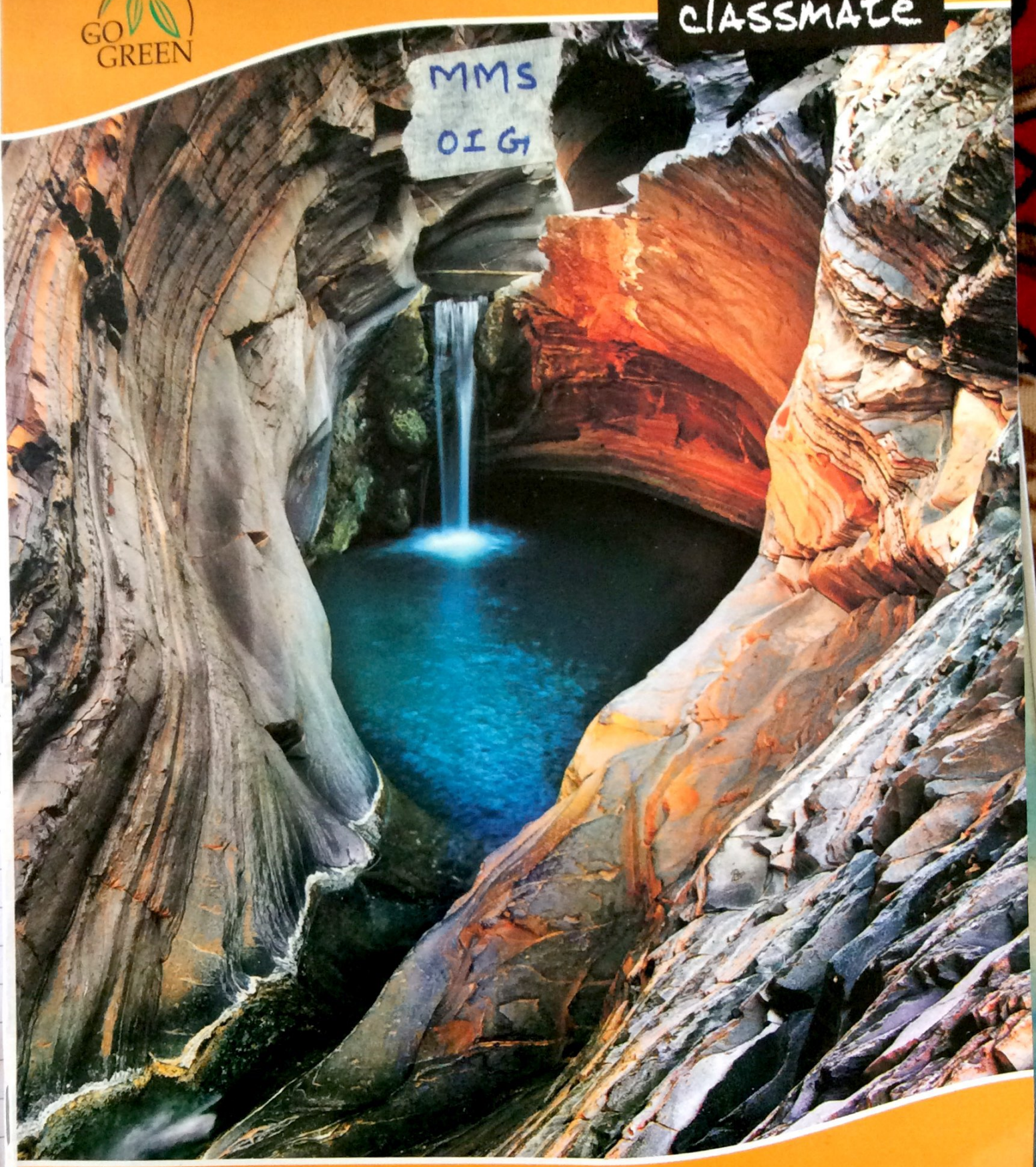
रजि. नं. २६७२५

GO GREEN

classmate



Notebook

A4

* Application of Multimedia
- A few application areas of multimedia are listed:

a. Creative Industries: fine arts, entertainment, commercial art, journalism,

b. Commercial: advertisement, Training, Slideshows

c. Engineering:
- Software engineers may use multimedia in computer simulation for anything from entertainment to training such as military or industrial training.
- Game development, Animation, product demonstration, Presentation, Conference

- Education

- Industry

- Mathematical and scientific research

- Medicine

- Entertainment and fine arts

- Public place: hotel, railway, airport, museum, Supermarket

2017 fall

(1a) What do you mean by Multimedia Computing? Explain the main properties of multimedia

Multimedia computing is simple : integration of sound, video, animation, photo quality images, with text, graphics and computing. Multimedia Computing is melding of ~~compu~~ technologies such as PC, TV etc.

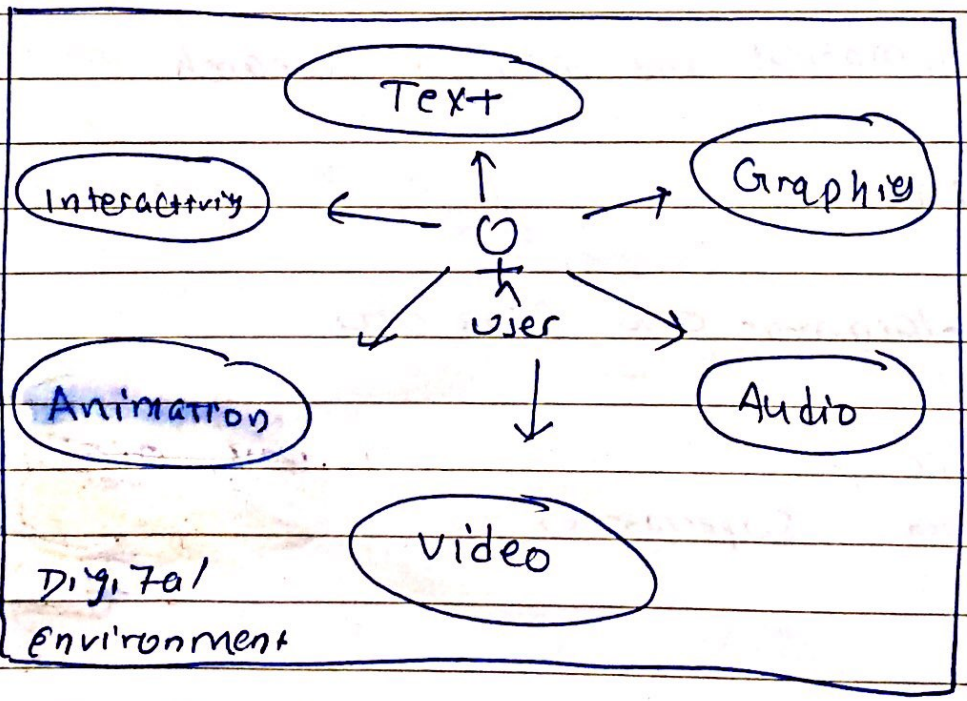
A multimedia system has 4 basic characteristics

~~(i) Multimedia System is must be computer controlled~~

(i) Combination of media
(ii) Independence
(iii) Computer supported Integration
(iv) Communication Systems

2016 fall

1(a) Explain building blocks of multimedia system



* Traditional Data Stream characterstics

- Distributed multimedia comm systems data of discrete and continous media are broken down into individual units (packets) and transmitted.

