a customer. Write four (04) things we have to ensure before delivering a multimedia system to the customer

(01*4=04 Marks)

a. bug free
b. accurate
c. operationally and visually on target
d. the client requirements have been met.

iv. An **archive file** is a file that is composed of one or more computer files along with metadata. Write four (04) advantages of file archiving (01*04=04 Marks)

a. take less time to transmit by modem than do uncompressed files.
b. East to uploading and downloading online files.
c. Self-extracting archives are useful for delivering projects on disks in compressed form.
d. Some compression applications allow you to compress, split and store large files on several floppy disks or Zip disks; the segments of these files are then automatically rejoined during installation.
e. Provide an encryption or security feature, so that people who have access to disks containing private archive files cannot read them without authorization. This helps hide classified data.

v. Briefly explains about Kerning , Leading and tracking (02*03=06 Marks)

Consider any two reasons of each

Leading

a. The vertical spacing between lines of text.

b. Pronounced “led-ding.”
c. In most software programs, it is referred to as line spacing.
d. In Desktop Publishing, it is still referred to as leading because typesetters used long pieces of lead between the moveable type to create blank lines between the text.

Kerning

a. **Kerning** is the process of adjusting the spacing between characters in a proportional font, usually to achieve a visually pleasing result.
b. Horizontal spacing between pairs of letters
c. Used to add or subtract space between pairs of letters to create a more visually appealing and readable text.

Tracking

a. Adjusting the overall spacing of a group of letters is called *tracking* or *letter spacing*. (Kerning adjusts the space between individual letter forms)
b. Horizontal spacing between all of characters in a large block of text.Makes a block of text seem more open or more dense

Q4.

i. What is the color theory in multimedia system? (02 Marks)
Color Theory is a set of principles used to create harmonious color combinations

ii. Briefly explain about saturation of colors (04 Marks)
Saturation or Chroma is the intensity of a colour.A highly saturated colour is bright and appears closer to the edge of the wheel.A more unsaturated colour is dull.A colour with no saturation is achromatic or in the grey scale.
Colorfulness is the visual sensation according to which the perceived color of an area appears to be more or less chromatic

iii. What are the four (04) properties of a sound wave (01*04=04 Marks)
Amplitude
Period
Through
Crest

iv. A 4 minutes and 08 seconds stereo song has to be recorded in DVD quality. (Sampling frequency = 44100Hz (44.1 KHz) and sampling depth: 24 bit) How much disk space would be taken by the song?
[Hint : file size (bits) = sampling frequency (Hz) x sampling depth (bits) x length of sound(s) x channels] (04 Marks)
File size = 44100*3*248*2 = 65,620,800bytes per second

v. What is a MIDI file? Write four advantages of MIDI File (02+04=06 Marks)

MIDI is a shorthand representation of music stored in numeric form. MIDI data is device dependent.Small in size, easy to embedded in web pages.Length of a MIDI file can be changed without affecting the frequency of the music.Working with MIDI requires knowledge of music theory.

Advantages

- MIDI file are much more compact and take up less memory and system resources
- MIDI files embedded in web pages load and play much faster than digital
- You can change the length of a MIDI file by varying its tempo
- With high quality MIDI devices, MIDI files may actually sound better than digital

Q5.

i. What is video? (02 Marks)

Video is the technology of electronically capturing, recording, processing, storing, transmitting, and reconstructing a sequence of still images representing scenes in motion

ii. What are the differences between digital video and analog video?(2+2=04 Marks)

Analog video

- Sequential image frames are recorded on film using a light sensitive technology similar to still photography
- Film must be chemically developed
- Editing requires physically cutting and splicing the film

Digital video

- No Generational Loss
- Digital Audio (CD-quality)
- Progressive-Scanned Image (not interlaced) = sharper image, no blurring
- Can Carry Non-video Data Layers for interactivity
- Superior Transfer of Colors

iii. Write four (04) things we have to consider when compressing a video? (1*4=04 Marks)

- Video Format/Architecture (QuickTime, Real, Windows Media)
- Data Rate
- Frame Rate
- Window Size

- Streaming Method: Progressive or Realtime

iv. Briefly explain animation types mentioned below (2+2=04 Marks)

a. 3D Animation

- 3D animation are digitally modeled and manipulated by an animator
- 3D techniques usually build virtual worlds in which characters and objects move and interact

b. Cell Animation

- Refers to 2 dimensional (2D) systems that computerize the traditional animation process
- Each frame is individually created

v. Briefly explain three (03) animation Principles (03*02=06 Marks)
(Marks for any three)