Data Stream: Sequence of individual packets that are transmitted in a time dependent fashion.

- Transmission of information carrying different media leads to data streams with varying features

(i) Asynchronous Transmission Mode

- Provides for communication with no time restriction,
- Packets reach receiver as quickly as possible
- Eg: Protocols for email transmission.

(ii) Synchronous Transmission Mode

- Defines a maximum end to end delay for each packet of a data stream. Packet can reach the receiver at any arbitary earlier time.
- May require intermediate storage.
- Eg: Audio connection established over a NIW.

(iii) Isochronous Transmission Mode

- Defines a maximum and minimum end-to-end delay for each packet of a data stream. Delay jitter of individual packets is bounded
- intermediate Storage requirements reduced
- Eg: Transmission of video over Network.

Sound and Audio

2017 fall

1(b) MIDI msg. relationship betⁿ MIDI and SMPTE timing standard

→ MIDI (Music Instrument Digital interface) message are used by MIDI devices to communicate with each other. MIDI message transmits information between MIDI devices and determine what kinds of musical events can be passed from device to device. The format of MIDI message consist of status byte (~~one~~ first byte of MIDI msg) and data byte.

1. Channel message : only to specified devices
   a. channel voice message : describe keyboard action, define music by pitch, note on/off, channel pressure
   b. channel mode message : deals with how to play notes coming in over MIDI cables ie Omni on/off
2. System messages : all devices
   a. System real-time message : Synchronize the time to avoid delay.
   b. System common message : command that prepare sequencers and synthesizer to play song.
   c. System exclusive message: to create customed MIDI msg.

- MIDI is a set of specification of instrument of different manufacturers to communicate musical information with one another without difficulty. MIDI reproduces traditional note length using MIDI clocks which are represented through timing clock message. Using MIDI clock, a receiver can synchronize with the clock cycles of sender. 24 MIDI clocks equal one quarter note.

- The SMPTE (Society of Motion Picture and Television Engineers) timing standard developed by NASA to mark incoming data from different tracking stations so that receiving computers could tell exactly what time each piece of data was created. To make time readings precise, SMPTE formats ~~exacts~~ consists of hours : minutes : seconds : frames : bits

- Because many film composers now record music on a MIDI recorder, A SMPTE synchronize should be able to give a time location to MIDI recorder so it can move to that location in MIDI score (prerecorded songs) to start playback. But MIDI recorders cannot use incoming SMPTE signals to control their recording and playback. So it uses MIDI/SMPTE Synchronizer that converts SMPTE into MIDI and vice versa

(Q10) Names and functions of MIDI Software

→ Once a MIDI device is connected to Computers, a variety of MIDI applications can run it.

a. Music Recording and Performance Applications
   - Recording of MIDI message as they enter the computer from other MIDI devices, and possibly editing and playing back the message in performance.

b. Musical Notations and Printing applications
   - Allows writing music using traditional musical notation.
   - User can playback the music a performance program
   - User can print music on paper for live performance

c. Synthesizer App editors and librarian
   - Allow information storage of different Synthesizer patches in the computer's memory and disk drives,

and editing of Patches in the computer

d. Music education applications:

.These software applications teach different aspect of music using the computer monitor, keyboard and other controllers of attached MIDI instruments

(2)b) Explain different image Transmission Possibilities.

→ Image Transmission takes into account transmission of digital image through computer nlw. There are several requirement on network when Images are transmitted.

1. Nlw must accomodate bursty data transport because image transmission is bursty (large size of image).
2. Image transmission is requires reliable transport.
3. Time dependence is not a dominant characteristics.

Image size depends on the Image ~~transmission~~ representation format used for transmission. There are several possibilities

a. Raw Image data Transmission:

The image is generated through a video digitizer and transmitted in its digital format.

Size = spatial resolution x pixel depth

Example: Image with a resolution 640 x 480 pixels and pixel quantization of 8 bit per pixel requires 307,200 bytes transmission through the network.

b. Compressed image data Transmission

Image is generated through a video digitizer and compressed before transmission. Methods such as JPEG or MPEG, to downsize the image. The reduction of image size depends on the Compression method and compression rate.

c. Symbolic image Transmission:

- Image is represented through symbolic data representation as p image primitives (2D or 3D), attributes and other control information.
- This method is used in computer graphics.
- Image size is equal to structure size, which carries the transmitted symbolic information of the image.

(3)(a) Define Run length Encoding. Construct Huffman Code for

Gray level	0	1	2	3	4	5	6	7
No. of pixel	4500	1500	900	750	1200	1300	550	100.

→ Sampled images, audio and video data streams often contain sequence of same bytes. By replacing these repeated byte sequences with the number of occurrences, a substantial reduction of data can be achieved. This is called run-length coding. Run length Encoding (RLE) is a very simple form of lossless data compression which runs on sequences having same value occuring many consecutive times and it encode the sequence to store only a single value and its count.

Eg: WWWWWWWBWWWWWBBBWWW

→ 7W1B5W3B3W

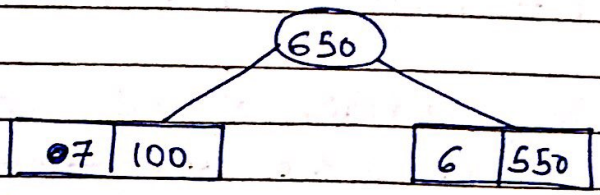
Huffman coding is a lossless data compression algorithm. The idea is to assign variable-length codes to input characters, length of the assigned codes are based on the frequencies of occurrences.

Step1: Sort the data in Ascending order:

Gray level	7	6	5	4
No. of pixel	100	550	1300	12

Gray level	7	6	3	2	4	5	1	0
No. of Pixel	100	550	750	900	1200	1300	1500	4500

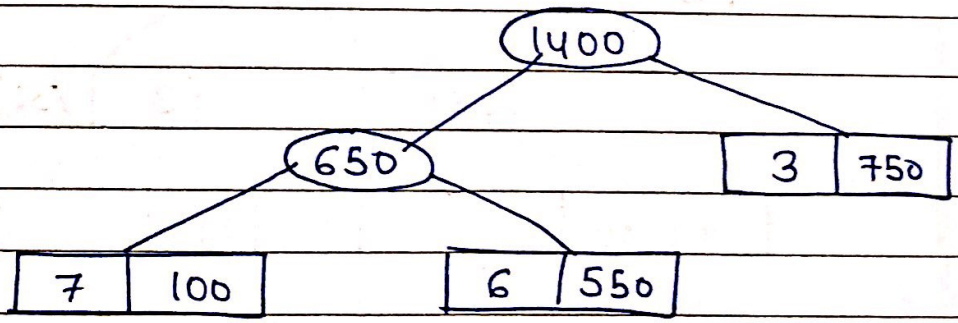
Step2: Extract two minimum frequency node and Add a new internal node with frequency of 7 & 6
100 + 550 = 650



Now min. heap contains 7 nodes where 6 are roots of trees and 1 is root.

Grey level	node1	3	2	4	5	1	6
No. of Pixe	650	750	900	1200	1300	1500	4500

Step3: Extract two min. freq nodes from heap and add a new internal node
650 + 750 = 1400

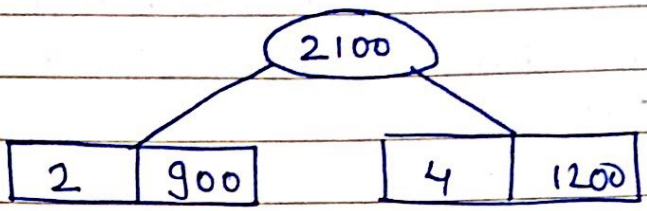


Gl	2	4	5	node2	1	6
Pixel	900	1200	1300	1400	1500	4500

Now min heap contains 6 nodes where 5 are roots of tree

Step 4: Extract two min. frequency node. Add a new Internal node with frequency of 2 and 4

900 + 1200 = 2100

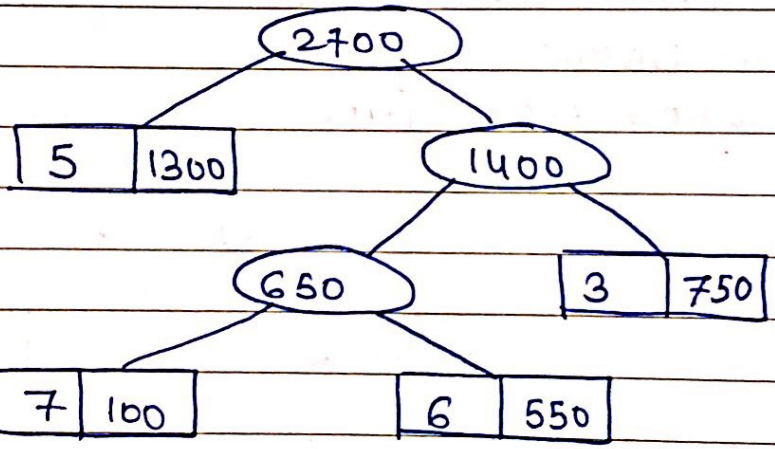


Now min heap contain 5 nodes where 2 are Internal nodes and 3 are ~~roots~~ leaf.

GL	5	node2	1	node3	0
NOP	1300	1400	1500	2100	4500

Step 5: Extract two min. frequency node of 5 & node2

1300 + 1400 = 2700



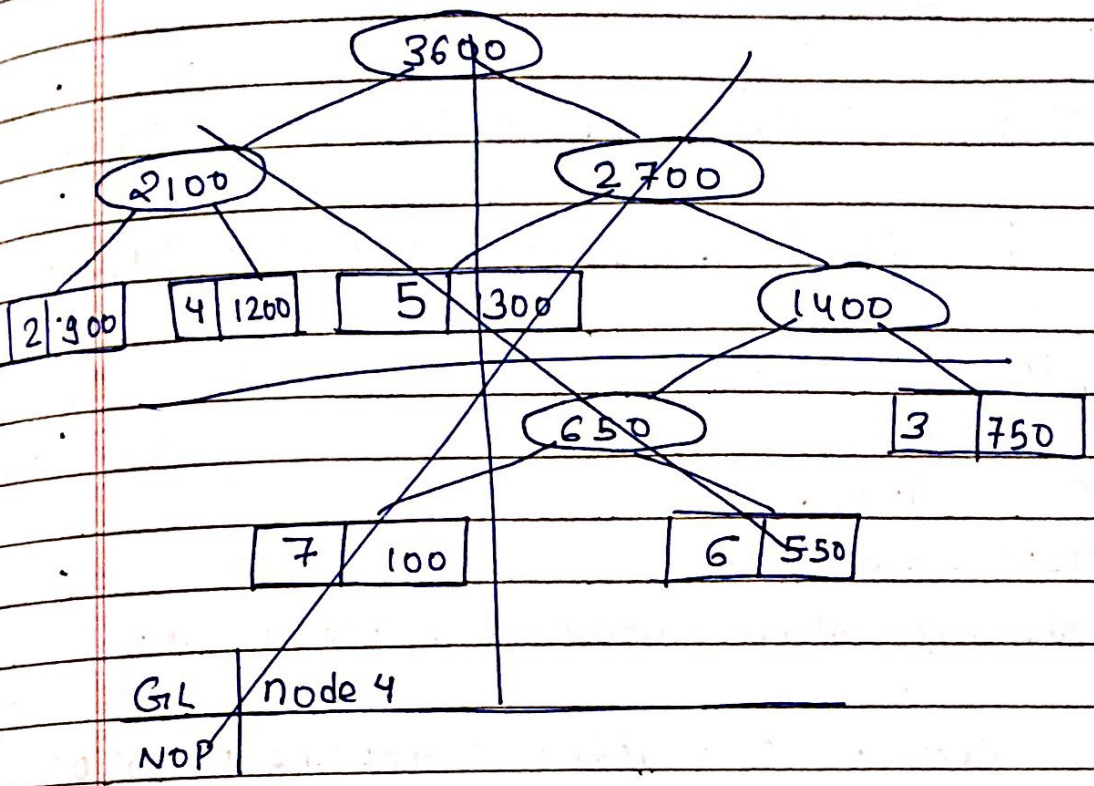
~~Now min~~

GL	1	node 3	node 4	0
NOP	1500	2100	2700	4500

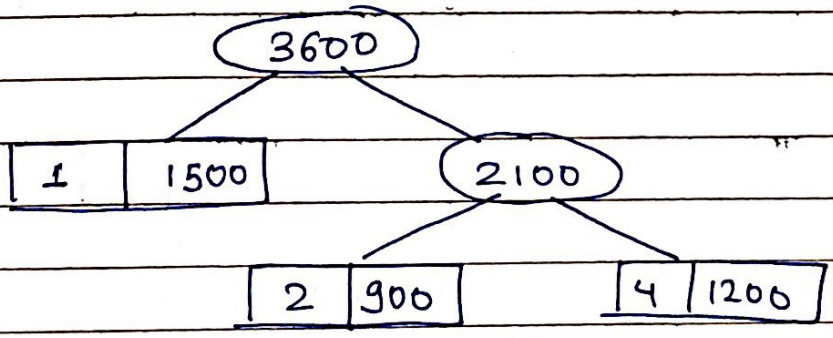
Now min heap Contain 4 nodes where 2 are leaf node and 2 are roots.