- The "**squash and stretch**" principle define the method to give a sense of weight and flexibility to drawn objects. The most important aspect of this principle is the fact that an object's volume *does not* change when squashed or stretched.
- **Anticipation** is used to prepare the audience for an action, and to make the action appear more realistic. A dancer jumping off the floor has to bend his knees first;a golfer making a swing has to swing the ball back first
- **Straight ahead action and pose to pose** are two different approaches to the actual drawing process. "Straight ahead action" means drawing out a scene frame by frame from beginning to end. "pose to pose" involves starting with drawing a few, key frames, and then filling in the intervals
- **Follow through** is the termination part of an action.An example is in throwing a ball - the hand continues to move after the ball is released. In the movement of a complex object different parts of the object move at different times and different rates.
- **Overlapping** means to start a second action before the first action has completely finished. This keeps the interest of the viewer, since there is no dead time between actions.
- **Slow in & out**refers to the spacing of the frames in between positions. Rather than having a uniform velocity for an object, it is more appealing, and sometimes more realistic, to have the velocity vary at the extremes. Ex:- a bouncing ball moves faster as it approaches or leaves the ground and slower as it approaches leaves
- **Arcs**Most human and animal actions occur along an arched trajectory, and animation should reproduce these movements for greater realism. This can apply to a limb moving by rotating a joint, or a thrown object moving along a parabolic trajectory.
- Adding **secondary actions** to the main action gives a scene more life, and can help to support the main action. The important thing about secondary actions is that they emphasize, rather than take attention away from the main actionA person walking can simultaneously swing his arms or keep them in his pockets,

- **Exaggeration**is a representation of something in an excessive manner.Exaggeration does not mean just distorting the actions , but the animator must carefully choose which properties to exaggerate.
- **Appeal** in a cartoon character corresponds to what would be called charisma in an actor.The important thing is that the viewer feels the character is real and interesting.A scene or character should not be too simple (boring) or too complex

Q6.

i. What are the two factors which decide the size of an Image file? (02 Marks)
- Number of pixels on the screen
- Bit depth (Number of bits allocated for a pixel)

ii. Compare Lossless and Lossy Compression (04 Marks)

Lossless

- Algorithms reduce file size without losing image quality
- They are not compressed into as small a file as a lossy compression file.
- When image quality is valued than file size, lossless algorithms are typically chosen.
  - because it lets you recreate the original file exactly.
- All lossless compression is based on the idea of breaking a file into a "smaller" form for transmission or storage and then putting it back together on the other end so it can be used again**.**

Lossy

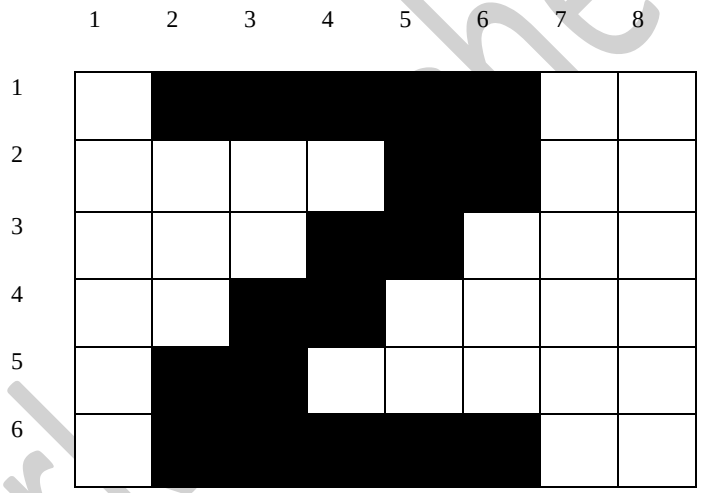
- Reduce non-sensitive information to human eyes (not mathematical, but physiological method)
- Cannot reproduce original image
- Can specify the amount of information loss
- High compression ratio (~100)
- Algorithms: DCT, Wavelet ,color space etc.

iii. Expand following Abbreviations (1*4=04 Marks)
a. BMP →Bitmap File Format
b. GIF → Graphics Interchange Format
c. PNG →Portable Network Graphics
d. PICT → Picture File Format

iv. What is the difference between “jpg” and “jpeg” files? (04 Marks)
JPG and JPEG stand both for an image format proposed and supported by the Joint Photographic Experts Group. The two terms have the same meaning and are interchangeable.

JPEG stands for Joint Photographic Experts Group. JPG (pronounced jay-peg) is the most commonly used file extension used to identify files created with this lossy format, and is the same as .peg. Both JPEG (Joint Photographic Experts Group) and JPG (Joint Photographic Group) are bitmap compression formats for picture and image files with compression ratios ranging from 10:1 to 20:1. In fact, JPG and JPEG file formats are **identical**. Older DOS-based computers were designed to handle a maximum "3-character file extension" which is why JPG was attributed to compressed image files. Newer Operating systems such as Windows XP and Vista allow for longer file extensions as evidenced by .html. Accordingly, the JPG file extension was upgraded to the JPEG file extension which is the true acronym for **J**oint **P**hotographic **E**xperts **G**roup.
Just as a side note, XP and Vista will also support the older JPG file extension.

v. Encode the following image using run length method as "0" for white and "1" for black (1*6=06 Marks)



Row 1: "0", 1, 5, 2
Row 2: "0", 4, 2, 4
Row 3: "0", 3, 2, 3
Row 4: "0", 2, 2, 4
Row 5: "0", 1, 2, 5
Row 6: "0", 1, 5, 2