Step 6: Extract two min frequency node: 1 and node 3

1500 + 2100 = 3600



GL	node 4
NOP	

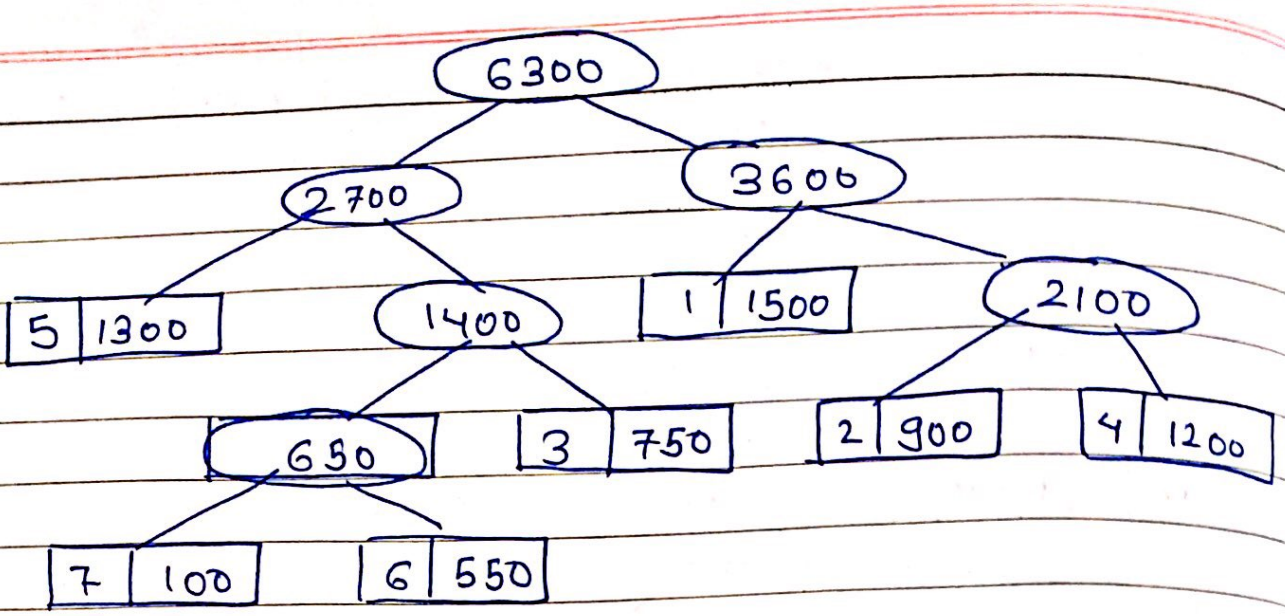


GL	node 4	node 5	6
NOP	2700	3600	4500

Now min heap contains 3 nodes where 2 are root & 1 is leaf.

Step 7: Extract 2 min freq. node 4 & node 5

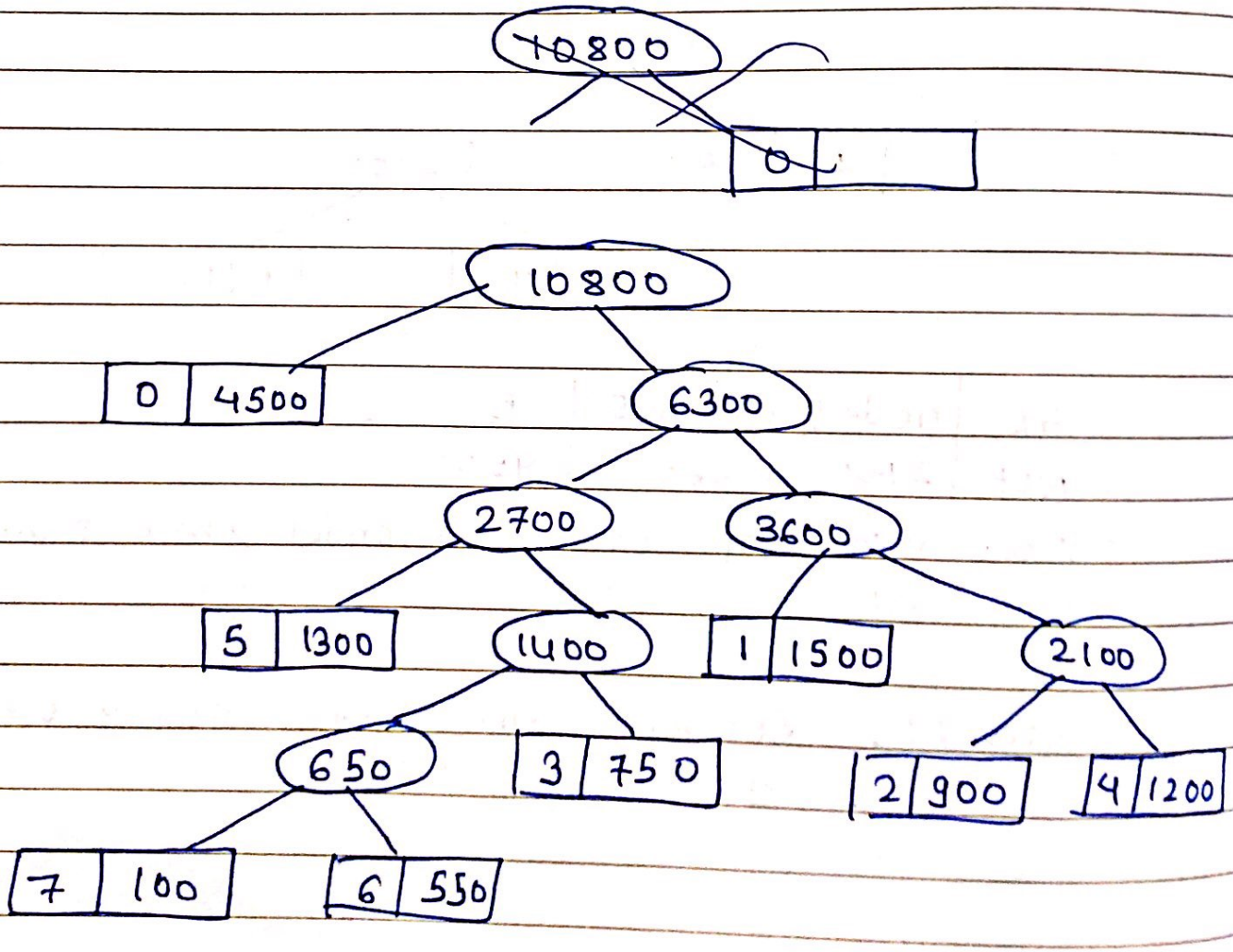
2700 + 3600 = 6300



GL	0	node 6
NOP	4500	6300

Now min heap contain 2 nodes ie 1 root 1 leaf.

Step 8: Extract 0 & node 6 = 4500 + 6300 = 10800



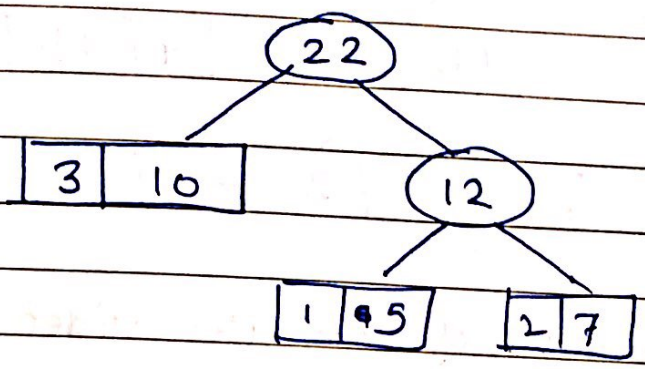
Example :

value	1	2	3	4	5	6
frequency	5	7	10	15	20	45

Step1 :

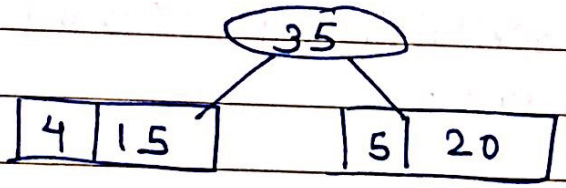
V	~~node1~~ 3	node1	4	5	6
F	~~12~~ 10	12	15	20	45

Step2 3 & node1 = 10 + 12 = 22



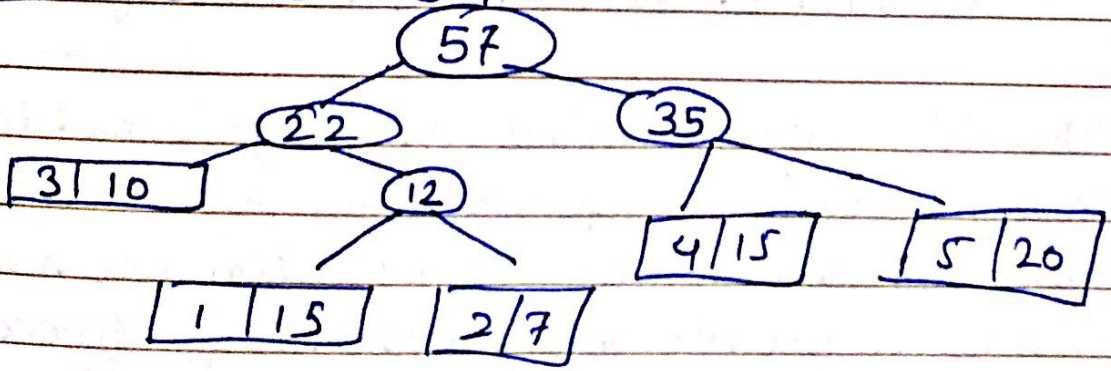
V	4	5	node 2	6
F	15	20	22	45

Step3 :



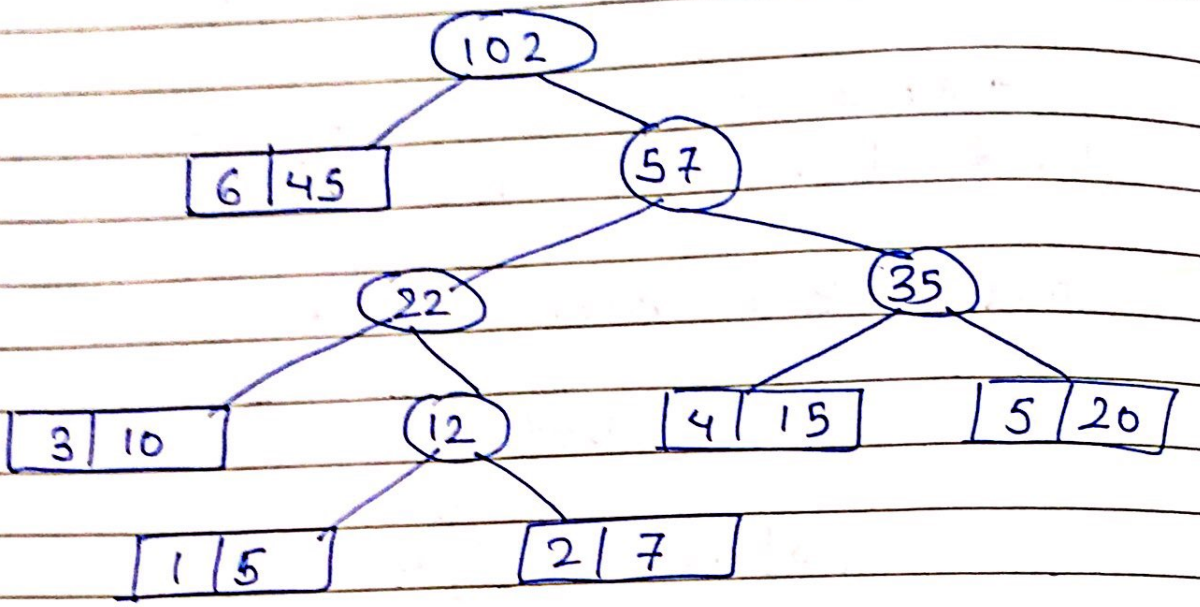
V	node 2	node 3	6
f	22	35	45

Step 4 : 22 + 35 = 57



V	C	node 4
F	45	57

Step 5: 45 + 57 = 102



(3|b) Explain major types of computer video format with Storage capacities of each.

→ Computer video formats depend on input and output devices for the motion video medium. Current video digitizers differs in digital image (frame) resolution, quantization and frame rate.

Example:

1. IRIS's video takes NTSC video signal and after digitization can achieve resolution of 640 x 480 pixel and quantization of 8 bits/pixel, fram rate of 4 FPS
2. SunVideo digiter takes NTSC in RGB signal with resolution of 320 x 240, quantization of 8 bit/pixel and 30 FPS.

The video controller displays the image stored in frame buffer accessing through a separate access port as often as the raster scan rate dictates. typically 1 scan line at a time, typically 60 times per second. for presentation of different colors

on screen. System coorks with a Color Look Up Table (CLUT)

S.N	Video Controller	Resolution (Pixels)	Color Format (bits/pixel)	Storage Capacity (byte)
1.	Color Graphics Adapter CGA	320 x 200 (4 colors)	2 bits/pixel	320x200x 2 bits/pixel / 8 bits/pixel = 16,000 bytes
2.	Enhanced Graphics Adapter EGA	640x350 (16 colors)	4 bits/pixel	640x350x 4/8 = 112,000 bytes
3	Video Graphics Array (VGA)	640 X 480 (256 colors RGB)	8 bits/pixel	307,200 bytes
4.	8514/A Display Adapter Mode	1024 X 768 (256 colors)	8 bits/pixel	786,432 bytes
5.	Extended Graphics Array (XGA)	1024 X 768 (256 colors)	8 bits/pixel	786,432 bytes
6.	Super VGA (SVGA)	1024 X 768	24 bits/pixel	2,359,296 bytes

(Q10) Discuss MPEG audio Encoding technique with a suitable diagram

→ MPEG (Motion Picture Expert Group) audio coding uses same ~~technique~~ sampling frequencies as compact disk Digital Audio (CD-DA) and Digital audio Tape (DAT) is 44.1 KHz and 48 KHz and additionally, 32 KHz is available all at 16 bits.

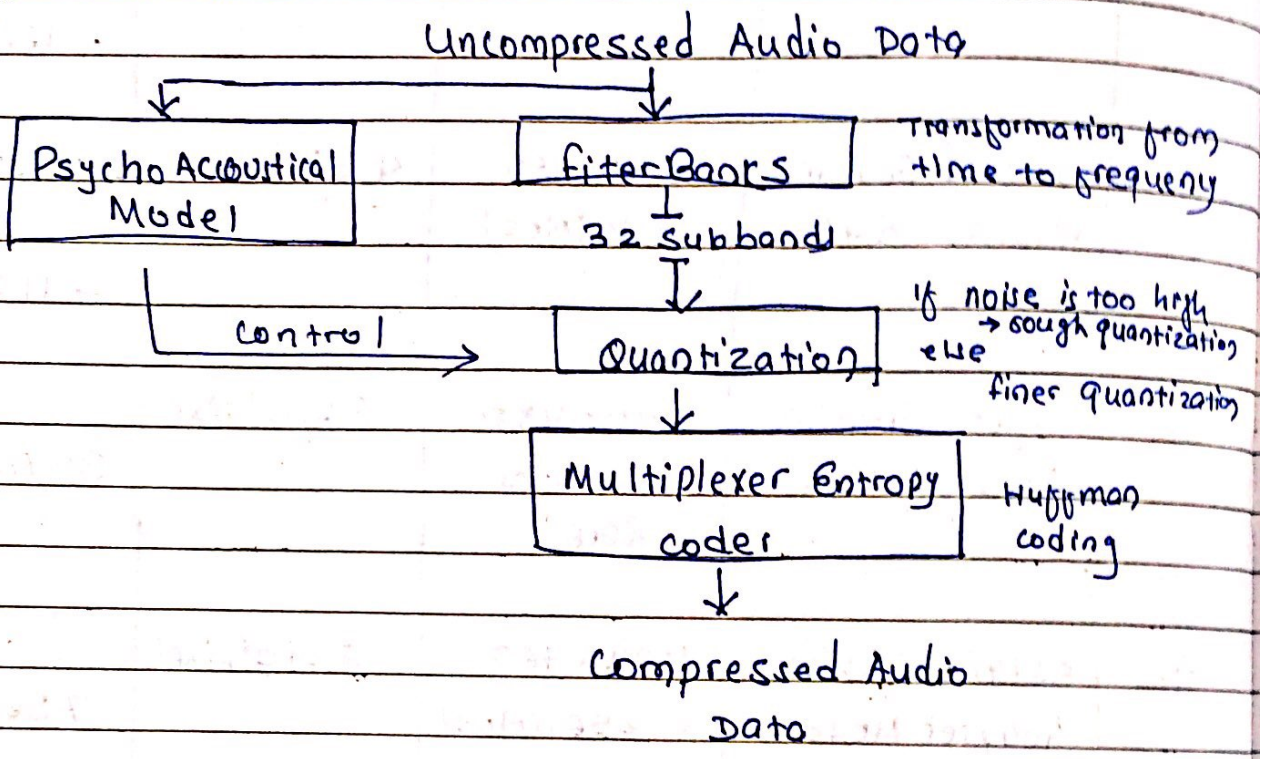


fig: MPEG basic steps of audio Encoding

MPEG-1 has 3 layers of increasing quality, layer 3 being the most common MP3:

- 16 bits
- Sampling rate - 32, 44.1, 48 KHz
- Bit rate: 32 to 320 Kbps
- Defactor: 44.1 KHz sample rate

from above fig: Three different layers of encoder and decoder complexity and performance are defined. 2D DCT for video, a transformation into frequency domain is applied for audio. Fourier transformation is used to split audio into 32 non-interleaved sub-bands, for each subband, the amplitude of the audio signal is calculated.

→ for each sub-band, Noise level is determined simultaneously to the actual FFT by using a psycho-acoustic model.

→ At higher noise level, rough quantization is performed and at lower, finer quantization is applied.

→ The quantized portion of layer1 and layer 2 are PCM encoded and those of layer 3 are huffman-encoded

The audio-coding can be performed with a single channel; two independent channels or one stereo signal

Single channel: 32, 48, 56, 80 kbits are allowed
All modes: 64, 96, 112, 128 kbits/seconds are allowed
Stereo, Joint stereo, dual channel: 224, 256, 320, 384 kbits/sec

5(b) Types of real-time OS with its major characteristics

→ - A Real time process is a process which delievers the result of the processing in a given time span
- A system in which the correctness of a computation depends not only on obtaining the right result but also upon providing the result on time.
Deadline means last acceptable time for the presentation of a processing result.

a. Soft deadline may violates and fail to meet does not produce an unacceptable result.

b. Hard deadlines may shouldn't violates else system failures.

System which is time dependent that is to process the input data and give output in given time.

a. Hard Real time Systems:
- It is purely deterministic and time time constraint.
- If deadline is not met, System performance will fail

Example: (defense system), if missile should reach the destiny at 4:00 but it reached at 4:01 because of performance of system, with 5 minutes of difference destination can change.

b. Soft Real time Operating System
- Meeting of deadline is not compulsory for every time for every task
- Process should processed and give the result.

Example: personal computer.

- Memory mgmt: virtual memory, allocation,
- Paging: fixed size page
- Segmentation: logical segments are to program
- Process Management
- File management
- System process
- Application Process
- Device management

Features of RTOS:
1. Context Switching latency should be short.
2. Multitasking and task preemption.
3. RTOS should be fast
4. RTOS are 3 types (Hard, firm, and soft)

Characterstics of RTOS:

1. Predictably fast response to time critical events and accurate timing information
2. A high degree of schedulability
3. stability under transient overload
4. Compactness 5. Performance, 6. Reliability

Military system & mgmt of manufacturing proces are app? area.

6(a) Compare and contrast hyperText and hypermedia with suitable examples.

→ HyperText And Hypermedia are both used to store the data on the WWW using HTML or XML. But difference is that the type of data they supported.

a. Hypertext : hypertext consist of nodes or chunks of information and links between them, is any text which references another and it can be seen as two nodes of information with reference forming the link. Hypertext is basically the same as regular text - it can be stored, read, searched or edit and hypertext is a text with pointers to other text. The browser let you deal with pointers in a transparent way

Example: You are reading a text on the japanese language you select a japanese phrase, then hear a phrase ~~or it~~ as spoken in native language.

Simply: It is text with links.

b. HyperMedia: Hypermedia is the use of text, data, graphics audio and video as elements of an extended hypertext system in which all elements are linked, where content is accessible via hyperlinks.

-Text, audio, graphics and video are interconnected to

each other creating a compilation of information which is generally considered as non-linear system

Hypertext	Hypermedia
1. Electronic text format where content is interconnected using hyperlinks	1. media such as text, audio, graphics and video interconnected using hyperlinks
2. Simple structure	2. complex structure.
3 Contain only text	3. Contain more media
4. Subset of hypermedia	4. Superset of hypertext

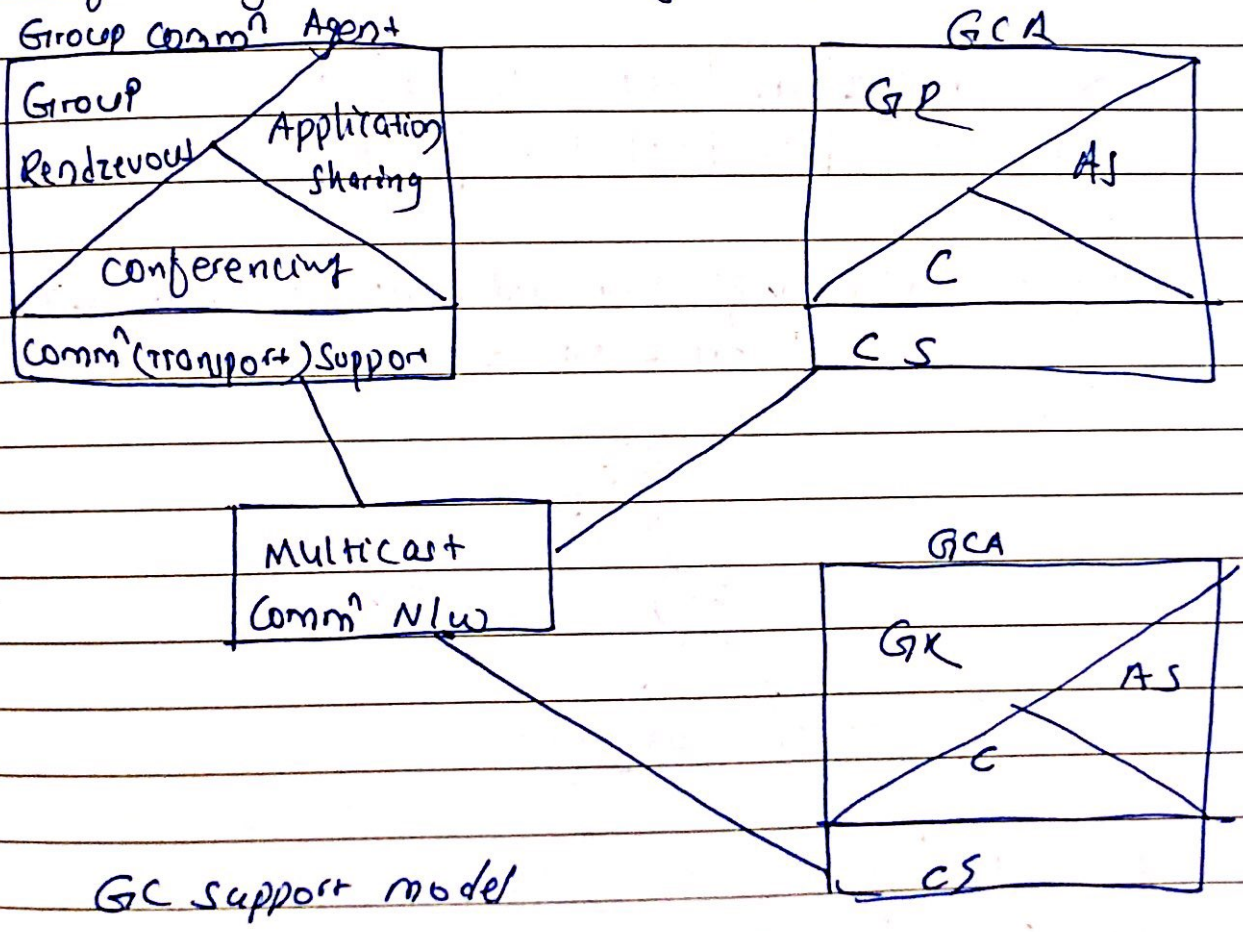
Hypermedia	Multimedia
1. All the media present in non sequential manner when the display time comes.	1. Collection of multimedia is synchronized media
2. It is non linear medium quality	2. It has both linear and non-linear medium quality.
3. Hypermedia is wider; dealing with audio, video and world wide web	3. associated with the presentation of media such as image, graphics with the help of computer or mobile
4. multimedia + hyperText = HyperMedia	4 presentation of media.

(GC)

6(a) Explain Group Communication Architecture with examples.

GC involves the communication of multiple users in a synchronous or asynchronous mode with centralized or distributed control. A GC Arch^{r} consists of a support model, system model and interface model. GC support model includes group communication agent that communicated via a multi-point multicast communication network as shown in fig. GC agents may use following for their collaboration

1. Group Rendezvous: denotes a method which allows one to organize meetings, and to get the inf^{n} about the group.
2. Shared Application: replicate information to multiple users.
3. conferencing: collaborating computer



GC support model

2016 Fall

(1b) Need of MIDI standard. types of MIDI message

MIDI (Musical Instrument Digital Interface) is a standard for digitally representing and transmitting sounds. It's a way to connect devices that make and control sound such as synthesizer, samplers and computers so that they can communicate with each other. Using MIDI msg.

The need of MIDI standards:

(i) To connect keyboard or module to your computer when you want to connect keyboard or piano to computer to compare using DAW software but it doesnot have a USB socket

(ii) User's can playback the music using the performance application or print the

(iii) To allow to communication between different MIDI devices

(iv) MIDI control ~~makes~~ manipulate the sound

(v) ~~Quality~~ Construction and durability

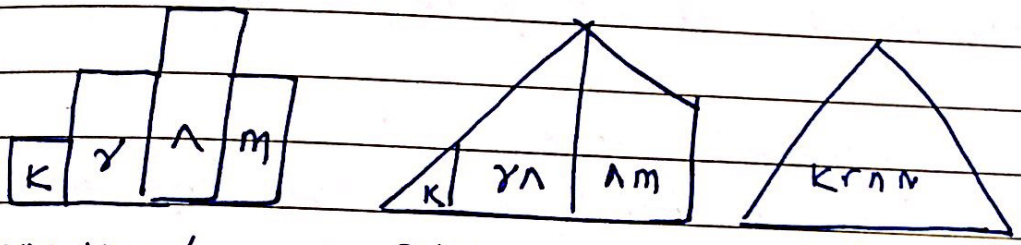
MIDI message
- channel msg
  - channel voice msg
  - channel mode msg
- System message
  - System real time
  - System common
  - System exclusive

2(a) What is speech. Describe time dependent sound concatenation

→ Speech is the expression of or the ability to express thoughts and feelings by articulate sounds. The communication or expression of thoughts in spoken words; exchange of spoken words. Speech can be perceived, understood and generated by human and machine as well.

[Page 44]

→ Speech Generation can also be performed by sound concatenation in a timely fashion. Individual speech units are composed like building blocks, where the composition can occur at different levels
Fig shows individual phones of word 'CRUMB'



Phone sound Diphone sound Syllable sound

Transition between individual sound units create an essential problem, called coarticulation, mutual sound influence throughout several sound.

Q1b) How do you represent image in computer? Explain briefly about fundamental steps in image processing.

→ A digital image is represented by a matrix of numeric values each representing a quantized intensity value. It may be vector or raster type.

The points at which an image is sampled are known as picture elements (pixel). The pixel values of intensity images are called gray scale level (color). The intensity at each pixel is represented by integer and is determined from continous image by averaging over a small neighbourhood around the pixel.

Simply: We represent by sampling image in matrix so called pixel and color intensity.

resolution: width (pixel) x height (pixel)

Steps in Image processing:

1. Image Acquisition: Sampling the image that in already in digital format. It is preprocessing such as scaling
2. Image Enhancement: ~~bring out detail that is to obscured~~ or improving image quality by eliminating noise or by enhancing contrast.
3. Image Restoration: improve image appearance based on mathematical or probalastic models of image degradation
4. Color image processing: color modeling.
5. Compression: reduction of storage
6. Pattern detection and recognition: detecting & classifying standard patterns.
7. Scene Analysis and computer vision: interpreting the image.

3(b) Concept of animation. 3 types of animation language

→ Animation is the process of making the illusion of motion and illusion of change by means of rapid succession of sequential image. A computer-based animation is an animation performed by a computer using graphical to provide visual effects. To animate

(I) first we need to draw character or objects and scanning, trace drawing or draw it in computer — input

(II) Then we need to have intermediate state of object. interpolation must be done. The system gets only start and end position. linear interpolation (tip lerping) is easy but it has many limitation

(III) Changing color: From look up table, change the color

The animation language are:
- Linear List Notations
- General purpose language
- Graphical language

(6(a) What is hybrid system? Discuss about hybrid system for communication architecture.

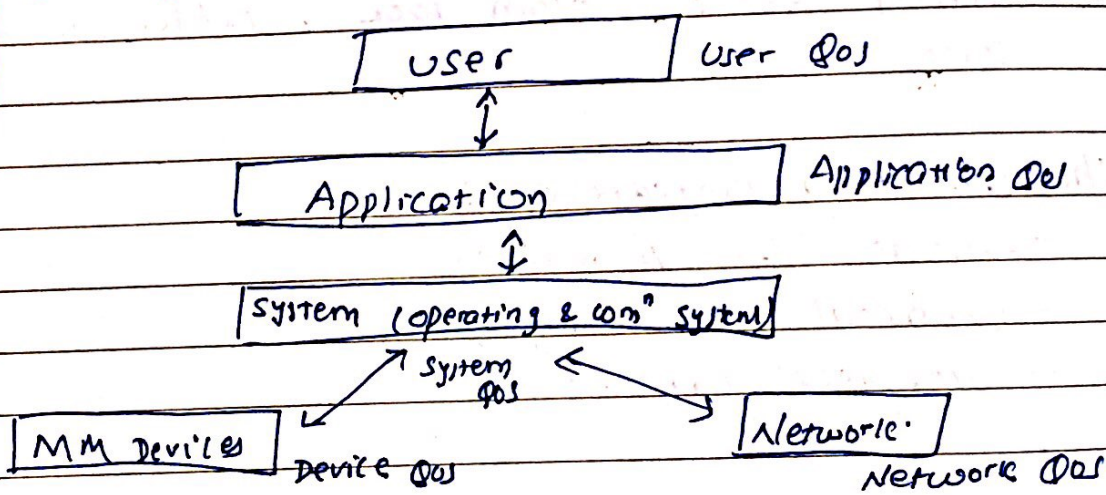
→ By using existing technologies, integration and interaction between analog and digital environment can be implemented, This approach is called hybrid system.

Advantage: (i) high quality a/v
(ii) studying application user interface
(iii) fast transmission

- Integrated Device control:
- Integrated Transmission Control
- Integrated Transmission:

(define each of them)(p-213)

(6(b) QoS layered model for multimedia Comm^n system



[page no: p-418]

[2015 Spring]

(2|b) Formats? How Speech can be generated by formats?

→ - Format [generally file format] is a extension for encoding information in file. Format is a overal layout of the data. A computer program accept data as input in certain format, process it; and output in same or different format.

- All data ~~or~~ is stored in certain format with the expectation that it will be processed by program that knows how to handle that ~~knowat~~ format.
  - bitmaps (strings of 0 & 1 for image, sound, text

(2|c) Digital Image? Explain types of image format

A digital image is a numeric representation normally binary, of a 2D image.

- Raster (finite set of digital elements, pixels)
- vector (has both direction and length)

Types of image formats:

- captured image format
  - spatial resolution
  - color encoding
- Stored image formats
  - TIFF
  - JPEG
  - GIF
  - PNG
  - BMP

(2b) Continuity of Motion

- In film editing, screen direction is the direction that actor or object appear to be moving on the screen from the point of view of camera or audience
Example: If actor is shown in one shot walking from screen's left to right and then right to left, audience assume that man is walking back where he started.
- Continuity of motion is known that we perceive a continous motion to happen at any frame rate faster than 15 frames per second.

Flicker:

Through a slow motion, a Periodic fluctuation of brightness perception, a flicker effect arises. The marginal value to avoid flicker is atleast 50 refresh cycles / second.

Digitization = Sampling + Quantization

Before motion video is processed into computer, it needs to be converted from analog to digital representation
Sampling is a process of recording an analog signal at evenly spaced instants in time creates sample

Necessity of Data compression

- Backup and Archiving file (speed up backup)
- File Transfer
- web use of media files
- emails
- File encryption and protection
- Improve data base performance
- fast processing

disadvantage

- added complication
- effects of errors in transmission
- need to decompress